



CHASING THE VIRUS:

A Public Health Response to the COVID-19 Pandemic



JANUARY 2020 – NOVEMBER 2020

Volume 1

**Ministry of Health and Family Welfare
Government of India**



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डॉ हर्ष वर्धन
Dr Harsh Vardhan

स्वास्थ्य एवं परिवार कल्याण, विज्ञान और प्रौद्योगिकी
व पृथ्वी विज्ञान मंत्री, भारत सरकार

Union Minister for Health & Family Welfare,
Science & Technology and Earth Sciences
Government of India

सबका साथ, सबका विकास, सबका विश्वास
Sabka Saath, Sabka Vikas, Sabka Vishwas



MESSAGE

It is a matter of great pride to note that the unmatched response of Ministry of Health and Family Welfare to the COVID-19 pandemic in India is being chronicled and published as *“Chasing the Virus: A Public Health Response to the COVID-19 pandemic”*.

Volume-I of this document narrates the sequence of pre-emptive proactive steps taken by the Government between January 2020 and November 2020. This document is a factual narrative of the health systems response across the nation to this unprecedented health emergency.

The document highlights how this unprecedented pandemic of global magnitude was converted into an exceptional opportunity and enabled us to understand key limitations of public health systems so as to repurpose and strengthen our public health Institutions to handle the crisis. This also allowed us to make realistic assessment of private sector involvement not only in health but in other spheres too. The fight against the pandemic evolved across the nation bringing together multiple players including different agencies of Central and State Governments; academic and research bodies; industry, civil society and most importantly the people of this country.

The focus of this document is to capture the efforts made by the Union Ministry of Health and Family Welfare to counter the pandemic in collaboration with all the stakeholders in a whole-of-Government and whole-of-society approach and showcasing aspects such as strategic planning, collaboration with States and communication with public.

On this occasion of release of “Chasing the Virus: A Public Health Response to the COVID-19 pandemic”, I extend my good wishes to all those who have been phenomenal and instrumental in our fight against pandemic and hope that this chronicle will remain a good remembrance of efforts which will continue to enlighten the path towards effective epidemic control in future.


(Dr. Harsh Vardhan)

कार्यालय: 348, ए-स्कंध, निर्माण भवन, नई दिल्ली - 110011 • Office: 348, A-Wing, Nirman Bhawan, New Delhi - 110011
Tele.: (O): +91-11-23061661, 23063513 • Telefax : 23062358 • E-mail : hfwminister@gov.in, hfm@gov.in
निवास: 8, तीस जनवरी मार्ग, नई दिल्ली - 110011 • Residence: 8, Tees January Marg, New Delhi - 110011
Tele.: (R): +91-11-23794649 • Telefax : 23794640



अश्विनी कुमार चौबे
Ashwini Kumar Choubey



सत्यमेव जयते

सर्वेसन्तु निरामया



स्वास्थ्य एवं परिवार कल्याण राज्य मंत्री
भारत सरकार
MINISTER OF STATE FOR
HEALTH & FAMILY WELFARE
GOVERNMENT OF INDIA



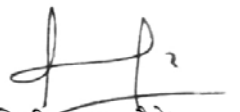
संदेश

मुझे इस प्रकाशन के प्रथम संस्करण की प्रस्तावना लिखने में हर्ष की अनुभूति हो रही है जिस में इस महामारी के प्रति स्वास्थ्य और परिवार कल्याण मंत्रालय की अनुक्रिया को लेखबद्ध किया गया है।

मुझे पूरी आशा और विश्वास है कि यह रिपोर्ट स्वास्थ्य और परिवार कल्याण मंत्रालय के नेतृत्व और समन्वय में की गई श्रृंखलाबद्ध अनुक्रियाओं को बेहतर ढंग से समझने में मदद करेगी। इस प्रकाशन के भाग 1 में महामारी संबंधी अनुक्रिया के विभिन्न आयाम दिए गए हैं जिनमें महामारी से जुड़े कार्यों के साथ-साथ गैर-कोविड अनिवार्य स्वास्थ्य सेवाओं तक निर्बाध पहुंच प्रदान करने के लिए स्वास्थ्य प्रणालियों को सक्षम बनाना शामिल हैं। अब भी निरंतर नए रूप ले रही इस महामारी के शुरुआती के महीनों में स्वास्थ्य मंत्रालय ने उभरते साक्ष्यों के आधार पर नीतिगत निर्णय लेने में और उपयुक्त कार्यक्रम मूलक अनुक्रियाओं के लिए राज्यों को मार्गदर्शन देने में अग्रणी भूमिका निभाई है।

इस रिपोर्ट के भाग 1 में जनवरी से नवंबर 2020 तक की अवधि शामिल की गई है। महामारी के गुजर जाने की प्रतीक्षा करने के बजाए इस प्रकाशन को अभी लिखने का निर्णय इसलिए लिया गया है ताकि इस अवधि के दौरान स्वास्थ्य और परिवार कल्याण मंत्रालय के विभिन्न अंगों द्वारा की गई अनुक्रियाओं और संबंधित सरकारी और निजी क्षेत्र की भागीदारी को एक साथ प्रस्तुत किया जा सके। भाग 2 में उन स्थितियों को शामिल किया जाएगा जिनका देश ने सामना किया जबकि भाग 1 में कार्यनीतियों की सफलता और कार्यकलापों के नए क्षेत्रों को स्पष्ट किया गया है

मुझे आशा है कि यह रिपोर्ट इस महामारी का सामना करने के मार्ग में आई जटिल चुनौतियों को याद दिलाने का कार्य करेगी और भावी अनुक्रिया को और बेहतर बनाने में मदद करेगी।


(अश्विनी कुमार चौबे)

Office : 250, 'A' Wing,
Nirman Bhavan, New Delhi-110 011
Tel. : 011-23061016, 011-23061551
Telefax : 011-23062828
E-mail : moshealth.akc@gov.in

Residence :
30, Dr. APJ Abdul Kalam Road,
New Delhi - 110003
Tel. : 011-23794971, 23017049



राजेश भूषण, आईएएस
सचिव

RAJESH BHUSHAN, IAS
SECRETARY



भारत सरकार
स्वास्थ्य एवं परिवार कल्याण विभाग
स्वास्थ्य एवं परिवार कल्याण मंत्रालय
Government of India
Department of Health and Family Welfare
Ministry of Health and Family Welfare



Preface

This report, documents the response of the Union Ministry of Health and Family Welfare to the COVID pandemic, "Chasing the Virus" phrase used in the title of the report refers to the proactive and pre-emptive approach followed by the government to tackle the pandemic. This is particularly true of the period, January to November 2020, which the first Volume covers. The subsequent Volume II will capture public health responses initiated after November 2020, when the focus gradually started shifting from containment, surveillance and treatment to mass vaccination.

COVID-19 presented us with a set of complex challenges, that warranted a "whole of government" and a "whole of society" approach. From January to November 2020, the pandemic moved with rapidity across the country, and this required that policy decisions, strategy design, and endorsement by states, kept pace with the spread of the virus. The COVID pandemic demanded that the Central government respond promptly to the evolving situation and in a manner that would facilitate rapid scaling up of the responses.

The strategic approach also needed to be calibrated to the varying maturity of health systems across various States/UTs to respond to the pandemic and also to ensure the delivery of non COVID essential services. State responses to central mandates and advisories were gratifying and provided us with significant learning so that we were able to modify and fine tune approaches as they were rolled out.

The evolving pandemic – necessitated graded and differential public health responses, which varied from day to day at first, subsequently from week to week and thence, from month to month. The nation's public health response, delivered by various institutions of the Ministry at the national level and coordinated by their counterparts at state and district levels, focused initially on containment and mitigation, progressing to adaptations and modifications of the legal framework, empowering the domestic R&D as well as manufacturing sector, ensuring the logistics to enable high quality devices- related to testing kits, oxygen supplies, ventilators and PPEs, crafting a media strategy that informed the public and kept misinformation at bay. The document also provides a glimpse on strategies for engaging the scientific community, enabling evidence based and scientific policy making, and building the capacity of government service providers and holding the private sector accountable. The country's primary health care system and community health workers were a key saving grace and their contribution in battling the pandemic is highlighted in this document.

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Aspects of institutional strengthening, reengineering internal structures and mechanisms and restructuring services are also highlighted. The role of technology in the COVID pandemic - especially related to the use of telemedicine, IGOT platform and the COVID portal, significantly facilitated the delivery of essential services, enabled capacity building of various cadres of workers and enabled mapping of various aspects of health system readiness and requirement for an adequate response. Several of these strategies have shown promise and need to be incorporated into the day to day functioning of health systems.

This document has been prepared in a short period of time, in a continually changing context, and attempts to distil a broad range of responses into a concise narrative. I sincerely hope that this document will go a long way in strengthening the institutional memory, in helping stakeholders to refine their strategies of dealing with pandemics & equip the health systems for the present & future health emergencies.



(Rajesh Bhushan)



Acknowledgement

This publication owes its existence to the multiple institutions and departments of the Ministry of Health and Family Welfare (MoHFW) that were actively engaged in formulating a response to the pandemic, providing implementation guidance, learning from the field and rapidly modulating policy. Thanks are due to the office of the Director General of Health Services, the various programme divisions of the MoHFW, and to the team at the National Health Systems Resource Centre (NHSRC) for their diligence, perseverance and motivation in crafting various chapters of this document.



About this Report

Volume I of this report covers the health system response to the COVID-19 pandemic and is a descriptive narrative on the measures taken to control the pandemic by the Ministry of Health and Family Welfare (MoHFW), Government of India, and spans the period from January 2020 to November 2020.

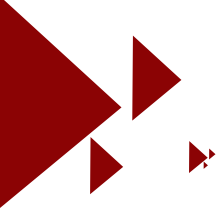
The report describes the measures taken for early detection, prevention, and containment, protocols used for testing and management of COVID-19, strengthening of the health system in terms of human resources, facility infrastructure, logistics, governance, financing and information systems to control the pandemic and cross cutting areas like building partnerships, community mobilization and empowerment, communication strategies and research and development which were instrumental in the effort to contain the COVID-19 pandemic.

Volume 2 of the report would cover developments after November 2020. There is an element of repetition in this report, which is unavoidable, given that some interventions cut across multiple domains. For instance, supply of PPE is discussed in the sections on transmission, Human Resources (HR), service delivery and procurement. Similarly, HR reforms are also discussed in Governance in addition to the HR section.

The report covers the following: Section 1 provides a background to the origin and spread of the virus, and a timeline capturing key events that originated at the national level. Section 2, which forms the bulk of this report, highlights the health system responses specific to COVID. Part A deals with actions related largely to prevention of transmission, case management and mitigation plans. Part B discusses health system responses from the perspective of the health systems building blocks, and also covers the delivery on non COVID essential services. Part C provides information on several cross-cutting areas, spanning partnerships, communication strategies and Research and Development.

Volume 2 of the report, spanning the period after November 2020, would also include a section on lessons learned during the course of this pandemic.

The document draws largely upon background material available in the public domain including government orders, guidelines and press briefings, supplemented to a minor extent by information obtained through interviews with selected stakeholders, briefing documents and presentations used by the Ministry of Health and Family Welfare (MoHFW) in meetings with state officials. Barring a few case studies to illustrate a particular event, the report describes the national level response. A final caveat is that this document is intended to compile the MoHFW's responses in one collection, and spans both *collation* and synthesis of appropriate data. This will be followed by critical analysis and reflection once the pandemic is behind us.





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Executive Summary

India's health system had to face multiple and formidable challenges in addressing the COVID pandemic. It is tasked with ensuring that public health functions related to COVID were delivered effectively, from prevention to containment to providing timely and appropriate care and treatment for those who were diagnosed with symptoms and to continue to provide uninterrupted access to non COVID essential services. The response spanned every component of the health system, from the one million ASHAs, to the specialist doctors, from the outreach platforms to the tertiary centres, the procurement and supply systems for medicines, diagnostics and equipment, the reorganization of service delivery in health care facilities, and the re-engineering that needed to take place in administrative and programme hierarchies, across institutions, all conducted under intense public gaze in the face of a pandemic that is evolving constantly.

A. CORONA VIRUS OUTBREAK: THE ORIGIN

On 31st December 2019, the Wuhan Municipal Health Commission of Wuhan City (Hubei Province, China), reported cases of pneumonia of unknown a etiology to the World Health Organization (WHO).^{1,2} The cause was eventually identified to be a novel coronavirus SARS-CoV-2,³ of the beta-coronavirus group. On 10th January 2020, WHO published technical guidance documents on its detection, testing and management. By 12th January 2020, the National Health Commission

of China had succeeded in genomic sequencing of COVID-19's and made it public. By mid-January, with the disease spreading to four countries in the East Asia region,⁴ WHO announced the possibility of a wide disease outbreak due to human-to-human transmission.⁵ WHO declared the outbreak as a Public Health Emergency of International Concern (PHEIC) on 30th January,⁶ followed by characterizing the outbreak as a global pandemic on 11th March when more than 150 countries reported the spread.⁷

Corona viruses are a large group of viruses that can cause illness ranging from common cold to more severe diseases in both animals and humans and the causative organisms for the SARS outbreaks in 2003 and the MERS outbreak in 2012. SARS infected about 8,098 persons with a mortality rate of 9.5%,⁸ and MERS infected 2494 persons with a mortality rate of 34%.^{9,10} Contrary to earlier outbreaks, COVID-19 outbreak has reported a mortality rate of 3.5% and so far, 6,35,77,838 persons have been infected and 14,73,456 persons have been reported dead between December 2019 and November 2020¹.

B. ORIGIN & TRANSMISSION

Coronaviruses have previously been detected in various animals, from bats to camels, raccoon dogs and palm civets.¹¹ However, information/reports are unclear on the origin and emergence of current

¹ <https://www.worldometers.info/coronavirus/>

strain of coronavirus; there is substantial evidence that it is of zoonotic source. The virus, it appears, was transmitted to humans after they handled animals infected with COVID-19 virus. This ensued human-to-human transmission¹² in two ways:

1. Direct transmission via close contact (within 6 feet) and inhaling respiratory/aerosol droplets.
2. Indirect transmission through contact with a surface or object, contaminated by the virus and then touching one's own mouth, nose or eyes.

C. VULNERABILITY, HIGH RISK GROUPS, CLINICAL SYMPTOMS

Although COVID-19 affects all population subgroup, the elderly, the immunocompromised and people with pre-existing chronic morbidity such as non-communicable diseases and respiratory ailments are at higher risk for severe illness from COVID-19. Close contacts and health care professionals are also at high risk of getting infection. The incubation period ranges from 7-14 days which is longer than other coronavirus infections. Signs and symptoms of the disease include cough with yellow or green mucus, fever and shortness of breath¹³ and fatigue, etc.¹⁴ Chest x-rays show scattered opacities in the lungs. Prevention requires basic hand and respiratory hygiene, keeping surroundings clean and hygienic, physical distancing, food safety, avoid touching eyes, nose and mouth, and covering the mouth and nose with a mask or face cover.

Spread of the Virus and Entry into India

Initial spread of the pandemics was reported from China to countries of East and South East Asian region i.e. South Korea, Japan, Taiwan, Thailand. By February 2020, the cases started surfacing globally, expanding to other regions of the world including Europe, Australia, Middle East Asia, and United States of America.¹⁵ In India, the first case of COVID-19 was reported on 30th January 2020 from Kerala. Two more cases were identified in Kerala making a total of three reported cases in January-February 2020. All three cases reported were students who had returned from Wuhan. Sixteen of the 138 Indian citizens on the Diamond Princess cruise ship, quarantined on Japan's shores, also tested positive in February 2020.¹⁶ By the end of the month, this pandemic had already outstripped previous outbreaks of its kind (severe acute respiratory infections) in the 21st century by both number of cases and deaths reported. The disease spread easily, given international travel and secondary infections from those who had a history of international travel. (Figure 1).

From 2nd March 2020 onwards, India began to see a rise in cases. Patients were either international tourists or Indian citizens with a travel history to affected countries. The first 50 cases were reported by 10th March from 19 cities/districts in 12 states across the country with most having international travel history (Figure 1) from Italy⁽²³⁾, the Middle East and USA; a few positive cases⁽¹¹⁾ were reported as contacts of these positive cases (local transmission).¹⁷

Figure 1: Global Spread of Coronavirus from December 2019 to March 2020

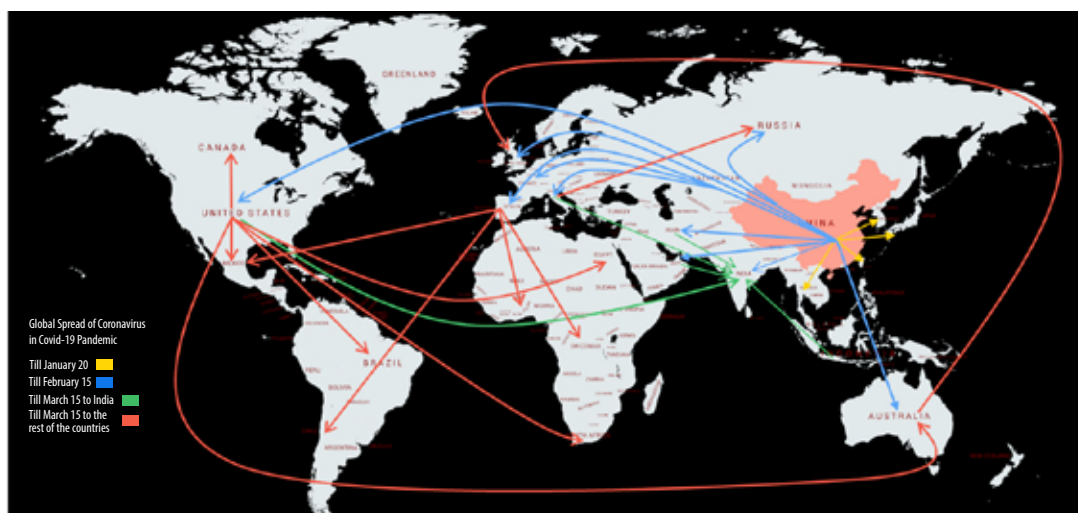
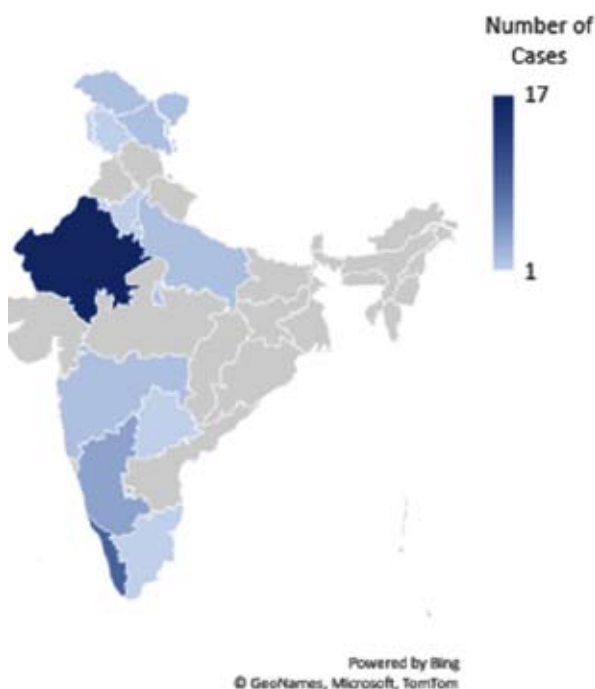


Figure 2: First 50 COVID-19 Cases in India

Sixteen of these cases were also Italian tourists, all in Rajasthan. Owing to international travellers returning to their hometowns, there was a sudden rise reported from Rajasthan, where the cases increased to 93 with Bhilwara becoming a hotspot. In view of this uncontrolled rise in COVID-19 cases in other parts of the country, the Honourable Prime Minister, addressed the nation, and called for the observance of a 14-hour long “*Janata curfew*” a voluntary public curfew on 22nd March 2020. This was followed on March 24th, 2020, by a National Lockdown. By the end of March, 1,559 cases were detected, with 49 deaths. The lockdown continued until 1 June 2020, after which the government-initiated easing of restrictions in a phase wise manner, restricting mobility in containment zones and identified hotspots.

The lockdown provided much needed time to the Central and state Governments to strengthen hospital facilities, create and augment indigenous manufacturing capacities to produce PPEs, Masks, Ventilators, etc.

During these two months, despite the lockdown, the infection spread across states and UTs. Two spurts in cases were noticed: - In April, there were 33,610 cases, which went up to 1,82,143 cases in

May.¹⁸ By the end of May, the spread was reported from all states and UTs except Lakshadweep. The worst affected states were Maharashtra, Gujarat, Tamil Nadu, and Delhi (Figure 3) accounting for about 68.63% of total cases. What the lockdown did manage to achieve was to slow the speed of the spread of the infection and to a large extent, also enabled flattening of the curve of the infection. It also provided much needed time to the Central and state Governments to strengthen hospital facilities, create and augment indigenous manufacturing capacities to produce PPEs, Masks, Ventilators, etc.

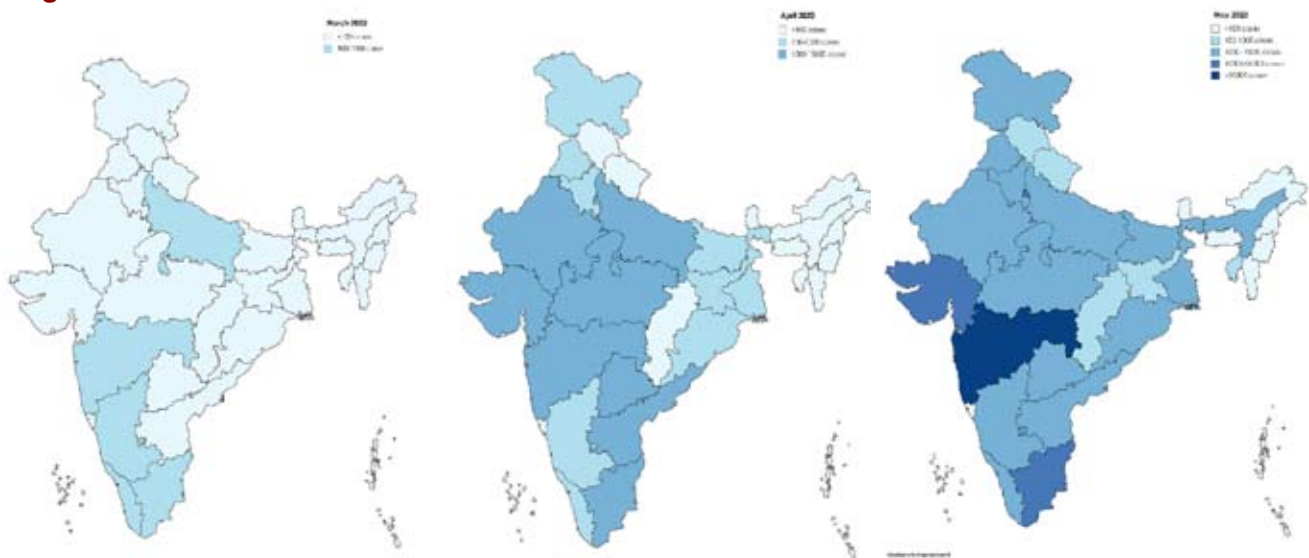
D. CENTRAL GOVERNMENT RESPONSE-A COORDINATED EFFORT TOWARDS CONTROLLING THE OUTBREAK

Preventing Transmission and Containing Spread of Virus

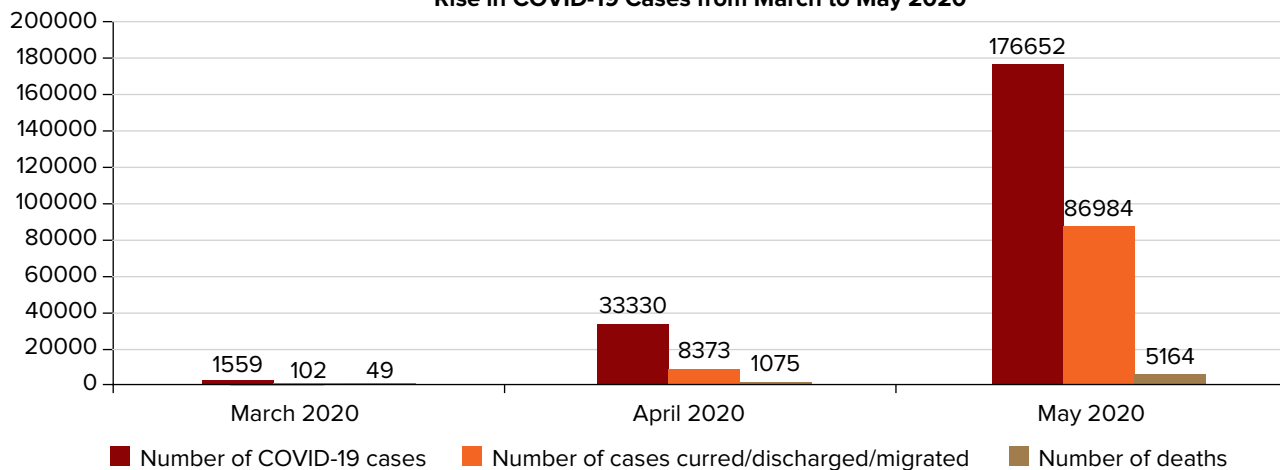
Ministry of Health and Family Welfare, Government of India (MoHFW, GoI) has been continuously monitoring the situation in consultation with the World Health Organization (WHO). Protective measures started from January 2020 itself for containing the virus's entry and spread in the country. Several steps were taken in this regard which included reviewing system preparedness, issuing advisories to states and UTs, for testing, diagnostics, surveillance, prevention and control, and risk communication, and working on strengthening capacities for timely detection and case management. Immigration officers were also sensitized for early detection and management, through inter-ministerial coordination.¹⁹ MoHFW also issued its first travel advisory for travellers to China on 17th January 2020²⁰ on infection prevention and control, identifying and reporting the symptoms. Guidance and training for surveillance was targeted at health workforce involved at all points of entry (designated international airports) and community surveillance in Integrated Disease Surveillance Programme (IDSP). Approximately 5,200 passengers travelling in 326 flights from China and Hong Kong were screened in January, 2020 itself. Ninety-seven symptomatic travellers

31 st Dec 2019	▶ China reports pneumonia-like cases of unknown aetiology
8 th Jan 2020	▶ JMG meeting convened under chairmanship of DGHS to review system preparedness
15 th Jan 2020	▶ Covid-19 cases in 4 countries: South Korea, Japan, Thailand, Taiwan ▶ JMG meeting convened under chairmanship of DGHS to review system preparedness
17 th Jan 2020	▶ 1 st Press briefing organized for sharing system's preparedness for Covid-19 ▶ 1 st Travel Advisory for travellers to China ▶ Guidance and Training to Health workforce at 4 airports and IDSP staff
27 th Jan 2020	▶ Active involvement of PMO and Cabinet Secretary in reviewing the outbreak status and situation across the country ▶ Inter-ministerial meeting for improved coordination and action in response to Covid-19 outbreak
30 th Jan 2020	▶ First Confirmed Case in Kerala, India ▶ WHO declares outbreak as PHEIC

Figure 3: Distribution of COVID-19 Cases in States and UTs of India



Rise in COVID-19 Cases from March to May 2020





were identified by IDSP, referred for isolation and tested for COVID-19.²¹

The Government of India via its embassy in Beijing, China, had planned and started evacuation process for Indians living in Wuhan from 1st February 2020 onwards. Two teams of doctors and paramedical staff were sent to Wuhan, China for aiding in screening and evacuation of Indian citizens.²² A total of 324 citizens were evacuated and quarantined upon arrival at the National Capital Airport²³ in 2 camps created and managed by Armed Forces and Indo-Tibetan Border Police with a team of doctors, public health experts and para medical staff. Safdarjung Hospital, in Delhi, was designated as the facility for critical cases. Evacuees from Diamond Princess cruise ship were also quarantined in these facilities. All concerned in these facilities and in the ministries were also connected via WhatsApp group for seamless communication and prompt action.²⁴ Rest of the citizens, totalling to 654 in number, were evacuated by 3rd February, 2020 and quarantined in these camps too.

Guidelines for thermal screening of foreign travellers from South East Asian Countries in addition to China and Hong Kong were issued and briefed to all the concerned, across 23 airports of the country. Passengers were required to contact airline crew if they felt sick. Visas issued to travellers from China were also cancelled.

Meanwhile, a High level Group of Ministers (Health, Civil Aviation, Shipping, Home Affairs, External Affairs) was formed to review, monitor, and evaluate system preparedness for COVID-19. The Government worked to strengthen its preparedness in various aspects, and the Whole of Government approach was adopted for better coordination and synergistic efforts.

1. Emergency Response Unit was activated at central level in the Ministry of Health and Family Welfare.²⁵
2. MoHFW issued guidelines to support States/UTs on surveillance and contact tracing, surveillance at all Points of Entry (airports, seaports, land borders), laboratory samples collection, packaging and transport, clinical management protocol and infection prevention and control in healthcare facilities.²⁶
3. National Institute of Virology, Pune (NIV, Pune) was identified as the nodal site for diagnostics, and 12 regional laboratories were activated, standardized, and initiated testing of the viral samples. MoHFW also listed State Nodal Viral Research and Diagnostic Laboratories (VRDLs) for 28 States and Union territories in the country.²⁷
4. Logistics partners were also identified to facilitate transporting of samples of suspect cases to NIV, Pune and reagents to these

1 st Feb 20	<ul style="list-style-type: none"> ▶ Indian Citizens and other south asian nationals evacuated from China arrive in India ▶ Quarantined in 2 facilities by Armed Forces and ITBP
3 rd Feb 20	<ul style="list-style-type: none"> ▶ 2 more confirmed cases in Kerala, India ▶ High Level Group of Ministers formed for reviewing, monitoring and evaluating system preparedness
4 th Feb 20	<ul style="list-style-type: none"> ▶ State Nodal and VRDLs identified ▶ Logistics planned for Covid-19 sample collection, transport and tests
7 th Feb 20	<ul style="list-style-type: none"> ▶ Covid-19 outbreak briefing in Parliament by Hon' Minister of HFW
15 th Feb 20	<ul style="list-style-type: none"> ▶ Thermal screening of all travellers from South East Asian Countries across 23 airports ▶ Visas issued for travellers from China cancelled ▶ Meeting with States along Indo-Nepal Border
17 th Feb 20	<ul style="list-style-type: none"> ▶ Medical Team, sent to Wuhan, met Hon' Minister of HFW and received letters of appreciation

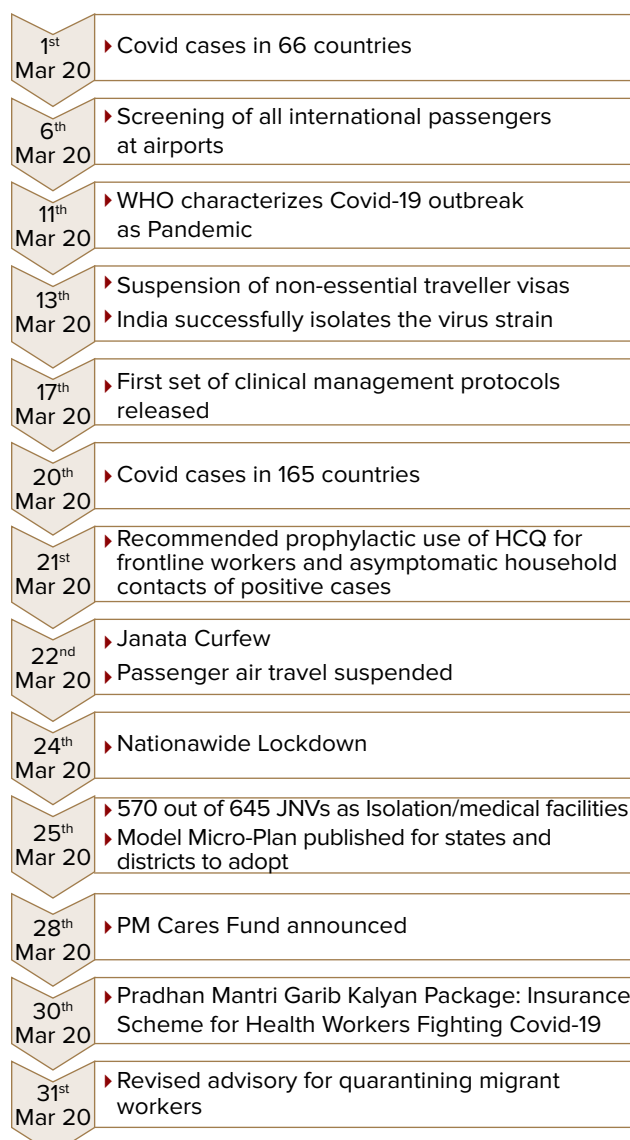
VRDLs so that more laboratories could initiate testing.²⁸

5. Export of critical items like Personal Protective Equipment (PPE) & N-95 masks was prohibited by Director General of Foreign Trade (DGFT), to ensure availability for the country's own health workforce. A buffer stock of these items was also maintained by States as well as Union Government.²⁹ Collaborative and proactive efforts were initiated by the MoHFW with the Department of Internal Industry and Trade, Department of Pharmaceuticals, and the Ministry of Textiles to create and augment domestic manufacturing capacity of these items.
6. Risk communication material was prepared and disseminated using print, electronic and social media. Daily press briefings were organized where representatives from MoHFW and Indian Council of Medical Research (ICMR) updated the media and the Country on current situation and government's strategy and actions for containing the virus, improving testing strategy, treatment plans and mitigating the virus's impact.³⁰
7. Special case of handling Indo-Nepal and Indo-China border: All villages and communities near the porous border with Nepal were sensitized, in special gram sabhas, about symptoms of the disease and its spread. The Panchayati Raj Ministry,³¹ collaborated with the MoHFW in this regard.

By 17th February 321,375 passengers from 2996 flights and 6387 passengers from 125 ships were screened for COVID-19. A total of 2571 samples across 15 laboratories had been tested. A Call Centre was also established at the central level, by NCDC,³² which had received 4,400 calls of which 390 were international calls. Over 360 emails were received and responded to on COVID-19.

With rise of cases being reported across the country, the Government of India with its expanded Group of Ministers (including food and consumer affairs, Textiles, etc) initiated coordinated comprehensive steps to address the situation in a more effective way.

Travel advisories were issued in a graded manner. GoI issued revised advisory wherein passengers were required to furnish self-declaration forms including personal contact details and travel history to health officials and immigration officials at all points of entry. Visas of nationals of other countries such as Italy, Japan, Iran were also cancelled.³³ It was declared that passengers traveling from Italy/South Korea will need certificate of having tested negative for COVID-19 from laboratories in their countries.³⁴ Standard Operating Procedures (SOPs) were issued for health officers at major seaports on 10th March for international cruise ships.³⁵ Detailed SOPs for screening and isolation of all travellers were released by 18th March for airports³⁶ and 20th March for seaports.³⁷



By the mid-March 2020, land-check points were included for screening. Travellers³⁸ and international passengers via flights, cruises, ships, land were neither allowed to leave or enter the Country, meaning that international travel had been halted.^{39,40} Goods were still allowed to enter and exit the country.⁴¹ Within the country, public conveyance including buses, rails and metro services were suspended. Some States had taken more steps by invoking Epidemic Diseases Act, 1897 and other relevant laws to curb non-essential movement, discouraging, and preventing mass gatherings.⁴² Lockdown orders were issued on 24th March 2020 wherein all movement of people and goods within Cities, States and Country was halted⁴³ except those involved in essential services. This continued for 2 months till 24th May wherein travel by air, rail and roads was allowed within the country with strict guidelines for maintaining hygiene, physical distancing and screening all passengers.

Guidelines for physical distancing, regulation of mass gatherings, and observance of hygiene were issued in March for public and private companies. By mid-March, educational institutions and gyms were also closed; and social gathering with increased chances of infection were also banned.⁴⁴

Guidelines for preventing transmission (maintaining hygiene, physical distancing and isolation upon developing symptoms, and reducing contact with common surfaces and objects) were issued in March 2020, for all government offices, including quarantine and isolation facilities,⁴⁵ across the country.^{46,47,48} These guidelines became more specific in April 2020 involving guidance on use of personal protective equipment, minimizing contact/interactions, etc. GoI also encouraged its offices to follow a roster for employees maintaining not more than 50% attendance. High risk groups including employees aged 60 years and above and/or with comorbidities were exempt from the roster completely. Any employee presenting symptoms similar to that of COVID-19 was also advised to promptly self-quarantine. Guidelines were also issued for workplaces other than

government establishments to prevent infection and control spread of disease.⁴⁹

State and district Surveillance and Rapid Response Teams were put into action by 24th March due to upward trend in cases, emphasizing comprehensive surveillance and contact tracing of positive cases.⁵⁰ Although 15 lakh passengers had been screened upon entering the country since 18th January 2020, there was still a gap in the number of those being monitored by states and UTs and action was taken to bring those missed out into the ambit of surveillance as soon as possible.⁵¹ SOPs for contact tracing for these teams were published on 3rd April 2020. A Model Micro-plan was published for States and Districts on 24th March 2020 to adopt for containing local transmission. An SOP was released on 16th May 2020 to instruct officers and people on physical distancing measures, surveillance and case identification and management for urban settlements, especially, the informal settlements.⁵²

With the launch of Arogya Setu Mobile Application on 6th May 2020, developed in collaboration with M/o Electronics and IT, ICMR made it mandatory for its employees to use it for tracking their safety/risk status

With the launch of Arogya Setu Mobile Application on 6th May 2020, developed in collaboration with M/o Electronics and IT, ICMR made it mandatory for its employees to use it for tracking their safety/risk status.^{53,54} GoI also recommended that citizens should use it for self-assessment and risk communication.

A modified version with phone calls could be used by those who only had access to land lines or feature phones. It could be accessed in 11 regional languages besides English.⁵⁵ Besides this, use of video conferencing, WhatsApp groups, and official emails were encouraged for maintaining physical distancing and reducing risk of spread of infection.

3 rd Apr 20	▶ India's participation in WHO SOLIDARITY Trial announced
4 th Apr 20	▶ Antibody based blood test advised for surveillance in containment zones/clusters
7 th Apr 20	▶ Available facilities re-organized into Covid Care Centres, Covid Health Centres and Covid Hospitals depending on severity of the disease
9 th Apr 20	▶ Rs 15,000 Crores for India COVID-19 Emergency Response and Health Systems Preparedness Project
14 th Apr 20	▶ Towards Indigenous Diagnostic Platform: Truenat Beta CoV test introduced as screening test
27 th Apr 20	▶ Guidelines for home isolation for very mild/asymptomatic cases
6 th May 20	▶ Arogya Setu App Launch
8 th May 20	▶ Revised guidelines for discharge policy
12 th May 20	▶ Population sero-based survey to monitor trend in prevalence of covid-19 infection at district level
19 th May 20	▶ Towards Indigenous Diagnostic Platform: Truenat Beta CoV test used as 2-step screening and confirmatory test

Isolation and Quarantine Facilities

In addition to the existing two quarantine facilities created by Armed forces and ITBP, Gol further identified additional facilities including educational institutions, hospitals, hotels, stadia, railway coaches for this purpose. Quarantine for all international passengers in dedicated centres was optional at first and home quarantines was encouraged, that too for 14 days. Later, it became mandatory and the duration increased from 14 to 28 days. In the third phase of lockdown, the restrictions varied across the identified zones (Red, Orange and Green) in the Country, and the number of days for quarantine of asymptomatic suspected cases in green zones was reduced to 14 days, where in first 7 days would be in dedicated institutions and the next 7 days would be at home. The Gol also mandated quarantine, later during the lockdown period, to inter-state and inter-district travel. Facilities for isolating positive cases depended on severity-Severe cases were isolated in COVID Hospitals with ICU facility, Moderate

cases in COVID Health Centers and Mild cases in COVID Care Centres.

Gol issued its first Testing Strategy Document on 6th March, 2020, wherein it specified who was eligible for COVID-19 testing. Before 6th March, evacuees from China and cruise ships had been tested for the virus. Eligibility criteria mainly involved those with travel history to affected countries. ICMR issued a total of five versions of the strategy with the rapidly changing international and domestic situation and extent of infection from March to May 2020. While only RT-PCR was the confirmatory test in the beginning, government issued advisory on antibody-based blood test, on 4th April 2020, for surveillance in containment zones/clusters. As procurement of test kits in international market became more and more difficult, development and manufacturing of indigenous diagnostic assays was prioritized (TrueNat). This was also validated by ICMR/NIV, Pune and advised as a 2-step procedure for screening and confirmatory test on 21st May 2020.

This test, unlike, RT-PCR, could be conducted at district levels also.^{56,57,58} Moreover, labs testing for COVID-19 and validation centres for recently developed indigenous test kits were scaled up in 3 months to 555 and 14, respectively.

Evolution of Testing Capacity and Strategy in India from January to November 2020

January 2020	November 2020
♦ 1 COVID-19 testing lab	♦ 2165 COVID-19 testing labs
♦ 1 validation centre, NIV (Pune) for test kits	♦ 14 validation centres for test kits

Partnerships

- ♦ TrueNat indigenous test kit developed and manufactured for screening and confirmatory test
- ♦ 14 indigenous test kits out of 28 approved for use
- ♦ Global and indigenous suppliers for testing kits and equipment
- ♦ Logistics partners, private sector, postal services, civil aviation engaged for doorstep delivery of kits and equipment
- ♦ 16 decentralized storage depots set up
- ♦ By 30 November 2020, 14.03 crore tests were conducted in the country of which 46.9% were RT-PCR and 49.8% were Rapid Antigen Tests (RAT)

emergency assistance loan to India. Using these funds, Rs 15,000 crores were allocated in a 100% Centrally Sponsored Scheme as early as 5th April, 2020, “India COVID-19 Emergency Response and Health Systems Preparedness Package (COVID Package)”, of which Rs 7,500 crores were specifically allocated for Emergency COVID-19 response. Multiple flexibilities have been provided to the states in the pre-existing rules for drawing and disbursement of funds.

Government also announced “Pradhan Mantri Garib Kalyan Package” providing an insurance cover of Rs. 50 lakhs in case of unfortunate demise of frontline health workers from COVID, given their vulnerability to contracting the infection

Untied funds per district were increased to Rs. one crore as most disaster managements plans need to be undertaken at district level depending on the severity of effects and available resources. Optimal and efficient utilization of these allocated funds has been another important goal for the Government for indigenous development and manufacturing of testing kits, price capping mechanisms for testing and procurement and reducing out-of-pocket expenditure of individuals. Testing and treatment for COVID-19 was included in AB-PMJAY package and CGHS; private insurance companies initiated dedicated policies for COVID-19 to public. Government also announced “Pradhan Mantri Garib Kalyan Package” providing an insurance cover of Rs. 50 lakhs in case of unfortunate demise of frontline health workers from COVID, given their vulnerability to contracting the infection.

Financing the Emergency Response

Gol’s strong resolve in fighting the COVID-19 pandemic is evident from the large-scale efforts and multi-pronged approach to not only act against COVID-19 but also forge a long-term plan for Health System Strengthening. It channelled funds to current needs of health institutions, garnered support from various international agencies such as, World Bank, Asian Development Bank and others through Fund Bank Division, and Department of Economic Affairs. New Development Bank of BRICS countries also disbursed USD 1 million

Case Management

The MoHFW released its first set of protocols for clinical management of positive cases on 17th March 2020 based on recommendations of WHO. Revised protocols released subsequently were also in line with WHO recommendations and experiences gained within the country. As no specific antivirals have been developed and approved for the disease as yet, case management continues to be based on clinical

symptoms presented by the patients. Initially a combination of Hydroxychloroquine and Azithromycin was used for patients with severe disease. Hydroxychloroquine was also used prophylactically for all frontline workers and asymptomatic household contacts of patients. By April-end, government also promoted home isolation for very mild/asymptomatic positive cases. Guidelines for discharge policy were also revised to judiciously use the existing resources and enable quicker discharge of very mild to moderate cases. Government also issued guidelines for clinical management of positive cases in vulnerable groups such as pregnant woman. Subsequently, based on the national experience as well as recommendations of the National Task Force (headed by Member, NITI and DG, ICMR), a National Treatment Protocol was developed and shared with all States/UTs. The Protocol has been updated five times so far. The protocol recommends- oxygenation, anti coagulation, and corticosteroids as well as investigational therapies for severe cases.

Service Delivery & Infrastructure

During the early stage of pandemic, blocks/wards in government and private hospitals were earmarked for treating the patients. However, with the rise in number of patients, it became necessary to re-organize available facilities in a hierarchy to optimally utilize them depending on the severity of the disease. Guidance document was released for the same wherein COVID Care Centres (CCC), COVID Health centres (CHC) and Dedicated COVID Hospitals (DCH) were defined. GoI supported states at all steps along the way. A COVID facility assessment checklist was also prepared to aid states in assessing facility readiness to be dedicated to management of COVID-19 cases. A centralized Portal was also created, i.e. 'Special Surveillance System' to ensure real time monitoring and information is accessible regarding all facilities. Later on the Ministry upgraded this portal and enhanced its capacity and renamed it as "COVID India Portal". Some states also undertook initiatives to provide care by creating makeshift field hospitals, fever clinics, screening centres, mobile clinics and mobile testing laboratories.

Health Workforce

Human Resource (HR) for Health are a key component of health systems. In COVID-19 pandemic, frontline workers and service providers are at the forefront of the fight against COVID-19, saving lives of millions while putting their own at risk on a daily basis.

For a country already facing challenges regarding availability and distribution of HR, COVID-19 posed an additional challenge. Centre and state governments took steps in resolving these challenges. The Empowered Group 4 on COVID-19 (Augmenting Human Resources and Capacity Building) launched an online data pool of state wise available human resources and volunteers in the month of April 2020. The purpose was to help the authorities to prepare for contingency plan based on the available human resources from various pool. A detailed SOP was released by MoHFW regarding deployment of residents/ PG students and nursing students as part of Hospital Management for COVID-19 on 27th March 2020.

Capacity building strategies were modified and online platforms were used on a large scale. (e.g. Integrated Govt. Online Training' (iGOT). Financial and non financial support was provided to the human resources engaged in COVID duties. Guidance was released for timely payments, additional incentives, psychological support to health workers. Pradhan Mantri Garib Kalyan Package: Insurance Scheme for Health Workers Fighting COVID-19 was introduced to provide an insurance cover of Rs. 50 lakhs for a period of 90 days (starting from 30th March 2020) to approximately 22.12 lakhs health workers. The scheme was subsequently extended upto 31st March 2021.

As per directions of Supreme Court, Ministry of Home affairs communicated to the states for providing adequate protection to the doctors and medical staff in hospitals, places where patients suspected of COVID-19, during screening of people or those quarantined are housed.

By amending the antiquated Epidemic Diseases Act of 1897, the Government has made physical

attacks against the HCW a non-bailable offence, instituted a prison sentence for the convicted of up to seven years, and provided for fines ranging from Rs. 50,000 to 5,00,000. The amendment covers all the HCW including doctors, nurses, paramedical staff, and accredited social health workers.

Information Systems and Data Sharing

Robust Information systems are an essential requirement for planning and monitoring for any programme. This requirement was strongly evident in managing COVID-19 and build a mechanism for effective disease surveillance. Key IT systems such as RT-PCR application, ICMR portal, Special Surveillance System (later renamed as COVID-19 India Portal), Facility application and Arogya Setu application were developed and used for planning, surveillance and patient management. These IT based systems evolved and were continuously refined and upgraded over time to address challenges.

Governance

Gol assumed a leadership role from the very start. When news of a new infectious disease emerging in China reached India and WHO declared a Public Health Emergency of International Concern (PHEIC) first in January 2020 and then, as a pandemic in March 2020. Centre-State synergy was evident with an uninterrupted, real time flow of information and high levels of coordination between the State and Central Governments. Gol established various Task Forces and Inter-ministerial committees to quickly mobilize resources under a Whole of Government approach, for a comprehensive response against COVID-19. Key to the response at all stages was the promptness with which decisions were taken and modified or revised as the situation evolved. Guidelines and Advisories were updated regularly and communicated to states. The MoHFW balanced centralized decision making with enabling decentralized planning and action, through consultative processes and issued orders and guidelines that were adaptable by states to their contexts.

Gol pushed for decentralization by according more power to the states and districts in resource management and implementation of guidelines

Disaster Management Act, 2005 and the Amended Epidemic Disease Act, 1897 were invoked in response to the pandemic. Gol pushed for decentralization by according more power to the states and districts in resource management and implementation of guidelines.

Communication

The Gol ensured that the general public was provided with accurate and timely information about the pandemic, its spread as well as protective measures to be adopted to prevent infection. Care was taken to prevent misinformation and the media was kept fully briefed of the changing status of the disease as well the response of the government. Appeals were made to the national media to educate the general public on hand, respiratory and environmental hygiene practices, testing protocols for COVID-19, responsibility of citizens like reporting travel or potential contact (if any), self-quarantine, cooperation to medical staff and government functionaries, avoiding hoarding of essential supplies and the need for Lockdown so as to break the chain of transmission.

IEC messages were disseminated through various communication channels like social and print media, Government websites, and IVR recording during phone calls. A 24x7 Call Centre came into operation on 23rd January 2020 which provided information related to the disease, its prevention, management and any other details to callers seeking clarification. A dedicated email address was also created for the same purpose in view of the pandemic.

Research

India has partnered internationally and domestically for research on diagnostics, equipment, epidemiology of disease, case management, etc. ICMR started research on COVID in February 2020. It had already designed, tested, and published mathematical model by end of February. It was

utilising it to formulate testing strategy, detect stage of transmission for India⁵⁹ and identify rational interventions to control the outbreak.⁶⁰

India was the fifth country to isolate the virus strain in the world. As ICMR/NIV, Pune was successful in isolating the strain in March 2020 itself, it paved the way for further research in development of drugs, vaccines and rapid diagnostic test kits in the country.⁶¹ ICMR initiated population based sero-survey in select district representing case detection across the country on 11th May 2020.⁶² It also launched ethical guidelines to protect participants that participate in research during pandemics in May 2020.

Besides ICMR, CSIR, DST and DBT were also involved in R&D. DST had received >200 applications for COVID-19 related technology capabilities in start-ups, academia, R&D, industry by March-end. DBT along with ICMR was involved in scaling up indigenous manufacturing of test kits, ventilators, testing equipment. CSIR, too, forged collaborations with private sector for research in surveillance, testing, diagnosis, case management.⁶³

Partnership in R&D: On 3rd April, ICMR announced it will collaborate with WHO for SOLIDARITY trial- an international therapeutic

trial for COVID-19 launched on 18th March 2020.⁶⁴ It also launched India COVID-19 Clinical Research Collaborative Network to enhance clinical understanding of the disease wherein all hospitals across the country were invited to register for participation. For PLACID trial, to test safety and effectiveness of plasma therapy, 46 institutions were approved within a month's time for their participation.

Aid to Other Nations

India employed Neighbourhood First Policy while planning response to the pandemic. India not only evacuated its own citizens from China and cruise ship but also those of other south Asian countries upon receiving request. It also tested samples for Maldives and Afghanistan and delivered emergency medical aid to Maldives and Seychelles. The government is also providing technical assistance to Bhutan in managing this infectious disease and screening of passengers. Beyond the South East Asian Region, India has exported HCQ and paracetamol tablets to over 150 countries.⁶⁵ Indian Army also sent Rapid Response Teams to Maldives and Kuwait to train the local medical personnel and guide the government in handling the pandemic.⁶⁶

COVID-19 disease trend in India during first five months of epidemic (30th January to 30th November 2020)

Figure A: Number of total and new cases of COVID-19 in India

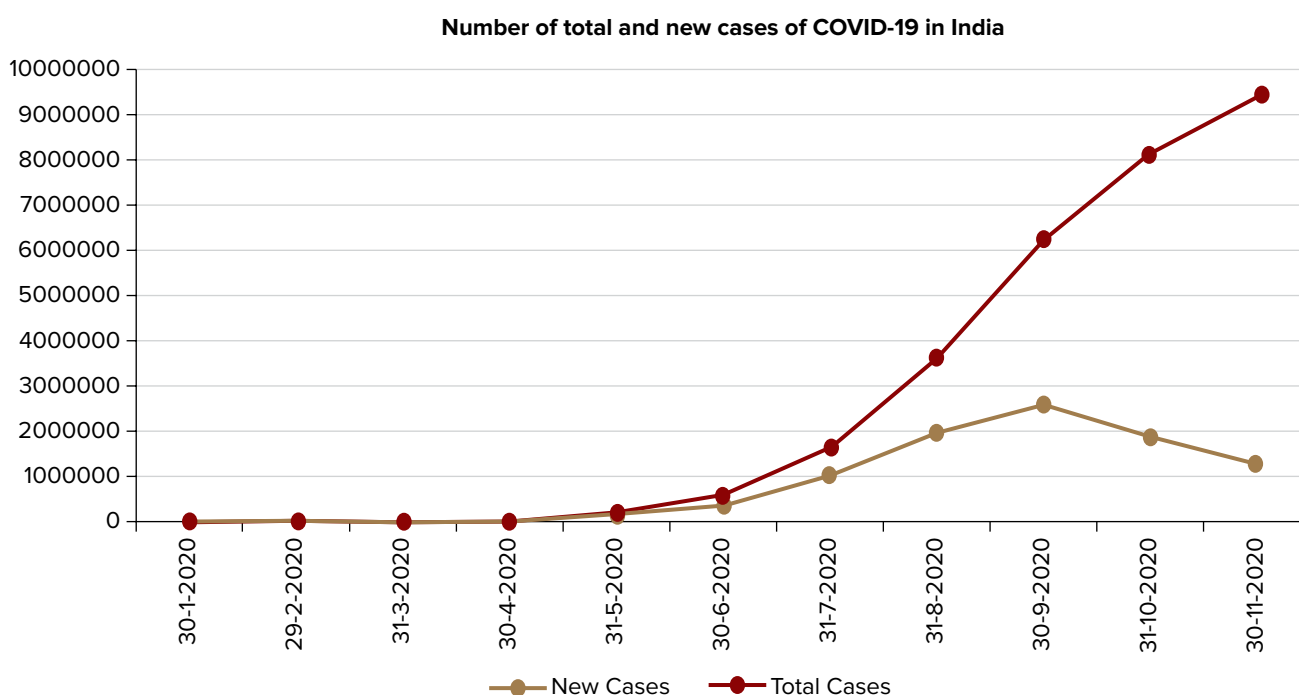
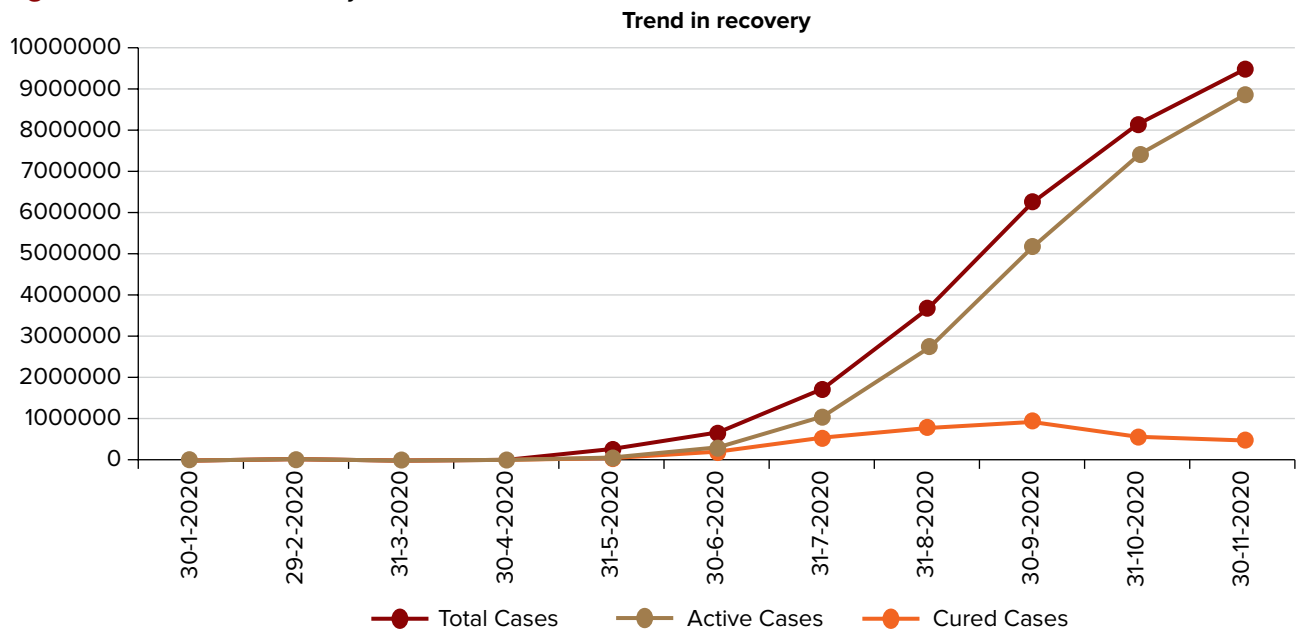
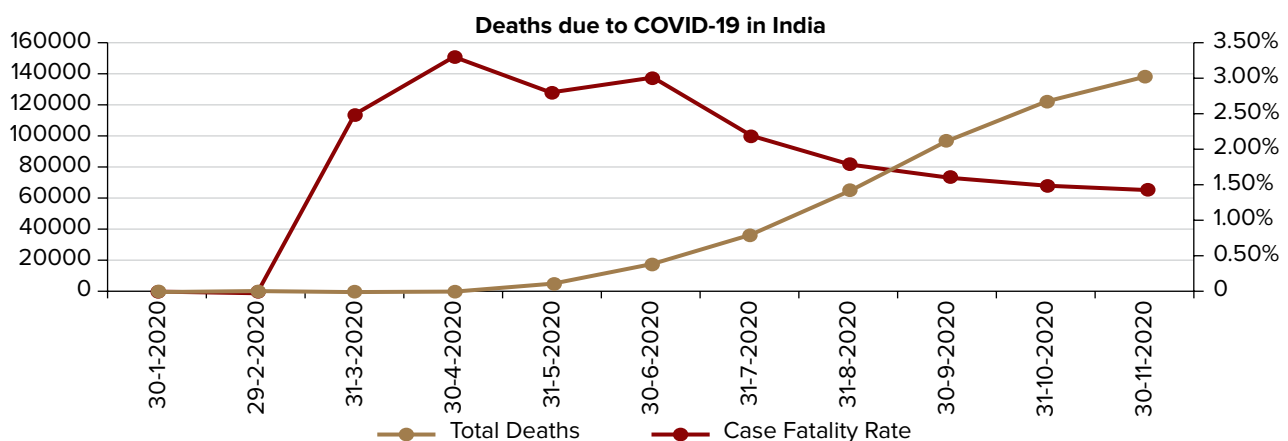
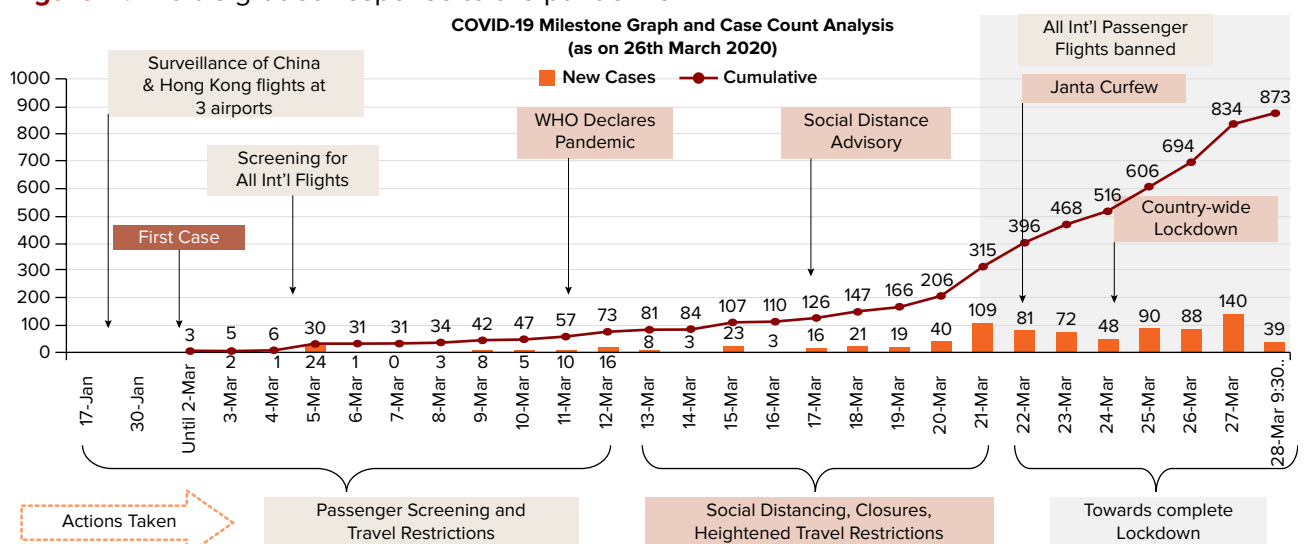


Figure B: Trend in recovery**Figure C:** Case fatality due to COVID-19 in India**Figure D:** India's graded response to the pandemic

Impact of Lockdown on COVID-19 Management

India had a growth rate of ~28.9% before 25 March and would have reached either 1.25 lakh cases (partial lockdown) or 8.2 lakh cases (in case of no lock down) by 15th April. Post Lockdown 1.0, India had a growth rate of ~14% on 14th April & would have reached either 11.0 lakh cases (partial lockdown) or 55.5 lakh cases (in case of no lock down) by 3rd May. It helped in restricting the case load to 40,263 and reduced avg. growth rate to 7.1%. Lockdown 3.0 restricted the number of cases to 85,940 (till 16th May). It further slowed down the growth to ~6%, preventing nearly 13.2 lakh cases. The lockdown was also intended to enable state and national governments to get their health infrastructure, human resources and medical supplies appropriately augmented and in place to handle the expected surge in cases.

Key Lessons

1. A proactive, pre-emptive and graded approach delivers results.
2. A “whole of government” and “whole of society” approach, works.
3. There is a need to invest in strengthening public health facilities and surveillance facilities.
4. Self reliance is a must and generates self confidence, which is critical for an effective response.
5. Investing in R&D and HR delivers good results in the sphere of drugs, diagnostics, and vaccines as well as healthcare services.
6. Given its potential to provide health care access in remote areas, telemedicine and e health service infrastructure needs to be harnessed to its fullest extent.



Section 1

Background







Background

A pneumonia of unknown cause detected in Wuhan, China was first reported to the WHO Country Office in China on 31st December 2019. According to WHO, the situation was still evolving, and preliminary investigations suggested links to the local sea food market. On 9th January 2020 WHO released a statement identifying it as a novel Coronavirus.

Ministry of Health and Family Welfare, Government of India since then has been closely monitoring the situation. Union Minister of Health and Family Welfare, Govt. of India reviewed the preparedness of the country on 5th January 2020, after the reports of 41 confirmed cases of novel Corona virus (nCoV) including one death from Wuhan, China were received. The first two meetings of the Joint Monitoring Group (JMG) were convened under the Chairmanship of Director General of Health Services (DGHS) on 8th and 15th January 2020 with representations from various domain knowledge experts (health and non-health sectors) and WHO.

The situation was being monitored in consultation with WHO keeping in view the limited human to human transmission, the risk at global level perceived to be low at that point of time, as a matter of abundant precaution the Ministry of Health instructed screening of international travelers from China at designated airports namely, Delhi, Mumbai and Kolkata through thermal scanners. Secretary(H) wrote to the States/UTs to review their preparedness, identify gaps and strengthen core capacities in the area of surveillance, laboratory

support infection prevention & control, logistics, and risk communication. States were advised in particular, to ensure hospital preparedness in terms of isolation and ventilator management of critically ill patients of SARI.

Till 22nd January, 12,828 passengers from 60 flights were screened for Novel Coronavirus symptoms, and no passenger was detected as being positive in India. MoHFW wrote to State Governments of Maharashtra, West Bengal, Tamil Nadu, Telangana, Kerala and Karnataka to review and strengthen preparedness measures at designated airports for provision of isolation and critical care facilities, linkages with VRDL network laboratories and adherence to infection prevention and control guidelines.

On the guidance of the Union Health Minister, multidisciplinary central teams were formed and sent to the seven states where thermal screening was being done at the seven designated airports (New Delhi, Kolkata, Mumbai, Chennai, Bengaluru, Hyderabad and Kochi). The central team consisted of a public health expert, a clinician and a microbiologist. The teams reviewed the end-to-end preparedness for management and control of nCoV in the states including that at the airports, for thermal screening and transferring of patients to hospitals for isolation, and visited the tertiary hospitals attached to the airports for reviewing the isolation wards and availability of Personal Protective Equipment (PPE) and masks etc. They also reviewed whether infection control, surveillance and other guidelines were being followed.

On the instructions of Prime Minister, the Principal Secretary to the Prime Minister, chaired a high-level meeting held on 25th January, 2020 on the Coronavirus outbreak in China. Secretary, Ministry of Health and Family Welfare briefed the Principal Secretary on hospital preparedness, laboratory preparedness, measures taken for the Capacity Building of the Rapid Response teams and the extensive surveillance activities undertaken by the Ministry. As on 25th January 2020, no nCoV case had been detected in the country so far. However, eleven (11) persons were put under observation; out of samples taken from these 11 individuals, samples of four passengers were confirmed to be negative for nCoV by the ICMR-NIV Pune lab.

World Health Organization (WHO) declared the SARS-CoV-2 outbreak as Public Health Emergency of International Concern (PHEIC) on 30th January 2020. On 11th February 2020, WHO named the new coronavirus disease: COVID-19.

World Health Organization (WHO) declared the SARS-CoV-2 outbreak as Public Health Emergency of International Concern (PHEIC) on 30th January 2020, advising that all countries be prepared for containment, including surveillance, early detection, isolation and case management, contact tracing and prevention of onward spread of SARS-CoV-2 infection. On 11th February 2020, WHO named the new coronavirus disease: COVID-19.

As per the Interim Guidance on Clinical Management of COVID-19 issued by World Health Organization, clinical and virologic studies from confirmed patients demonstrate that shedding of SARS-CoV-2 is highest in the upper respiratory tract (URT: nose and throat) early in the course of the disease, within the first 3 days from onset of symptoms. The incubation period for COVID-19, which is the time between exposure to the virus (becoming infected) and symptom onset, is, on average, 5–6 days, but can be up to 14 days. During this period, also known as the “pre-symptomatic” period, some infected persons can be contagious, from 1–3 days before symptom onset. Pre-symptomatic transmission still requires the virus to be spread via infectious droplets or by direct or indirect contact with bodily fluids from

an infected person. An asymptomatic case is a person infected with SARS-CoV-2 who does not develop symptoms.

The available literature at that time suggested that of the total symptomatic COVID patients, 80% would have Mild illness requiring isolation, 15% would have Moderate illness needing oxygen therapy and 5% would have Severe illness needing intensive care. It was important to put in place mechanisms for triaging and decision making for identification of the appropriate COVID dedicated facility for providing care to COVID-19 patients.

The unfolding public health emergency, of the scale of COVID-19 required a concerted and whole of Government approach in order to prevent importation/spread of cases and to build up a comprehensive, robust and prompt response system and the Government took all measures to achieve this.

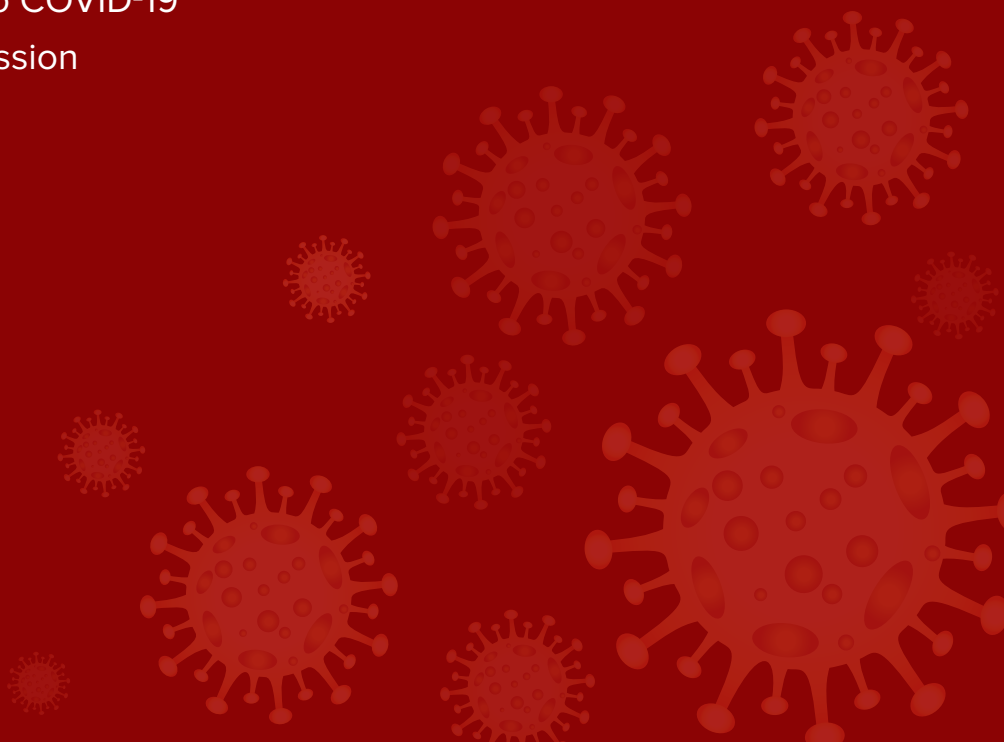
On the directions of Prime Minister, a High-Level Group of Ministers was constituted when India had reported four cases. The GoM comprised of Union Ministers of Health & Family Welfare, Civil Aviation, External Affairs and Ministers of State for Home, Health & Family Welfare and Shipping to review, monitor and evaluate the preparedness regarding management of Novel Coronavirus in the country. The GoM held its first meeting on 3rd February 2020 and was apprised by the MoHFW that adequate materials like Personal Protection Equipment (PPE) and N-95 masks were available and the situation was being closely monitored in all the States/UTs. The preparedness and actions were reviewed at the highest level on a daily basis by the Union Health Minister and the Cabinet Secretary, in addition to Secretary (HFW). A 24x7 Control Room was operationalized (011-23978046). IEC material was prepared and widely disseminated through various channels of print, electronic and social media. Daily Press briefings by Ministry of Health were undertaken to update the public. In a letter issued by Cabinet Secretary, GoI (D. No. 272/2/1/2020-Cab.III) dated 8th March 2020, all central ministries/departments were asked to step up their efforts and fully mobilize their resources to support the efforts of MoHFW in preparedness, control and containment measures to tackle the pandemic.



Section 2

The Health Systems Response to COVID-19

- ▶ A. Response Specific to COVID-19
 - ▶ A1. Preventing Transmission
 - ▶ A2. Case Management
 - ▶ A3. Mitigation Plan



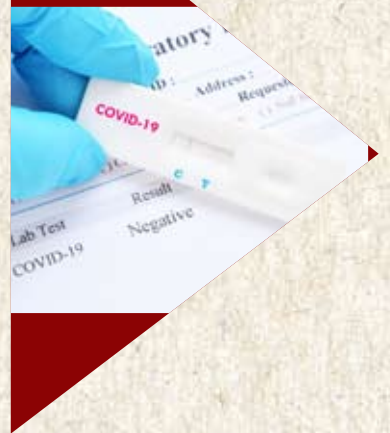


Aarogya Setu

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Government of India





A. Response Specific to COVID-19

India's mixed health system is faced with multiple and formidable challenges in addressing the COVID pandemic. It was tasked with ensuring that public health functions related to COVID were delivered effectively, from prevention to containment to providing timely and appropriate care and treatment for those who were diagnosed with symptoms and to continue to provide uninterrupted access to non COVID essential services. The response spanned every component of the health system, from the one million ASHAs, to the specialist doctors, from the outreach platforms to the tertiary centres, the procurement and supply systems for medicines, diagnostics and equipment, the reorganization of service delivery in health care facilities, and the re-engineering that needed to take place in administrative and programme hierarchies, all conducted under intense public scrutiny in the face of an unprecedented pandemic that evolved constantly.

A1. PREVENTING TRANSMISSION

A1.1 COVID-19 Surveillance

Surveillance in terms of continual scrutiny of all aspects of the occurrence and spread of a disease are pertinent to effective management of an epidemic like COVID-19. The systematic collection, analysis, interpretation and

dissemination of health data are the essential component of surveillance. Government of India has an established disease surveillance system for epidemic prone diseases i.e. mechanism for in-country surveillance and contact tracing had been put in place through Integrated Disease Surveillance Programme (IDSP) and National Centres for Disease Control (NCDC). The program aims to monitor the disease trends and to respond to outbreaks in early rising phase through trained Rapid Response Team (RRTs). The weekly reporting system from all the States/UTs had helped in identifying varied outbreaks occurred in the country over the years. The COVID-19 outbreak posed new challenges to the established surveillance system of the Government of India and the response against the COVID-19 was customized accordingly.

a) Initial Response

- ◆ During the initial phase of the spread of COVID-19, MoHFW vigilantly monitored the spectrum of the outbreak through the reported data at the global level.
- ◆ Subsequently, a policy regarding in-flight announcements with regard to nCoV and entry screening for travellers from COVID-19 affected countries at designated airports was declared by the Government on 25th January 2020 with the circulation of a **'Guidance document for Point of Entries (PoEs), States and Union Territories for Surveillance of**

2019-nCoV. The objectives of the guidance document were to establish a system for screening of travellers from 2019-nCoV affected countries at PoEs and to establish in-country/community surveillance through IDSP.

- ◆ The Standard Operating Procedures and the reporting formats for daily reporting of passengers by the State and District Surveillance Units (SSUs/DSUs) under IDSPs had been defined by the Government. This document played a crucial role for the health workers involved in the entry screening at point of entries.
- ◆ The mechanism for in-country surveillance and contact tracing had been put in place through IDSP, by the time the first positive case was reported (on 30th January 2020) in the country.
- ◆ Proactive decisions were taken by the Government to improve the surveillance of COVID-19 cases. Several advisories for travellers visiting or returning from China were issued in this regard.
- ◆ The risk communication in relation to COVID-19 was initiated with display of signages at Point of Entries (PoEs) of the designated airports.
- ◆ The State and District Surveillance Units (SSUs/DSUs) under IDSP were strengthened in terms of human resources at State and District level in order to cover all the aspects of COVID-19, under surveillance.
- ◆ Through the '**Guidelines for Community based Tracing and Management of Contacts for 2019- nCoV case**', MoHFW elaborated the process of contact tracing and elucidated the precise meaning of the term 'contact'. This aided in prevention of the onward transmission by identifying,

assessing and managing people who were exposed to the virus and follow up of exposed cases for 28 days from the date of the probable exposure/arrival from 2019-nCoV affected countries.

- ◆ The advisories for managing the symptomatic and asymptomatic patients and health and safety precautions for the officials involved in the contact tracing process were circulated throughout the States/UTs for adherence.

b) Strategic Response

- ◆ With due course of time, it was realized that the collaboration of public and private sector could accelerate the efforts in the fight against COVID-19. Therefore, on 17 March 2020; MoHFW developed the '**Guidelines for notifying COVID-19 affected persons by Private Institutions**' with an aim to enlist the support and cooperation of private sector.
- ◆ The private sector aided and strengthened the containment measures put in place by the Government, which included the isolation and treatment of confirmed/suspect cases and also the contact tracing.
- ◆ The collaborative efforts of the public and private sector resulted in the notification of the COVID-19 suspect and confirmed cases at a fast rate.



- ◆ As a result, the information pertaining to the COVID-19 cases had started being reported to the District Surveillance Units (DSU) from all the hospitals (Government and Private), Medical officers in Government health institutions and registered Private Medical Practitioners including AYUSH Practitioners; with an increased pace.
- ◆ Government also declared the National (1075) and State helpline numbers including e-mail address for reporting of such cases, so that every citizen of the country could be involved in case tracing.

c) Interventional Response

- ◆ In wake of increased trend of COVID-19 reported cases, an advisory was released by the Cabinet Secretary, Government of India on 24th March 2020; to enhance the efforts in respect of surveillance and contact tracing of positive cases, so that the chain of transmission could be broken.
- ◆ The strategic approach of supplementing the State and District Surveillance Teams, as well as the Rapid Response Teams in surveillance and contact tracing of positive cases was emphasized; along with the continuous monitoring of the task by the State Health Secretaries and the District Magistrates.
- ◆ An advisory for immediate identification and earmarking of the COVID-19 dedicated hospitals in all the States/UTs, with their readiness to manage the then anticipated spike of confirmed cases was also highlighted.
- ◆ All the reported data from the States/ UTs in this regard was uploaded on the Online Portal of MoHFW, which helped the Government to plan the further course of action, based on evidence.
- ◆ The information pertaining to the incoming of international passengers was collated as per the data of Bureau of Immigration.
- ◆ The observed monitoring gap between the numbers being monitored and the actual numbers to be monitored by the States/

UTs, as analysed on 26th March 2020; was taken into consideration. As a response, the Cabinet Secretary advised the States/UTs to take concerted and immediate action to ensure the surveillance of all the incoming international passengers.

Electronic System for Surveillance

At National Level:

- ◆ To augment the efforts against spread of COVID-19, **Ministry of Electronics & Information Technology, Government of India launched a mobile application namely; 'Aarogya Setu'** on 2nd April 2020.
- ◆ The objective was to enable a Bluetooth based electronic system for contact tracing, mapping of hotspots and dissemination of relevant information pertaining to COVID-19.

As per the collated data on 26th May 2020, the number of Aarogya Setu app users had been reported as the highest than any other Contact Tracing App in the world

- ◆ The algorithms and artificial intelligence-based application proved to be a very useful resource for contact tracing with a rapid increase in number of users on daily basis. As per the collated data on 26th May 2020, the number of app users had been reported as the highest than any other Contact Tracing App in the world.
- ◆ Considering the diversity in language in India, the App was made available in 12 regional languages and on varied platforms including Android, iOS and KaiOS platforms. Of more than 114 million registered users of this App, two-thirds took the self-assessment test to evaluate their risk of exposure to COVID-19.
- ◆ The App has helped in identifying about 500,000 Bluetooth contacts. Those who are identified as Bluetooth contacts of COVID-19 positive cases or are classified as needing assistance based on their self-assessment

have further been contacted by National Health Authority. Amongst those who were recommended for testing for COVID-19 by utilizing the data from the app, around 24% were found to be positive.

- ◆ The app served as a useful tool to support the Government in containing the pandemic.
- ◆ Analytics of Bluetooth contacts and location data also helped in identifying the potential hotspots with higher probability of positive cases allowing the State Governments, District Administration and Health authorities to take necessary steps for containment of the pandemic.
- ◆ Through the characteristic feature of the syndromic mapping, population level epidemiology modelling and the prevalence of COVID-19 in different regions of the Country, the Aarogya Setu identified more than 3,500 hotspots across the Country.
- ◆ For including the citizens with feature phones and landline under Aarogya Setu, the “Aarogya Setu Interactive Voice Response System (IVRS)” was implemented on 6th May 2020. Being a toll-free service, the citizens were asked to give a missed call to the number 1921, which was followed up

by a return inquiry call for inputs regarding their health.

- ◆ The information gained by this unique combination of Bluetooth-based contact tracing and identification of hotspots was expected to hold the key to break the chain of transmission, flattening the curve and saving lives.

At State Level:

- ◆ Many States and Union Territories also came up with innovative mobile applications for surveillance and tracking of COVID-19 cases. These include:
 - ▶ ‘Delhi Corona App’ at Delhi,
 - ▶ ‘Mahakavach’ at Maharashtra,
 - ▶ ‘Corona Watch’ at Karnataka,
 - ▶ ‘GoK Direct’ at Kerala,
 - ▶ ‘Manu’ at West Bengal,
 - ▶ ‘Corona Mukh Himachal’ at Himachal Pradesh,
 - ▶ ‘COVA Punjab’ at Punjab,
 - ▶ Test Yourself Goa’ at Goa etc.



d) Supportive Response

On 3rd April 2020; National Centres for Disease Control (NCDC), Directorate General developed the 'Contract Tracing Standard Operating Procedure (SOP) for COVID-19 Cases' with an aim to provide guidance to health authorities on contact tracing for persons, including healthcare workers, who had come in contact with a lab-confirmed case of COVID-19

- ◆ On 3rd April 2020; National Centres for Disease Control (NCDC), Directorate General of Health Services, MoHFW further developed the 'Contract Tracing Standard Operating Procedure (SOP) for COVID-19 Cases' with an aim to provide guidance to health authorities on contact tracing for persons, including healthcare workers, who had come in contact with a lab-confirmed case of COVID-19.
- ◆ Covering the purpose of contact tracing and classification of high or low risk contacts, it helped as a tool to execute the plan of action for both the high and low risk contact.
- ◆ Additionally, it covered the Health and Safety precautions for Frontline Health Workers (FLW-ASHA, AWW, ANM, Link Worker, other) doing contact tracing, contact identification and listing with an algorithmic representation for management of contacts of confirmed COVID-19 cases.
- ◆ The step wise role of Frontline Health Workers during contact tracing, during release from contact tracing, the notification process if contact leaves the district/state/country and the contact tracing in cluster was emphasized by the Government.
- ◆ A '**Guidance Document on District Level Facility based surveillance for COVID-19**' was circulated on 11th May 2020; as an additional systematic surveillance activity, from routine testing. The objective of the document was to monitor the trend in prevalence of COVID-19 infection at district level.
- ◆ The brief on the method of District Level Facility based surveillance including the

units of surveillance, population groups, the sample size, frequency of sample collection, laboratory test and pooling, data collection and analysis etc. helped in enhancing the surveillance activity at District level.

All the interventions undertaken by the Ministry of Health and Family Welfare, State and District Administrations, State health authorities with the continuous support from the general public has played a remarkable role to fight and triumph against the COVID-19 virus. In view of existing situation, continuous efforts are ongoing to ensure the surveillance of COVID-19 cases and further necessary action to combat the burden posed by it.

A1.2 Containment Plan, Isolation and Quarantine

The COVID-19 pandemic progressed in the country in stages. The MoHFW proposed containment plans for the pandemic in five possible scenarios, while elaborating on actions that need to be taken to contain large outbreaks:

1. Travel related case reported in India
2. Local transmission of COVID-19
3. Large outbreaks amenable to containment
4. Wide-spread community Transmission of COVID-19 disease
5. India becomes endemic for COVID-19

A micro plan for containing local transmission of COVID-19 was released by the health ministry on 24th March 2020. Later, an updated containment plan for large outbreaks was published on 4th April 2020 which was revised and reissued on 16th May 2020.

The former document defined mapping of the affected geographical areas into Containment and Buffer zones, and proposed deployment of existing human resources to undertake and supervise containment activities in the field, along with detailed description of each worker's role. The micro plan comprised active and passive surveillance for suspect COVID-19 cases and their transfer in dedicated ambulances to identified

nearby health facilities, contact tracing and quarantine of contacts, laboratory support, logistic support, communication for raising awareness in the community and data management.

As of 29th March 2020, three types of districts were identified to decide upon containment measures:

1. Existing 'hotspots' i.e., cities/districts with a high number of confirmed COVID-19 cases or a significant increase in case volume over the last 14 days. (Action – Consider additional containment measures like border sealing, surge teams, etc.)
2. At-risk districts i.e., cities/districts with multiple confirmed cases and high population density or presence of an international airport. (Action – Ensure strict compliance with lockdowns while conducting extensive testing)
2. Other infected districts i.e., districts with at least one confirmed case (Action – Ensure strict compliance with lockdowns while completing contact tracing)
- I. As per the document published on 4th April 2020, areas were divided as hotspots (Red Zones) and Green Zones. Inclusion Criteria for identification of hotspots were defined as:
 - ▶ Highest case load districts contributing to **more than 80% of cases in India** or
 - ▶ Highest case load districts contributing to **more than 80% of cases for each state in India** or
 - ▶ Districts with doubling rate less than 4 days (calculated every Monday for last 7 days, **to be determined by the state government**).

Areas where no new confirmed case is detected for last 28 days, were defined as green zones. If no new case has been detected in last 14 days, the district was categorized in orange zone. On 14th April, 2020, there were 170 hotspot districts in country, as per these criteria. Out of these, 123 districts had large outbreaks, while 47 districts had clusters. 207 districts were identified as non-hotspot districts with clusters. 353 districts were non infected districts (green zone).

II. A new zoning strategy was proposed after 3rd May 2020. Classification criteria for districts was as follows:

1) Red Zone

- ◆ If a district records **15+ active cases**, and at least one of the following
- ◆ Doubling rate less than 10 days
- ◆ Case Fatality of 6% or more (exclusion: No new deaths in last 7 days)
- ◆ Testing per million less than 50% of national average,

2) Green Zone

- ◆ No case or
- ◆ No new cases in last 28 days

3) Orange Zone

All other districts

Besides this, nation-wide SARI and ILI surveillance was planned **every 15 days** using random testing methodology to locate and identify hotspots as per the results.

III. The updated document (16th May, 2020) explained, in addition to the above, isolation, quarantine and physical distancing along with infection prevention and control, testing, case management and capacity building.



Recommendations for containment zone management

Indicator	Root Cause	Recommended actions
High Doubling Rate	Poor social distancing Ineffective contact tracing Poor Home quarantine and isolation	Ensure social distancing Ensure perimeter control Ensure rigorous contact tracing Counsel on the importance of isolation and quarantine
High Case Fatality Rate	Delay in case identification Inadequate Health Service preparedness	Raise community awareness through IEC De-stigmatize COVID-19 Train health staff Mobilize resources from adjacent districts Create more dedicated beds
High confirmation %	If low testing rate, prioritization for only high-risk cases If adequate testing, indication of high disease burden	Increase testing capacity Focus on breaking the chain of transmission

a) Geographic Quarantine and Surveillance for COVID-19 Suspects

MoHFW described in the updated containment plan, “*Geographic quarantine (cordon sanitaire) strategy calls for near absolute interruption of movement of people to and from a relatively large defined geographic area where there is single large outbreak or multiple foci of local transmission of COVID-19. In simple terms, it is a barrier erected around the focus of infection.*”

Mapping of the area: The containment zone would be decided by the Rapid Response Team when possible, otherwise it would incorporate a 3 kilometers radius area around the residence of a positive case, which would further be divided into sectors of 50 houses each for active surveillance. A buffer zone of an additional 5 kilometers radius around the containment zone (or an administrative area) would also be defined to maintain increased vigil where new cases were more likely to appear.

Proposed criteria for classification of zones were as follows (Table 1).

Table 1: Criteria for classification of zones

S. No.	Parameter	Critical	Desirable
1	Total active cases	> 200	0 cases or 0 cases in last 21 days
2	Active cases per lakh population	>15	-
3	Doubling rate	< 14 days	> 28 days
4	Case fatality rate	> 6%	< 1%
5	Testing ratio (Tests per lakh population)	< 65	> 200
6	Sample positivity rate (confirmation rate)	>6%	< 2%

- ◆ These criteria were proposed as a normative guidance and it was communicated that, states may revise these as per the evolving situation.
- ◆ States were asked to categorize districts/corporations as green/orange/red zones. Additional flexibility was provided to states to demarcate red/orange/green zones at sub district/ward level based on field level analysis.

Active surveillance: Active surveillance for ILI/SARI cases as per case definition was expected to be carried out by the ASHA/ANM/Anganwadi Worker by making daily visits to

all households in her respective sector. These frontline workers would be supervised by an assigned Medical Officer/LHV within the defined surveillance zone. Suspect cases would be brought to the notice of the supervisory officer who would review the case and arrange for immediate transfer to the identified health facility if required.

Surveillance in the buffer zone, as per the updated containment plan for large outbreaks would include review of ILI/SARI cases reported in the last 14 days by the District Health Officials to identify any missed case of COVID-19 in the community. Enhanced passive surveillance for ILI and SARI cases through the existing Integrated Disease Surveillance Programme would also be done in the buffer zones. In case of any identified case of ILI/SARI, sample would be collected and sent to the designated laboratories for testing for COVID-19.

Passive surveillance: For passive surveillance, all health facilities (both government and private sector) in the containment and buffer zones would be listed and all such facilities would report clinically suspect cases of COVID-19 to the identified supervisory officer for that sector. Testing for COVID-19 for these cases would be done as per the latest testing strategy.

Perimeter control: A strict perimeter control was established as per the containment plan to ensure that unchecked movement in and out of the containment zone would be avoided. All vehicular movement, movement of public transport and personnel movement in the containment zone would be restricted except for maintaining essential services (including medical emergencies) and government business continuity. Entry and exit points to a containment zone would be defined and the remaining perimeter sealed for movement. The defined entry and exit points would be guarded by the police at all times.

b) Contact Tracing

The definition of contacts in context of COVID-19 (including both high-risk and low-risk contacts) was provided by the MoHFW in the beginning

of the pandemic. Whenever a person tested positive for COVID-19, all epidemiological contacts of the case would be line-listed, traced, kept under surveillance at home and followed up for development of symptoms. The Supervisory officer in whose jurisdiction, the laboratory confirmed case/suspect case falls would inform the Control Room about all the contacts and their residential addresses. The control room would in turn inform the supervisory officers of concerned sectors for surveillance of the contacts. In the event of the residential address of the contact being beyond the allotted sector, the district IDSP would inform the concerned Supervisory officer/concerned District IDSP/ State IDSP.

Flow of information in contact tracing: All contacts of a particular COVID-19 case would first be listed out in a specified format (provided by IDSP) by the Epidemiologist/Medical Officer. Each contact would be followed up on a daily basis for 28 days by the field worker and presence/absence of symptoms suggestive of COVID-19 would be noted down daily in a prescribed format. The Supervisor would fill and submit a consolidated daily report of all the contacts under his/her surveillance area. A Master contact list would be maintained and updated daily by the Data Entry Operator for the entire duration of surveillance. Whenever a contact developed symptoms, he/she would be referred to the designated Medical Officer, who would review the case and send to the



designated health facility and contact tracing for that case would follow the same procedure.

c) Isolation of Laboratory Confirmed Cases/Suspect Cases

All laboratory confirmed cases/suspect cases would be isolated in designated COVID facilities depending upon the severity of symptoms. The MoHFW allocated three different types of COVID facilities (COVID Care Centres, Dedicated COVID Health Centres and Dedicated COVID Hospitals) for this purpose. Further, the MoHFW proposed home isolation for very mild/pre-symptomatic COVID-19 cases who had the requisite facility at their residence for self-isolation. Isolation of COVID-19 cases was necessary in the containment process to limit the spread of infection.

d) Quarantine of Contacts

Quarantine or separation of individuals who are not yet ill but have been exposed to COVID-19 and therefore have a potential to become ill is another important means of breaking the chain of transmission of COVID-19 infection. All such cases therefore were mandated to follow voluntary home quarantine.

All persons in home quarantine were required to stay in a well-ventilated single-room preferably with an attached/separate toilet. If another family member needed to stay in the same room, he/she would maintain a distance of at least 1 meter. The quarantined persons would need to stay away from elderly people, pregnant women and children, restrict their movement around the house, follow IPC measures like wearing a mask and following hand hygiene, and, under no circumstances, attend any kind of social/religious gathering. Only an assigned family member would be tasked with taking care of the quarantined person after following adequate personal protective measures. Adequate environmental sanitation of the house would have to be ensured.

e) Physical Distancing

The updated containment plan reiterated the importance of physical distancing to stop the

spread of the corona virus and elaborated on social distancing measures that would rapidly curtail the community transmission of COVID-19 by limiting interaction between infected persons and susceptible hosts. Advisories were issued to this effect by the Government of India in order to speed up the control of the pandemic in the country.

India went into a nationwide lockdown with restricted movement on 24th March 2020 which was extended in a graded manner up to 31st May 2020. A slow and staggered work and market hours were put into practice following the lifting of the lockdown

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Closure of schools, colleges and workplaces: All schools, colleges and workplaces in containment and buffer zones were temporarily closed for an initial period of 28 days which was extended based on risk assessment.

Cancellation of mass gatherings: All mass gathering events and meetings in public or private places, in the containment and buffer zones were cancelled till the area became free of COVID-19 or the outbreak increased to such scales so as to warrant mitigation measures instead of containment.

Suspension of public transport: All buses and trains were temporarily suspended to avoid movement of people into and out of containment zones. Additionally, the strict perimeter control were ensured to facilitate prevent people from exiting containment zones using private vehicles.

Avoidance of public places: Within the containment zone, there was restriction on people visiting/moving around in public places except for obtaining essential services.



f) Risk Communication

Risk communication to the people, especially targeted towards the geographic containment zone was done through a variety of communication channels like interpersonal communication (during house visits by the field workers) and mass awareness through miking, distribution of pamphlets, mass SMS, social media, radio and television. A caller tune comprising of awareness messages on COVID-19 was played while placing calls throughout all tele-networks. A dedicated helpline number informed callers about risk of transmission, preventive measures and availability of essential services. Regular press briefings/press releases with updated information was done to keep the general population informed regarding developments with respect to the pandemic situation in the country.

g) Isolation and Quarantine Post Lockdown

As international and domestic travel was restarted, movement policies and standard operating protocols for foreign evacuees/returnees and domestic passengers were issued:

- ◆ After 5th May 2020, international flights were restarted, to bring foreign returnees/evacuees to India. Protocols for quarantine of these returnees were defined. All passengers were required to complete mandatory 7 days of paid institutional quarantine, followed by 7 days of home quarantine and self-monitoring of health status. Symptomatic travelers were tested as per ICMR guidelines.
- ◆ Domestic flights were initiated on 21st May. On arriving at destination, passengers were directed to adhere to protocols prescribed by destination state/UT. Travel by symptomatic individuals was not allowed and isolation was advised, if passenger was found symptomatic at exit.
- ◆ Shramik express trains for migrant workers were started from 29th April 2020. A guidance was issued directing states to assess the health status of returnees by local health authorities

and advise home quarantine. Institutional quarantine was advised if requirement was felt post assessment.

- ◆ For passengers travelling by regular trains, passengers were directed to adhere to protocols prescribed by destination state/UT.

Agra Case Study

Agra in Uttar Pradesh had the first cluster of COVID-19 cases in India. The activities undertaken under the Agra Containment Model in India Containment & Rapid Emergency Response Plan are detailed as follows:

- ◆ Detailed tracing of epicentres/hotspots was done. Cluster containment plan was made which included identifying the geographical distribution & preparing the microplan (3km Radius from epicenter).
- ◆ COVID war room for Agra district was set up at Integrated Control & Command Centre (ICCC) of Agra Smart City, built under Smart City Mission. Central Help Lines were set up for the district; Multifunctional District teams were setup for centralized and coordinated response management and Teams from SSP Police and SP Traffic were deployed to man lockdown and clustering.
- ◆ Isolation and Medical Facility Set-up and Cluster Containment: Active Public Private Partnerships were established for setting up testing and treatment facilities and isolation centres; active survey and containment in identified hotspots were managed by city officials.
- ◆ Doorstep Distribution Chain: Local providers of food and medical supplies were identified in every Ward and distribution chain was set up for doorstep delivery to citizens. E-Pass facility was started to facilitate movement of essential goods and services during lockdown.
- ◆ Food and shelter arrangements were made for the needy and homeless population.
- ◆ Citizen Self Registry Platform was created and the app link shared with citizens via social media. It provided immediate information to

citizens in the form of risk rating, risk related recommendations and health helpline details.

- ◆ Infrastructure and logistics supply were strengthened to ensure effective containment of the outbreak.

Kasargod Case Study

Kasargod, a highly vulnerable state located in the northern tip of Kerala, reported the highest number of COVID-19 cases in the state by the end of March, 2020. The Kasargod model of containment is detailed as follows:

- ◆ A 'three-lock strategy' was used which included a combination of professional policing, technology and community surveillance.
- ◆ State appointed a special officer to coordinate & monitor functioning of District Administration. Section 144 was declared in the entire district whereby movement of people was restricted and maintained through intense police patrolling.
- ◆ All those with travel and/or contact history were home quarantined and their locations were mapped on a Geographical Information System (GIS). Drones were employed to detect gatherings of people, compliance to quarantine was monitored and Geo Spatial tracking of home quarantine violators was done. Home delivery of essentials in containment clusters was ensured.
- ◆ A check on community transmission was ensured by ensuring that all primary and secondary contacts of confirmed cases were confined to their homes.
- ◆ A Social Distancing IEC campaign – "Break the Chain" – was implemented throughout the district.
- ◆ Social Welfare activities were undertaken in the district: Care for Kasargod initiative, Jana Jagratha Samithis at ward level, distribution of free food kits to poor and migrant workers, keeping effective check on black marketing, hoarding & price rise, setting up of Shelter Home and Community Kitchens to ensure food supply

to the poor & destitute and health checkup on alternate days of all migrants/destitutes.

A1.3 Infection Prevention Control Protocols

Infection prevention and control (IPC) play a pivotal role in combating pandemics like COVID-19. Adherence to Infection control protocols becomes mandatory not only within the health facilities, but also at public places, workplaces and home setting.

Government of India took several steps to implement Infection Control Protocols as well as strengthen the existing ones. These efforts could be broadly classified into three categories:

1. Strategy, Plan and Steps taken for IPC at healthcare facilities.
2. Strategy, Plan and Steps taken for IPC at work and public places.
3. Strategy, Plan and Steps taken for IPC in home settings.

Each of these is described below in detail.

1. IPC protocols for Healthcare facilities

The IPC protocols for managing COVID-19 include;

- ◆ Standard precautions,
- ◆ Triage, and early recognition,
- ◆ Source control,
- ◆ Implement additional precautions (droplets and contact) for suspected cases of COVID-19,
- ◆ Implement administrative controls and use environmental and engineering controls.

i. Establishing Institutional Mechanism for IPC

Hospital infection control committees and teams are required to implement IPC protocols at the

health facilities. States and UTs have built upon such committees, already constituted under the National Quality Assurance Programme (NQAP) & Kayakalp Initiative. Broad objectives of such committee have been to reduce the transmission of healthcare associated infection, enhance the safety of staff, patients and visitors, ensure uninterrupted supply of PPEs, and regular trainings of staff for adherence to standard and additional precautions. The challenges were to strengthen their capacities to deal with pandemic COVID-19 within the facilities.

ii. Isolation of COVID-19 Patients

- Isolation facility at the level of district hospitals and other secondary health care facilities in the districts were established.
- A guidance document for establishment of Isolation ward was prepared and disseminated that also included infection prevention strategies like wearing and removing of PPEs.
- Guidance was issued by the Ministry of Health & Family Welfare on 20th April 2020 to take necessary action during suspected or confirmed COVID patients in the healthcare facilities.

Guidelines and Advisories

- In India several guidelines were already available to prevent hospital acquired infection, such as: National Guidelines for Infection Prevention and Control in Healthcare Facilities, Hospital Infection Control Guidelines, Guidelines for Implementation of Kayakalp, Swachhata Guidelines, IMEP Guidelines, etc.
- IPC gaps were identified that included inadequate capacity trained health care staff in IPC and standardized IPC protocols for COVID-19.
- Guidelines, posters, training materials developed by WHO, CDC were consulted, and they were contextualised based on available resources in the country. Guidelines for infection control protocols especially for COVID-19 were developed by MoHFW and shared with the States and UTs by 31st March 2020.

iii. Capacity Building of all Cadre of Staff

- Multiple, online virtual trainings were conducted by MoHFW, WHO-India, and AIIMS.

Capacity building of all level of healthcare workers for COVID-19 was arranged at all levels

- Capacity building of all level of healthcare workers for COVID-19 was arranged at all levels. PPTs and other resource material in IPC, Short video clips for rational usage of PPEs, proper method of donning and doffing off PPEs, personal usage of N-95 masks for HCWs, BMW management, etc. were prepared and shared with the States/UTs.
- States like Madhya Pradesh, Haryana, and Kerala developed state specific guidelines, videos, trainings materials to orient the facility staff about IPC measures for COVID-19. The MoHFW developed a short video in Hindi and English, and disseminated to States/UTs. Orientation of all nodal officers of Quality, BMW and other facility staff was done on 29th May 2020 through webinar.
- AIIMS developed many videos in both English and Hindi for management of biomedical waste and conducted series of webinars to manage BMW. YouTube channel of AIIMS telemedicine centre also uploaded videos for management of BMW.
- Integrated Govt. Online training (iGOT) portal for COVID-19 was developed in DIKSHA platform and specific training module for infection prevention and care and PPE usage were created for imparting training to the health facilities staff on 7th April 2020.

iv. Formulating SOPs (Standard Operating Procedures)

- MoHFW defined the procedure for “disposal of dead body” on 15th March 2020.
- SOPs were released by MoHFW on 29th March 2020 for operations of the ambulance to transport COVID patients and training of ambulance drivers and technicians in transporting COVID-19 patients.

- c) Subsequently, SOPs for different category of healthcare workers were issued by the MoHFW for high-risk exposure and low-risk exposure on 15th May 2020.
- d) SOPs to be followed in case of reports exposed/breach of PPE, report symptoms suggestive of COVID-19, Regular quarantine of HCWs after performing duty in COVID-19 areas were defined and disseminated.
- e) Institutional mechanism for preventing and responding to healthcare associated infections among HCWs, mandatory trainings on infection prevention and control, self-health monitoring and its reporting were strengthened with on-going advisories and problem solving at each level.

v. Bio Medical Waste Management

- a) Guidelines for the management of Bio Medical waste i.e. Bio Medical Waste Rule 2016 and its amendment in 2018 & 2019 were already available in the country.
- b) Central Pollution control Board (CPCB) issued Guidelines for handling, treatment & disposal of waste generated during treatment/diagnosis/Quarantine of COVID-19 patients on 18th March 2020.
- c) These guidelines were further amended in 25th March and 18th April 2020. A system of double bagging with labelling of COVID-19 waste, disposal of PPEs, responsibilities of waste generators, CWTFs staff and ULBs were laid down in these guidelines.
- d) The CPCB has also created a digital tracking system to monitor the lifecycle of waste from collection, segregation, transportation and incineration by geo-tagging each process and submission of details on a common platform through mobile app.

2. IPC Protocols for Work and Public Places

For prevention of transmission in workplaces and public places, key strategies were environment cleaning, robust hand hygiene, respiratory

hygiene, cough etiquette, social distancing and usage of masks. Non-usage of the mask was made a punishable offence.

Workplaces and Offices

Aadhar based biometric attendance system (AEBAS) for employee was discontinued in the government offices and department from 6th March 2020.

Subsequently, precautionary measures like monitoring of temperature, usage of sanitizer, and restriction of visitors in the office, avoidance of face-to-face meeting and unessential travels were defined to contain spread of infection in ministerial office and advisories were provided on 17th March 2020.

Guidelines on preventive measures to contain spread of COVID-19 in workplace setting were issued on 18th May 2020, which provided simple way to prevent spread of infection in work place, that includes social distancing, respiratory hygiene, hand washing, usage of masks etc. Further SOPs were defined for offices during unlock1.0 for offices on 4th June 2020.

Public Places

- a) MoHFW released “Guidelines on disinfection of common public places including offices” on 29th March 2020.
- b) An appeal was made to general public not to consume and spit smokeless tobacco in public places on 4th April 2020.
- c) Initially many states and other organisations had started spraying sodium hypochlorite solutions on large congregations and other interventions in the form of automatic disinfection tunnel through which people were expected to pass through, were employed. However, the MoHFW on 18th April 2020 informed States that use of disinfectant like sodium hypochlorite on individual causes physical and psychological harm and so its usage was discontinued.
- d) The SOPs for workplaces, shopping malls, religious places, hotels and restaurants were

released 4th June 2020, as a graded unlock began in the country.

3. IPC Protocols for Home Settings

To prevent the transmission in general, mass hand hygiene, respiratory hygiene, prevent spitting in public, social distancing and usage of masks are very important. Various channels like print media, electronic media and social media have been used to spread the message to common people.

Home Quarantine

- a) Advisories were issued for contacts of a suspect or confirmed case of COVID-19 for home Quarantine on 11th March 2020.
- b) Necessary precaution like availability of well-ventilated room with attached toilets, frequent washing of hands, usage of surgical mask, avoid sharing of household item were provided.
- c) A revised guideline for home isolation for very-mild and pre-symptomatic COVID-19 were provided on 27th April 2020.

Physical Distancing

Since beginning of the pandemic in India, the Government has been strongly advocating maintaining physical distance of one meter. MoHFW issued advisories on physical distancing on 16th March 2020.

Hand Hygiene and Usage of Masks

To control the quality and price of sanitizers & Masks, Central Drug Standards And Control Organisation (CDSCO) issued an order on 18th March 2020 to provide manufacturing licence under Drugs and Cosmetics Act 1940 for sanitizers.

For ensuring affordability, the ministry capped retail prices of hand sanitizers and surgical masks. Both hand sanitizers and surgical masks were also included in the Essential Commodities Act

The country took urgent steps to ramp-up production of the hand-sanitisers in the country. The Ministry of consumer affairs, food and public distribution requested all the states and UTs on 21st March 2020 to ensure adequate availability of alcohol for production of sanitiser to facilitate self-reliance. At the same time, for ensuring affordability, the ministry also capped retail prices of hand sanitizers at Rs. 100 per bottle of 200 ml, surgical mask (3 ply) @ Rs. 10 per piece and mask (2 ply) @ Rs. 8 per piece. Both hand sanitizers and surgical masks were also included in the Essential Commodities Act.

An advisory was issued to use homemade protective cover for face and mouth with the detailed process of preparation of mask with or without sewing machine in home by MoHFW on 3rd April 2020.

A1.4 Personal Protective Equipment (PPEs)

Personal Protective Equipment (PPEs) are protective gear designed to safeguard the health of workers by minimizing the exposure to a biological agent and helps them to perform their duties towards nations and humanity. Components of PPE are goggles, face-shield, mask, gloves, coverall/gowns (with or without aprons), head cover and shoe cover.

After detection of the first case of COVID-19 in India on 30th January 2020, Union ministry of commerce and industry next day banned all exports of all sorts of PPE, surgical mask and ventilators to ensure enough supply in the country. But only banning the export could not have sufficed as the production of PPE was not adequate in the country to meet the ever-increasing demand.

In March 2020, when the pandemic cases started escalating, health system was not fully equipped to handle the patients. There were many challenges in term of insufficient production and supply chain of PPEs. The government realized the critical role of PPEs in combating with COVID-19 and took following steps:

- a) Domestic manufacturing of PPEs and ramping up production capacity

b) Advisory for rational usage of PPEs released.

India's Preparedness for PPE Kit: Manufacturing of PPEs and Ramping up its Production

“Journey from importer (Nirbhar) to being self-sufficient (Aatma Nirbhar)”

Till February, 2020 India was largely dependent on import of PPEs from different countries and only 2.75 lakh kits were available in the country (January, 2020). In March, 2020 national lockdown was implemented and other countries sealed their borders to prevent pandemic. Because of India's substantial dependence on import, procurement and supply chain issues in PPEs started emerging.

The government immediately took steps and efforts of all ministries were galvanized with Textile ministry taking the lead. This initiative is a shining example of proactive collaboration between central government, state governments and industry to revamp and repurpose existing

production lines to manufacture a completely unknown product, i.e PPEs from scratch.

India took its giant leap in manufacturing by producing domestically nearly 4.5 lakh PPE kits every single day and with growth of 56 times within 60 days.

Stakeholders who Ramped up PPE Production

Production of Personal Protective Equipment (PPE) was ramped-up by active participation of several stakeholders, like Defense Research and Development Organisation (DRDO), The South India Textile Research Association (SITRA), The Railway Network, The Navy and others. The Indian textile manufacturing industry came forward to start production, initially masks, followed by complete PPE kit. Currently, Bengaluru, Tamil Nadu, Gujarat, Punjab, Maharashtra, Rajasthan, Kolkata, Delhi, Noida, Gurugram and few other states are contributing in manufacturing.



The government not only focused on production of adequate numbers of PPE; but ensuring quality in the indigenous PPE was also ensured. In this context Indian Technical Textile Association made and released stringent guidelines on Quality Control Mechanism for PPE Body with subsequent amendments. Defense Research and Development Organisation (DRDO) also approved several laboratories centres across country for quality testing and Certification of PPEs.

The Aatma Nirbhar mission has rolled out successfully and resulted in regularizing procurement and supply chain processes. As per press release by government of India on 7th May 2020, a total 29.06 lakh Personal Protective Equipment (PPEs) were distributed to the States, UTs and Central government institutions.

Key Strengths of PPE Production

- ◆ The domestic production of PPE has been pegged to 4.5 lakh PPE kits per day.

India emerged as the 2nd largest PPE manufacturer in the world in just 60 days. It also became the World's First Reusable PPE Suit developer

- ◆ India emerged as the 2nd largest PPE manufacturer in the world in just 60 days.
- ◆ India also became the World's First Reusable PPE Suit developer.
- ◆ Over 600 companies for certified manufacturing of PPE which strengthened procurement and supply chain.
- ◆ Industry identified opportunities in the crisis and optimally utilized these opportunities.
- ◆ Along with ensuring enough supply through a huge leap in production, the government also took enough measures to ensure safe and effective usage of PPE kits. In this regards advisories and necessary guidelines were released by different governing bodies.

Table 2: Advisories released regarding PPE

Advisory	Released Date
Minutes of meeting with MOT to assess the availability of protective wears for use of health professional in country in the wake of COVID-19	19 th March 2020
Guidelines on rational use of Personal Protective Equipment	24 th March 2020
List of Fabric Manufacturers for making PPE body coveralls approved by SITRA	15 th April 2020
Two laboratories under OFB equipped with Blood Penetration Resistance Test Facilities for Testing Body Coveralls for COVID-19	16 th April 2020
Testing and Certification of PPE Body Coveralls at DRDE / INMAS (DRDO Laboratory), SITRA and Ordnance Factories - Additional Procedures	16 th April 2020
Quality Control Mechanism for PPE Body Coveralls Manufactured in India.	22 nd April 2020
Quality Control Mechanism of Fabrics required to manufacture PPE Body Coveralls in India	24 th April 2020
Additional guidelines on rational use of Personal Protective Equipment (setting approach for Health functionaries working in non-COVID areas)	Updated on 15 th May 2020

A1.5 Serological Surveillance in India

The Indian government and health authorities have responded in a robust manner to contain the spread of infection/community transmission by improving access to reliable diagnostic facilities. As the fundamental principle to counter any contagious epidemic is to detect cases early and prevent the occurrence of new cases.

Faced with an unprecedented challenge, India became fully self-reliant in its testing capabilities, despite starting from scratch just a few months ago. In January 2020, nation had only one laboratory testing for COVID-19, at the ICMR (Indian Council of Medical Research's) National Institute of Virology (NIV), Pune. Starting from less

than 100 tests per day, on 06th June 2020 India reached a landmark in its fight against COVID-19 by performing nearly 1.4 lakh tests in one day. This represents a 1400-fold increase in just 80 days. By 30th November 2020, the number of testing laboratories increased to 2165. Of this 1175, were public laboratories, and 990 were in the private sector. Average daily test climbed to a high of 10.52 lakhs. A total of 14.03 crore tests were conducted by 30th November 2020. It was made possible by Inter Ministerial Convergence across health ministry, ministry of education, airlines and postal services working together. At present, country conducts two types of test namely; Molecular based test (RT PCR/TrueNat/CBNAAT) and Antibody Rapid Test.

Ramping-up COVID-19 Testing Capacity

- ◆ In the preparedness for the COVID-19 outbreak, NIV Pune served as the apex laboratory to optimize the conventional and real-time Polymerase Chain Reaction (PCR) assays targeting different genomic regions of SARS-Cov-2 and initiated testing of suspected cases.
- ◆ ICMR released “Testing strategy for COVID-19 testing” to avoid indiscriminate testing and reducing panic and optimally utilize the resources of the country and scale up facilities for testing. However, advisory for testing are being reviewed and updated periodically based on the nature of spread of infection (Local/Community transmission).
- ◆ The scale up of testing laboratories started with a network of 106 ICMR-funded Viral Research and Diagnostic Laboratories, (VRDLs). Subsequently, the testing was initiated in partnership with laboratories in Department of Science & Technology (DST), Department of Biotechnology (DBT), Indian Council of Agricultural Research (ICAR), Council of Scientific & Industrial Research (CSIR), Defence Research and Development Organization (DRDO), MHRD, medical colleges and private laboratories. Only, private laboratories that had approval from the National Accreditation Board for Testing

and Calibration Laboratories (NABL) were accepted.

- ◆ With a view to contain the spread of COVID-19, an office memorandum was released by Ministry of Health and Family Welfare on 20th March 2020 reiterating that all the notified National Labs for COVID-19 testing, including Viral Research & Diagnostic Laboratories (VRDLs) and other Labs, spread across the country shall remain open all the 7 days a week.
- ◆ Similarly, an advisory was released by ICMR on 1st April 2020 requesting each state to identify a nodal officer to coordinate with the State Resident Commissioner stationed at Delhi for procurement /supply of reagents/primers/probes and other related supplies to respective ICMR recognized labs for the diagnosis of COVID-19 in their states. All labs certified by ICMR will procure VTM & RNA Extraction kits through States.
- ◆ An advisory was issued by ICMR on 7th April 2020 for sample collection sites on sample collection protocols to be followed by the sites.
- ◆ In order to augment the plan of fast-tracking the COVID-19 testing laboratory set-up a total of 14 Centres of Excellence have been designated and delegated with the responsibility of mentoring all the Govt. & Private Medical Colleges in their catchment area and to eventually create state-of-art molecular virology setups.



- ◆ For private laboratories, the National Task Force recommended that the maximum cost for testing sample should not exceed Rs. 4500 (Rs. 1500-Screening and Rs. 3000-Confirmation test, as reported in the guidelines issued by ICMR for COVID-19 testing in private laboratories in India, dated 21st March 2020. By 30th November 2020, the average cost of the test had declined to Rs. 1000 only.

COVID-19 Testing Kits

- i. There is a continuous demand for various types of diagnostic tests by countries all across the globe. Reverse transcription polymerase chain reaction (RT-PCR) test is considered gold standard frontline test for clinical diagnosis of SARS-CoV-2, causing COVID-19. The test is useful only when performed in the acute stage of infection (< 7 days). ICMR has established a fast-track mechanism for validation of non-US FDA EUA/CE IVD approved kits and has identified 14 ICMR validation centres for validation of RT-PCR/ RNA extraction kits/Viral Transport Medium (VTM). As on 30th May 2020, out of 86 RT-PCR kits, 36 were found to be satisfactory.
- ii. Apart from this, antibody-based tests have also been made available for sero-surveillance. However, antibody tests are not suitable to diagnose live COVID-19 infections. ICMR released advisory to start rapid antibody-based blood test for COVID-19 as a strategy for areas reporting clusters (containment zone) and in large migration gatherings/ evacuees centres. ICMR has validated 42 antibody-based kits and recommended 13 such test kits for use. Out of which, 10 are manufactured in India itself:
 - ▶ Though, as per the advisory released by ICMR on Rapid Antibody Blood Tests dated 27th April 2020, States were advised to stop using these kits procured from the Guangzhou Wondfo Biotech and Zhuhai Livzon Diagnostics companies.
- iii. In April 2020, ICMR validated and recommended Truenat™ beta CoV test to minimize the risk of infection and contamination by the virus. The advantage of TrueNat is that

the Virus is lysed during the testing process and can be deployed at district hospitals/ primary health centres across the country. This fully indigenous diagnostic platform offers a reliable and affordable option to augment the SARS-CoV 2 testing capacity in India. The assay comprises of following two steps:

- ▶ **Step 1:** This is E gene screening assay. All samples of suspect COVID-19 should be first tested by this assay. All negatives are to be considered as true negatives. All positive samples should be subjected to confirmation by step 2 assay.
 - ▶ **Step 2:** RdRp gene confirmatory assay. All samples that test positive by this assay must be considered as true positive. No further RT-PCR based confirmation is required for samples that are positive after step 2 of the assay. Currently, 77 TrueNat machines are already in use and there are a total of 1,800 TrueNat machines across the country which can be deployed by the states when needed.
- iv. In May 2020, ICMR recommended that any laboratory which is already functional for SARS CoV2 testing by real-time PCR with the appropriate Biosafety 2 level (BSL-2) setup may initiate testing using Cepheid Xpert Xpress SARS- CoV2, an FDA approved Cartridge Based Nucleic Acid Amplification Test (CBNAAT) under an emergency use authorization (EUA) only.
 - v. As the epidemic evolved, India's testing strategy underwent iterative calibration, and another accomplishment attained by the scientists at ICMR-NIV, Pune on 14th May 2020. They developed and validated the completely indigenous IgG ELISA test for antibody detection for SARS-CoV-2. On external validation, the IgG test kit produced by ICMR-NIV, Pune was found to have sensitivity and specificity of 98.7% and 100% respectively. To fast track production and increase availability of the IgG ELISA test, ICMR has transferred this technology to many pharma companies viz. Zydus Cadila, J Mitra & Company, Meril Diagnostics, Voxtur Bio, Trivitron Healthcare, Karwah Enterprises, Avecon Healthcare, etc.

Measures taken to Test the Coronavirus Exposure in General Population and in High Risk Populations

1. On 19th March 2020, ICMR initiated sentinel Surveillance to detect large scale transmission of COVID-19. The surveillance included more areas specially areas where COVID-19 cases have been reported.
2. Afterwards, on 13th April 2020 an advisory was released by ICMR on feasibility of using pooled samples for molecular testing of COVID-19 for the purpose of surveillance. In this direction, a feasibility study was conducted at DHR/ICMR Virus Research & Diagnostic Laboratory (VRDL) at King George's Medical University (KGMU), Lucknow.
3. Later, a District level facility-based surveillance for COVID-19 was planned to monitor the trend in prevalence of SARS-CoV2 infection at district level.
4. On 12th May 2020, ICMR conducted a community based sero-survey in collaboration with key stakeholders to estimate the prevalence of SARS-CoV-2 infection in Indian population. This household level cross-sectional survey covered 24,000 adults distributed in randomly selected 69 districts from 21 States. Sera from these individuals was tested for presence of IgG antibodies using ELISA test. The results of the survey provided information about spread of SARS-CoV-2 infection in different parts of the country. The first sero-survey revealed a 0.7% prevalence across the country.
5. On 30th May 2020 ICMR advised States to conduct sero-survey to measure Coronavirus exposure in the population using IgG ELISA Test. The IgG test is not useful for detecting acute infection but indicates episode of SARS-CoV-2 infection in the past. However, detection of IgG antibodies is useful in the following situations:
 - ▶ Sero-surveys help to understand the proportion of population exposed to SARS-CoV-2 infection including asymptomatic individuals.

- ▶ Survey in high risk or vulnerable populations (health care workers, frontline workers, immune-compromised individuals, individuals in containment zones, etc.) to know who has been infected in the past and has now recovered.

India's testing strategy ensured that access to tests was assured not only for risk groups, that needed it the most but was also made accessible for surveillance purposes in green zones (districts with no case/no case reported in last 21 days), migrant workers in institutional quarantine facilities, international passengers returning to their countries, etc. as well. Later on, from September 2020 onwards, access to tests, was further simplified and the provision of doctor's prescription for testing was done away with.

In the days ahead, contribution of research institutes like ICMR, government and private laboratories will be required even more as India continues to grapple with the present danger still posed by COVID-19.

A2. CASE MANAGEMENT

A2.1 Testing Protocols in COVID-19

Testing for COVID-19 forms one of the pillars of pandemic control along with containment measures and case management. In the absence of a definitive treatment for the disease, early testing of suspects is imperative to break the chain of transmission and is a mainstay for implementing preventive measures in the country. In the early days of the pandemic, the National Institute of Virology, Pune, was the apex body and the only laboratory facility equipped to undertake testing for 2019-nCoV.

The first guideline regarding specimen collection, packaging and transport for 2019-nCoV was issued jointly by the Indian Council of Medical Research, New Delhi and National Institute of Virology Pune on 24th January 2020, a week before India reported its first case of COVID-19. The guideline aimed to direct the Government health authorities/ hospitals/ clinicians/

laboratories planning to collect appropriate clinical samples as indicated for diagnosis of 2019-nCoV, from patients who met the following criteria: Any person who presents with Severe Acute Respiratory Illness (SARI) AND any one of the following i.e. a history of travel from Wuhan, China in 14 days prior to symptoms onset; disease in healthcare worker working in an environment of SARI patients; unusual or unexpected clinical course, especially sudden deterioration despite appropriate treatment.

While National Institute of Virology, Pune, remained the apex laboratory for testing for 2019-nCoV, State Nodal & Testing Laboratories and VRDLs were identified and notified in the first week of February about their responsibilities in 2019-nCoV testing. All samples collected at the VRDLs were to be tested using molecular based tests (real-time PCR based assay for RNA virus). These VRDLs were Government hospitals with testing facilities, identified in each State, who were initially to ship the collected samples to ICMR-NIV,

Pune, till the time they received testing reagents, primers and probes, and subsequently were to conduct the tests on their own, instructions to which were provided in the guidance document dated 4th February 2020.

The pandemic evolved rapidly in India, thereby necessitating a rapid revision of testing protocols. The first testing strategy for COVID-19 in India was published by ICMR on 9th March 2020, which mandated testing for anybody who either was a close contact of a laboratory confirmed COVID-19 case or had a history of travel to a COVID-19 affected country, and developed symptoms of the disease within 14 days of contact or travel. A week later, on 17th March 2020, the second testing strategy was released. In addition to the previous eligibility criteria, healthcare workers managing respiratory distress/Severe Acute Respiratory Illness were also recommended to get tested if they developed symptoms. The third testing strategy was released on 20th March 2020, which, in addition to the above, mandated

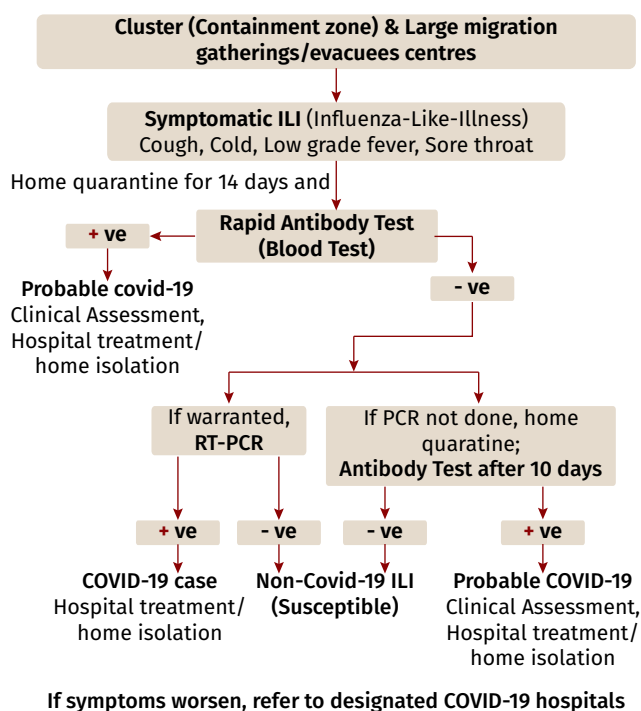


testing for all hospitalized patients with Severe Acute Respiratory Illness (fever AND cough and/or shortness of breath) and asymptomatic direct and high-risk contacts of a confirmed case (once between day 5 and day 14 of contact).

In order to increase testing capacity in the country, on 21st March 2020 ICMR notified that Private laboratories with requisite facilities could also conduct testing for 2019-nCoV as per guidelines along with immediate/real time reporting of test results to ICMR HQ database. A cap of Rs 4,500/- as cost of testing in Private laboratories was recommended by the National Task Force. The laboratory network for COVID-19 testing grew steadily with both Government and Private testing facilities being added to the pool regularly.

In the first week of April 2020, as cases of COVID-19 continued to rise in the country and geographical areas started reporting clusters of cases, an advisory was issued by ICMR allowing for rapid antibody based blood test to be done for cases of Influenza like illnesses (ILI) in areas reporting clusters (containment zone) and in large migration gatherings/evacuees centres. (Figure 4)

Figure 4: Testing strategy for Rapid Antibody Testing



As cases of COVID-19 continued to rise exponentially, and it was seen that positivity rate among suspects tested was still low, the need of the hour was to optimize the capacity of laboratories to effectively screen increased number of samples. **An advisory on the feasibility of using pooled samples for molecular testing of COVID-19** was issued on 13th April 2020, which explored the PCR screening of a specimen pool comprising multiple individual patient specimens (preferably not more than five), followed by individual testing (pool de-convolution) only if a pool screened positive. As all individual samples in a negative pool were regarded as negative, this strategy would result in substantial cost savings when a large proportion of pools test negative.

As the pandemic progressed, a large number of people were placed in quarantine including migrants who has returned to their States of origin and international passengers who had come back to the country. A guideline for RT-PCR based pooled sampling for cohorts of 25 people was issued on 14th May 2020 to screen migrants, returnees from abroad and for surveillance purposes in green zones (as per MoHFW). *This would supersede the antibody based pooled sampling strategy as practiced till date.* On 18th May 2020, the fifth testing strategy for COVID-19 was released, which is the most recent to the series of evolving strategies. It prescribes testing for the groups as mentioned below. It also mentioned that no emergency procedure (including deliveries) should be delayed for lack of test, although sample can be sent for testing if indicated, simultaneously.

India has steadily grown in its testing capacity, achieving a landmark of 1,00,000 tests in one day on 18th May 2020. As on 20th May 2020, there are 555 laboratories across the country performing molecular tests for diagnosis of COVID-19. This further increased to 2165 laboratories by 30 November 2020

1. All symptomatic (ILI symptoms) individuals with history of international travel in the last 14 days.
2. All symptomatic (ILI symptoms) contacts of laboratory confirmed cases.



3. All symptomatic (ILI symptoms) health care workers/frontline workers involved in containment and mitigation of COVID-19.
4. All patients of Severe Acute Respiratory Infection (SARI).
5. Asymptomatic direct and high-risk contacts of a confirmed case (once between day 5 and day 10 of coming into contact).
6. All symptomatic ILI within hotspots/containment zones.
7. All hospitalized patients who develop ILI symptoms.
8. All symptomatic ILI among returnees and migrants within 7 days of illness.

India has steadily grown in its testing capacity, achieving a landmark of 1,00,000 tests in one day on 18th May 2020. As on 20th May 2020, there are 555 laboratories across the country performing molecular tests for diagnosis of COVID-19. This further increased to 2165 laboratories by 30 November 2020.

A2.2 Clinical Management of COVID-19

a) Clinical Management Guidelines

The Ministry of Health and Family Welfare released the first set of guidelines on clinical management of COVID-19 cases early in the pandemic on 17th March 2020, which were further revised based on updated clinical evidence on 31st March 2020. Case definitions for suspect and laboratory-confirmed cases were formed and updated in line with World Health Organization recommendations. Corona virus disease presents in many forms, from asymptomatic infection to severe disease leading to death. Common clinical syndromes associated with the disease were defined (uncomplicated illness, mild pneumonia, severe pneumonia, acute respiratory distress syndrome, sepsis and septic shock) and appropriate management protocols were laid down by MoHFW which included triage of suspected/confirmed cases of COVID-19, early supportive therapy, management of hypoxemic respiratory failure, ARDS and septic shock.

Concurrently, MoHFW also issued Standard Operating Procedures for transporting a suspected/confirmed case of COVID-19 on 26th March 2020. These outlined mechanisms to identify designated ambulances to transport suspected/confirmed COVID-19 cases, emergency medical team to identify suspected COVID-19 patients among those who seek ambulance services, protocols during transportation, and infection prevention protocols for such ambulance vehicles and staff.

The clinical management protocol was continuously updated, based on evidence, and its fifth version was issued in July 2020. Guidelines for mental health during the times of COVID was issued in July 2020. Guidelines for eye-care facilities during the times of COVID was issued in August 2020. In August 2020, guidelines for Diabetes management in COVID facilities and bi-directional TB COVID screening were also released. Post COVID management protocol was released in September 2020.

With respect to pharmacotherapy, there are no specific antivirals used to treat patients of COVID-19 in India. Case management remained mainly based on the type of clinical syndrome presented by the patients. However, for patients with severe disease and requiring ICU management, the clinical management guidelines prescribed a combination of Oxygenation, Anticoagulants, and Corticosteroids.

b) Prophylaxis Against COVID-19

Hydroxychloroquine was recommended for use as a prophylactic against SARS-CoV-2 infection, for asymptomatic healthcare workers involved in the care of suspected or confirmed cases of COVID-19 and for asymptomatic household contacts of laboratory confirmed cases, by the National Task Force for COVID-19 on 21st March 2020. The dose recommended was 400 mg twice a day on Day 1 followed by 400 mg once a week for 7 weeks for healthcare workers and 400 mg twice a day on Day 1 followed by 400 mg once a week for 3 weeks for household contacts. A subsequent guideline issued by the MoHFW on 22nd May 2020, based on available evidence of safety and effectiveness, extended Hydroxychloroquine prophylaxis to two other groups, viz., (i) asymptomatic healthcare

workers working in non-COVID hospitals/non-COVID areas of COVID hospitals/blocks, and (ii) asymptomatic frontline workers, such as surveillance workers deployed in containment zones and paramilitary/police personnel involved in COVID-19 related activities. The drug was however contraindicated in persons with known case of retinopathy, hypersensitivity to HCQ or 4-aminoquinoline compounds, G6PD deficiency and pre-existing cardiomyopathy and cardiac rhythm disorders. Regular monitoring for cardiac symptoms of those people placed on prophylaxis was also recommended.

On 7th April 2020, the Ministry of AYUSH issued an advisory which prescribed various indigenous methods for boosting immunity with special reference to respiratory health. These included Ayurvedic immunity promoting measures, Ayurvedic procedures to boost immunity and Ayurvedic treatments which may be followed for dry cough/sore throat.

c) Dedicated COVID-19 Facilities

In the early phase of the pandemic, several Government and Private hospitals were assigned

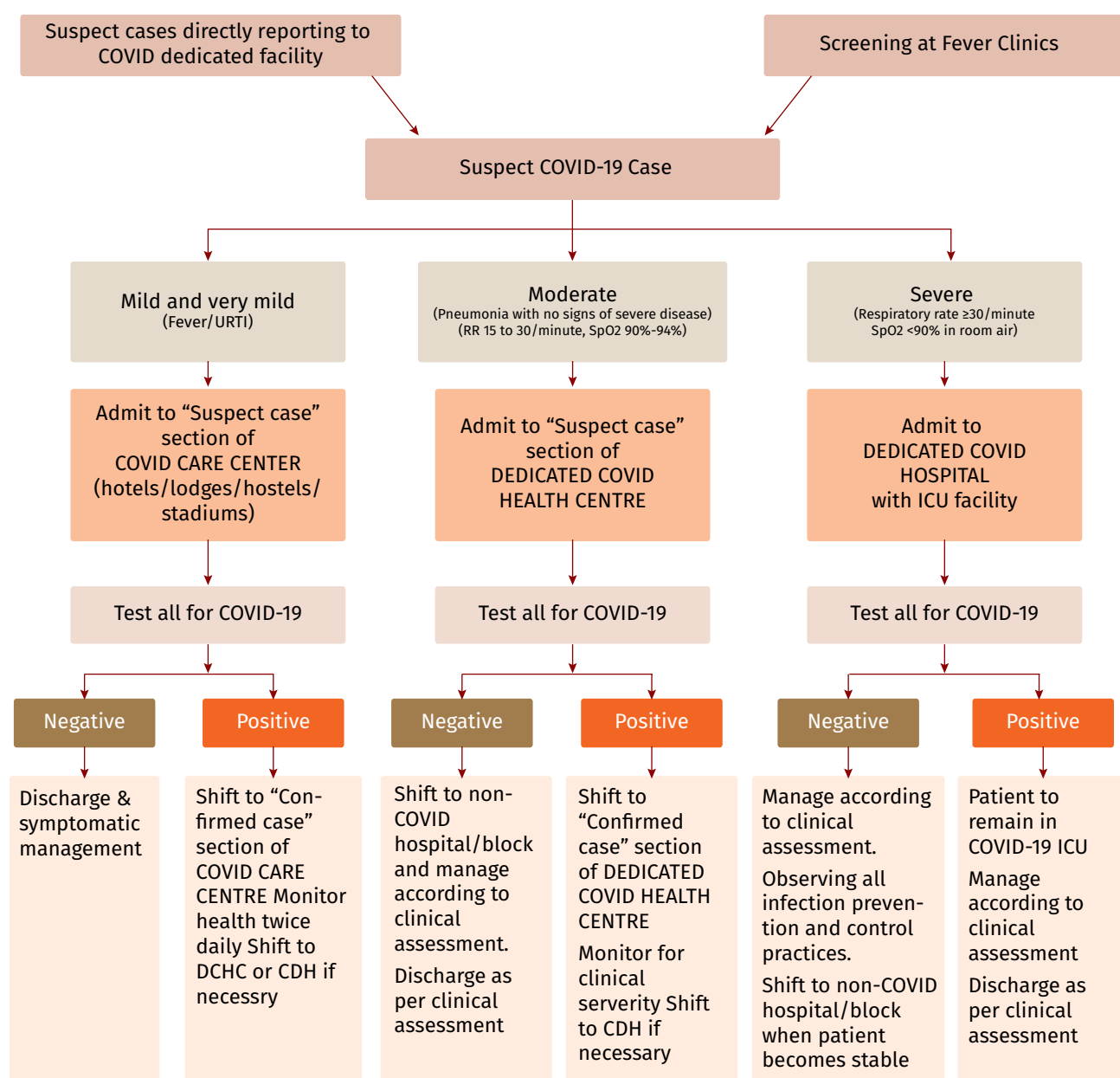
to treat COVID-19 patients where wards/beds or entire block/wing of hospitals were earmarked for providing care to patients admitted with COVID-19. But the progression of the pandemic and rise in the number of cases called for a different approach towards case management. Findings showed that a majority of the patients suffered from mild or very mild disease, about 14% developed severe illness requiring oxygen therapy and only about 5% required intensive care unit treatment. The patients with mild disease required only supportive treatment, and many patients were seen to be asymptomatic as well. The need for reorganization of available hospitals/facilities to cater to the different patient need was recognized and on 7th April 2020, the MoHFW released a guidance document whereby it proposed three different levels of dedicated COVID-19 facilities. These were,

- i. COVID Care Centre for mild or very mild cases or COVID suspect cases,
- ii. Dedicated COVID Health Centre for cases that had been clinically assigned as moderate, and
- iii. Dedicated COVID Hospital for cases that had been clinically assigned as severe.



This was in view of ensuring optimal utilization of available resources and thereby providing appropriate care to all the COVID-19 patients. Whereas the Dedicated COVID Health Centres and Dedicated COVID Hospitals were government or private hospitals having assured oxygen support and fully-functional ICUs respectively, the COVID Care Centres were set up in makeshift facilities like hostels, hotels, schools, stadiums, lodges etc., both public and private.

Figure 5: Clinical Management and classification of healthcare facilities for COVID-19



In order to prevent overwhelming of health facilities and keeping in line with the clinical categorization of patients according to severity, the MoHFW proposed home isolation for very mild/pre-symptomatic COVID-19 cases who have the requisite facility at his/her residence for self-

isolation. In a document issued on 27th April 2020, MoHFW prescribed eligibility criteria for home isolation of clinically very mild/pre-symptomatic cases of COVID-19, when to discontinue home isolation and also enlisted the conditions when he/she should seek medical attention. On 2 July 2020,

revised guidelines for home isolation, of very mild/pre-symptomatic/asymptomatic COVID-19 cases was issued.

d) COVID-19 Response in Urban Settlements

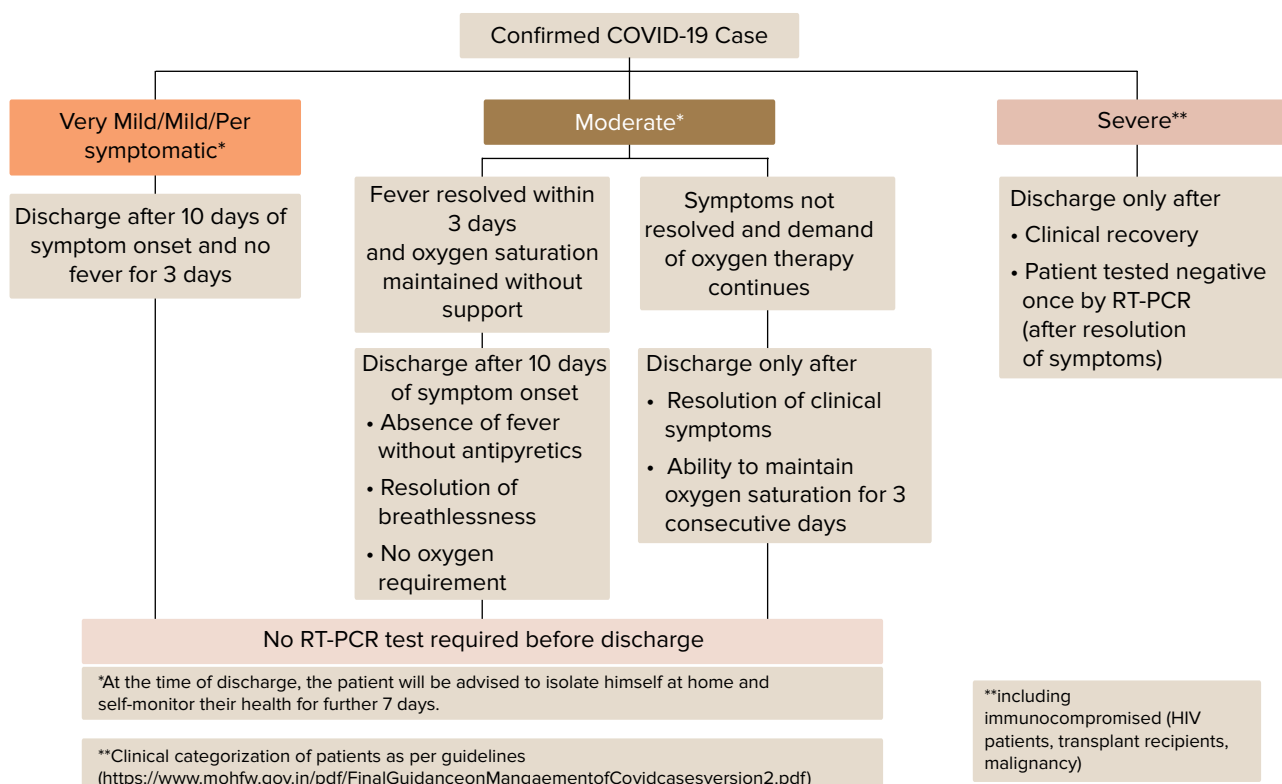
Recognizing the need for a focused approach to the pandemic situation among vulnerable population in urban settlements, MoHFW released a document on 16th May 2020 to guide Urban Local Bodies to plan for preparedness and response to COVID-19. Since community level structures capable of functioning as COVID Care Centres are mostly absent in these areas, the document proposed that the ULBs would identify available structures for this purpose. The civil dispensaries, health posts, health & family welfare centers and private health facilities within these settlements would act as nodal points for detecting ILI/SARI cases, acting as depot holders for PPE and infection control amenities, delivering essential health services and coordinating for testing and referral of suspected COVID-19 cases. The management

of the suspect and confirmed cases would be institutional, in accordance with MoHFW guidelines and no case would be managed at home.

e) Discharge Policy for COVID-19

The discharge policy for patients admitted with COVID-19 has also evolved with time. Till the first week of May 2020, patients were discharged from the hospital on clinical recovery, clearing of chest radiograph and two specimens taken 24 hours apart testing negative for the virus, after 14 days of the initial positive test. On 8th May 2020, MoHFW issued a revised policy for discharge which was aligned with the guidelines on the three-tier COVID facilities and the categorization of the patients based on clinical severity. It revoked the need for testing at the end of treatment phase for patients clinically assigned as very mild, mild and moderate in order to be eligible for discharge. For clinically severe COVID-19 cases, it recommended RT-PCR testing once symptoms resolved and the patient could be discharged after one such negative test. (Figure 6).

Figure 6: Discharge Policy for COVID-19





f) Recording of COVID-19 Deaths

The World Health Organization has provided ICD-10 codes for COVID-19 mortality coding. The National Centre for Disease Informatics and Research, issued a guidance note for appropriate recording of COVID-19 deaths in India on 10th May 2020, according to the guidelines for reporting cause of death in India. Since COVID-19 deaths are associated with several syndromes, it becomes necessary to identify the immediate and antecedent causes of death as well as record the other significant conditions contributing to the death.

Table 3: ICD-10 codes for COVID-19 mortality

Test	Symptoms of COVID-19	Diagnosis	Code
+ve	None	Confirmed COVID-19	U07.1
+ve	Present	Confirmed COVID-19 documented as UCOD	U07.1
+ve	Present with comorbid conditions like heart disease, asthma, COPD, Type 2 diabetes	Confirmed COVID-19 documented as UCOD	U07.1
Test Negative	Present	Clinically-Epidemiologically diagnosed COVID-19	U07.2
Test awaited	Present	Suspected COVID-19	
Test inconclusive	Present	Probable COVID-19	

g) Dead Body Management

Similar to previous pandemics of infectious diseases, dead body management was a point of concern. Since COVID-19 was a new disease, little was known about the threats the bodies of patients dying from the disease could pose in terms of transmission of infection. Standard precautions to be followed while handling dead bodies of COVID-19 were prescribed in a document

issued by the MoHFW on 15th March 2020 when two deaths from the disease had occurred in the country. The main mode of spread of infection is through respiratory droplets, so an increased risk of COVID infection from a dead body was unlikely if health workers or family members followed standard precautions while handling the body. The advisory laid down guidelines for removal of the body from the isolation room/area, transportation to and handling of the body in the mortuary and at the crematorium/burial ground. Separate guidelines for medico-legal autopsy in COVID-19 deaths were issued on 19th May 2020 by the Indian Council of Medical Research, which elaborated on procedures and precautions to be taken while conducting a forensic autopsy, transporting and handing over the dead bodies to the relatives, as well as disinfection/sterilization of the mortuary.

COVID-19 in Pregnancy

COVID-19 mainly presents as mild to moderate disease, but there are some groups of people (elderly, immunocompromised and those with co-morbidities) who have been seen to suffer from severe forms of the disease. There is not much evidence around the world to show that the disease is severe in pregnancy or can be transmitted to the baby during birth or while breastfeeding. However, in view of pregnant women being a physiologically vulnerable group, the National Institute of Research in Reproductive Health issued a guidance note on management of pregnant women in COVID-19 pandemic. It included the testing and management plan for COVID-19 positive pregnant women, special considerations related to antenatal, intrapartum and postnatal care, caesarean section including anaesthesia, breastfeeding as well as instructions for obstetric health care providers.

A3. MITIGATION PLAN

Strategic approach by MoHFW towards COVID-19 pandemic evolved as per the following stages of epidemic.

- Travel related case reported in India
- Local transmission of COVID-19
- Large outbreaks amenable to containment
- Community transmission* of COVID-19

v. India becomes endemic for COVID-19

*Community transmission: Large outbreaks of local transmission defined through an assessment of factors including, but not limited to:

- large numbers of cases not linkable to transmission chains;
- large numbers of cases from sentinel lab surveillance; and/or multiple unrelated clusters in several areas of the country/territory/area

At the stage of community transmission phase as defined by MoHFW, a transition in strategy was planned from cluster containment to mitigation. This shift is explained in the Table 4.

Table 4: Difference between Containment and Mitigation strategies

	Containment	Mitigation
Objective	To break the chain of transmission	To minimize mortality and morbidity
Containment zone, buffer zone and Perimeter control	Yes. Strictly enforced	No perimeter control or containment zones
Surveillance	Active house to house search and contact tracing	Passive surveillance and routine ILI SARI surveillance
Laboratory diagnosis	All cases to be tested	Testing only high risk and severe cases
Hospital admissions	All cases to be admitted for isolation *	Only those requiring oxygen therapy / intensive care
Risk communication	Mainstay interpersonal communication	Mass media for COVID related behavior and for lifestyle changes to “live with the virus”

The objectives of mitigation strategy were as follows:

- ◆ Detect COVID-19 cases early and ensure care of ill
- ◆ Reduce morbidity and mortality due to a COVID-19
- ◆ Minimize transmission and limit health impact
- ◆ Ensure availability of logistics: drugs, vaccines (if any), medical equipment incl. personal protective equipment
- ◆ Reliable and timely information for policymakers, professionals, the public and the media
- ◆ Maintain essential services and business continuity
- ◆ Accelerated R&D on epidemiology, drugs, vaccines and diagnostics

The core components under the mitigation plan include:

- ◆ ILI SARI surveillance
- ◆ Testing of high-risk groups and hospitalized patients
- ◆ Triage of cases on severity: mild to moderate (stable and without risk factor) cases to remain at home
- ◆ Hospitalization of only those requiring Oxygen therapy and intensive care
- ◆ COVID related behavior (Hand hygiene, cough etiquettes, face cover, avoiding spitting etc.)
- ◆ Social distancing measures in all settings (schools, colleges, workplaces, markets, etc.)
- ◆ Psychosocial care
- ◆ Risk communication





B. Health Systems Measures

B1. COMMUNITY MOBILIZATION AND EMPOWERMENT

In the context of public health system, especially during emergencies such as pandemics, community is not to be viewed as only the recipient of policies adopted by the Government. In a democratic state, active participation of community is necessary in planning and implementation of planned activities. Community mobilization entails processes ranging from raising community awareness, community empowerment, community engagement in planning, and implementation of plan by the community. During COVID-19 pandemic, varying measures were undertaken to ensure community mobilization by central and state governments.

ASHAs (Accredited Social Health Activists) formed the forefront of community mobilization and engagement activities related to COVID-19. Along with ASHAs, other existing platforms- Self Help Groups, local volunteers, community-based NGOs have also played a significant role in promoting behavior change, participating in health related activities as well as other essential needs during the period of restriction/lockdown.

B1.1 ASHAs

The ASHA programme is the cornerstone of the National Health Mission (NHM) and the face

of its community processes interventions. This program has been operational for fifteen years, and investments have been made by center and states over these years in capacity building, dedicated support structures, and an increasing range of incentives and other benefits for the ASHAs. These investments under NHM were leveraged during the pandemic. Large workforce of frontline health workers, including multi-purpose workers and ASHAs are playing pivotal role in outreach services and communication efforts for COVID-19.

Guidance on the role of frontline workers including ASHAs in COVID-19 related services, and incentive structure for COVID-19 activities was shared with states on 27th March 2020. A brochure on 'Role of Frontline Workers in Prevention and Management of COVID-19', to be used by frontline workers was also shared by MoHFW. Some states engaged ASHAs in household survey and contact tracing from February, 2020. The guidance note helped in further streamlining the activities and supporting ASHAs and ASHA facilitators through incentive provision.

By 22nd May 2020, around 8,92,446 ASHAs and 42,988 AFs were trained in prevention and management of COVID-19

ASHAs and ASHA facilitators were trained for their role in community outreach during the pandemic, through tele platforms, given the



lockdown and physical distancing measures. In most states, ASHAs and MPWs attended the virtual training session at PHC level or using individual mobile phones. In some states, where ensuring internet connectivity was a challenge, cascade model of training was adopted and ASHAs were trained by block MO/ LHV in small clusters at PHC. Around 90% of the ASHAs and AFs were trained in prevention and management of COVID within two months of dissemination of guidelines to the states, demonstrating the criticality of dedicated trainers and training systems for frontline workers. WHO and UNICEF also supported states in facilitating the training. By 22nd May 2020, around 8,92,446 ASHAs and 42,988 AFs were trained in prevention and management of COVID-19.

Provision was made for incentive of Rs. 1000 per month per ASHA (for duration of engagement). An additional incentive of Rs. 500 per month is provided for ASHA facilitators

Key roles of ASHAs include creating awareness on COVID-19, early detection and timely referral of suspected cases, line listing of individuals with travel history within last 14 days, individuals in contact with suspected/positive cases and following up with individuals who have been advised home quarantine. This has been undertaken through household visits. During the visits, ASHAs inform community members regarding the disease, prevention measures, and dispel the myths. For undertaking these activities, provision was made for incentive of Rs. 1000 per month per ASHA (for duration of engagement). An additional incentive of Rs. 500 per month is provided for ASHA facilitators.

Being a community-based health worker, ASHAs have undertaken these tasks efficiently as reported from states. However, there were instances of non-cooperation and resistance from the community. Incidences of misbehavior and violence were also reported against ASHAs in some states. Limited supply of masks, gloves and sanitizers was also reported in the initial stages. Responding to this, a communication regarding supporting ASHAs by supplying

adequate PPEs and ensuring her protection was sent by MoHFW (dated 3rd April 2020). States were suggested to provide ASHAs with Identity card, and facilitating her movement in teams.

ASHAs also facilitated the provision of essential health services other than COVID-19. During the period of restrictions/lockdown, ASHAs were playing a pivotal role in outreach services, including home based distribution of contraceptives, medicines for chronic diseases- TB, Hypertension, Diabetes, undertaking home visits to newborns and visits to households with pregnant women. To support ASHAs, states were requested to ensure that incentive for routine and recurrent activities (Rs. 2000 per month) was paid in full for all the ASHAs. ASHA and ASHA facilitators were included in the insurance scheme which provided a cover of Rs. 50 lakhs per worker for health workers fighting COVID-19, under 'Pradhan Mantri Garib Kalyan Package'

ASHAs are at the forefront of fighting the pandemic at community level. Although over the years, ASHAs have adopted role of frontline worker of the health system, her community embeddedness facilitated her activities during the pandemic. At the same time, there are critics about lower payments to ASHAs, including for COVID-19 related activities, considering the tasks performed by her. The pandemic has shown the dependence of health system on this large workforce and also the gaps in the support provided to her. This suggests the way forward for changes in program- for sustaining the program, increasing her credibility and support in monetary and non-monetary forms while retaining her status as a community health worker.

B1.2 Community Mobilization, Including Participation of Local Governance Bodies

Other than engaging with ASHAs, who are largely considered as a part of health system rather than community, there were efforts for community mobilization from national level. Community engagement was a critical component of MoHFW's

risk communication strategy; the plan/strategy for larger community participation in planning and implementation of COVID management activities, namely- quarantine, surveillance and essential services supply was left to states. At state level, especially in states with greater decentralization in governance and active PRI involvement in health related services from before, good practices of community participation were observed. In Odisha, powers of District Magistrate were delegated to the Panchayat Head (Sarpanch) for Disaster Management Functions. In Karnataka, panchayat level Task Force was formed with participation from frontline workers of health system and PRI members, as leaders to decide the COVID management plan at village level. This facilitated community participation.

Although, in rural areas, local bodies actively participated at community level; in urban areas, challenges were faced in community participation. Urban areas, especially the metro cities were largely affected by pandemic since the beginning

and community participation challenges were more evident here. Community based civil society organizations, wherever available played an important role in the urban areas. At state level, urban local bodies and health departments communicated with Resident Welfare Associations regarding the infection prevention and control practices and containment plan.

Limited efforts by state and central government in coordinating with civil society networks was a challenge reported both in rural and urban areas. This necessitates need for building these networks and engaging with them in identifying the gaps in services and the target population as a component of essential preparedness for urban public health systems.

Involvement of community members in non-health related activities during restrictions/lockdown was observed. Ministry of Rural Development had communicated with states to engage women's Self Help Groups in various activities,





namely production of masks, and provision of ration or cooked food to vulnerable families using funds available with SHGs and ALFs. In Kerala, community kitchens operated by Self Help Group- 'Kudumbashri' network ensured regular provision of food to vulnerable populations, especially migrant workers stranded in the state. Local bodies in Kerala did documentation of at risk, vulnerable population, which was updated by frontline workers to ensure supply of essential services to all in need.

Good practice from Haryana

In Nuh district of Haryana, there was active involvement of community members- local community leaders, village heads and religious leaders in containment plan. Health department coordinated with community leaders in contact tracing, isolation and quarantine. This community engagement was essential and crucial to build confidence in the community about services provided by health system. In Nuh, incidences of resistance for essential service such as immunization have been reported earlier. Learning from these challenges, the health department actively engaged with community and empowered them for undertaking various activities. PRI members were empowered to monitor the physical entry to village and to ensure quarantine in a non-discriminatory manner. Village heads also took the responsibility for supply of food, and maintaining cleanliness at quarantine facilities. Health department held meetings with religious leaders to inform them about the disease surveillance activities and the leaders in turn informed the community members through religious platforms about the infection prevention practices and requested for cooperation with health teams. This helped the health department to contain the spread of the disease faster.

Way forward

As cases increased, and home-based isolation and prompt quarantine was adopted on a large scale, community involvement became critical. As observed in states of Kerala and Nuh in Haryana, community participation ensured the surveillance activities without creating distrust in the community. This was contrary to practices observed in many places, where pandemic

control was treated more as a law and order situation. Under Epidemic Disease Act, 1897, state has power to implement certain interventions- closing of institutions, lockdown, surveillance of premises and enforcing isolation and quarantine. Although these steps are necessary for disease containment, implementation of these without community engagement has proved to be harmful. Therefore clear strategies for community mobilization at national and state levels were evolved as the pandemic progressed.

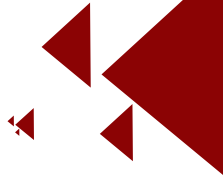
B2. HUMAN RESOURCES

Human Resources for Health are a key component of health systems. In this current situation of COVID-19 pandemic, frontline workers and service providers are at the forefront of the fight against COVID-19, saving lives of millions while putting their own at risk on a daily basis.

B2.1 HRH Policies

Of the 11 Empowered Groups constituted by the GoI under Disaster Management Act 2005 to formulate plans and provide solutions to fight against COVID-19, one was Empowered Group 4 (EG 4) on COVID-19 (Augmenting Human Resources and Capacity Building). EG 4 launched an online data pool of state wise human resources and volunteers in the month of April 2020. The purpose was to help the authorities to prepare for contingency plan based on the available human resources from various pool. The portal provides information about critical human resources required for managing COVID-19 including medical doctors, nurses, pharmacists, lab volunteers, other allied health professionals, ASHAs etc. along with training matrix and role envisaged for each category.⁶⁷

Considering the shortage of HRH and need for medical staff at Airports and other locations in connection to surveillance, all leaves (except on medical ground) and permission/ request to visit abroad of all central government staff was cancelled. Also, directives were provided to disburse medicines to chronic diseases patients for at least a one to three month period at a time, to reduce visits of patients to health facilities



and thus, reduce overcrowding of facilities and most importantly ensure that those with chronic diseases (given high risk for contracting COVID) did not default on treatment because of shortages of medicines. Also, resources from Railways, PSUs, ESIC were mobilised to meet the requirement.

The details of doctors, nurses and paramedics who have retired from Central govt services in last 5 years was collected at central level as a measure of advance preparedness. These details (names, address and mobile number) along with location were then shared with the states and also uploaded on a dedicated web portal. The states could contact them on need basis to extend their services at this time of crisis; subject to their willingness. The states and districts were also encouraged to contact the Zila Sainik Board for enlisting the services of ex-servicemen on a similar basis for COVID management.

As one of the most important steps towards COVID management, tracking of disease outbreak was important. The Integrated Disease Surveillance Programme (IDSP) responsible for surveillance activities has positions of Epidemiologist each at state and district level, one Microbiologist and Entomologist each at the state level. However, many of these positions were vacant. This issue was raised by Hon'ble PM during virtual meetings with the Hon'ble Chief Ministers and a letter was issued asking the states to urgently fill the positions required for surveillance activities.

A detailed SOP was released by MoHFW regarding deployment of residents/ PG students and nursing students as part of Hospital Management for COVID-19 on 27th March 2020.⁶⁸ As per the guideline, the residents (including DNB and CPS students) may be categorized into six broad groups based on their specialty/department and placed in different area of hospital including:

1. Category A: Core Departments
2. Category B: Clinical specialties already running ICU/HDU under their care
3. Category C: Other specialties with clinical post-graduates, but not running ICU/HDU under their care

4. Category D: All other clinical specialties with limited or no responsibility for critically ill patients
5. Category E: Medically trained (MBBS) residents from pre-clinical and para-clinical departments
6. Category F: Interns

These groups may further be divided into sub-groups constituting a team leader and members based on department and posted in different facilities responsible for screening non-clinically ill hospitalized cases and clinically hospitalized cases as per requirement. Similarly, to meet the shortage of manpower, the SOP also provided guidance on deployment of B.Sc., B.Sc. (PB) and M.Sc. nursing students.

On 30th March 2020, the Ministry of Rural Development conveyed to all state Chief Secretaries to utilise the services of youth (approximately 44,000) trained under different trades of healthcare sector under Deen Dayal Upadhyay Grameen Kaushalya Yojana (DDUGKY) to augment the front-line health workers.

B2.2 Deployment/Recruitment

For the country already facing a major challenge with respect to availability and distribution of skilled human resources in the health sector, the COVID-19 pandemic, only widened the gap further. It was essential to deploy human resources to work in dedicated COVID-19 hospitals on a priority basis. COVID posed an additional challenge in planning for backup to replace staff who were quarantined and additionally ensure availability of essential services in non-COVID hospitals.

For management of COVID-19, Human Resources for Health was deployed based on four broad areas of work:

1. **Surveillance and Contact Tracing:** This was performed by the frontline workers (ASHA, ANM and AWW) and supervised by LHV and Medical Officer. The Frontline Workers were responsible for conducting daily house visits (50 households daily; 30 in difficult area) for

case identification, counselling and educating suspected cases and other family members on precautions to be taken. The LHVs and MPW (Male) were given the role of supervision and reporting. On a population of 1000, one supervisory Medical Officer was deployed. Where Health and Wellness Centres were operationalized Community Health Officers played a key role in these functions at the block level.

2. **Clinical Management:** Facility level staff was deployed to provide treatment to COVID-19 patients. This included involvement of resident/ PG students, nursing students and ex-service person.
3. **Management of quarantine, isolation facilities, logistics and supply chain management:** Various medical, paramedical, nursing, ancillary and support staff were placed at the quarantine and isolation centres for providing treatment, diagnostic support and IPC.
4. **Maintenance of Non-COVID essential Health Services**

B2.3 Capacity Building

Prior to engagement of the health workers in COVID pandemic management, they needed to be trained for better management of the pandemic and enhance their skills for surveillance, investigating outbreaks, lab testing, clinical management and infection prevention at the earliest. Capacity building was planned through online training programs developed by MoHFW and webinar by apex institutes like AIIMS, New Delhi on clinical care and associated services and activities. A Training Nodal person in each state was identified to coordinate the trainings in the state. Master trainers were trained by the MoHFW and the database of the trained staff was maintained by the states.

Keeping in view the training requirement of all types of health workforce to be involved in COVID-19 management training modules/ materials were developed for field staff (ASHA, ANM, Aanganwadi workers, NCC cadets

and other volunteers), field supervisory staff (LHV, PHC staff), laboratory staff and persons involved in clinical management in COVID-19 treatment facilities including Intensive care facilities. The broad areas covered were: (i) field surveillance, contract tracing, data management and reporting; (ii) handling specimens (sampling, packaging and shipment); (iii) infection prevention, use of PPE and biomedical waste management; (iv) clinical care management; (v) managing quarantine and isolation facilities; (vi) community based training in Psycho-social care. The states were advised to train all the hospital staff including the dental and AYUSH practitioners available in the isolation areas. It was proposed that one person covering a population of 250 must be identified and trained in surveillance activities. Each quarantine facility should have trained person equal to the number of COVID Warriors. Similarly, training on ventilator use should be imparted to double the number of ICU beds earmarked for COVID-19 patients.

As a part of this, a series of webinars for the doctors, staff nurses and institutional level health care providers were conducted by AIIMS, New Delhi and the Centres of Excellence identified in each state. The training programs were aimed at developing competencies on:

1. Clinical management of COVID-19 cases
2. ICU care and Ventilation management
3. Responsibility of Nurses for Specimen collection and Sample collection of patients suspected of COVID-19 infection
4. Role of Nurses in Bio Medical Waste Management Practices for hospital and home for COVID-19 outbreak
5. Disinfection Practices of equipment and surfaces during outbreak of COVID-19 infection
6. Preparation of Isolation and Quarantine for Persons with COVID-19 infection: Principles and Practices: Role of Nurses for preparing the facility and family and patient
7. Management of Antenatal, Post Natal Women with COVID-19 infection at Home: Role of

Nurses for preparing the pregnant women and family

8. Surveillance of SARS-CoV-2 infection
9. Communicating effectively with person suspected of COVID-19 infection
10. Potential for developing Substance Use disorders during outbreak of SARS-CoV-2 infection. Specific care issues of Patients with Substance Use disorders during outbreak of SARS-CoV-2 infection
11. Antepartum and intrapartum management at Primary and Secondary level facility during COVID-19 infection.
12. Guidance on rapid preparation of COVID-19 ICUs.

The webinars also addressed the technical concerns of the State Nodal Persons. The state nodal officials guided the health care providers of the state. The recorded webinars are available free on YouTube channel/platform. The Topics of trainings for each cadre and volunteers were communicated to states and were available in public domain (MoHFW website and www.Covidwarriors.gov.in). Over ten lakh viewers were recorded for the webinars by AIIMS, and more than 1.77 lakhs enrolments were made for various programs on iGOT platform.

Online training modules on management of COVID-19 was launched on Ministry of HRD's DIKSHA platform as 'Integrated Govt. Online training' (iGOT). This platform provides training modules on flexitime and on-site basis so





that COVID response can be delivered at a scale for the workforce needed as the need increases. It has courses for various health worker categories including Doctors, Nurses, Paramedics, Hygiene Workers, Technicians, Auxiliary Nursing Midwives (ANMs), final year students of ANM, GNM, MSC Psychology, MSC Bio-Chemistry, MSc Microbiology and others like police personnel and NSS volunteers, etc. The site is elegantly designed and easy to navigate. Most of the courses are available in English, Hindi; while some have been translated to regional languages like Bengali, Kannada, Gujarati and Malayalam etc. The iGOT platform provided training modules broadly grouped as follows:

1. Basics of COVID-19
2. Clinical management of COVID-19
3. ICU care and Ventilation Management
4. Management of COVID-19
5. Laboratory sample collection & testing
6. COVID-19 Training for NCC cadets
7. Infection control & prevention
8. Infection prevention through PPE
9. Quarantine and Isolation
10. Psychological care of the patients with COVID-19

The training under iGOT have provision for issuance of certification on successfully completing the modules and passing the examination.

B2.4 Protection (PPE, Work Schedule, Quarantine vs Duty, etc.)

Health workers because of the nature of their occupation are at increased risk of infection. A study reviewing SARS-CoV-2 along with SARS-Cov-1 and MERS-CoV has stated that coronavirus does infect Healthcare workers at a significantly

higher proportion in these outbreaks as compared to the general population.

These risks can be attributed to the virulence of the infection and the lack of preparedness of self and hospitals in dealing with the pandemic. There are several important aspects for preparedness of hospitals and these include creating isolation wards and intensive care facilities, ventilators and other supportive equipment, protocols for treatment and infection control and personal protective equipment for health personnel. The availability of these inputs varied across both public and private hospitals in India. But the weakest link had been the availability of PPEs for health workers. Shortage of such essential protective gear has affected doctors, nurses, technicians, and sanitary workers in hospitals and frontline workers in the community. Personnel in the public and private hospitals faced a shortage of PPEs. Several nurses and doctors were tested positive for COVID-19 even in internationally accredited tertiary private hospitals in Mumbai and Delhi.

Guidance from Centre

Keeping in view the safety of the people, office memorandum was issued on 6th March 2020 to exempt the Central Government employees to mark biometric attendance. Guidelines were issued by MoHFW on diagnosis, management, infection prevention, rational use of PPEs etc. ICMR issued advisory for sample collection under protection, which included wearing of Personal Protective Equipment (PPE) by the collector, regular disinfection of sample collection site, sample transport to the nearest COVID-19 testing laboratory under proper cold-chain conditions and with triple layered packing and ensure all recommended biosafety and biosecurity precautions implemented. Program divisions also issued guideline for prioritizing activities in Green, Orange and Red Zone districts and taking safety measures by the program staff for ensuing ongoing activities under National Health Programs e.g. National Tobacco Elimination Program. In May 2020, an Advisory on re-processing and re-use of eye protection- goggles was issued. In June 2020, a

video on addressing psycho-social concerns on health care workers was issued.

1. PPE, N-95 and Ventilator Availability and Supply

Components of PPE (Personal Protective Equipment) are goggles, face-shield, mask, gloves, coverall/gowns (with or without aprons), head cover and shoe cover. Normally, PPEs are used in hospitals for surgeries and for treating infectious diseases. Given the pandemic situation they were a necessity for all health care workers, including those who were conducting door-to-door checks for people with symptoms of COVID-19 infection. It was estimated that India needs over a lakh PPE kits per day.⁶⁹ Another report estimated the requirement of at least 38 Million masks and 6.2 Million PPEs to fight COVID-19 pandemic.⁷⁰ India, by June 2020 had placed orders for 2.22 crore kits, including 1.42 crore kits from domestic manufacturers. 1.87 lakh kits were being produced daily in the country adding that the PPE market has quickly become a Rs. 7,000-crore industry in India.⁷¹ By November 2020, over 300,000 PPE kits were being produced in the country.

As on 20th April 2020, nearly 5.11 lakh PPEs, 30.32 lakhs N-95 mask were supplied to the states and various central hospitals by central Government. Since domestic PPE manufacturer were not available in the country, Ministry of Textiles and the Ministry of Commerce, worked to encourage stakeholders for enhancing domestic productions. By November 2020, over three crore N-95 masks, over 80 lakh PPE kits and more than 28,000 ventilators were supplied to the States and Central Government hospitals by the Centre.

On 16th April 2020, the Bureau of Indian Standards issued specifications for the manufacture of “bio-protective coveralls” for frontline workers at risk of exposure to the novel coronavirus. The bureau is the sole government agency responsible for laying down standards and specifications for all goods made in India.

Soon after the first coronavirus case was detected in India, the government moved to ban

the export of all Personal Protective Equipment on 31st January 2020; but this ban was partially revoked on 8 February for surgical masks and all gloves. Later, on 25th February 2010, the government also allowed the export of eight types of PPE items. On 19th March 2020, by the time India had 194 COVID-19 cases, the government reinstated the ban on the export of masks, ventilators and raw materials needed to manufacture PPE.⁷²

In January 2020, India had a negligible number of Personal Protective Equipment (PPE) kits, and was entirely dependent on imports. The challenge in manufacturing PPE domestically was, inter-alia, the limited availability of taping machines, testing facilities and raw materials. The requirement of PPE coveralls, suitable for coronaviruses, in the country before the pandemic was less than 50,000 per year. Before 29th March 2020, India did not manufacture any PPE suits or testing kits used for diagnosing COVID-19 in significant numbers. N-95 masks were produced sparingly while production of ventilators was negligible. There were, in fact, around 16,000 ventilators in public hospitals. Import availability was negligible while cost was restrictive. Moreover, ventilator components were mostly unavailable in India, and mass manufacturing capabilities were non-existent. The goal was to identify, and secure adequate availability of equipment required for combating the pandemic such as (PPEs) kits, N95 masks, testing kits and ventilators, among others.

An Empowered Group (EG-3) was constituted to streamline availability of medical supplies. Its strategy was also to partner with domestic industry to work towards self-sufficiency in testing.

PPE Kits

The Ministry of Health and Family Welfare (MoHFW) released a set of guidelines for the rational use of PPE kits by healthcare workers and for others who work at various point of entries, quarantine centers, hospitals, laboratories, primary healthcare and community settings. An outreach programme was launched by Ministry of Textiles (MoT) and MoHFW, inviting fabric and garment manufacturers to develop suitable

product and manufacturing capacities on a war-footing. On 1st March 2020, two days before the World Health Organization (WHO) mentioned of a global shortage of PPE, India had no PPE coveralls suitable for COVID-19. India was completely import dependent as far as PPE kits were concerned. In January 2020, there were only 2,75,000 PPE kits available, and that too on account of timely import.

MoHFW nominated HLL Life care Limited (HLL) as its central procurement agency. When initial requirement was informed by MoHFW to HLL only two suppliers existed in India for the supply of Coveralls as per the mandated specifications, which were imported. HLL placed PO for the residual stocks which were available with them. The quantity they supplied was not sufficient to meet the Ministry requirement. It was decided to make procurements centrally through HLL and supply the medical equipment free of cost to the states/UTs for ensuring equity of distribution of limited available resources depending on the disease load.

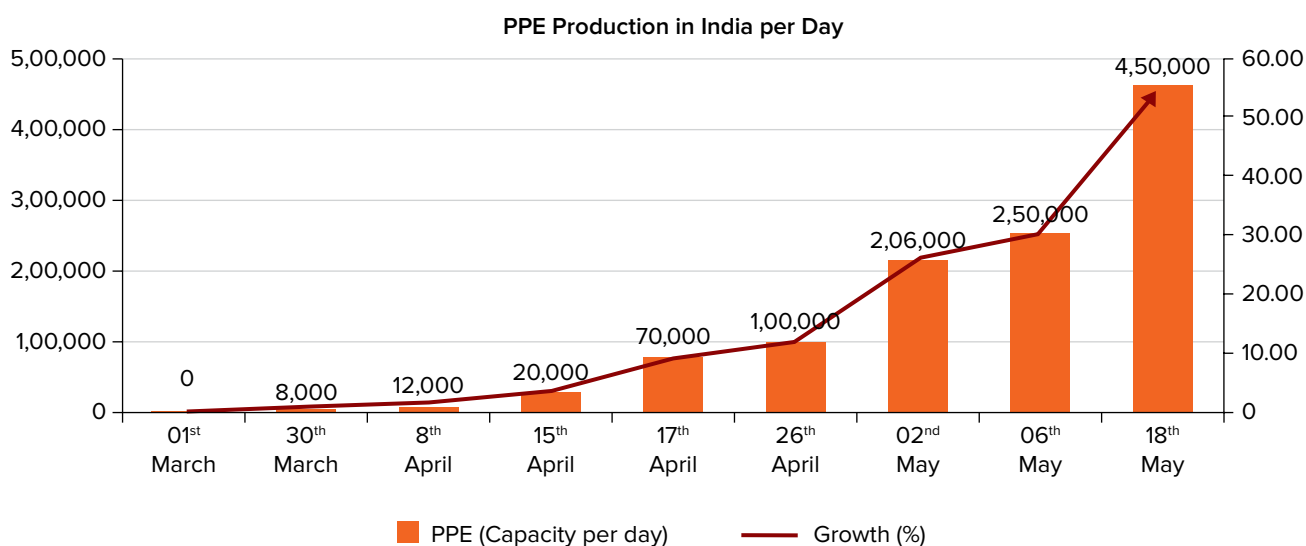
The detailed note on quality control protocol for PPE was released by the Ministry of Textiles on 6th April 2020 followed by periodic revisions on 22nd April 2020 and 5th May 2020. At present, India has 10 Ministry of Textiles approved laboratories for testing and certification of PPE coveralls for COVID-19. What followed this is a remarkable journey of collaboration between governments at the central and state levels,

industries and workers to revamp the existing production of PPEs in India.

The Ministry of Textiles undertook various activities to develop a domestic manufacturing industry of PPEs. This included identification of raw material suppliers, encouraging existing manufacturers to commence production of PPEs, and facilitating expeditious testing of samples. The Ministry of Textiles also issued guidelines on the methodology and process to be followed when testing PPE suits. To maintain quality of high standards, the Ministry of Textiles made it mandatory to obtain Unique Certification Code (UCC) for each tested sample, prior to supply; and emboss the details of UCC, name of the manufacturer, date of manufacturing/batch number etc. on each Coverall.

MoT supported 600 manufacturers in starting PPE manufacturing. With the help of DRDO, new material and sealing technology was developed. The DRDO, along with the South India Textile Research Association (SITRA), also conducted tests on PPE kits produced by various manufacturers. By 25 April 2020 104 domestic manufactures of PPE and 113 manufacturers of N95 masks were producing over 1 lakh PPE kits and N-95 masks daily. By 5 May 2020 this number increased to 2.5 lakh PPE suits and 2 lakh N-95 masks.

The graph below depicts the increasing trend in the production of PPEs in India.



From 0, India now produces nearly 4.5 lakh PPE kits every single day.

In 60 days, the PPE industry in India has witnessed 56 times growth.

India became the World's 2nd largest PPE Manufacturer in just 60 days

Today, India manufactures more than 5 lakh PPE coveralls per day while more than 4 lakh N-95 masks are produced by domestic manufacturers daily. India is now second only to China in manufacturing PPE kits.

Masks

Initially when N-95 Masks enquiries were sent to 5 manufacturers of N-95 Masks, only one Indian manufacturer responded by providing the rate and agreed to supply to HLL. The Ministry of Textiles also took proactive steps to encourage manufacturing of N-95 masks in the country. To plug an estimated gap of 2,50,000 N-95/N-99 masks per day in April 2020, the Ministry of Textiles sponsored machinery at AMTZ with a capacity to manufacture 50,000 N-95 masks per day. Further, to augment domestic supplies of N-95 masks, potential manufactures of N-95 masks were supported in helping them get raw material for producing samples and getting such samples tested from SITRA. The testing of

samples to be sent from DRDO to SITRA and other labs were closely monitored.

Ventilators

India was traditionally an importer of ventilators, primarily from Europe and China to meet its requirements. Specifications of ventilators generally used to be high seeking USFDA/CE approvals etc. Early March, MoHFW made an attempt to identify availability of imported ventilators however the availability was negligible because of high global demand and export restrictions in many countries. Under the chairman of DGHS, specifications were developed prescribing essential and desirable specifications. DGHS committee handheld the parties who showed interest in manufacturing ventilators, including the automobile and electronic companies who were not in medical equipment business till then.

Video conferences were held to give clarifications on essential specifications, purpose of each and every parameter and its importance in COVID treatment was explained. Experts committee with their long experience in using ventilators also made their best experts to explain to manufacturers how to achieve these specifications. Demonstrations and repeat demonstrations were facilitated for interested manufacturers which helped them in developing





ventilators meeting not only essential features but even surpassing them.

Pre-COVID there existed only three manufactures of ventilators who did had limited capacity both in terms of quantity and specifications. Manufacturing capacity was hardly 10,000 ventilators per annum. Today India has over 25 manufacturers with manufacturing capacity between 1.5-2.0 lakh ventilators per annum. 06 manufacturers are already supplying to GoI who have been placed orders for supplying ventilators during COVID. Around 60948 ventilators have been ordered out of which 58850 are Make in India Ventilators contributing over 96%). Timely production and supplies were ensured through regular video conferences and real-time monitoring of the manufacturing activities. BIS standards were also developed for the ventilators.

Box: Industry Development for PPE Coveralls, N-95 Masks and Ventilators

PPE Coveralls

- ◆ Over 1150 manufacturers
- ◆ Manufacturing Capacity now is approximately one million per day from almost nil during pre-COVID
- ◆ Over 230 BIS Licensed manufacturers
- ◆ Over 10 BIS approved manufacturers are registered on GEM
- ◆ Quantity of more than 1.50 crore supplied to GoI.

N-95 masks

- ◆ Over 200 manufacturers
- ◆ Manufacturing capacity now is approx. 8 lakh per day against negligible capacity during pre-COVID
- ◆ Over 72 BIS Licensed manufacturers
- ◆ Over 67 registered on GeM
- ◆ Quantity of 2.49 crore masks supplied to GoI

Ventilators

- ◆ Over 25 manufacturers
- ◆ Manufacturing capacity over 1.50 lakh per annum against 10,000 during pre-COVID
- ◆ Over 35000 Make in India Ventilators Supplied

2. Work Schedule

In the initial phase of tackling the pandemic in Delhi, Doctors, nurses, and para medical staff worked for 14 days continuously followed by 14 days break. They were provided accommodation during this entire period by the Hospitals. They worked in the COVID-19 designated hospitals and medical teams at quarantine facilities in two shifts of 10 hours (8 am to 6 pm) and 14 hours (6 pm to 8 am).⁷³

SMS Medical College, Rajasthan scheduled one-week duty followed by one-week isolation. They also provide food and accommodation in hotel for the doctors.⁷⁴

In Karnataka some hospitals scheduled 14 days non-stop work followed by COVID-19 test. Some hospitals reduced the working window to seven days, followed by the 14-day quarantine break⁷⁵. Hence different states followed different scheduling methodologies but with the common aim of reducing fatigue and burn-out among doctors.

Nurses also underwent different work schedules. A nurse at a government hospital in Delhi said their quarantine period was only 10 days. While a nurse from an ESIC Mumbai hospital informed that they don't have a quarantine period at all. But that they get a break of one or two days and need to go back to work right after.⁷⁶ The Ministry also issued an Advisory which stated that other than those who are deemed to be at risk, other workers do not need to be quarantined and also advised removal of mandatory testing after 14 days of work.⁷⁷ Some other issues faced by nurses is that they spent more time at the patient bedside than any other personnel. Many non-nursing tasks like distributing food was also being performed by them, as ward helpers and aides were hesitant in the initial phase to approach the patient area out of fear.

3. Wearing PPEs for Long Duration

The doctors and the nurses working in ICU or COVID wards ended up spending almost six to eight hours (12 hours in Maharashtra⁷⁸) in

multi-layered PPE clothing as none of the body parts should be exposed in a non-AC room full of COVID-19 patients. But this protection came at a cost. Wearing PPEs for such long duration, deprived them from eating or drinking or even urination at regular intervals. PPE suits are expensive and therefore, they cannot afford to waste these. So, the health workers usually resorted to having heavy meals, and drinking limited fluids.

It was more difficult for the medical team going on field visit every day for screening people in the community. In the scorching heat medical team wearing PPE and carrying the instruments was a difficult task. Few medical team members developed low blood pressure because of heavy sweating reported from Rajasthan.^{79,80}

Studies revealed that there are three main types of PPE-related skin injuries included device-related pressure injuries (DRPI), moist associated skin damage (MASD), and skin tear (ST). Factors increasing the risk for skin injury include heavy sweating, greater daily wearing time.⁸¹ Many nurses and doctors complained of fatigue, dehydration, and headache.⁸² Healthcare providers globally faced similar difficulties because of shortage of PPEs,⁸³ which leads to use them for more than the recommended duration of 6-7 hours.⁸⁴

Accommodation for Health Service Providers

Considering the long exhaustive duty hours in COVID treatment facilities, few states like Maharashtra, Goa, Rajasthan, Uttar Pradesh, Delhi, etc., made stay arrangement for the hospital staff to cut short the commute hours, provide adequate rest and prevent spread of infection to the family members.⁸⁵ However, the accommodation facilities that were provided differed widely in convenience, quality and safety. There were also reports about various residential societies issuing notice restricting entry of health care providers. Additionally, many personnel were facing the hassle of acquiring passes to travel to work to Delhi from Ghaziabad, Noida and Haryana.⁸⁶ Both Ministries of Health and Family Welfare as well as Ministry of Home affairs issued instructions and advisories to state governments to address these issues.

Taj Mahal Palace, the country's first luxury hotel situated along the Gateway of India opened the doors of the hotel to house medical staff and ease the pressure on the overburdened public health machinery. Other cities of the state have also made accommodation arrangement of the health care providers. Indian Hotels Company (IHCL), also arranged for food for healthcare providers in Maharashtra and other states.

Healthcare providers treating coronavirus patients at Delhi's hospitals e.g. Lok Nayak Jai Prakash Narayan Hospital, GB Pant Hospital & Bardhaman Mahavir Medical College and Safdarjung Hospital etc. were also provided dedicated accommodation for quarantine. The staff nurses and paramedics were provided hotels whereas the support staff were accommodated in Dharamasalas.

4. Medical Safety for HRH

ICMR recommended the use of Hydroxy Chloroquine for prophylaxis of SARS-CoV-2 infection of high population including all asymptomatic health workers involved in care of the suspected or confirmed cases of COVID-19. The National Task Force for COVID-19 in India recommended once a week maintenance dose for seven weeks (400 mg once weekly), following the loading dose (400 mg bd). The tablets were supplied free of cost by the Central Government to the states. India increased its HCQ production capacity from 12.23 crore tablets in March to 30 crore tablets in April.⁸⁷ PPEs along with N-95 masks were also supplied free of cost to the hospitals by the central government. The health of the staff providing direct services to COVID patients was monitored. Regular RT-PCR tests were conducted for those who were examining patients without adequate protections or those showing symptoms.

B2.5 Support (Financial and Non-financial)

Ensuring timely payment: Guidance released by MoHFW mandated timely payments for frontline workers and service providers including those requisitioned from outside of government sectors. This helped in decreasing the psychosocial stress

and maintain the essential services. However in spite of this there were a few instances of Government doctors not receive their salaries or receiving delayed salaries.

Additional incentives: Provision for additional incentives was made for existing HR supported under NHM and working for COVID pandemic. This included both clinical/ service delivery as well as programme management HR.⁸⁸

Psychological support of health workers: Dedicated toll-free helpline 08046110007 was set-up for providing psycho-social support for health care workers. Health professionals were encouraged to practice stress management techniques. The training modules were made available in the MoHFW website.

Pradhan Mantri Garib Kalyan Package: Insurance Scheme for Health Workers Fighting COVID-19 was introduced to provide an insurance cover of Rs. 50 lakhs for a period of 90 days (starting from 30th March 2020) to approximately 22.12 lakhs health workers. The scheme is an accidental insurance scheme covering loss of life due to COVID-19 or accidental death on account of COVID-19 related duty was covering public healthcare providers including community health workers who might have been in direct contact or care of COVID-19 patients and were at risk of being impacted. It was also extended to private hospital staff, retired service providers, volunteers, local urban bodies, contractual, daily-wage, ad-hoc and outsourced staff engaged by state or central ministry for COVID related responsibilities. To extent coverage to all health workers age limit was waived off. Also, the entire premium amount for this was borne by MoHFW and individual enrolments were not required under the scheme. This scheme was eventually extended to 31st March 2021.

Dealing with discrimination against HRH: As per directions of supreme court, Ministry of Home affairs communicated to the states for giving protection to the doctors and medical staff in hospital, places where patients suspected of COVID-19, during screening of people or those quarantined are housed.

By amending the Epidemic Diseases Act of 1897, the Government made physical attacks against HCW a non-bailable offence, instituted a prison sentence for the convicted of up to seven years, and provided for fines ranging from Rs. 50,000 to 5,00,000

By amending the Epidemic Diseases Act of 1897, the Government made physical attacks against HCW a non-bailable offence, instituted a prison sentence for the convicted of up to seven years, and provided for fines ranging from Rs. 50,000 to 5,00,000. The ordinance covered all the HCW including doctors, nurses, paramedical staff, and accredited social health workers. Strict enforcement remained a big challenge for the Government, as has been seen so often a significant gap in enforcing the law. States have brought the law into action for providing protection to the health care providers.

B3. INFRASTRUCTURE

Background

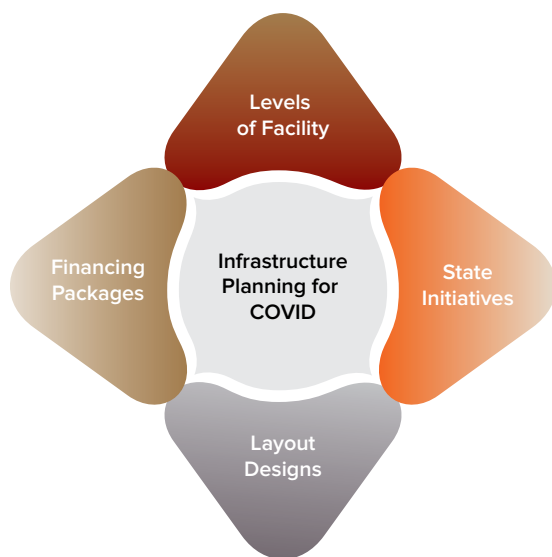
The steps undertaken by Government of India and various states for augmenting health systems capacity in terms of infrastructure are documented in this chapter.

Of the 11 Empowered Groups, one was formed under the chairpersonship of Mr. CK Mishra the then Secretary, Environment, Forests and Climate Change to ensure availability of hospitals, isolation and quarantine facilities, disease surveillance & testing facilities and critical care training.

A letter from Union Health Secretary to Chief Secretaries of all states/UTs, dated 28th March 2020 emphasized that identifying isolation beds within the indoor wards of a hospital could lead to intermingling of patients and runs the danger of hospital itself becoming a hub for transmitting the disease. Several states and central ministries had already made arrangements for shifting the existing patients in the earmarked dedicated hospitals/ blocks to

other hospitals so that a fully dedicated stand-alone hospital/block management of COVID-19 patients could be created. The subsequent sections consist of a comparative analysis of all the orders/guidelines issued by various ministries/departments for identification/creation of COVID related institutional infrastructure.

Infrastructure Planning for COVID



B3.1 Levels of Facility

1. Quarantine Centres

A series of measures were taken by both the Central and State Governments to break the chain of transmission. One among these was to quarantine/isolate all suspect and confirmed cases of COVID-19. National Centre for Disease Control (NCDC), New Delhi, issued 'Guidelines for Quarantine Facilities COVID-19' to provide interim guidance for setting up of quarantine facilities.

Quarantine is the separation and restriction of movement or activities of persons who are not ill but who are believed to have been exposed to infection, for the purpose of preventing transmission of diseases. Persons are usually quarantined in their homes, but they may also be quarantined in community-based facilities. The recommended duration of quarantine for COVID-19 based on available information is up to 14 days from the time of possible exposure. However, as the number of cases increased, it was important

to appropriately prepare the health systems and use the existing resources judiciously.

All central ministries/ departments stepped up their efforts and mobilized their resources to support the efforts of Union Health Ministry in preparedness, control and containment measures. Some of the specific tasks undertaken by other ministries included identification of facilities/buildings that could be used as quarantine centres or could be converted to temporary hospitals with isolation facilities. The ministries that were asked to identify such facilities included M/o Home Affairs, Defence, Railways, Labour, Housing and Urban Affairs and Tourism.

In the initial phase of the pandemic, effective co-ordination between Ministry of Home Affairs, Ministry of Defence and Ministry of External Affairs enabled the establishment of two centralized Quarantine Centres at Manesar and Chawla. In addition, Union Ministry of Health and Family Welfare set-up a 50-bedded critical care facility at Safdarjung Hospital in Delhi for critical care of the patients. The bed strength of this facility was expanded later on. Similarly, Ministry of Railways readied railway coaches for isolation of suspected/ confirmed COVID cases.

To augment these efforts, orders/letters/guidelines were issued by various Ministries to set up temporary camps/ quarantine facilities for suspect/ asymptomatic COVID cases. Similar action was initiated by the state governments.

Augmenting the capacities of existing health facilities

The delivery of services through the public health sector in India follows the three-tier structure of primary, secondary and tertiary care services. This covers both rural and urban areas. As on 31st March 2019, there are 240 Medical Colleges, 756 District Hospitals, 1234 Sub-Divisional Hospitals, 5335 Community Health Centres, 24855 Primary Health Centres, and 157411 Health Sub Centres with varying bed capacities in the country. It was important to ensure the availability of existing services to prevent mortalities and morbidities due to overburden of communicable and non-communicable diseases. Thus, the existing facilities continued to provide routine services. Simultaneously, to prevent any transmission of



infection, GoI supported the states in identifying/creating exclusive dedicated hospitals or separate blocks within hospitals with separate entry and exit points for management of COVID-19 cases.

The severe cases were admitted in Dedicated COVID Hospitals, (DCH) cases with mild to moderate symptoms requiring oxygen support were admitted in Dedicated COVID Health Centres (DCHC) and mild or asymptomatic cases were admitted in COVID Care Centres (CCCs)

On 7th April, 2020, Ministry of Health and Family Welfare issued Guidance document on appropriate management of suspect/confirmed cases of COVID-19. Based on the infrastructure needs of the COVID positive/suspect patient, the COVID-19 hospitals were categorized into 3 types. Infrastructure requirements varied by symptoms wherein the severe cases were admitted in Dedicated COVID Hospitals, (DCH) cases with mild to moderate symptoms requiring oxygen support were admitted in Dedicated COVID Health Centres (DCHC) and mild or asymptomatic cases were admitted in COVID Care Centres (CCCs).

The Three Types of Health Facilities are

A) COVID Care Centre (CCC)

- ◆ The COVID Care centres were set up for cases that have been clinically assigned as mild or very mild cases or COVID suspect cases. These centres were makeshift facilities hence the existing hostels, hotels, schools, stadiums, lodges etc., both public and private were used for the same. All such facilities have separate areas for suspected and confirmed cases with separate entry and exit.
- ◆ All these COVID care centres were mapped to one or more DCHC in case the patient required referral. One BLS ambulance is attached with each of these facilities with sufficient oxygen support on 24x7 basis. The AYUSH doctors are being utilized in giving clinical care in these hospitals.

B) Dedicated COVID Health Centre (DCHC)

- ◆ The Dedicated COVID Health Centre were the hospitals that offered care for all cases

that had been clinically assigned as moderate. They were either full hospital or a separate block in a hospital with separate entry and exit and zoning area. These hospitals assured Oxygen support and had an appropriate referral mechanism for referring to higher centre i.e. DCH if the symptoms worsened.

C) Dedicated COVID Hospital (DCH)

- ◆ Dedicated COVID Hospitals were set up to provide comprehensive care primarily for those who have been clinically assigned as severe. Either a full hospital was dedicated as DCH or a separate block within a hospital with separate entry or exit gates were defined as DCH. These hospitals were fully equipped and had fully functional ICUs and Ventilatory beds with assured Oxygen Support. The Dedicated COVID Hospitals were also the referral centres for the Dedicated COVID Health Centres and the COVID Care Centres.
- ◆ While designing these facilities special focus was given on zoning and triaging to transmission of infection. Proper and separate zoning of the entire hospitals was ensured for suspect and confirmed cases. The triaging involved two stage triaging. One at the entrance and the other at the holding area before entering into isolation ward/rooms. It consists of both screening plus detailed evaluation (with ultrasonogram etc.) wherein patients were monitored before being wheeled into specific hospital isolation wards. The beds in the isolation ward (especially oxygen supported beds) were placed at 3 feet (1 m) distance from each other with provision of negative pressure in some of the facilities.
- ◆ Hand washing area for each zone with continuous water supply was made essential to ensure cleanliness and hand washing facility. Adequate ventilation and power back were part of the protocol to be maintained.

All these facilities followed strict infection prevention and control practices. The facilities were operationalized by equipping with trained manpower, adequate equipment and oxygen supply (wherever needed). National Health Mission issued guidance documents for providing support to states in procurement and infrastructure creation.

Union Ministry of Health and Family Welfare also issued a guidance note for 'Preparedness and Response to COVID-19 in Urban Settlements' on 16th May 2020. The document delineated focus areas that needed to be addressed by the Urban Local Bodies for preparedness in these settlements for responding to COVID-19. These focus areas included identification of quarantine centres, CCC, DCH and DCHCs near urban settlements.

B3.2 Assessment of COVID Facility Preparedness

Further to setting up of these COVID facilities, a checklist was prepared each for DCH, DCHC and CCC facilities and states were oriented on the same for facility assessment. Checklists were prepared for each level of facility by MoHFW with support from NHSRC, WHO, UNFPA, UNICEF and NIPI to assess facility preparedness. Two rounds of orientation workshops for all states on the checklist were conducted. These covered about 1000 participants including Regional Directors & District Programme Officers. 1067 DCHCs and 695 DCHs were assessed.

Through the checklists, it was verified whether the states have been able to dedicate hospitals or entire blocks for COVID which was critical to prevent nosocomial transmissions.

Some of the findings of the Rapid Assessment of Dedicated COVID Hospitals conducted from 17-24th April 2020 were:

- ◆ Most of the facilities did demarcate separate area for confirmed and suspected cases, however few facilities in Maharashtra, Punjab, Uttar Pradesh and West Bengal did not have separate area for confirmed or suspected cases, and were advised appropriately.
- ◆ Dedicated blocks for COVID-19 hospitals should have separate entry and exit to avoid transmission to person attending routine health services. Haryana (6 out of 28), Gujarat (5 out of 22), Karnataka (11 out of 30), Maharashtra (18 out of 59) and Punjab (14 out of 41) did not have separate entry/ exit.

- ◆ States with <60% oxygen supported isolation beds are Maharashtra (42%), Nagaland (42%), Arunachal Pradesh (11%), Andhra Pradesh (50%), Jharkhand (51%), Rajasthan (56%), Tripura (50%).
- ◆ It was observed that only 57% of ICU beds had ventilator support. Arunachal Pradesh (19%), West Bengal (36%), Puducherry (42%), Maharashtra (44%), Haryana (45%) and Karnataka (49%).
- ◆ 29% ICU beds having Air Handling Units (AHUs) and 20% facilities having negative pressure in isolation wards for confirmed cases for minimizing cross infection.
- ◆ States need to review the status of AMC contracts for all critical equipment and Oxygen supply.

To ensure consistent monitoring, a portal 'Special Surveillance System (S-3)' was also developed by Ministry. The objective of the portal was to have a single integrated platform to access real time information on preparedness of health facility

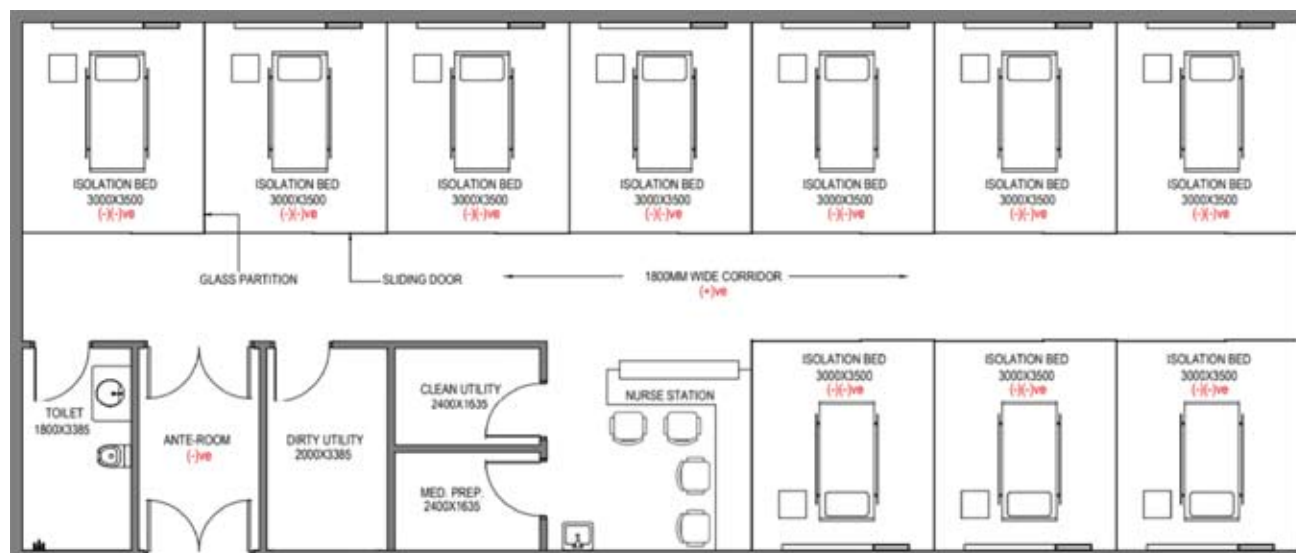
To ensure consistent monitoring, a portal 'Special Surveillance System (S-3)' was also developed by Ministry. The objective of the portal was to have a single integrated platform to access real time information on preparedness of health facility. The dashboard was used for viewing data in terms of Infrastructure, Equipment, consumables, community surveillance etc. both at national and state level. The portal was continuously refined and upgraded as the situation of the pandemic changed in a dynamic manner. Later on, the portal was renamed as the COVID India portal.

B3.3 Layout Designs

Based on the assessments conducted, sample layouts were designed for several areas of a dedicated COVID facility such as ICU, isolation wards, screening/triage areas etc. To implement these designs and construct new hospitals/provide add on structures to existing hospitals, an orientation workshop was organized digitally for various stakeholders

(architects, engineers, oxygen suppliers, manufacturers, engineering institutes etc.). A list of suppliers was added on to GeM portal under the section COVID-19 to support the states in augmenting infrastructure for dedicated COVID facilities.

Figure 7: Layout design for Dedicated COVID Facility



B3.4 State Initiatives

In addition to developing dedicated facilities for COVID management, states undertook several initiatives to provide care to patients. Some of such initiatives were as following. (Table 6)

Table 6: State initiatives for health infrastructure

S. No.	Name of Initiative	States which implemented it	Brief Description
1.	Makeshift Hospital	Maharashtra	1000 bed makeshift hospital built as isolation facility for non-severe COVID cases.
2.	Fever Clinics	Karnataka, Madhya Pradesh, Maharashtra, Uttar Pradesh	Wherever space allowed, a temporary make shift arrangement was arranged for the triaging. The medical officer at the fever clinics could identify suspect cases and refer to COVID Care Centre, Dedicated COVID Health Centre or Dedicated COVID Hospital, depending on the clinical severity. District Mandya in Karnataka initiated 'Fever Clinic on Wheels' while Maharashtra and Karnataka designated Urban CHCs/ Municipal Hospitals as Fever Clinics. MP and UP established fever clinics in existing CHCs.
3.	Screening Centres	Delhi, Bihar, Jharkhand, Telangana	Contact less booths created as sample collection centres.
4.	Isolation Beds	Jharkhand	Conventional iron beds covered with polythene sheet from all four corners
5.	Remote Controlled Robots	Delhi, Jharkhand	To deliver food, medicines and water to patients, remote controlled robots were developed

B3.5 Tender floated for COVID-19 Infrastructure

States such as Assam, Andhra Pradesh, Bihar, Delhi, Jammu and Kashmir, Jharkhand, Kerala, Maharashtra, Tamil Nadu, Uttar Pradesh, Uttarakhand, floated tender for creating infrastructure for COVID-19 facilities. The list of tenders is placed below. (Table 7)

Table 7: List of state wise tenders related to health infrastructure

S. No.	Area of work	State
1	Infrastructure new, Sample collection and Screening	Tamil Nadu (New Block), Bihar (Screening area), Jammu And Kashmir
2	Construction/augmentation of Isolation ward	AP, Uttarakhand
3	OT preparation	Maharashtra
4	Oxygen generation plant and Oxygen gas pipe line	AP, Bihar, Delhi
5	Equipment (Ventilators, Video Laryngoscopes and HFNO Machines, C-arm image intensifier)	AP, Kerala, Jharkhand, Bihar,
6	Mask N-95, PPE Kit & various items	Jharkhand, UP

B3.6 Access to safe Oxygen

Oxygen plays a vital role in managing moderate and severe cases of COVID-19. As per WHO, majority of COVID patients (80%) are expected to have mild to moderate illnesses, 15% would have severe illnesses requiring oxygen therapy and 5% will be critically ill, requiring ICUs. As a response to growing concern around COVID-19, MOHFW worked with states to ensuring provision of safe medical oxygen supplies in Public Health facilities.

- On 10th April, 2020 MoHFW disseminated a guidance note to states on major sources for supply of oxygen, oxygen system components and normative requirement of quantity of oxygen. The guidance also mentioned precautions required for handling the oxygen cylinders (including disinfecting these, right from the point of filling point to transporting, loading, unloading, use

exchange, and carriage in the hospital and in critical care facilities).

- In addition to this, the Department of Promotion of Industry and Internal Trade (DPIIT) and its subordinate office of the Petroleum & Explosive Safety Organisation (PESO) in collaboration with the All India Industrial Gas Manufacturers' Association (AIIGMA) developed a monitoring mechanism for overseeing the situation in totality. This mechanism included reviewing availability of medical oxygen to end users by ensuring no disruption in production, transportation and supply of medical oxygen.
- The department also monitored production in close coordination with the manufacturers of medical oxygen and cylinders. For this, PESO nominated 20 Group "A" official as State wise nodal officers for all States/UTs of the country. Similarly, AIIGMA also nominated 51 state-wise nodal officers and volunteers. In order to improve coordination AIIGMA drafted a list of medical oxygen manufacturers and re-filler contact details, which MoHFW shared with all states/UTs.
- Subsequently, on 17th April, 2020, MOHFW shared the DPIIT guidelines⁸⁹ for the role and responsibility of Nodal Officers of PESO and a flow chart for communication and supply line of medical oxygen. These guidelines were intended to improve the coordination between State/Districts officials and PESO nodal officers in tackling issues arising on maintaining the crucial supplies of medical oxygen to the Dedicated COVID Health Centres and Dedicated COVID hospitals.
- In September 2020, the Ministry of Road Transport and Highways, issued a gazette notification, waiving the requirement of permit for transport category of vehicle carrying oxygen during the period of COVID-19 pandemic upto 31 March 2021.
- On 25 September 2020, Union Ministry of Health and Family Welfare, issued, "guidelines for rational use of Oxygen for management of COVID-19".

B3.7 Augmentation of Infrastructure During Lockdown

Government of India undertook decision of national lockdown on 24th March 2020. This

lockdown extended till 17th May 2020. The rationale behind lockdown was to improve the health system's capacity and to contain the outbreak. Over the duration of three phases of lockdown, health system's capacity was gradually increased in terms of infrastructure. Table 8 contains information on infrastructure availability as on at the end of each lockdown.

Table 8: Augmentation in Health infrastructure availability

Health infrastructure	Lock-down 1.0	Lock-down 2.0	Lock-down 3.0
Total isolation beds (with and without oxygen)	41,974	6,31,052	9,24,815
Number of ICU beds	2,532	51,840	36,160
Number of ventilators	6,704	25,134	16,067

B3.8 COVID-19 Emergency Response and Health Systems Preparedness Financial Package

As part of the India COVID-19 Emergency Response and Health Systems Preparedness Package (for more details please refer to the section on Financing), states/UTs were supported under NHM for development of dedicated COVID hospitals and other hospitals, isolation blocks, negative pressure isolation rooms, ICUs with ventilators, oxygen supply in hospitals, strengthening of laboratories in hospitals, hiring of additional human resources and incentives to human resource and community health volunteers.

As part of the India COVID-19 Emergency Response and Health Systems Preparedness Package, states/UTs were supported under NHM for development of dedicated COVID hospitals and other hospitals, isolation blocks, negative pressure isolation rooms, ICUs with ventilators, oxygen supply in hospitals, strengthening of laboratories in hospitals, hiring of additional human resources and incentives to human resource and community health volunteers

The Government rapidly ramped up the number of COVID testing facilities and availability of Personal Protective Equipment (PPE), Isolation Beds, ICU beds, Ventilators and other essential equipment. Simultaneously, trainings of medical and paramedical manpower were also undertaken.

With the evolving epidemic, the Ministry reassessed the requirements based on the requirements from States and developed a plan for not only ensuring adequate immediate public health response, but also to build health systems of the country to respond to future pandemics

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B4. SERVICE DELIVERY FOR COVID-19

B4.1 Diagnostic Services

Testing for COVID-19 is a key intervention to track the virus, understanding epidemiology, informing case management, and to suppress community transmission. The Indian Council Medical Research (ICMR), under Ministry of Health and Family Welfare played a crucial role in overall management of COVID-19 diagnostic services. ICMR constituted a Rapid Response Team. The accomplishments in the domain of diagnostic services are:

Strengthening of Laboratory Services

a) Sample Management

Sample management covers sample collection, transportation and test requisition for proper monitoring. ICMR issued an advisory⁹⁰ for sample collection at site on 7th April, 2020. It also covered safety measures to be followed for sample transportation.

Subsequently, ICMR released Specimen Referral Form⁹¹ for COVID-19 (SARS-CoV2) to capture details of patients and medical information for better monitoring and tracking on 25th May, 2020. ICMR gave instructions for sample storage and biomedical waste management for COVID-19 samples. All positive detected samples were required to be sent to ICMR –NIV, Pune under suitable bio safety and bio security precautions, all other samples were to be discarded at the labs under proper Biomedical waste management protocols for treating human waste. ICMR released a detailed guidance document for State Nodal office & VRDL labs on 4th February, 2020 covering the roles and responsibilities of State nodal officer. In July 2020, ICMR issued guidance to states and UTs, for district wise log in credentials for rapid antigen testing for COVID-19. On 4th September 2020, ICMR issued a detailed Advisory on the use of RT-PCR test, TrueNat/CBNAAT and Rapid Antigen Test.

Diagnostic Equipment & Kits

As a part of strengthening COVID-19 testing capacities across the country, on 28th March, 2020, several Virus Research and Diagnostic labs⁹² (approved under the Department of Health Research scheme) were supplied with Real Time PCR machines to enable testing at a quick pace.

ICMR released revised guidance⁹³ on the use of Truenat beta CoV on 14th April, 2020 after validating TruenatTM beta CoV test on TruelabTM workstation and recommending it as a screening test. In addition to this, ICMR also released additional Guidelines⁹⁴ for TrueNat testing for COVID-19 on 19th April, 2020.

ICMR also released an advisory on 9th May, 2020 for use of Cartridge Based Nucleic Acid Amplification Test (CBNAAT) using Cepheid Xpert Xpress SARS-CoV2 after confirmation from US FDA. Comprehensive instructions for use included sample collection, testing protocols and reporting of testing process.

On 4th June 2020, a detailed guideline⁹⁵ for validation and batch testing of COVID-19 diagnostic kits was released by ICMR and DCGI. It consisted of details on: type of kits needing validation, request procedure for validations, time

frame and list of validation centres under ICMR, DBT, CSIR and others. The guidelines adhere to the pre-requisite for validation as per Medical Device rule, 2017.

b) Empanelment of Labs

On 21st March, 2020, ICMR released the guidelines⁹⁶ for COVID-19 testing in private laboratories in India. Service providers from private sectors were allowed to serve as testing facilities with pre-requisite criteria mentioned in the above guidelines. These additional criteria were primarily used to ensure safety and quality of diagnostic service provided.

On 5th May, 2020, ICMR formulated the guidelines⁹⁷ for establishment of a new testing laboratory for COVID-19 testing in districts. The guidelines had essential criteria for fulfilment prior to initiation of additional COVID-19 testing laboratories. Till then, ICMR had approved the COVID-19 testing in over 200 laboratories across States.

In view of increasing case load, on 8th May, 2020, ICMR invited application⁹⁸ from Government and Private medical colleges for setting up COVID-19 testing facilities.

Furthermore, on 22nd May 2020 in order to accelerate COVID-19 testing, the government labs⁹⁹ operational under Department of Biotechnology (DBT), Department of Science and Technology (DST), Council of Science & Industrial Research (CSIR), Department of Atomic Energy (DAE), Indian Council of Agricultural Research (ICAR) and Defence Research Organisation (DRDO) were also allowed to initiate the testing adhering safeguards advisory on commercial kits, sampling of cases and reporting of tests on a real time basis.

Presently, the labs which are operational as per ICMR guidelines:

1	Government laboratories :	1010
2	Private laboratories :	1047
Total (as on 30th November 2020)		2057

On 20th March, 2020, With a view to contain the spread of COVID-19, Ministry of Health and Family



Welfare instructed all the notified National Labs for COVID-19 testing, including Viral Research & Diagnostic Laboratories (VRDLs) and other Labs, spread across the country to remain functional throughout the week.

c. Strategy for Augmenting the Pace of Testing

Ministry of Home Affairs and Ministry of Health and Family Welfare requested ICMR to increase capacity for COVID-19 testing in all Government and Private Medical college on priority. On 12th April, 2020, ICMR designated various institution of eminence all across the country as mentor institutes.¹⁰⁰ These institutions would primarily serve as the mentors for the various Medical colleges in their allotted States and facilitate the establishment of COVID-19 testing facilities. Specific Terms of Reference were developed for these 14 centres of excellence and for mentor institutions, ICMR shared detailed guidance on requirement for infrastructures and consumables for Real Time PCR laboratory, and a suggestive list of good quality consumables and details of State/UTs allotted to each of the mentor institutions.

These mentor institutes created a core team, comprising microbiologists, and trained technical staff for training and handholding for setting up of COVID testing facilities.

d) Monitoring of Diagnostic Service

ICMR developed a mechanism for reporting of cases. It included registration of (Public/Private) labs prior to initiation of COVID diagnostic testing to real time reporting of test results along with the contact details to be included in the ICMR database as mandated by PMO. The same lab also reported to State officials (Integrated Disease Surveillance Program of Government of India).

A dashboard¹⁰¹ was created by ICMR for reporting of COVID testing and other key areas of monitoring related to service delivery:

- ◆ Total number of government health facilities functional, List of COVID-19 testing facilities along with location, Status of new labs, type of equipment deployed for testing etc.
- ◆ Total number of testing done till date and number of samples tested in 24 hours

- ◆ Other information including test Strategy, kit validation and batch testing, reagents distribution depots, and information for labs etc.

B4.2 Transport Services

Background

Under National Health Mission, the Government of India provides technical and financial support for Emergency Medical Services in States/UTs through a functional National Ambulance Service (NAS) network to cater to medical emergency cases. Under NHM while one ALS ambulance (with ventilator) is supported for an average population of 5 Lakh, one BLS (without ventilator) Ambulance is supported for over one lakh population. As the need arises, there is a provision of saturating 1 ambulance per 50,000 population in the plains/densely populated locations and 1 ambulance for 15,000-20,000 populations for hilly and sparsely populated regions. This led to the improved response time, for every patient in reaching the hospital for timely care.

Currently (as of Dec 2019*) 28 states are providing ambulance service through the toll free nos 108/102. These include 10139 ambulances under '108', 10730 under '102' and 1653 empanelled vehicles to provide transport to pregnant women and children.

Introduction -Ambulance Services During COVID-19

Availability of National Ambulance services proved to be a boon during the COVID-19 pandemic.

During the initial days of the pandemic due to lack of adequate awareness and knowledge the public did not understand the virulence of COVID-19 and patients were dropped to the hospital or Quarantine Centres without following any proper precautions and infection prevention protocols in the ambulance.

This problem was immediately noted at the highest level of the 11 empowered groups constituted for ensuring a comprehensive and integrated response to the COVID-19 pandemic, two committees were especially formed for a) Medical

Emergency Management Plan and b) Augmenting Human Resources and Capacity Building.

Standard Operating Procedures for Transporting a Suspect/Confirmed case of Covid-19 was released. Another guideline was released on Dead Body Management relating to the precautions to be taken during transporting dead bodies (positive cases) in ambulances to the crematorium

Director Emergency Medical Response under the directions of Secretary, Health & Family Welfare was assigned to develop a standard referral protocol/while transporting/referring COVID suspect/positive patients to health facilities.

Standard Operating Procedures for Transporting a Suspect/Confirmed case of COVID-19 was released. Another guideline was released on Dead Body Management relating to the precautions to be taken during transporting dead bodies (positive cases) in ambulances to the crematorium.

The district administration ensured that separate vehicles were arranged/identified for carrying the COVID-19 patients while following the infection prevention practices. Regular cleaning and decontamination of these ambulances/vehicles were undertaken. Some health facilities in the state conducted mock drills of their ambulance staff to prepare for surge capacity. District level trainings and orientation of the ambulance staff on triaging and how to identify and transport the COVID positive/suspect patients were under taken.

Salient Features of the Guidelines

- ◆ As a preventive measure it was specifically directed that all the patients suspect or confirmed should be transported in a separate vehicle/ambulance to the health facility.
- ◆ There should be no intermixing of such patients (having symptoms or suspect of COVID-19) with the other population , while transportation.
- ◆ *It should be ensured that existing 102 ambulances should not be used for corona patients and should only be used for transporting pregnant women and sick infants.*
- ◆ States could empanel other ambulances having basic equipment like that of BLS and use it for COVID patients. However, this must be ensured that strict adherence to cleaning and decontamination protocols given here in the guidance note need to be followed.
- ◆ Call centres after receiving the call would triage the patient and accordingly dispatch either ALS, BLS or other registered ambulances.
- ◆ Ambulance staff (technicians as well as drivers) should be trained and oriented about common signs and symptoms of COVID-19 (fever, cough and difficulty in breathing).
- ◆ Both the EMT and driver of ambulance would wear PPE while handling, managing and transporting the COVID identified/ suspect patients. Similar use of PPE is to be ensured by the health personnel at receiving health facility.
- ◆ Patient and attendant should be provided with triple layer mask and gloves. Simple public health measures like hand hygiene, respiratory etiquettes, etc. need to be adhered by all.
- ◆ All the surfaces that may have come in contact with the patient or materials contaminated during patient care (e.g., stretcher, rails, control panels, floors, walls and work surfaces) should be thoroughly cleaned and disinfected using 1% Sodium Hypo chlorite solution.

Augmenting Capacity of Ambulances in the Districts During COVID

- ◆ Local authorities should prepare a line list of all private ambulance service providers in their respective areas.
- ◆ These ambulances to be linked with centralized call centre so as to ensure adequate number of ambulances based on population and time to care approach.
- ◆ People, health functionaries, nursing homes, private clinics, and hospitals should be made aware to use ambulance services for COVID patients being provided through toll free numbers. Otherwise it might increase the chances of transmission of infection.
- ◆ Every district should facilitate empaneling of ambulances other than those in the public health system even if the present situation may not require using them.

- ◆ Ambulances shall be manned by personnel adequately trained in Infection Prevention and Control (IPC), use of PPE and protocol that needs to be followed for disinfection of ambulances.
- ◆ Similar use of PPE is to be ensured by the health personnel at receiving health facility.
- ◆ Simple public health measures like hand hygiene, respiratory etiquettes, etc. need to be adhered by all.

State Initiatives

Chhattisgarh

The state has a total of 274 ambulances functional under NAS. 38 Ambulances out of these 274 ambulances were initially earmarked for COVID patients. Due to an increase of COVID-19 cases, 100+ more ambulances were engaged to cater the people of Chhattisgarh.

Dist-Raipur,
Location-
Abhanpur



Location-Bastar



All Protocols followed as per guideline of Govt. of India & Govt. of Chhattisgarh i.e Proper Sanitization of Ambulances & Personnel before & after transportation of COVID-19 suspected Patients. The staff is being provided with Proper Training through our Doctors & Emergency Handling Trainer, for the transportation of COVID-19 patients etc.



Training session & Trials



Dist-DURG, Location-Patan

CLEANING & DISINFECTION PROCESS FROM JAES STEAM DURING COVID-19

GOOD PRACTICE

All patients admitted in Covid hospitals and quarantine center are being distributed fruits and flowers to boost their immunity and wishing them speedy recovery. Awareness program are being conducted in remote areas on how to protect from Covid-19.

Jharkhand

108 Emergency medical ambulance services is being operated through centralized call center in the states by a fleet of 337 ambulances. Out of the existing 337 ambulances (50 ALS + 287 BLS),

71 ambulances are dedicated for transporting COVID suspect/positive patients. Till June 20, 2020 around 1648 COVID +ve patients have been served by these ambulances.



Kerala

The state has an existing fleet of 315, 108-ambulances. Out of these, 285 ambulances were specifically dedicated to COVID-19. Along with these 104 private ambulances, 52 from IMA and 12 other vehicles were earmarked for transporting COVID patients. Several orders and guidelines were released regarding maintenance of these ambulances.

The State has fully supported ambulance drivers who are transporting suspected persons with training and personal protective measures. A system of quarantine for the drivers was adopted with buffer drivers. Their grievances were addressed by the teams on a real time basis. In addition the State committee reviewed the work routinely on a weekly basis through video conference.



Thiruvananthapuram:

In seconds after getting a call, Ganesh and Prashanth - frontline workers in the fight against coronavirus in Kerala - start donning their Personal Protection Equipment. Within minutes, two more men rush into the same room to change into their PPEs. These men, working round the clock, are a part of COVID-19 ambulance emergency response teams in the state.



"We are going to a quarantine centre. Someone there needs to be taken to a hospital for swab collection. I have been on this duty for three days. I work cumulatively for a few days before returning to my family. I am proud to be a part of this team", Mr Ganesh, a technician with the emergency response team said.

Source: NDTV News , 22nd May 2020

Rajasthan

In Rajasthan, 4-5 dedicated COVID ambulances were assigned in districts depending on the incidence of COVID cases. Overall approximately 150-200 dedicated COVID ambulances were working in the state.

COVID patients were transported to the hospital in two categories. In the case of severe patients, any nearby ambulance was used because the primary purpose was to save the patient. In the case of mild to moderate COVID patients only dedicated COVID ambulances were used. 102 which is Janani ambulance was not used for COVID patients. Fumigation and disinfectant process was carried out after the transportation of each patient.

After 15-20 days each COVID ambulance was reviewed by the District program coordinator, if in any district the incidence of the COVID cases

decreased or the utilization of the dedicated COVID ambulance is lower, then those ambulances were utilized for shifting the other patients.

All the health care personnel and the ambulance drivers were trained in proper wearing of PPE and disposal of the PPE kit.

**Jammu & Kashmir**

The state recently started with the National Ambulance services. The 102-108 Ambulance Service was launched in the UT of Jammu & Kashmir on 24th March 2020 by Hon'ble Lieutenant Governor with a fleet of 112 new Ambulances (including 48 ALS & 64 BLS Ambulances) responding to Toll Free No. 108 for handling Medical Emergency calls; and an existing

fleet 286 Transport Ambulances fitted with Vehicle Tracking Management System (VTMs) responding to Toll Free No. 102 for the benefit of Pregnant Women and Infants. 7 additional Critical Care Ambulances were integrated with the fleet taking the total number of ambulances to 405.

102-108 Ambulance Services were utilized by the weakest sections of the society and also by people living in the remote areas of the UT. In addition to the regular utilization of 102-108 Ambulance Service in the UT of J&K, timely launch of this much awaited service strengthened the administration in the COVID Control efforts.



Bihar

Bihar state utilized its existing 102 ambulance services exclusively for transporting COVID patients. District wise 102 Ambulances are identified for transportation of suspected/+ve COVID-19 patients. Training and awareness Program was conducted by SHSB for 102 Ambulance crew members in District headquarters

to present COVID-19 infection during patient transportation. All the SHSB and 102 Ambulance operator were provided with PPE kits and masks for Ambulance crew members to safeguard them against of COVID-19. Ambulances which are involve in transportation of suspected/+ve COVID-19 patients were being sanitized with sodium Hypo chloride & Formal in on regular basis.

GOOD PRACTICES

- ◆ Partition work was done between Driver and patient's cabin in these identified Ambulances with PLY/ACP/ Plastic as safety measures.
- ◆ More than 1000 ambulance workers from 38 districts participated in the virtual training- "Capacity Building for Ambulance Operations during COVID-19" based on Standard Operating Procedure (SOP) for transporting a suspect/confirmed case of COVID-19 of Ministry of Health & family Welfare, Government of India.
- ◆ The Guidelines on rational use of Personal Protective Equipment in local language (Hindi) was circulated on WhatsApp "102 operation Group"



"Today in Bihar the ambulances, dedicated for carrying the suspected or confirmed cases of COVID-19, including mortuary van have separations to minimize the droplet infection from patient to technician and drivers. This reminds us what Benjamin Franklin once said, "An investment in knowledge pays the best interest."

Manoj Kumar
Executive Director
State Health Society, Bihar
23.6.2020

Way Forward

The emergency response system proved to be a vital life line for registering the demand of ambulances to transport the patients within defined response time for assured critical care in COVID dedicated hospital. Learnings from COVID-19 clearly indicate that ambulance services in states should be organized in a way that there is universal and assured access to the

entire population through a systemic response mechanism particularly during emergencies. The COVID-19 pandemic provided an opportunity for a robust system for assured emergency transportation, which could be scaled up to the block level of the country.

This also highlighted the need to adhere to Infection prevention protocol in ambulances so that every ambulance remains safe for transporting patients. Capacity building of EMTs,

driver and support staff on life saving skills and infection prevention protocol should be adhered to, not only during COVID-19 times but as a routine practice. Supervision, monitoring and operational status of equipment in the ambulances was another area which proved to be important in saving lives and must be in practice for every ambulance running on the road.

The crisis during COVID-19 also highlighted that besides government ambulances it is important that every district should have a list and contact number of all the private ambulances functioning in the district, to be roped in during disaster or emergency.

B5. SERVICE DELIVERY FOR ESSENTIAL NON COVID SERVICES

COVID-19 outbreak placed unprecedented demands on public health system. As the pandemic progressed, the health system was overburdened. This resulted in compromised access to essential health services. At the same time, measures adopted for preventing transmission of COVID-19, namely- travel restrictions and the lockdown also affected access to essential health services. Another reason was reluctance on the part of the community members to avail services, owing to perception that health facilities may be unsafe. Private healthcare facilities, including nursing homes, clinics, dispensaries and even hospitals were not functioning in adequate numbers, thereby further reducing access to non COVID essential healthcare services.

These measures were important to maintain people's trust in health system and to minimize increase in mortality and morbidity from other conditions

Learning from earlier pandemics, it was anticipated that service delivery for non COVID health needs were likely to be compromised. These essential health services include reproductive, maternal, new-born and child health, prevention and management of communicable diseases, treatment for chronic diseases to avoid complications, and addressing

emergencies. MoHFW communicated guidance to states, periodically to ensure continuing delivery of essential health services. These measures were important to maintain people's trust in health system and to minimize increase in mortality and morbidity from other conditions.

All these measures related to essential health services were undertaken after travel restriction/ lockdown was enforced nationally, that is after 23rd March 2020. States were provided guidance regarding exemption of all essential health services from lockdown measures and need for facilitating movement of patients and healthcare providers. In an order dated 10th April 2020, MoHFW again emphasized the need for continuing essential health services. Key population sub groups for these services were listed:

- ◆ Pregnant women likely to deliver in the period of lockdown with particular focus on high risk pregnant women
- ◆ Newborns and young children
- ◆ Patients on treatment for chronic communicable and non-communicable diseases
- ◆ Elderly people
- ◆ Patients needing dialysis, cancer treatment and
- ◆ Those requiring transfusion of blood and blood products

States were asked to ensure movement of beneficiaries, patients, health care workers, and supplies of essential medicines and commodities for these population sub groups. E.g. transport of pregnant women for delivery, ensuring birth doses of vaccines, home visits to new-borns and young children by FLWs, delivery of medicines for chronic diseases etc.

In order to ensure continuous delivery of services, states were asked to use additional funds released under HSS pool and funds released under 'India COVID-19 Emergency Response and Health System Preparedness Package'. States were asked to use these funds and flexibilities under NHM to recruit additional HR and essential supplies as per requirement.

Further, a detailed guidance note on health system measures required for delivery of COVID and non COVID services was communicated with states on 14th April 2020. The note included basic principles to be followed for health service delivery during outbreak as per health system components- human resources (deployment, capacity building, and safety), reorganization of service delivery, ensuring supply of medicines, consumables and other logistics, program management and finance. Essential and desirable health services during lockdown were defined and alternative models of service delivery for essential health services to key population sub groups were described.

Key points from the guidance note are described below:

A. Health Systems Approach to Deliver Essential Health Services

1. Reorganization of Service Delivery

- ◆ States were asked to identify and designate facilities or blocks within facilities to provide COVID-19 related services, namely- fever clinics, COVID Care Centre, Dedicated COVID Health Centre and Dedicated COVID Hospital. This was expected to facilitate ensuring essential services at remaining facilities and blocks.
- ◆ Dedicated first level 24*7 emergency units to be set up at CHC/SDH to ensure non COVID acute emergency care and emergency obstetric care. Private (for profit and not for profit) providers also to be engaged, wherever necessary.
- ◆ Alternate models of service delivery to maintain physical distance were elaborated, namely telehealth, organizing immunization and ANC sessions with fewer number of beneficiaries and increasing the number of outreach sessions and home visits by FLWs.
- ◆ Triaging mechanism at all healthcare facilities would further facilitate delivery of COVID and non COVID services.

2. Human Resources

- ◆ Different strategies to augment health workforce availability were articulated, including temporary hiring, mobilizing resources from railways, PSUs, ESIC etc, redeploying from non affected areas, and engaging with private sector.
- ◆ Accelerating training through use of web based platforms (e.g iGoT) was highlighted.
- ◆ Staff safety and security measures, including adequate PPE, ensuring IPC practices, timely payment to staff, dedicated helpline for health workforce, and need for facilitating transport, food and stay arrangements for health workforce were elaborated.

3. Medicines and Diagnostics

- ◆ Ensuring supply of medicines and diagnostics at all levels of care using mechanisms of online indenting, provisioning of adequate funds at facility level, and using alternate models to ensure supply up to the facility level, such as hiring of local youth/ volunteers.
- ◆ For chronic communicable and non communicable diseases, one month supply of medicines was to be given to the patients either at facility or through home visits.
- ◆ Similarly, home based supply of other commodities- contraceptives, condoms through FLWs was suggested.

4. Program Management

- ◆ Dedicated teams to be identified at state level and in each district to plan and monitor delivery of essential services.

5. Financing

- ◆ Ensuring availability of adequate funds at facility level and providing flexibility for use at facility management level.
- ◆ Uninterrupted provision of existing entitlements related to essential health services to beneficiaries.

6. Accountability

Grievance redressal mechanism for denial of entitlements for essential non COVID and COVID services to be functional.

Routine disease surveillance, service delivery monitoring and reporting according to SHC/PHC requirements should continue uninterrupted.

B. Essential Non COVID Services

Detailed mechanisms for delivery of services to key sub population groups is described in this section. States were asked to maintain the list of these groups at SHC level for regular follow up by ASHA/ANM/CHO.

This included guidance on RMNCHA+N services (ANC, intra partum and PNC services, immunization, newborn care, Family planning services and safe abortion) services for

communicable diseases (TB, leprosy, HIV-AIDS, viral hepatitis), non communicable diseases (hypertension, diabetes, cancer, epilepsy, blood disorders) and emergency and critical care services.

Detailed guidance regarding individual programs was communicated periodically to states. These include guidance on services for TB, blood transfusion, dialysis, reproductive and child health services, immunization, dental and ENT services and liver transplant

Detailed guidance regarding individual programs was communicated periodically to states. These include guidance on services for TB, blood transfusion, dialysis, reproductive and child health services, immunization, dental and ENT services and liver transplant. Table 9, brief description of these communications is provided.

Table 9: Communications sent from MoHFW regarding Essential Health Services

S. No.	Essential Health Service	Details of Communication- order/notification/guidance note from MoHFW	Order Dated
1	TB services	◆ All District Microscopy Centres, Reference Laboratory and Rapid Molecular Testing Labs to remain functional	25 th March 2020
		◆ TB medicines can be issued from any government health facility (episode ID of the patient is recorded and even if episode ID is not available, medicines are to be issued for a month)	26 th March 2020
		◆ Detailed advisory on measures for continuous provision of preventive and curative services for TB.	27 th April 2020
		◆ In an order from Central TB division, need for following earlier mentioned measures was reiterated, with emphasis on redressal of grievances by patients.	13 th May 2020
		◆ Equipment used under NTEP- CBNAAT and Trunat to supplement RT-PCR testing for COVID-19. CBNAAT machines available in laboratories with biosafety level 2 or above to be used for COVID-19 testing, and other machines in peripheral setting continue testing for TB and DR-TB.	14 th May 2020
		◆ Guidance Note on Bi- Directional TB COVID screening	26 th August 2020



S. No.	Essential Health Service	Details of Communication- order/notification/guidance note from MoHFW	Order Dated
2	Blood transfusion	♦ States directed to continue activities for blood collection and blood donation uninterrupted	25 th March 2020
		♦ Post donation care and protocols for management in case a donor is suspected or turns COVID positive after donation (within 14 days) defined.	
		♦ Hon'ble Union Minister for Health and Family Welfare communicated with his state counterparts regarding ensuring availability of blood, especially for people requiring regular blood transfusion.	Letter dated 16 th April 2020
		♦ Ministry of Home Affairs issued a communication to states to facilitate unhindered movement of blood mobile vans, blood transportation vans, and movement of voluntary blood donors for donation.	17 th April 2020
		♦ Union Ministry of Health issued Second Interim National Guidance to Blood Transfusion services in India in the light of COVID 19 pandemic.	25 th June 2020
		♦ Directions from MHA to State for promotion of voluntary blood donation	20 th April 2020
3	Doorstep delivery of medicines- retail sale of medicines to doorstep of consumers	♦ Doorstep sale and delivery of medicines of schedule H drugs based on prescription physically or through e-mail. For chronic diseases, prescription can be dispensed if presented within 30 days and in acute cases, if presented within 7 days of its issue.	26 th March 2020
4	Dialysis	♦ Districts directed to facilitate access of patients requiring dialysis services. For patients without private vehicles, services of MMU, National Ambulance Service or any other appropriate ambulance, transport to be used.	10 th April 2020
5	Liver transplant	♦ Advisory on liver transplant issued; transplants for Acute Liver Failure to continue as before, while for Acute on Chronic Liver Failure, case to case decision to be taken. All recipients and donors to undergo RT-PCR test. Protocols for COVID-19 positive cases in pre-transplant and post-transplant scenarios were defined.	13 th April 2020
6	Dental care	♦ Guidelines for dental professionals in different settings were issued. COVID zone wise protocols, list of emergency procedures, and modifications required in a dental clinic set up were elaborated.	19 th May 2020
7	Immunization	♦ Zone wise protocols for immunization services were defined for containment and buffer zones and areas beyond buffer zones and green zones.	21 st May 2020

S. No.	Essential Health Service	Details of Communication- order/notification/guidance note from MoHFW	Order Dated
8	RMNCHA+N services	♦ Guidance note on Essential RMNCAH+N Services during and post COVID related to provision of ANC, intrapartum, PNC services, HBNC and HBYC, sick newborn care, immunization, RBSK, management of children with SAM, AFHC, family planning and safe abortion services.	27 th May 2020
9	Mental Health	♦ Mental Health in the times of COVID 19 Pandemic – Guidance for General Medical and Specialized Mental Health Care Settings	9 th July 2020
10	ENT services	♦ Protocols for OPD services, ENT, Head and Neck surgery ward and guidelines for operation theatres for ENT surgeries were described in the guidance note.	3 rd June 2020
11	Eye Care	♦ Guidelines for Eye Care facilities in COVID 19 scenario	19 th August 2020
		♦ Guidelines on Safe Ophthalmology Practices in COVID-19 Scenario	28 th December 2020
12	Diabetes	♦ Clinical Guidance on Diabetes Management at COVID 19 patient management facilities.	26 th August 2020
13	Others	♦ Guidance note for enabling Delivery of Essential Health Services during the COVID 19 Outbreak	14 th April 2020
		♦ Advisory for effective management & ensuring safe drinking water during lock down due to COVID-19	14 th April 2020
		♦ Updated Advisory for managing Health care workers working in COVID and Non-COVID areas of the hospital	18 th June 2020
		♦ COVID-19 Pandemic and Tobacco Use in India	28 th July 2020

These periodic communications from MoHFW guided states to continue provision of essential non COVID services during the outbreak and lockdown.

Secretary, MoHFW reviewed status of delivery of essential non COVID services in all states through video conferencing. A monitoring tool for assessing essential services was shared with state officials. (Principal Secretary and Mission Directors, NHM). States presented the status of essential service delivery to MoHFW officials during VC.

CGHS Services

Directorate General of CGHS has periodically issued orders for providing uninterrupted essential services. On 20th March, an order

was issued for issuing/indenting medicines for three months at a time (in chronic diseases) in the special circumstances- elderly, beneficiaries undergoing immunosuppressant treatment, uncontrolled diabetes, any other illness compelling staying at home, without beneficiary visiting the centre. Further, on 27th March, an order was issued to facilitate access to care by CGHS beneficiaries. Beneficiaries were allowed to purchase medicines for requirement till 30th April 2020, irrespective of non availability of certificate from CGHS or otherwise and medical claim can be submitted through CGHS wellness centres. Validity of CGHS card was extended till 30th April 2020 via order dated 3rd April. Time line for reimbursement of OPD medicines was extended to 31st May 2020, via order dated 5th May 2020. On 3rd September 2020, the Union Ministry of Health issued "Reimbursement of



OPD medicines to CS (MA) beneficiaries: Special Sanction in view of COVID-19”, extended it until 31st December 2020.

B6. LOGISTICS SUPPLY

Public Procurement in the Time of COVID-19

Ensuring sufficient medical supplies is crucial for dealing with the COVID-19 outbreak as there may be surge demand, partly associated with panic buying, hoarding and misuse of essential supplies amid the pandemic. As part of the crisis response mechanism, ensuring life-saving health supplies to hospitals was a major challenge during the pandemic especially when the entire country was under complete lockdown.

B6.1 Production, Procurement and Supplies of Essential Medical Products - March 2020

After detection of the first case of COVID-19 in India on 30th January 2020, the Union Ministry of Commerce and Industry on the very next day banned all exports of all sorts of PPE, surgical masks and ventilators to ensure adequate supply in the country. Only banning exports could not have sufficed as the production of PPE was not adequate in the country to meet the ever-increasing demand.

On 13th March 2020, the GoI released a notification to regulate the production, quality, distribution, logistics of masks (2ply & 3ply surgical masks, N-95 masks) and hand sanitizers under Essential Commodities

On 13th March 2020, the GoI released a notification to regulate the production, quality, distribution, logistics of masks (2ply & 3ply surgical masks, N-95 masks) and hand sanitizers under Essential Commodities Act, 1955. For COVID-19 management, factories producing these items were working round the clock and ordinance factories were trying to produce personal protection equipment for medical personnel.

Ministry of Textiles and Ministry of Health and Family Welfare collaborated in this endeavour.

Defence Research and Development Organization (DRDO) developed a bio suit to keep the medical, paramedical and other personnel engaged in combating COVID-19 safe from the infection. Scientists at various DRDO laboratories applied their technical know-how and expertise in textile, coating and nanotechnology to develop the Personal Protective Equipment (PPE) using specific type of fabric with coating.¹⁰²

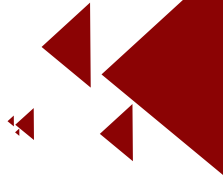
The Ministry of Textiles had set up an Emergency Control Room under the supervision of Special Secretary to monitor production and supply of medical textiles (N-95 mask, Body Coveralls and melt blown fabric). Along with senior level officers, field officers were also appointed in the emergency control room to take stock of the situation at ground level.

In order to ensure uninterrupted supply of reagents for COVID-19 testing, ICMR requested each state to identify a nodal officer to coordinate with the State Resident Commissioner stationed at Delhi for procurement /supply of reagents/ primers/probes and other related supplies to respective ICMR recognized labs for the diagnosis of COVID-19 in their states. All Private Labs and select Government labs not supported by ICMR were advised to procure reagents on their own.

Government e-Marketplace (GeM) took initiatives in the fight against COVID-19 Pandemic for quick, efficient, transparent and cost-effective purchases. A new dedicated page <https://gem.gov.in/Covid19>, for purchasing medical and allied supplies was created. The World Bank increased procurement threshold at GeM for COVID-19 Response Project, from \$ 1 Lakh to \$ 1 Million.¹⁰³

B6.2 Production, Procurement and Supplies of Essential Medical Products – April 2020

Honourable Prime Minister chaired a joint meeting of the Empowered Groups on 4th April 2020 for planning and ensuring implementation of COVID-19 response activities in the country.¹⁰⁴ The



Empowered Group 3 took charge of production and supply of essential Medical Utilities across the country ranging from PPEs to O² cylinders to ventilators.

The major challenges while initiating the production process were:

- ◆ The demand for medical supplies across the world was consistently high in the face of the global need.
- ◆ In India, majority of the essential medical supplies were imported.
- ◆ Before March 2020, India had negligible production facility for PPEs/N-95 and small production facility for ventilators and testing kits.

The strategies that the Government of India undertook in order to mitigate these challenges are discussed in detail.

The government immediately took steps and efforts of all ministries were galvanized. There was an excellent collaboration between central government, state governments and industry to revamp existing production lines to manufacture a completely unknown product from scratch. They were urged to see this as an opportunity to create supply chains and manufacturing within India by helping the existing manufacturers to expand their production capacities, identifying new manufacturers, hand holding and facilitating the manufacturers was done with right material, right technology and adequate resources for better outcomes. The Empowered Group deployed teams of officers, scientists and engineers for scaling the production. It was decided to import spares and consumables only if absolutely necessary to meet the desired timelines.

Due to the emerging pandemic and foreseeing a crisis situation, the Indian Government modified rules for procurement under General Financial Rules, 2017 as Disaster Management Act 2005 was imposed

Due to the emerging pandemic and foreseeing a crisis situation, the Indian Government modified

rules for procurement under General Financial Rules, 2017 as Disaster Management Act 2005 was imposed. Major highlights of the change in rules is as follows:

- ◆ The states could procure medical essential supplies without tendering.
- ◆ The State could procure medical essential supplies from International markets without tendering.
- ◆ The State could pay 100% advance to the manufacturer.
- ◆ The State could procure different products at different times at different price.

a) Ventilators¹⁰⁵

The ventilators that were made in India before the pandemic largely relied on foreign countries for spares and consumables. In March a national lockdown was imposed and other countries sealed their borders to prevent the pandemic. Being largely dependent on the import, procurement and supply chain shortages loomed. Department of Research and Defence Organisation (DRDO), Department of Biotechnology, Department of Science and Technology collaborated to overcome these challenges by designing valves and pressure sensors for ventilators.

In order to train large number of health professionals/paramedical staff, a video on training for ventilator support for COVID-19¹⁰⁶ was uploaded on MoHFW website on 02nd April 2020, subsequently on 19th April 2020, a webinar on mechanical ventilation for Physicians by AIIMS, New Delhi was organised.¹⁰⁷ MoHFW worked with suppliers and State Governments on Logistic challenges for installation of ventilators. Consumables were to be procured by the hospitals from suppliers as and when required directly.

The interventions undertaken to ramp up the domestic production of ventilator and the outcome of such interventions, has been discussed in detail in the earlier sections of this document.

b) Production and Supply of Oxygen and Oxygen Cylinders¹³⁰

The Government of India in a press conference stated that India has enough oxygen production and supply. On 3rd April 2020, National Health Mission under MOHFW issued a guidance note to States on supply of Oxygen to Hospitals and individual patients in a Corona infested environment.¹⁰⁸ This note informed the states about various sources of oxygen available for public health use, the components of oxygen supply systems, normative requirements and precautions to be taken for handling oxygen cylinders in a corona infested environment.

On 30th April 2020, the total manufacturing capacity of oxygen in the country was about 6400 Metric tons of which around 1000 Metric Tons was used for medical oxygen. DCGI permitted to all industrial oxygen suppliers to manufacture medical grade oxygen. This increased the capacity of medical oxygen available sixfold.

In India, there were been 5 large and 600 small manufacturers of oxygen; MoHFW mapped all the COVID hospitals with all manufacturers, States were advised to submit Medical gas stock details to the Ministry on a daily basis. 409 hospitals had their own oxygen generation plants. Number of cryogenic tankers available was around 1050.

As of 30th April 2020, 4.38 lakhs medical oxygen cylinders were available for supply and MoHFW placed an order of 103000 lakhs medical oxygen cylinders to Indian Manufactures. The states were advised to order medical gases from the existing supply chain as and when required. As per the analysis done on 03rd June 2020 of State factsheet for assessment of preparedness of COVID hospitals for 895 Dedicated Corona Health Centres (DCHC) in 24 states of India- Percentage of isolation beds having dedicated oxygen source was 59% and percentage of DCHCs having manifolds and pipeline for oxygen was 43%.

c) Material Testing Labs for PPE Kits

Initially only SITRA Laboratory (South India Textile Research Association), Coimbatore was certified to test PPE kits. Nine new laboratories were added in a short span of time across the country to ease the testing turnaround time:

INMAS- Institute of Nuclear Medicine and Allied Sciences, Delhi

DRDE- Defence Research and Development Establishment, Gwalior

ADRDE- Aerial Delivery Research and Development Establishment, Agra

6 labs of Ordinance Factory Board at Chennai, Mumbai, Muradnagar, Kolkata and Kanpur

Order for PPE kits were placed to the Indian Manufacturers with approved specifications as per demand through open tenders.

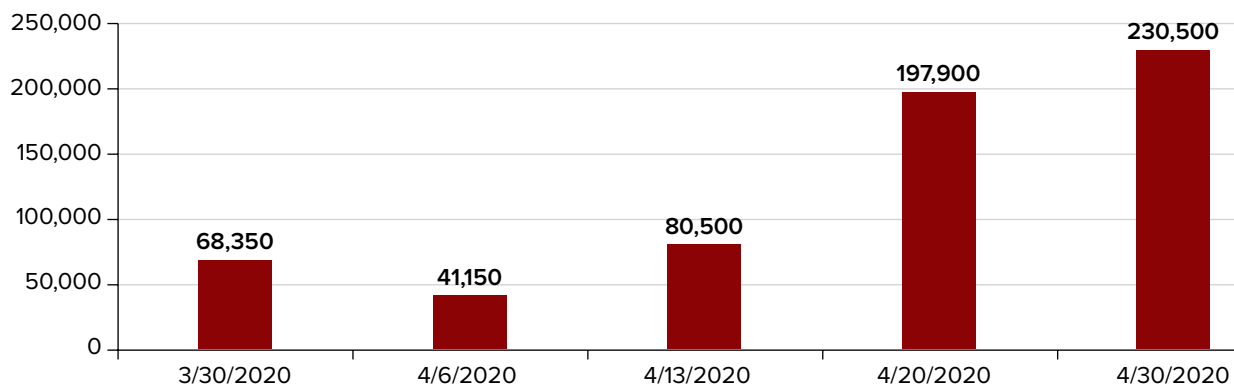
India took a giant leap in manufacturing nearly 4.5 lakh PPE kits every single day and with growth of 56 times within 60 days. Government of India increased its capacities and PPE kits manufacturing became a 7000 Crore industry. India became the second country in the world after China for mass production of PPE kits

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d) Production and Supply of Diagnostic Testing Kits¹³⁰

This section deals with diagnostic testing. Primarily, Diagnostic testing kits for COVID-19 comprise of:

- ◆ Viral Transport Medium (VTM) Kits
- ◆ RNA Extraction Kits
- ◆ RT-PCR Kits (manual and automated)

Figure 9: Domestic N-95 masks production per day

An estimated demand from April 2020 to June 2020 for Combined RT PCR machines was around 35 lakhs of which ICMR ordered 21.35 lakhs machines. Two lakh domestic orders were made and overall 13.75 lakh machines were received in the first phase. MoHFW received a demand for 8 lakh Roche kits for Corona testing of which 2 lakhs were ordered by ICMR. Each testing kit has a testing capacity of 1400 samples. For Manual RT PCR, the Ministry received the demand of 35 lakhs each for Probe, Primer and master mix. Details are in Table 10.

Table 10: Status of demand, order and receipt of products

Product	Demand	Ordered	Domestic Orders	Received
Combined RT PCR	35 lakh	21.35 lakh	2 lakh	13.75 lakh
Roche Kits	8 lakh	2 lakh	-	0.6 lakh
Manual RT PCR				
Probe	35 lakh	34 lakh	-	30 lakh
Primer	35 lakh	25 lakh	-	22 lakh
Mater Mix	35 lakh	35 lakh	-	16.4 lakh

Procurement of VTMs and RNA Extraction Kits was done by states along with central government. In order to streamline the procurement, Indian Council for Medical Research (ICMR) released an advisory for procurement of Reagents for Labs doing Real Time (RT)-PCR of Throat and Nasal Swab for diagnosis of COVID-19.¹⁰⁹

As per the analysis done on 3rd June 2020 of State factsheet for assessment of preparedness of COVID hospitals for 895 Dedicated Corona Health Centres in 24 states of India- Percentage of DCHCs not having laboratory and diagnostic services was only 11%.

e) Support by Other Ministries and Departments in Production and Logistics Supply

- ◆ Department of Pharmaceuticals, department for Promotion of industry and internal trade, MoHFW, DRDO, ICMR were part of Empowered Group 3 and supported immensely in production of essential medical supplies. The group released several advisories and guidelines on rational use of resources and on research and development of new alternatives.
- ◆ External Affairs Ministry identified external resources and imported spare parts for Indian Manufacturers for ramping up production.
- ◆ Ministry of Home Affairs coordinated with States to maintain smooth and hassle free supply of essential medical items in the country.¹¹⁰
- ◆ Civil Aviation assisted in international and domestic movement of logistics and supply through Cargo-air Bridge and Lifeline Udan Projects.
- ◆ 'Lifeline Udan' flights operated by Ministry of Civil Aviation were used to transport essential medical cargo to remote parts of the country to support India's war against COVID-19.

As of 31st May 2020, 588 flights were operated under Lifeline Udan by Air India, Alliance Air, IAF and private carriers. Air India and Alliance Air operated 317 of these flights. Cargo transported was around 940 tons.¹¹¹ Ports and Customs assisted in faster and hassle free clearance at the seaports and airports. Railways and posts also assisted in distribution of supplies. State Governments provided logistics and necessary permissions to new manufacturers and ancillary industries were opened with the help of state government.

B7. GOVERNANCE

This section documents how governance related functions (stewardship/leadership, effectiveness and efficiency, participation and inclusion, consensus-oriented decision making, rule of law, accountability, transparency, fairness and responsiveness) were enacted during this period. The GoI reoriented priorities through appropriate investment in human needs and provision of social safety nets for the poor and marginalized, strengthened institutions with inter-sectoral/inter-ministerial coordination, introducing appropriate reforms and legal frameworks such as Disaster management act, 2005 and The Epidemic Diseases Act, 1897, enhanced service capacity through appropriate reform measures that match performance, formulated new alliances with INGOs, civil society and public at large, and evolved a new framework for government and business cooperation for indigenous development and manufacture of test kits, PPE, other equipment and materials. The Box below highlights the various governance related interventions undertaken in this period.

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Box 1: Common Tools/Mechanisms used During India's Health System Response to COVID-19

<ul style="list-style-type: none"> ◆ Control ◆ Contracts ◆ Law & Declarations ◆ Market based instruments (Bans, Price Caps) ◆ Regular internal/ external audits (financial, clinical, quality) ◆ Reward or sanction of performance 	<ul style="list-style-type: none"> ◆ Collaboration ◆ Inter-ministerial and interdepartmental committees ◆ Ad-hoc committees on specific initiatives ◆ Partnerships with civil societies or NGOs
<ul style="list-style-type: none"> ◆ Coordination ◆ Common workforce qualifications, support and advice ◆ Professional advisory committees (national, regional, local, institutional) ◆ Financial measures- cost sharing, resource pooling 	<ul style="list-style-type: none"> ◆ Communication ◆ Watchdog committees (media, political, non governmental)

GoI exercised a leadership role since the start of the outbreak, undertaking the following measures:

- ◆ Issued travel advisories and planned evacuations of stranded citizens from across the world, screening incoming passengers at the airports and isolating them at pre identified camps.
- ◆ Led the evacuation of stranded citizens abroad in high risk countries and cruise ships. It also aided other neighbouring south Asian countries in evacuating their citizens.
- ◆ Public discourses by the Prime Minister on spreading awareness about the disease, providing information on measures taken by the government and for motivating health workforce.

The Union Ministry of Health and Family Welfare which led the health systems effort undertook the following:

- ◆ Established a central command centre to guide States in planning and implementing response to COVID-19 and contain its spread.
 - ◆ Constituted various task force committees, inter-ministerial committees to aid intersectoral coordination for a comprehensive response against COVID-19.
 - ◆ Ensured synergy between Centre and states, resulting in a high level of coordinated action through real time updates and a bidirectional flow of information.
 - ◆ Rapid mobilization of funds for an emergency response to COVID-19 from the World Bank, loans from international development banks, corporates and public donations and enabled 100% centrally sponsored assistance with no state share involved.
 - ◆ Held daily press briefings to update all stakeholders including public regarding progress made by the Govt to contain/mitigate the pandemic.
 - ◆ Instituted processes to involve the private sector to develop indigenous test kits, PPE, equipment and manage clinical cases.
- Responsive Guidance: The Union Ministry provided guidance to states and sharing best practices for improving service delivery by setting service standards, training the health workforce, and improving the supply of equipment, materials and testing kit for managing the response to COVID-19**
- Responsive Guidance:** The Union Ministry provided guidance to states and sharing best practices for improving service delivery by setting service standards, training the health workforce, and improving the supply of equipment, materials and testing kit for managing the response to COVID-19. The following were undertaken:
- ◆ Re-organizing and purposing available facilities for appropriate care to patients as COVID Care Centres, COVID Health centres and COVID Hospitals and enabling sharing of state level strategies for creating makeshift hospitals, fever clinics and screening centres.
 - ◆ Improving service standards by issuing guidance documents for all aspects of service delivery for all stakeholders at every level. This included guidelines for contact tracing for frontline workers, screening of suspect cases at airports for immigration officials, setting up quarantine and isolation facilities for civil services, clinical case management for clinical health workforce and testing strategy.
 - ◆ Encouraged online sessions and trainings of health workforce by coordinating with different institutions such as AIIMS for training on all the required guidelines and guidance on clinical management by specialists. By 20th April, >6 lakh views were recorded for webinars by AIIMS and >1.77 lakh enrolments were made for programs on the iGOT platform of more than 95,000 unique candidates.
 - ◆ Creative use of media platforms such as print, tv, mass SMS, radio, caller tunes, dedicated helpline for universal reach, and focused on specific target populations, and considering access to internet.
 - ◆ Updated all guidelines and advisories as and when new evidence came to light or when situation regarding the spread and extent of disease changed.
 - ◆ Launched online data pool of state wise HR and volunteers to help States prepare for contingency plan based on available HR. Information on doctors, nurses, paramedics who had retired from central government services in last 5 years was collected and their location shared with States to facilitate their engagement, subject to their willingness.
 - ◆ Advised/tasked the states to fill all the required vacant positions in IDSP program within 4 weeks. Human Resources from Railways, PSUs, ESIC were also mobilised to help meet HR shortages.
 - ◆ Various financial and non financial incentives were provided to the health workforce for working during this pandemic. Govt. announced Pradhan Mantri Garib Kalyan Package for frontline health workers as they are highly vulnerable to getting the infection. States

offered financial incentives, psychological support, food and accommodation also.

Participation and Consensus Oriented Approach

- ◆ Government of India constituted 11 Empowered Groups under Disaster Management Act 2005 to formulate plans and provide solutions to fight against COVID-19. These groups were empowered to identify problem areas and provide effective solutions therefor; delineate policy, formulate plans, strategize operations and take all other necessary steps for effective and time-bound implementation of these plans/policies/strategies/decisions in their respective areas.
- ◆ Facilitated States and Districts for further decentralizing decision making as most disaster management plans need to be undertaken at district level depending on the severity of effects and available resources. Untied funds per district up to Rs. 1 crore was provisioned.
- ◆ Other institutions such as AIIMS, also contributed in sharing their expertise in clinical management and made webinars and conducted online trainings to train the workforce.
- ◆ Regular video conferencing became a norm for all:
- ◆ Administrative staff of central and state governments for coordinating implementation activities
- ◆ Ministers in central and state governments for updating situation in states and decision-making
- ◆ Govt declared National (1075) and State helpline numbers including e-mail address for reporting of suspect COVID-19 cases, so that every citizen of the country could be involved in case reporting and contact tracing.

Fairness

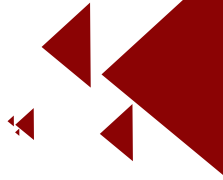
Gol ensured its citizens feel secure and feel included in the mainstream of the society in

its strategy to fight the pandemic. All groups, especially the vulnerable, were provided the opportunity to maintain well bring.

- ◆ Issued separate focussed guidelines for managing spread of COVID-19 in urban settlements such as slums, urban villages.
- ◆ Established distribution system for food and medical supplies for residents in containment zones.
- ◆ Arranged transport via buses and trains so that migrants could go back home and issued guidelines for institutional quarantine in their panchayat/village.
- ◆ Ordered closure of schools, colleges and workplaces, cancellation of mass gatherings, suspension of public transport and general advisory for avoiding public places and maintain social distancing.
- ◆ Testing and treatment for COVID-19 was included in AB-PMJAY package and CGHS.
- ◆ Regulated businesses and private sector involvement by banning exports of face masks foreseeing surge of demand, price capping of tests for COVID-19, developing indigenous tests for COVID-19 and patent sharing to scale up production and supply, expanding capacity of manufacturers to mass produce PPE, involving private hospitals to set up testing booths and manage mild/moderate/sever COVID-19 cases and the hospitality sector for establishing institutional quarantine facilities for public and health workforce

Rule of Law

Two acts in the constitution have been evoked for responding to the pandemic. Disasters Management Act, 2005 accords more power to the Central government and National Disaster Management Authority. The Epidemic Diseases Act, 1897 accords more power to the States: States have applied their powers under this act by regulating the movement of people and timings of shops etc.



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- ◆ Disasters Management Act, 2005 accords more power to the Central government and National Disaster Management Authority: Govt evoked this act to decentralize decision making and funds utilization to the states and district level as severity and spread of disease varied inter- and intra-states.
- ◆ The Epidemic Diseases Act, 1897 accords more power to the States: States have applied their powers under this act by regulating the movement of people and timings of shops etc. The act was also amended to include protection for healthcare personnel combatting epidemic diseases and expanding the powers of the central government on 22nd April 2020.

Accountability and Transparency

Gol followed the rule of law and was transparent about all its decisions and communicated all the steps taken to respond to the pandemic with the media and the public regularly. Its role, in comparison to other actors in governance such as civil society and private sector, in decision-making and implementation increased. This was done to safeguard the interests of the public. Key actions include:

- ◆ Ensured that the general public was provided with correct information about the pandemic. Care was taken to prevent misinformation and the media was updated by daily press briefings.
- ◆ Launched digital portals so that public at large could access IEC related to COVID-19 and data on daily new cases, recovered cases, hospitalized cases, deaths due to COVID-19 daily.
- ◆ Engaged with Ministry of Electronics and Information Technology to launch Aarogya Setu App: a Bluetooth based electronic system for contact tracing, mapping of hotspots and dissemination of relevant information pertaining to COVID-19. updated the IVRS feature so that users with feature phones and landlines could also be included in the system.

- ◆ All information collected from States regarding active, recovered and hospitalized cases were shared on Health Online Portal by the Govt.
- ◆ It motivated health workforce to work despite the danger to themselves by providing financial and non-financial incentives.
- ◆ Enabled decentralization by according more power to the states and districts in resource management and implementation of guidelines. Districts with adequate information could declare to be in red/orange/green zones and follow the appropriate mitigation strategy.

B8. FINANCING

COVID-19 has placed an unprecedented burden on health system of the country. Govt has provided a strong financial impetus in strengthening the Health system of the country, which was already being funded through the National Health Mission. The Govt enabled loans from various lending institutions, and created mechanisms for voluntary contributions from the public and corporate sectors. The MoHFW also facilitated states in re-allocation of funds to meet the COVID related needs of health facilities, enabled price capping in the private sector and facilitated reforms in the insurance scheme.

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Leveraging Additional Funds

- ◆ The World Bank's Board of Executive Directors approved a fast-track \$1 billion to **India COVID-19 Emergency Response and Health Systems Preparedness Project** to help India prevent, detect, and respond to the COVID-19 pandemic and strengthen its public health preparedness, largest ever health sector

support from the Bank to India. The focus of these first efforts is to help health systems tackle the immediate challenges of COVID-19 covering all states and Union Territories across India. The project is financed from the International Bank for Reconstruction and Development (IBRD) in the amount of \$1 billion, of which \$350 million is provided through the World Bank Group's COVID-19 Fast-Track Facility. The New Development Bank of the BRICS countries fully disbursed USD one billion emergency assistance loan to India with the view to assist in containing the spread of COVID-19. The loan could be utilized for Healthcare Sector Emergency Response and Strengthening Social Safety Net for expenditures (already incurred since 1st January 2020 to prospective expenditure associated with COVID-19 up to March 2021).

- ◆ The general public and corporate sector also made generous contribution in the form of donations to Prime minister's Citizen Assistance and Relief in Emergency Situations (PM-CARES) Fund aimed at strengthening the fight and further availability of quality treatment and encourage research on ways to beat coronavirus disease.

The India Covid-19 Emergency Response and Health Systems Preparedness Package (Covid Package), a 100% Centrally Sponsored Scheme financed through support from the World Bank and other Financial Institutions, sanctioned on 05.04.2020, has provided an estimated amount of Rs. 15,000 crores to support preparedness and prevention related functions that would address not only the current Covid-19 outbreak but also any such emergencies in future

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current COVID-19 outbreak but also any such emergencies in future. It has been noted that it is imperative to not only focus on the present circumstances, but take a futuristic approach to developing a robust and resilient health system. The package has three components - Immediate (Jan 2020-June 2020), Short-term (July 2020-March 2021), and medium-term response (April 2021 to March 2024).

- ◆ The COVID Package of about Rs. 7500 Crores is allocated as follows: Rs. 4150 Crores for Strengthening National and State Health Systems to support Prevention and Preparedness, Rs. 1400 Crores for Strengthening Pandemic Research and Multi-Sector, National Institutions and Platforms for One Health, Rs. 1050 Crores for Community engagement and Risk communication, and Rs. 900 Crores allocated for Implementation, Management, Capacity Building, Monitoring and Evaluation.
- ◆ Multiple flexibilities have been provided in the pre-existing rules for drawing and disbursement of funds:
 - ▶ Resources made available under the Package supplement the resources provided for the Health Systems Strengthening Pool under the National Health Mission and are in addition to the resource envelope indicated to states for FY 2019-20 & 2020-21.
 - ▶ Allocation of resources to districts to be based on the stages/severity of the COVID-19 outbreak in districts.
 - ▶ Untied Funds of Rs. 1 Crore per district, (Rs. 70 lakh per district, issued to each district with an additional pool @ Rs. 30 lakh per district available at the state level to supplement the need for funds for high COVID-19 burden districts, wherever necessary) has been made available, considering that several interventions spanning public health and primary and secondary care will need to be undertaken at the district level.
 - ▶ The Emergency Response Plan is expected to be developed by the District authorities on the lines of District Disaster Management Plan, and is aimed at enabling district funds

allocated for epidemics to be used for immediate procurements, medicines and other emergency service provisions.

- ▶ Additional funds under HSS pool of FY 2019-20 have been released to the states on 6th April 2020. States may use these funds and other flexibility to hire for additional HR and services supplies that are required to ensure that COVID related activities are undertaken along with existing essential services.
- ▶ Resources available in other pools (other than HSS pool) are also allowed to be utilized on loan basis at the state level.

Price Capping Mechanisms

- ◆ Guidelines were laid down by ICMR for COVID-19 testing in private labs in India and the National Task force, which recommended that the maximum cost for testing sample should not exceed Rs. 4500 (including Rs. 1500 as a screening test for suspected cases and an additional Rs. 3000 for confirmation test). ICMR also encouraged free or subsidised testing in the hour of national public health emergency. This was done with due consideration of the financial burden on people seeking care at private facilities.
- ◆ The price ceiling was only removed once it was clear that due to varied options of testing materials/kits, including indigenous ones, the prices are becoming competitive and undergoing reduction, and testing supplies are stabilizing and procurement of such kits can be done from the local market.
- ◆ With the removal of price ceiling, all state governments/UT administrations have been advised to negotiate with private labs and fix up mutually agreeable prices for samples being sent by the government and also for private individuals desirous of testing by these laboratories.
- ◆ The State of Tamil Nadu, based on consultations with laboratories and various stakeholders, has directed private laboratories to reduce the price of COVID tests to Rs. 3,000 with the provision

of charging additional Rs. 500 for home tests, given that the number of tests would increase substantially in the time to come.

Reforms in the Insurance Sector

- ◆ The Ayushman Bharat Pradhan Mantri Jan Arogya Yojana (AB-PM JAY), is intended to provide secondary and tertiary care for the poorest and most marginalized of India's population and covers about 40% of the population. However, since 4th April 2020, testing and treatment for COVID-19 has been made available under the scheme. Beneficiaries could avail free testing through private labs and treatment for COVID-19 in empanelled hospitals under PMJAY and by private labs approved/registered by private labs approved/registered by ICMR, reducing the burden of PMJAY scheme.

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- ◆ The decision has helped over 2,300 patients avail free treatment for COVID-19 in various hospitals and more than 3,000 to get tested for the novel coronavirus. This was an important step to enhance scope and capability to move towards UHC in the current emergency scenario.
- ◆ Private insurance companies including ICICI Lombard Health Insurance and Star Health and Allied Insurance, have also initiated providing dedicated policies for COVID-19 to the population.
- ◆ Public sector insurance schemes such as CGHS also initiated reforms, especially in

medicine dispensation for chronic diseases. CGHS beneficiaries getting medicines for chronic diseases were allowed to purchase medicines based on the prescription held till 30th April 2020 irrespective of non-availability certificate from CGHS or otherwise. This had have the dual effect of maintaining social distancing norms and ensuring that beneficiaries don't have to suffer OOPE on their existing drug regimes in light of the current emergency.

- ◆ Recognizing the vulnerability of frontline health workers and the need to ensure financial cover given the fairly high risk of infection the Central government announced the Pradhan Mantri Garib Kalyan package, an insurance scheme for health workers fighting COVID-19 to provide an insurance cover of Rs. 50 lakh for 90 days to a total of around 22.12,00,00 public health care providers, including community health workers, who may have to be in direct contact and care of COVID-19 patients and who may be at risk of being impacted by this. The insurance is provided by New India Assurance Company limited, will be available for 90 days and will extend to Private hospital staff/retired/volunteer/local urban bodies/contract/Daily wage/Ad-Hoc/outourced staff requisitioned by state/central hospitals/autonomous hospitals of central/state/UTs, AIIMS & INIs/ Hospitals of central ministries drafted for COVID-19 related responsibilities.

B9. INFORMATION SYSTEMS

B9.1 Portals/Dasbboards

IT Systems

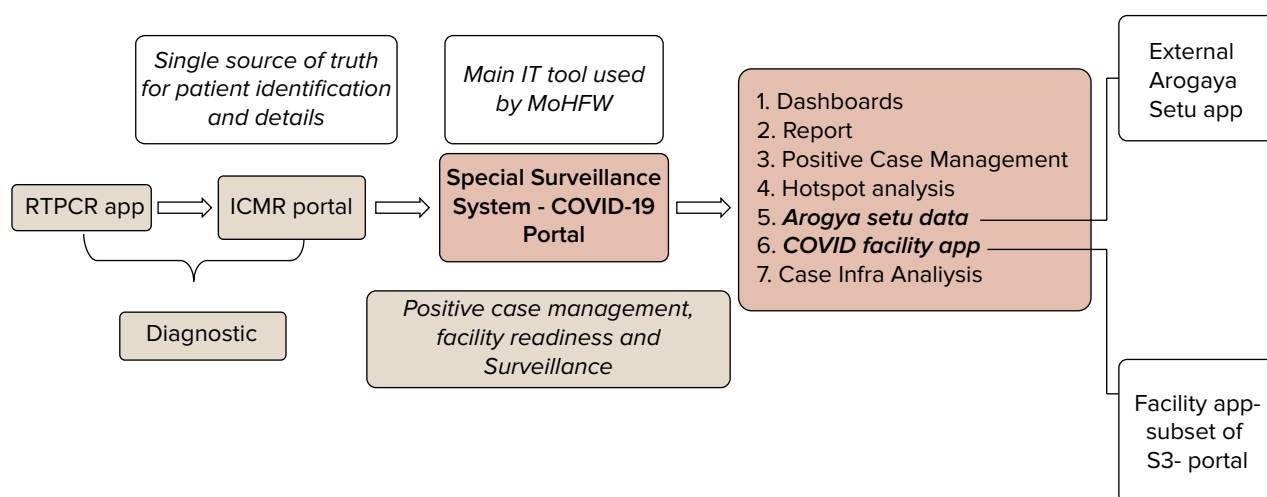
Robust Information system have increasingly become an essential requirement for planning and monitoring for any programme. This requirement was felt much more strongly to manage COVID-19 and build a mechanism for effective disease surveillance.

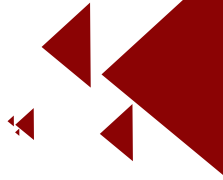
Key IT systems developed for planning, surveillance and patient management included:

1. RT-PCR application
2. ICMR portal
3. Special Surveillance System (COVID-19 Portal)
4. Facility application
5. Arogyasetu application

1. RT-PCR Application

The starting point for all data entry is the **RTPCR android application** developed by NIC, which can only be used by all authorised sample collection centres and captures details from **Specimen Referral Form (SRF)**. The application captures details of all individuals for whom the sample is being collected for





RT- PCR test and generates an SRF ID for the sample collected. Application for Rapid Antibody test kit has been developed but will be launched shortly.

2. ICMR Portal

As the testing and treatment modalities were guided by ICMR, it was also made the single source of truth for collecting patient data. The **ICMR portal**² (<https://cvstatus.icmr.gov.in/>) uses SRF IF to prepopulate patient data captured in the SRF. Subsequently **ICMR unique ID** is generated after sample is accepted for testing and test is conducted. This portal captures details up to the testing results of individuals as the case management does not come under the purview of the ICMR. Hence all patient data from ICMR portal is shared with multiple users v.i.z, **Special Surveillance System** (S-3) portal, NDMA and NIC hub. In addition, the ICMR portal also provides updated list of all certified laboratories and collection centres with location details.

3. Special Surveillance System

Special Surveillance System commonly known as COVID-19 Portal or S3 (**Covid19.nhp.gov.in**) is the main IT platform used by MoHFW and state counterparts for planning, patient tracking and surveillance. Development work for the portal started in the month of January, 2020 mainly for surveillance of passengers to assess the status of passengers who were symptomatic, hospitalized and migrated out. This was further expanded to include multiple features as the COVID-19 cases increased in the country.

The main users of the portal are at state and district level who can do data entry and also access the reports and dashboards. In addition, access to data is also available for all other important key stake holders v.i.z, PMO, Cabinet Secretariat and NDMA and Boston Consulting Group. NIC hub has been created on recommendation of Empowered Group -9, to facilitate collection and

sharing of data with various stake holders as per requirements and protocols.

Key Features of the Portal Include

a) Positive case Management

After completion of the test, the entire patient data is synced from **ICMR portal** with **S3** through API. The portal maintains list of positive of patients which is also shared with the National Centre for Disease Control (NCDC) at national level and surveillance officers at state (SSO) and district levels (DSO) under IDSP. The NCDC teams utilize S3 data along with the field level system of manual data collection through surveillance officers to reconcile data and ensure that all patients and their contacts are covered.

The ICMR ID is the main reference ID utilized as unique ID. Till the month of April (with 5000 cases), the Surveillance ID issued by NCDC was used as main ID which was subsequently replaced with the ICMR ID after deployment of the ICMR portal.

This module provides detailed status of number of tests conducted and number of positive cases. In addition, detailed current status of active patients classified mainly as Home Isolated, Hospitalized and Isolated at Camp and outcomes v.i.z, Active, Recovered, Death or Migrated are collated on the portal. In addition, contact tracing undertaken by health workers for each patient as well as list of individuals under quarantine is also captured on the portal.

b) Hotspot Analysis

The hotspot analysis module generates list of areas identified as hotspots based on number of patients entered on S-3 system and trends to generate state wise list of districts which are contributing 80% or more cases to the all India figure. Technical inputs for development of tools to forecast emerging hotspots and peak load analysis was provided by experts from EMR Division, NCDC, IIT, AIIMS, KPMG and BCG teams.

2. Developed by ICMR and managed by NIC



c) Case and Infrastructure Analysis

In addition to the patient related data, the districts also enter the facility level data for facilities categorized as Dedicated COVID Care centres, Dedicated COVID Health Centres and Dedicated COVID Hospitals. This module captures readiness of the health facilities in terms of bed strength, ventilators, Oxygen capacity, availability of PPE and N-95 masks, essential medicines and compatibility to Biomedical Waste System as per the three categories. These details are utilized by S-3 to inbuilt predictive tools to estimate the peak load for districts and forecasting the requirement for additional infrastructure and logistic by assessing the duration for which the current availability of infrastructure and logistics will be adequate. District wise projection of infrastructure requirement and logistic requirement is also made based on current number of cases to facilitate planning. To improve the access to services, a new feature for grouping of districts with nearest COVID-19 centres and dedicated facilities has been enabled on the portal.

Reports are also generated about availability of ambulances and quarantine facilities with details of no. of beds, toilets and availability of dining services.

d) Arogya Setu Data

Data of COVID-19 patient is shared with Arogya Setu application automatically through ICMR portal. If the Arogya Setu application has been downloaded by the patient / mobile number then their status is alerted as red and all individuals who have come in blue tooth contact are identified for contact tracing. Details of individuals covered under contact tracing are shared with the SSO and DSO to initiate action as per protocols for quarantine and testing.

4. COVID Facility Application

A facility application has also been launched recently to enable facility level entry about patient details (admission, treatment and outcome details) and availability of infrastructure and inventory of essential items. Data for all positive cases flows

from S-3 portal to the facility application for further updation. The adoption of application is nearly about 50%:

- ◆ Training of state and district users on S-3 portal is conducted on a regular basis through virtual platform. This include orientation of the State Mission Directors and Principal Secretaries, nodal officers at state and district level. Resource material like videos and user manuals are regularly updated on the portal for easy access of the users. In addition, support groups have been created at various levels to resolve the issues raised by the users.
- ◆ Few states like – Delhi, UP, Tamil Nadu and Rajasthan have developed state specific portals hence data updating on the S-3 portal is irregular. All states provide consolidated figure on four parameters (active, death, discharged and migrated) which is synced with the National dashboard every evening as reconciliation of portal data is not yet complete.
- ◆ With regards to comorbidities, SRF forms captures underlying conditions and risk categorization (severe, moderate or mild risk) is done by individuals filling the form. However detailed analysis on risk profiling based on age and health conditions is currently not available on the portal. The portal has recently created a link for sharing of data on patients with NCDs from CPHC–NCD application to enable tracking of patients with co-morbidities.

5. Additional Portals

like <https://Covid19cc.nic.in/> have been created by NIC for ICMR for improving access to public for information about collection centres and laboratories providing testing facilities. Testing status/ results can also be viewed by the patients using the sample ID and mobile number.

6. Arogya Setu Application

Arogya Setu application was developed and launched by MeitY in the month of April, 2020.

The main objective of the app is to enable early identification and prevention of potential risk of infection through contact tracing and self-assessment features, identification of potential hotspots to control and mitigate the spread of COVID-19.

The application has following key features:

- ◆ Automatic contact tracing using Bluetooth
- ◆ Self-Assessment test based on ICMR guidelines
- ◆ Identification of Risk Status of Users
- ◆ Provide updates and advisory related to COVID-19
- ◆ Generate Geo-location based COVID-19 statistics and Nationwide COVID-19 statistics
- ◆ Provide important information related to Emergency COVID-19 Helpline contacts and List of ICMR approved Labs
- ◆ Integration with e-Pass portals

Arogya Setu app is available for smart phones i.e., android, IOS and KaiOS phones in 12 languages (English, Hindi, Gujarati, Punjabi, Telugu, Odia, Marathi, Bengali, Kannada, Tamil and Malayalam and Assamese). In addition, Arogya setu services are also available for users of feature and landline phones through IVRS (Interactive Voice Response System) services available in 11 languages. Hence feature phone/ landline users receive return call if they give a missed call to toll free number 1921 and self-assessment similar to the questions on Aarogya Setu app are administered. A summary of their health condition is sent via SMS after self-assessment. Data of self-assessment is shared with National Health Authority, from where a call is generated to the individuals identified to be at higher risk for confirmation and further guidance.

Until November 2020 the Aarogya Setu app has over 134 million users. Review of data indicates that app has supported focused efforts through identification of individuals who need testing though contact tracing or findings of self-assessment. The information of self-assessment and bluetooth enabled contact tracing is being

used to identify emerging hotspots and forecast hotspots based on artificial intelligence tools developed by IIT Madras in collaboration with other stakeholders. Over 3,500 hotspots were identified across the country at sub-post office level through the application.

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ITIHAS (IT-enabled Integrated Hotspot Analysis System)-Arogya Setu Coupled System - In Order

ITHAS was developed by IIT Madras in coordination with MeiTY. The tool initially relied on inputs from NDMA, which provided 15 days record of cell tower association details with location for all COVID patients. This information is analysed for every latitude and longitude scores are generated which reflects the status of COVID infection in that area. The analysis was first conducted on 10th April 2020 to predict four category of areas – Red, Pink, Amber, Deep Blue and Light blue spots, indicative of the incidence of COVID in a particular area up to the level of sub post office level and cell tower.

Subsequently from 22nd April 2020 onwards inputs from Arogya Setu application about self-assessment and bluetooth contact tracing details with location were also integrated. This further increased the accuracy of the prediction of emerging hotspots. The system is capable of projecting a cluster development in 300meter geography. The system can be accessed through sacess.nic.in portal.³

The tool has been enabled for use on mobile phones with google map linkage for the ease

3. Virtual web based private network (VPN) provided by NIC

of access to Surveillance officers to prioritize specific areas (starting from top two cell towers) for initiating field-based surveillance. Feature on calling the AS self-assessment users for Surveillance officers for follow up has recently been added.

Ahmedabad protocol

The tool was piloted in 137 pink areas in West Ahmedabad. A team of 1500 Health workers surveyed 1.6 Lakh houses i.e, 6 L individuals and collected 321 samples for testing from these areas. Around 30% of the samples collected tested positive which is much higher than the expected positivity rate of 8-10%. Thus, indicating that the tool was able to identify areas which needed focused efforts for surveillance and follow up.

B9.2 Call Centre for Grievance Redressal & Health Helpline

Background

The COVID pandemic necessitates provision of accurate information and assistance to the public related to actions based on whether they are suspects or confirmed cases. Some require quarantine while some others may need dedicated medical care. People need clarification about the disease, testing, health facilities etc. To accommodate this increased demand, a robust call center capable to handle such calls was felt. Of the 11 empowered groups set up to ensure a comprehensive and integrated response to the COVID-19 pandemic. Three were formed for a) Information, Communication and Public Awareness, b) Technology and Data Management and c) Public Grievances and Suggestions:

- ◆ The National Monitoring Dashboard (<https://darpg.gov.in>) was developed by DARPG in pursuance of the recommendations of the committee on Public Grievances and Suggestions to ensure timely implementation of COVID-19 Response activities. COVID-19 related grievances received for all Ministries/ Departments and States/ Union Territories are monitored on priority basis by a technical team of DARPG.
- ◆ On 25th January 2020, a 24x7 NCDC Call Centre (+91-11-23978046 or 1075) was operationalized. The call center was utilized to provide details of district and state surveillance officers to those who seek them; and in case of any clinical query, direct the concerned to the relevant Integrated Disease Surveillance Programme (IDSP) officer. Some of the states and UTs utilized their own call centers as helplines for COVID-19 related information. 15 states/ UTs utilized their 104 Call Centers for registration and resolution of grievances and as health helplines during COVID-19. A decision was taken to integrate the existing 104 call centre for Grievance Redressal and Health Helpline with 1075 NCDC call centre to cope up with increasing calls from public. A Joint Secretary level officer in the Ministry of Health and Family Welfare was made nodal officer to co-ordinate this and operationalize integration.
- ◆ 104 call center for Grievance Redressal & Health Helpline (GRS & HHL), as part of accountability framework, provides a platform to the community to share their concerns and suggestions to make the public healthcare delivery system more responsive to their needs which further creates patient centric environment. It helps the states in establishing and effectively operationalizing a client friendly, dedicated and transparent system for providing information and redressal of grievances.
- ◆ In crisis situations like the ongoing COVID-19 pandemic, it is important to enable transparent e-governance delivery in real-time and answering citizen queries swiftly, and at scale. State helplines for COVID-19 were integrated with national COVID help line number 1075. Initially, the queries were related to information regarding COVID-19 symptoms, testing facilities etc. After the lockdown was announced and migration started, the calls received in national and state call centers started increasing. Some of the states and UTs informed that calls from other states were coming to them and it was difficult to give information to the public on such queries since states/UTs did not

have data/information from other states. It was then found that the diversion of calls to other states/UTs was due to telecom circles being used to integrate the helplines which led to overlapping of circles. Additionally, due to Mobile Number Portability, many citizens were using other states' phone numbers in their home states. To address to this issue, smaller states were delinked from bigger states' telecom circles. As a long term solution, Gol switched to based (location) routing. Call center executives were educated to provide respective state's helpline numbers. To generate awareness for national and state helplines, several IEC platforms such as print, digital, social media were utilized. This led to an increase of 201% of calls in April as compared to calls received in January. Bihar saw a rise of 700% calls in March in comparison to calls received in January. A total of 86,73,122 calls were registered in four months – January to April (as per data received from 18 states) for 104 GRS & HHL.

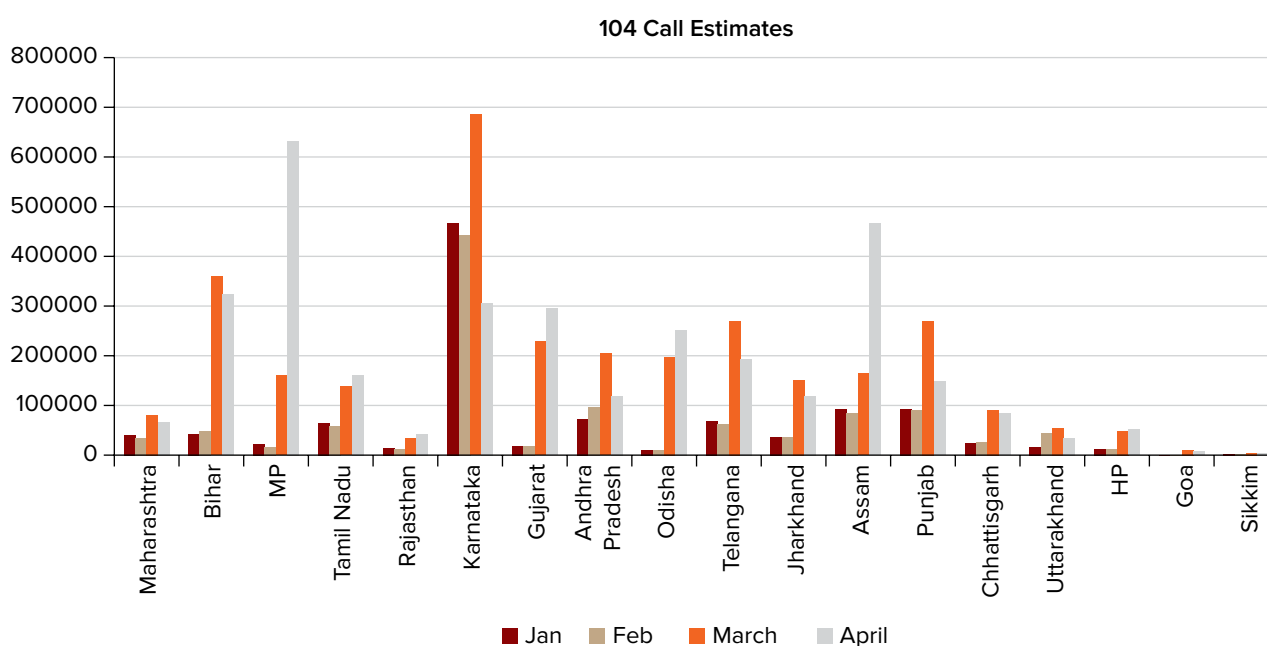
- ◆ This system was implemented through three components i.e. Help Desk, Call Centre and Web portal. All three components registered

the grievances, informed the concerned authority and gave the feedback to the complainant. Timely redressal of grievance was imperative for satisfaction of clients.

- ◆ During the COVID pandemic, and the restrictions imposed on routine activities as part of distancing norms to prevent the spread of the disease, scores of migrant workers moved back to their native places. Many of them however, were stuck at borders, including state, district and at national border areas. These were the most marginalized sections of the society dependent on daily wages for their living. Immediate concerns faced by such migrant workers related to food, shelter, healthcare, fear of getting infected or spreading the infection, loss of wages, concerns about the family, anxiety and fear. 104 Call Centre served as a life-line for many people during this crisis by providing information, registering complaints and redressing grievances.

Data received from 18 states showed an increase of 201% calls from January to April 2020 (Figure 10).

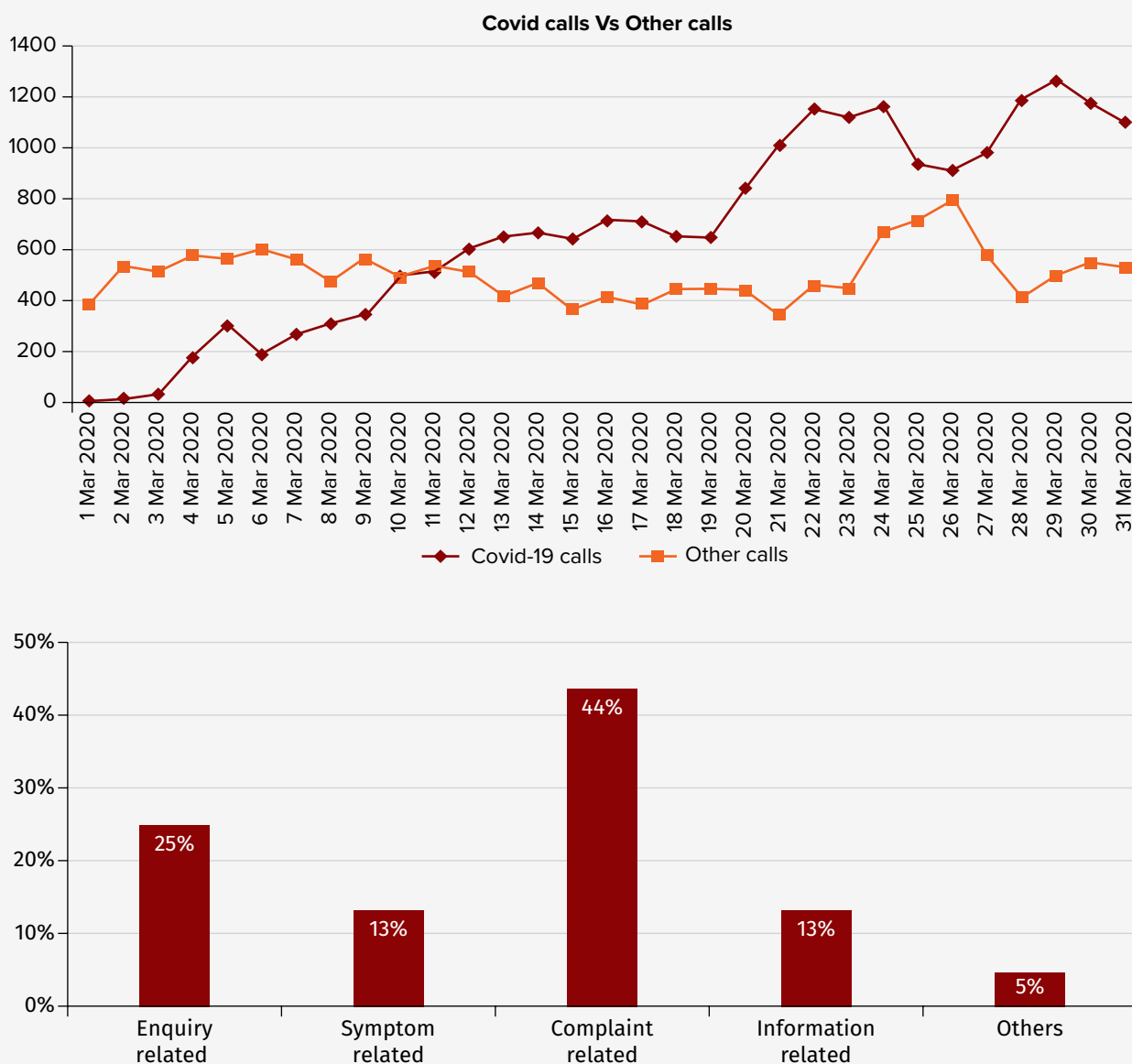
Figure 10: Status of 104 calls over four months (18 states)





Case Study – Maharashtra

As the COVID cases started rampantly increasing in the country, many states saw a spike in numbers of calls received. Many of these calls were enquiry related. One such example from Maharashtra's 104 call center is placed below:

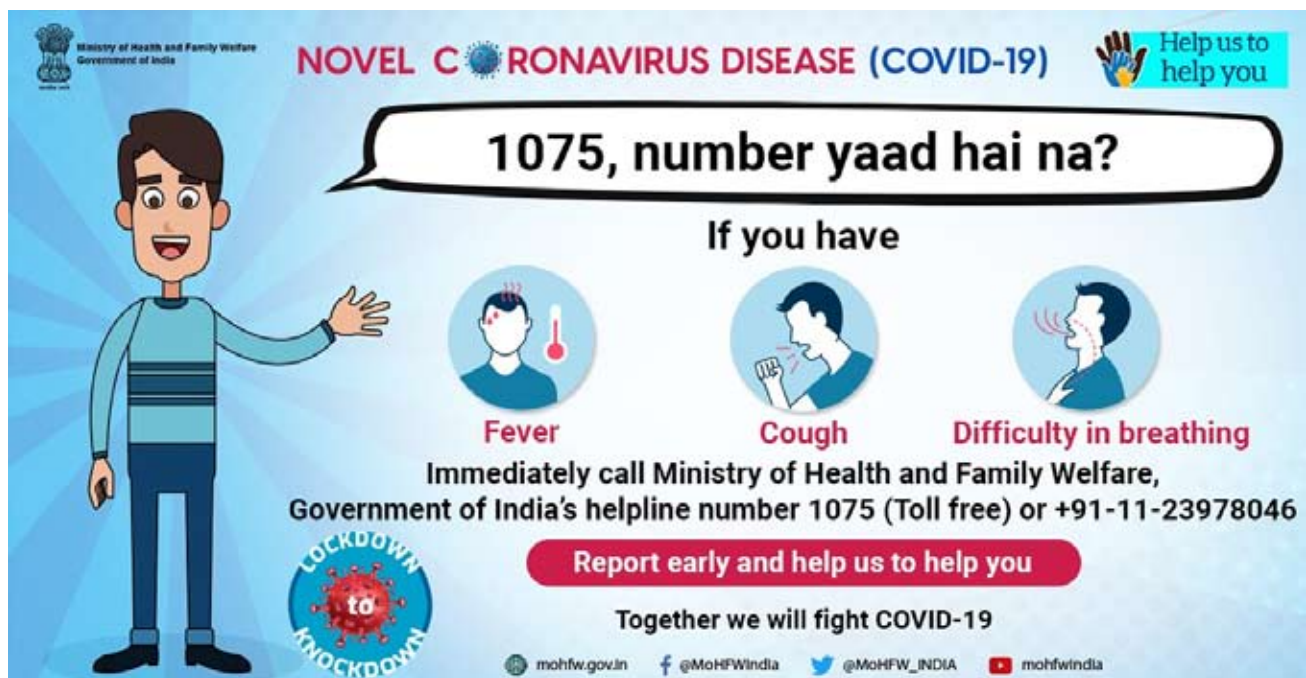


1075 NCDC Call Centre

As a part of the public health surveillance and response management, technical guidance, laboratory support and to address public concerns, a 24x7 helpline for COVID-19, 91-11-23978046 or 1075 was setup under NCDC on 25th January 2020. Several State helplines for COVID-19 were integrated with this national

COVID helpline number. Some states also initiated district level helpline numbers synchronized with Disaster Management Cells to resolve localized COVID related queries.

As on 24th March 2020, at the time of announcement of lockdown, over 2 lakh calls had been answered and responded to at the Control Room, while nearly 52,000 emails were answered.



Psychosocial Support

NIMHANS started a helpline inclusively for psychosocial support and mental health services during disasters. The helpline addressed the psychosocial issues of disaster survivors and created a tertiary level support system for them during emergencies. It is a 24 x 7 toll free helpline. This number was used on a large scale during COVID pandemic.

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Many NGOs engaged in counselling for issues pertaining to COVID-19. These issues included nervousness, fears of contamination, constant reassurance-seeking behaviours, panic attacks, sleep disturbance, excessive worry and feelings of helplessness etc. Probability of an economic slowdown, potential job losses, financial burden,

domestic violence, uncertainty about future possibilities, fears of running out of food and necessities etc. were additional worries which led to increased number of calls. Establishing call centre helped the public and also service providers and NGOs, self-help groups engaged in counselling.

Department of Administrative Reforms and Public Grievances, Public Grievances Division

An order was issued by DARPG, Govt. of India dated 30th March 2020, on 'Handling public grievances pertaining to COVID-19 in ministries / departments of government of India. A similar order was also issued for grievances related to states. As per the orders issued:

- ◆ Every Department/ Ministry/State appointed a designated Nodal Officer for handling COVID-19 Public Grievances. The name, phone number and email ID of the designated Nodal Officer was placed on the website of the concerned Department/ Ministry/State and was widely publicized.
- ◆ Every Department/Ministry/State website had a separate field in CPGRAMS to cater to COVID-19 grievances for more focused

tracking, monitoring, and disposal of public grievances.

- ◆ Considering the importance of prompt redressal of such grievances, every Department/Ministry/State paid high priority and closely monitored COVID- 19 public grievance redressal in a time bound manner on their respective Dashboards.
- ◆ In Departments/Ministries/State where CPGRAMS version 7.0 had been implemented, mapping of the COVID-19 grievances was done to the last mile grievance officers.
- ◆ Considering the urgency and importance of redressal of COVID-19 grievances, every Ministry/ Department/State had to prioritize expeditious quality redressal of these grievances at the earliest preferably within a timeline of 3 days to provide redressal.

Learnings from this process could be utilized as an opportunity to scale up the reach of call centers to the last mile.

COVID Call centers during the course of pandemic have aided in establishing direct contact with citizens. Several initiatives taken by the government have helped people in getting clarification or information about the disease, testing, health facilities etc. Call Centre executives, especially during crisis, have supported with correct, timely and vital information in local language. They have rendered unstinting service to the nation during this hour of need. Establishing such resources with direct contact to the public will also be an important resource for information on events happening in the community in future. So, this is an important source for getting community involvement on various public health issues.



C. Cross Cutting Areas

C1. PARTNERSHIPS

MoHFW and state governments are collaborating with various for profit and not for profit organizations for different purposes, including technical guidance, financial aid and implementation. Various government supported institutions such as AIIMS and other medical colleges, public health institutes, other autonomous institutions such as CDAC collaborated with MoHFW in providing technical guidance in their respective domain areas. International and local development partners have also provided technical guidance and implementation support. MoHFW has collaborated with private sector (for profit and not for profit) in different areas, namely infrastructure (for health facilities, isolation and quarantine facilities), human resources, manufacturing and supply of PPE, diagnostic kits, equipment, medicines, developing IT solutions, and service delivery including testing, management of COVID cases and provision of essential non COVID services. The following section provides details regarding these different partnerships.

C1.1 Development Partners

1. World Health Organization

- ◆ Technical support for planning and implementation.
- ◆ WHO Country office is part of Joint Monitoring Group (JMG) headed by DGHS, on Emerging Diseases and provides regular updates and technical guidance on risk assessment and reviewing preparedness and response. WHO country office works with NCDC and ICMR for guidance on testing and research and development related to COVID-19. Field functionaries of WHO engaged in National Public Health Surveillance Project, Tuberculosis, Neglected Tropical Diseases, Hypertension Control Initiative and Health System Strengthening are involved in COVID-19 response measures. WHO provides assistance at state and district level for strengthening surveillance and response measures, including capacity building of rapid response teams, supporting contact tracing, facilitating mock drills, developing IEC material etc.
- ◆ WHO supported assessment of functionality of district hospitals dedicated to COVID-19. Technical support is provided for strengthening COVID-19 Special Surveillance System through the Integrated Health Information Platform (IHIP). Community Preparedness Checklist' was developed for use by Gram Panchayat/Village Health & Sanitation Committee for strengthening community preparedness for COVID-19.
- ◆ WHO along with UNICEF supported MoHFW in developing communication campaigns. It

partnered with various social media platforms like WhatsApp and Facebook to launch *WHO Health Alert messaging service*, to increase access to reliable information. WHO is supporting MOHFW, UNICEF and partners to establish an Interfaith Corona Coalition to engage religious community in action against COVID-19. A campaign to address the issue of stigma, in the society both against COVID positive cases and the medical community, was also supported by WHO.

- ◆ WHO is supporting research and evidence generation. WHO is working with the National AIDS Research Institute (NARI-ICMR) for WHO SOLIDARITY trial. A survey to assess the situation of COVID-19 awareness in urban slums through a participatory survey is also supported by WHO. The country office is conducting rapid assessment of availability of essential health services in 10 States and 30 districts with support from the WHO Field Staff to capture the current situation and document local solutions adopted by districts to overcome access barrier to essential health services due to lockdown. ICMR with MoHFW and WHO is conducting a community based sero-survey to estimate the prevalence of SARS-CoV-2 infection in Indian population.
- ◆ WHO in the initial stages also provided some kits and reagents to COVID-19 testing laboratories through ICMR to partly meet their huge testing requirement. The country office partnered with FICCI in preparing guide and SOPs for use in workplaces post lockdown.
- ◆ MoHFW has set up an Emergency Operating Centre (EOC) to monitor response in 30 districts of the country with highest COVID-19 cases and WHO personnel have been deployed to support the EoC.

WHO along with WFP and UNICEF developed a guidance document on food donations in the context of Covid-19 to promote healthy diets and ensuring safety

- ◆ WHO along with WFP and UNICEF developed a guidance document on food donations in

the context of COVID-19 to promote healthy diets and ensuring safety. WCO India and Indian Dental Association developed a guidance on Infection prevention and control during oral and dental healthcare when COVID-19 is suspected. WHO India together with FICCI released guidelines on 'Back: To Safer Workplaces: The New Normal'. (Source: WHO, India Country Office, India Situation Reports, accessed from [https://www.who.int/india/emergencies/coronavirus-disease-\(Covid-19\)/india-situation-report](https://www.who.int/india/emergencies/coronavirus-disease-(Covid-19)/india-situation-report))

2. World Bank

WB has been the funding partner for tackling the pandemic situation.

On 2nd April 2020, WB announced the 'India COVID-19 Emergency Response and Health System Preparedness Project', a Loan amount of \$ 1Billion that was approved in principle for this project for duration of 18.5 years. Under this project, procurement of testing kits; setting up of new isolation wards — including turning hospital beds into intensive care unit beds; infection prevention and control; and purchase of personal protective equipment, ventilators, and medicines, particularly in district hospitals and designated infectious disease hospitals. The project is financed from the International Bank for Reconstruction and Development (IBRD) in the amount of \$1 billion, of which \$350 million is through the World Bank Group's COVID-19 Fast-Track Facility. The fund will be managed by the National Health Mission (NHM), the National Center for Disease Control (NCDC) and the Indian Council of Medical Research (ICMR) under the Ministry of Health and Family Welfare.¹¹²

On 14th May 2020, another project named 'Accelerating India's COVID-19 social Protection Response Program' was approved. It consisted of \$1billion. \$ 750 million were released immediately (IBRD loan- \$ 200 million and IDA credit- \$ 500 million). This project was to support efforts by Gol at providing social assistance to the poor and vulnerable households, severely impacted by the COVID-19 pandemic.¹¹³

C1.2 Government Supported (Autonomous) Institutes

1. AIIMS

For capacity building of healthcare providers, MoHFW commissioned AIIMS, New Delhi to conduct Webinars on COVID-19 with WHO and partners. AIIMS, Delhi organized a series of webinars for nursing officers and physicians on a range of topics related to COVID-19. Webinar series was initiated in last week of March 2020. The topics covered included- epidemiology, clinical features of COVID-19, IPC protocols, case management, use of ventilators, management of special cases like pregnant women, children with COVID-19. Other topics such as stress management during the outbreak, legal aspects related to COVID, and care of health care providers were also covered.

AIIMS, New Delhi, also started twice a week (on Tuesdays and Fridays), e ICU for the doctors of all the dedicated COVID hospitals across the country to increase awareness of treatment protocols and various therapies as well as standards of care.

C1.3 Professional Bodies/ Organization

Indian Medical Association: IMA at national and state level has been active in the following ways:

- ◆ IMA-National communicated with its state and local branches to coordinate with public health department, develop IEC material and operate 24-hour helpline for public in March 2020.¹¹⁴
- ◆ IMA also published guidelines for private clinics and hospitals, regarding triaging and IPC measures.
- ◆ Dr. Harsh Vardhan, Union Minister of Health & Family Welfare interacted with members of IMA and state branches on 1st April 2020. During this video conference, IMA was briefed about the measures being undertaken by MoHFW, and informed about various guidelines and protocols. Minister reviewed the preparedness of private sector and encouraged IMA and

its state, local branches to collaborate with state/district health authorities, in response for COVID-19.

- ◆ On 16th April 2020, IMA published a statement regarding online and phone consultations, mentioning that these platforms are to be used for triaging patients and for advising patients on follow up (patients of hypertension, diabetes). The statement mentioned lack of clarity on medico legal implications and data ownership as reasons for not promoting teleconsultation.¹¹⁵ The Central government on the other hand promoted tele consultation through a dedicated platform i.e. E-sanjeevani in April 2020 and by November 2020 the platform gained in popularity and registered about ten lakh consultations.
- ◆ Responding to the incidents of misbehavior and violence towards doctors during the pandemic, IMA had planned a nationwide protest in April 2020, which was withdrawn after consultation with MoHFW. On 22nd April 2020, an ordinance to the Epidemic Disease Act, 1897 was promulgated to protect healthcare personnel and property including their living/working premises against violence during epidemics.
- ◆ State health departments also collaborated with IMA. E.g. in Tamil Nadu, overcharging for care of COVID cases in private sector was being reported. Therefore, the state health department decided to cap the prices for treatment and has consulted with IMA to suggest the cost of care for COVID-19 cases with mild, moderate symptoms and for those with severe symptoms.

C1.4 Private Sector

Collaboration with for profit and not for profit private sector has been described as per the area of collaboration.

Infrastructure

Private sector infrastructure is being used in the states/UTs for institutional quarantine and all three levels of COVID care facilities.

Manufacturing

RT-PCR kits have been developed by various Indian and foreign manufacturers in private sector. ICMR has evaluated these kits from time to time and published validation results for procurement purpose. Manufacturing of indigenous IgG Elisa test developed by ICMR-NIV, by companies such as Zydus-Cadilla, Cipla and NextGen Life Sciences etc.. Private companies were involved in rapid scaling up of manufacturing of consumables, reagents required for testing, including swabs, VTM, and test kits.

Research and Development

Private sector has actively engaged in research and development related to COVID-19. MoHFW also partnered with private sector for clinical/epidemiological research. On 6th April, National Taskforce recommended the establishment 'India COVID-19 Clinical Research Collaborative Network', to be coordinated by ICMR. All hospitals managing COVID-19 cases were invited to join this network to enhance the clinical understanding of the disease in India. ICMR engaged with Bharat Biotech International

Limited (BBIL), to develop indigenous vaccine for COVID-19 using virus strain isolated at ICMR-NIV, Pune. ICMR initiated a multi-center clinical trial, titled "A Phase II, Open Label, Randomized Controlled Trial to Assess the Safety and Efficacy of Convalescent Plasma to Limit COVID-19 Associated Complications in Moderate Disease" (PLACID Trial). (dated 22nd May 2020). Private healthcare facilities providing COVID care were also involved in this trial.

Service Delivery

MoHFW and state health departments have engaged with professional bodies and industry organizations to involve private sector in provision of COVID and non-COVID services.

a) Diagnostics

Private laboratories are providing diagnostic services for COVID-19:

- On 18th March, ICMR communicated a proforma to be filled by private laboratories interested in COVID-19 testing. NABL accreditation was a mandatory requirement for private laboratories to engage.



- ◆ On 21st March, MoHFW issued a guideline for private laboratories, which was notified under Disaster Management Act, 2005. The guideline mentioned sample collection and testing guidelines, reporting protocols, policy for sample storage and destruction and cost of testing. Guideline mentioned the requirement of prescription by a physician for testing and directed the laboratories to follow the updated ICMR guidelines for testing. Quality control measures and protocols for real time/immediate data reporting were included. All laboratories were directed to send the COVID positive samples to ICMR-NIV Pune and to discard the negative samples within one week of collection. Maximum cost of Rs. 4500 for testing sample, as suggested by National Task Force was mentioned in this guideline.
- ◆ On 26th March, an addendum to the order was circulated and laboratories were asked to use the ICMR-NIV approved real time RT-PCR kits by Indian manufacturers.
- ◆ Private sector was engaged in efforts for scaling up of laboratories. On 12th April, ICMR invited laboratories and especially the medical colleges in government and private sector to come forward for setting up required laboratory. 14 mentor institutes were identified across the country to facilitate the process by coordinating with laboratories/colleges and state governments. Pre-requisites for establishing COVID testing facility in medical colleges was communicated, including list of equipment, reagents, consumables, desired workplace criteria and HR skills. For private laboratories, NABL accreditation was mandatory requirement. Scope of accreditation for real time PCR for RNA viruses was also to be submitted by private laboratories along with application.
- ◆ With changes in testing strategies, private laboratories also started undertaking screening using TruNat and testing using CBNAAT. Private laboratories with TruNat set up in the same lab registered for RT-PCR were allowed to undertake screening. (ICMR guideline dated April 19th 2020). Private laboratories with NABL accreditation for

molecular detection of RNA either by RT-PCR or by CBNAAT were allowed to undertake this testing (ICMR guideline dated May 9th 2020).

- ◆ In Karnataka, cost per RT-PCR (including screening and confirmation) was fixed at Rs. 2250. On 25th May 2020, ICMR directed states to negotiate and fix mutually agreeable prices for RT-PCR test for COVID-19. Accordingly, states have issued orders for capping the testing charges in private sector (Maharashtra, Telangana, Tamil Nadu). By November 2020 the average testing charges came down to Rs. 1000 only.

Number of laboratories providing these services has increased considerably over eleven months. In November 2020, 2,165 laboratories were reporting to ICMR, out of which more than 900 were private. Over 70% of private laboratories are located in six states- Delhi, Maharashtra, Karnataka, Tamil Nadu, Telangana and Gujarat

- ◆ Number of laboratories providing these services has increased considerably over eleven months. In November 2020, 2,165 laboratories were reporting to ICMR, out of which more than 900 were private. Private laboratories are providing real-time RT PCR, TruNat and CBNAAT test for COVID-19. Distribution of private labs varies and most of the facilities are concentrated in major cities in selected states. Over 70% of private laboratories are located in six states- Delhi, Maharashtra, Karnataka, Tamil Nadu, Telangana and Gujarat.¹¹⁶

b) Management of COVID Cases

Private sector is engaged in providing services to COVID positive patients. Private healthcare facilities have been converted to dedicated COVID care centers, dedicated COVID health centres and dedicated COVID hospitals:

- ◆ On 5th March 2020, Health Minister held a meeting with private hospital representatives from Delhi along with IMA and FICCI representatives. Discussions were held on creating a pool of beds in private facilities,

where it was suggested that NITI Ayog can also support MoHFW and private hospitals.

- ◆ On 17th March, MoHFW circulated a guideline for notifying COVID-19 affected persons (suspected/confirmed) by private and public sector providers, to the concerned district surveillance unit. It also mentioned filling of a self-declaration form regarding travel history for concerned cases. Private providers (at hospitals, registered medical practitioners including AYUSH practitioners) were asked to provide information on cases to state helpline number or through mail.

c) Non COVID Essential Services

Private sector was expected to have significant role in providing essential non COVID healthcare services, as most of the tertiary healthcare facilities in public sector were converted to COVID facilities. However, private sector response was nominal.

Considering the presence of large private sector in India, especially in metro cities with high COVID-19 burden, private healthcare facilities were expected to step up and provide services for COVID-19 and other essential services. However, public health facilities have remained at forefront of providing care for COVID-19 and other essential services particularly during initial phases of lockdown.¹¹⁷ Many private healthcare facilities were closed after 23rd March lockdown as reported from states. Although tertiary care facilities in private sector were providing services, small clinics, nursing homes and some hospitals remained closed. Closing down of facilities was due to fewer patients visiting during lockdown and hospitals becoming the hotspots of infection leading to sealing of the facility. Fear of infection to health workers and closure of facility in private sector led to other challenges. There were cases of denial of healthcare from private hospitals.¹¹⁸ Some hospitals mandated COVID-19 testing to all admitted patients irrespective of ailment.¹¹⁹ As a result, access to COVID-19 and other essential health services was compromised. Public health facilities were burdened with provision of COVID-19 and other essential services. As health facilities in public sector are converted to dedicated COVID

facility, provision of essential healthcare services was also affected. Patients were therefore forced to seek care at private facilities, which were either closed or were charging high prices.¹²⁰ There were irregularities in quality and adherence to protocols as reported in some cases.¹²¹

Regulation of private sector was evident during the pandemic. Decisions on regulating prices charged by private sector were undertaken by few states in month of March (last week), namely, Rajasthan, Andhra Pradesh. In majority of states, these decisions were undertaken in May and June 2020.

In different states, different models of regulation were adopted during this emergency.

Models of Engagement with Private Sector

States have engaged with private sector for service delivery for COVID-19 and non-COVID essential services during the pandemic. There are broadly three models adopted by states.

I. Capping/Fixing of prices for services:

1. Fixing of testing charges: As per the ICMR order dated 25th May 2020, states were directed to negotiate and fix mutually agreeable prices for RT-PCR test for COVID-19. Accordingly, states issued orders for capping the testing charges in private sector. These include states of Maharashtra, Tamil Nadu, Telangana, Karnataka, and Delhi. (till 25th June 2020)
2. Capping of prices for COVID-19 management: Per day charges for isolation, treatment with and without ICU/ventilator requirement have been defined by state governments. As of 25th June 2020, states of Chhattisgarh, West Bengal, Delhi, Maharashtra, Telangana, Tamil Nadu, Karnataka, and Rajasthan capped prices for COVID treatment. Exclusions to these capped prices were also defined by most states.

- II. **Designating private hospitals for COVID-19 services:** This model includes designating private providers under the powers of an act (Epidemic Disease Act/ Clinical Establishment Act/Nursing home act etc.) for COVID-19

services. In this arrangement, either whole facility is acquired by government (Rajasthan) or some beds within facilities are reserved for COVID-19 services (Tamil Nadu, Maharashtra, Rajasthan, Delhi). Government could decide the manner in which the cost incurred by these private institutions is borne.

III. Coverage under Publicly funded insurance scheme: In states like Telangana, Tamil Nadu, Andhra Pradesh, Rajasthan, Karnataka, Chhattisgarh and Maharashtra the beneficiaries of publicly funded insurance scheme could get treatment in private hospitals under the COVID-19 package with the rate fixed by the Government.

Maharashtra: Curling Charges in Private Sector

Along with capping prices for COVID treatment, state government also regulated charges for certain non COVID procedures. It was observed that, private sector was overcharging for non COVID services and hence, state government undertook decision for regulation 80% of bed capacity in trust hospitals, registered under of Bombay Public Trusts Act, 1950. 80% of isolation beds were regulated and COVID package was defined. Along with this, 80% of non isolation beds were also regulated through the order. For these beds, charges for 170 non COVID procedures were defined to be applicable till 31st July 2020. This order was invoked using powers under Epidemic Disease Act, 1897, Disaster Management Act, 2005, Maharashtra Essential Service Maintenance (Amendment) Act, 2011, Maharashtra Nursing Home (amendment) Act, 2006 and Bombay Public Trusts Act, 1950

C1.5 Non-Governmental and Civil Society Organizations

Union Minister of Health and Family Welfare interacted with Civil Society Organizations and NGOs registered on NGO Darpan through a video conference on 30th April 2020. During this interaction, HFM briefed the representatives on steps undertaken by Gol. He praised the efforts by NGOs during the pandemic at different fronts, especially issues related to stigmatization of patients and healthcare workers and social assistance to migrant laborers. At this forum,

NGO and CSO representatives raised concerns such as limited availability of medicines, lack of services for elderly care, issues faced by women, mobility challenges faced by NGO staff, food security and livelihood issues and provision of entitlements to last mile beneficiary. Union minister assured help to representatives and suggested them to prioritize their work as per containment zones, while taking precautions. He requested them to communicate their concerns to Gol through existing communication channels and social media.

C2. COMMUNICATION STRATEGIES

The communications strategy adopted by Gol holistically complemented its stringent response and surveillance measures. Ensuring factual information & information on preventive measures reaches all those who are affected or susceptible to Covid -19, a disease the world did not know much about was undertaken as a priority task

The communications strategy adopted by Gol holistically complemented its stringent response and surveillance measures. It was conceptualized and designed to inform and gear-up the country's vast 1.3 billion population, comprising primarily of rural and vulnerable habitants, migrants and populations residing in urban slums, to join hands in this fight against the global pandemic. Ensuring factual information & information on preventive measures reaches all those who are affected or susceptible to COVID-19, a disease the world did not know much about was undertaken as a priority task.

Committed towards ensuring this fight was a "People driven movement". The National tagline "Help Us to Help You" was conceptualized and launched in February 2020, a month before the country declared nationwide lockdown on 22nd March 2020. The Government intended to strike quick and far with factual information based on evapotranspirations to sensitize the public towards COVID-19. This translated into roll out of a pre-caller tune on COVID-19 information across all



States and Union Territories, with support of five National telecom companies (BSNL/MTNL/IDEA-VODAPHONE/AIRTEL/Reliance). The telecom players amplified the caller tune, along with Do's and Don'ts pertaining to COVID-19 across 117.2 crore mobile telephone connections and disseminated key messages via 544.63 crore SMS. Simultaneously four TV Commercials and radio spots were broadcast across key National and Regional networks / channels.

Multiple half-page advertisements were released across National dailies, narrating key information and subsequent preventive behaviours which needed to be followed by the public. Media houses and key celebrity influencers such as Shri. Amitabh Bachchan came forward offering their influence and Suo-moto support for amplification of COVID-19 protocols. As far as possible public and private mass media networks were leveraged with zero cost implication to telecast talk shows, panel discussions and special programmes on COVID-19.

As the situation changed, the Government issued several health and travel advisories which were widely circulated through the traditional channels of print, electronic and social media. As a periodic intervention, bulletins, and Public Service Announcements (PSA) were aired across the country in local languages by Regional News Units and through Private news and entertainment networks.

In the month of March 2020, an updated "Novel Corona Virus" landing page was created on the Ministry of Health and Family Welfare's website www.mohfw@govi.in, providing all guidelines, advisories, awareness generation and capacity building materials on COVID-19 and help line numbers for queries and psychosocial support. Since early January 2020, daily press releases were issued via Press Information Bureau (PIB).

Ensuring the media is abreast with all updates on the various activities undertaken for combating COVID-19, daily media briefings were held at 4 pm since March 2020 by spokespersons from the Ministries of Health, Home Affairs, ICMR and other relevant Ministries and Chairpersons of Empowered Groups.

In the age of technology and public's access to information from varied sources, another key challenge faced by the country was to combat the COVID-19 info-demic, arising parallel to the pandemic. News tracking and monitoring mechanisms were strengthened to counter myths and fake news. The Fact Check Unit in PIB under Ministry of Information and Broadcasting was constituted to effectively curb misinformation on the Government's decisions and schemes; and reports fake and unscientific health related news.

To ensure that public's concerns and queries with regard to COVID-19 were addressed promptly and appropriately, a toll-free national helpline number (1075) and State level call centres (104) were set-up.

A wide range of thematic campaigns were rolled out. While the Ministry's twitter handle holds a dedicated following of 1.85 million followers, over 4.2 million people are abreast with Covid-19 updates via Ministry of Health and Family Welfare's official Facebook page

In the spirit of real time organic amplification of information, social media was aggressively leveraged to reach out to public far and wide. A wide range of thematic campaigns were rolled out since February 2020, covering critical issues like physical distancing, home quarantine, taking care of elderly, managing anxiety and stress, hand & respiratory hygiene practices, among others, amplified via Ministry's official social media handles and also by official State run and Development Partner handles (i.e Facebook, Twitter, WhatsApp and Instagram). While the Ministry's twitter handle holds a dedicated following of 1.85 million followers, over 4.2 million people are abreast with COVID-19 updates via Ministry of Health and Family Welfare's official Facebook page.

Identifying the critical need to promote an environment of solidarity, oneness, support and appreciation for healthcare workers on COVID-19 line of duty, persons affected with COVID-19 and their families, a National Anti-Stigma Campaign



was rolled out by Government of India in April 2020 on all mass media platforms with the tagline #TogetherAgainstCOVID19. Key development Partners (such UNICEF, WHO, USAID, BMGF, UNDP, Tata Trust, CHAI, UNFPA, NIPI, TRIFED) came forward to support the government in design and implementation of the Anti-Stigma Strategy, action plan and a comprehensive messaging bank to influence behaviours at all levels. The said campaign strategy was guided by four strategic pillars which included leveraging advocacy and partnerships engaging all key partners, line Ministries and community influencers, capacity building of key formal/ non formal actors, amplifying community involvement and media engagement.

The Ministry's official webpage was also leveraged to develop a corner on the landing page on "Inspirational series on healthcare service personnel" which includes numerous videos and

social media creatives celebrating the role of healthcare professionals during COVID-19.

In June, 2020, as the country transitioned from lockdown to "the gradual unlocking phase", the communications strategy gradually shifted towards defining a safe life based on sustained preventive behaviours to be followed by one and all beyond COVID-19. The core behaviours identified as COVID Appropriate Behaviours included among others –wearing a face-cover / mask, maintaining appropriate social distancing and no spitting in public places. These were disseminated across both Line Ministries & all State/UTs urging them to carry forth the messaging to the last mile through their respective networks. Within Health Ministry, messaging on key preventive behaviours to be adopted by the community, were disseminated to the Community Health Officers of 42,000 Health & Wellness Centres and over 12 lakh ASHAs and ANMs. The Kilkari platform under Ministry's



RCH division was also leveraged to reach out to ASHAs and ANMs via pre-recorded messages on their mobiles. Subsequently, a comprehensive guidebook on COVID Appropriate Behaviours was developed and disseminated across states, line ministries and key development agencies.

While much of the messaging around the preventive measures & COVID Appropriate Behaviours etc. emanated from MoHFW & rightly so, other departments namely Meity, Dept of Drinking Water & Sanitation, NITI Aayog etc. amplified the efforts in an attempt to ensure maximum outreach at zero cost. Simultaneously, the formation of an Empowered Group under the Chairmanship of Secretary, Information and Broadcasting to steer communication response efforts for COVID-19 gave the communication efforts the much-needed momentum & direction.

As the country progresses towards normalizing everyday life, in the absence of an antidote till date, constant amplification and reiteration of sustained preventive behaviours, through all available platforms, channels and networks will continue be a priority task.

C2.1 Early Communication Strategy

The Ministry of Health & Family Welfare was on the forefront of not only addressing the health and other associated challenges posed by the Corona Virus outbreak, but also used the communication and media outreach platforms in a graded and strategic manner. As the initial strategy was focused on the response to the emerging global scenario largely in terms of travel advisories, travel restrictions and the health advisories related to travel, the mediums of Twitter, Facebook, Youtube and the Ministry's website was profusely and prominently used.

The initial communication endeavored to create awareness about the travel advisories, protocols to be followed at the airports, the basic precautions to be taken to avoid the infection and helpline numbers provided by the Ministry.

Government of India issued several travel advisories for the people returning to India and

other nationals too. In the period from 17th January to 19th March 2020, the Government had issued a total of 21 travel advisories. The travel advisories firstly focused on China (it being the epicenter of the outbreak) and then progressed to other countries in the consecutive travel advisories based on the evolving situation of COVID-19, and emerging assessment. Social media, website of Ministries of Health & Family Welfare, MEA and Civil Aviation were the prominent platforms of communication in view of the segregation of population mainly coming from abroad, and who were found to be more active on social media platforms. The creatives used on Social Media platforms regularly updated the public about the latest developments in the Travel Advisories and other guidelines as and when issued by the Ministry.

The posts focused on the basic information on COVID-19 like where it originated and warned/cautioned the public about its global spread. It included the symptoms of COVID-19 like cough, fever and pneumonia like symptoms and also had information about who to contact in India or abroad after the onset of symptoms. Posts on the basic precautions included protocol on hand hygiene, respiratory hygiene, other precautions like cooking meat thoroughly and avoiding close contact with persons with cold or flu-like symptoms. Keeping a distance of at least 1 meter (as per WHO guidelines) was advised. The posts advised 14-day home isolation if the person had a travel history to countries having COVID-19 infection like China or came in contact with a COVID-19 infected person. It also advised self-observation from COVID-19 symptoms for those with travel history. The contact information included the 24*7 Ministry help line number 011-2397 8046. The persons with symptoms were encouraged to self-report to the call centre.

To involve the targeted audience as partners in the various endeavors of the Government, a unique logo was developed by the Ministry. Using the tag line "Help Us to Help You", the graphic used three hands symbolizing "partnership" and sense of working together. It was used in all the posts, and all IEC material developed which was also shared with the States and other organizations. The IEC material displayed on the airports, border posts etc., prominently displayed this logo. Also,



all the initial posts had the same colour coding of deep blue with white/red (for added focus). The template created a visual identity of the communication being on COVID-19 and coming from the Health Ministry. When shared too, it was a ready reminder that the material is from the MoHFW related to COVID-19.

All the material including press releases, tweets, FB posts etc., were seamlessly shared with the national and regional media through the extensive networks of PIB, DD and AIR. This created national dissemination of information in real time. The regional PIB network ensured the information in the form of travel and health advisories etc., was disseminated in regional language for wider outreach among the people.

To augment this information outreach, press releases (as many as five on some days) were issued regarding the decisions, status, advisories/protocols, meetings etc., and translated in regional languages by the PIB network. The same was shared through the Ministry's Whatsapp groups, media Whatsapp groups and other groups too. This ensured real time communication and kept the people informed through the media.

C2.2 Early Campaign on COVID-19 Related Dos & Don'ts – Pre Caller Tunes

In collaboration with Dept of Tele communication, campaign was implemented to reach communities. Five Telecom Companies namely BSNL/MTNL, Jio, Airtel & Vodafone were directed to play a 30 second pre caller tune on all mobile telephone connections in 22 telecom circles across the country. The caller tune was translated in vernacular languages and played across 117.2 crore connections. Bulk SMS were also transmitted in huge numbers.

Evidently this proved to be a master stroke very early on in the trajectory of our COVID-19 communication response. Quite clearly the message had reached every nook and cranny of the country and that too without incurring any expenditure. Till date (30th June 20) the caller tunes have been changed five times to

correspond with the unfolding circumstances. Along with messages the caller tunes also provided information on the national helpline number (1075) & State helpline numbers to encourage health seeking behaviours.

Ministry of Health and Family Welfare published a series of advertisements in leading newspapers between 05th - 29th March 20. These were by way of initial protocols to be followed for preventing the spread of infection. These were based on advisories issued by the Ministry. The same were also disseminated via social media and hosted on the landing page of the Ministry's website www.mohfw@gov.in

Secretary Health also wrote to Chief Secretary of all States /UTs and Special Secretary Health wrote to – line Ministries requesting to put in place mechanisms for dissemination of the messages.

C2.3 Lockdown and Communication on Mental Health

Several lockdowns were imposed to break the chain of transmission of the disease. Never being witnessed before, these lockdowns brought new challenges for everyone. The temporary shutdown of economic activities & suspension of most services brought forward new concerns. The Ministry engaged in developing communication material to encourage activities to boost positive mental health for all ages & for different sections of the society. People were urged to look at the brighter side of life and spend quality time with their families and loved ones; practice yoga & other physical regimen, pursue online learning, work from home and desist from watching stressful news or chronic addiction like alcohol & smoking etc.

Several audio video spots were sourced from NIMHANS, Bengaluru & AIIMS, New Delhi and were hosted on the website & shared via social media. The psychosocial support toll-free helpline number 08046110007 was also flashed on various media platforms. The website also shared other resource materials to help alleviate stress among the people during the lockdowns.

C2.4 Campaign on Anti-stigma

As the country battled COVID-19 on one end there was a serious backlash by people on the other end against persons affected by COVID-19, their care givers and doctors and other frontline workers. Even as fear of the disease spread, the country witnessed a growing stigmatization against such people. These people were being perceived as carriers of the virus and there was an urgent need to address it.

Around mid-April '20, MoHFW collaborated with Development Partners including BMGF, UNICEF, UNDP, WHO, CHAI, Tata Trusts, USAID, NIPI, TRIFED and UNFPA to initiate a campaign across the country to fight stigma against persons impacted by COVID-19 & those associated with COVID care. The strategy devised for carrying out the campaign was based on four pillars of advocacy, community engagement, capacity building and media engagement to ensure last mile reach of positive messaging centering around solidarity, support and appreciation for health care workers on line of COVID-19 duty, persons affected with COVID-19 and their families. A tagline for the National campaign #TogetherAgainstCOVID19 was rolled out on all platforms.

Anti-stigmatization messaging was done through Social Media Platforms, radio & television. The attempt was to deal with the issue in a manner so that it struck at the root cause of stigma i.e

fear of the disease and its consequences in terms of preventing people from testing thus adding to the burden of the disease. The third aspect was that the campaign would need to be carried out on a sustained basis.

Other line Ministries and Governments of State/ UTs were also roped in to lend their support in terms of carrying the anti-stigma messaging right down till the last mile. MoHFW leveraged Kilkari platform was to disseminate anti-stigma messages to 12 lakh ASHAs/ANMs.

C 2.5 Campaign on COVID Appropriate Behaviours

While all public health measures were being put in place to mitigate the rise of the epidemic curve there was a felt need to also put in place a set of COVID-19 Appropriate behaviors to cope with the disease in the long run.

The 15 COVID-19 Appropriate Behaviours were articulated as follows:

1. Greet without physical contact
2. Maintain physical distance of minimum 6 feet in public places. (Do gaj Ki doori)
3. Wear homemade reusable face cover or mask
4. Avoid touching your eyes, nose or mouth unnecessarily
5. Maintain respiratory hygiene
6. Wash hands frequently and thoroughly with soap and water or use an alcohol-based hand sanitizer
7. Do not chew tobacco, khaini etc or spit in public places
8. Regularly clean and disinfect frequently touched surfaces
9. Avoid unnecessary travel
10. Avoid crowded places
11. Download Aarogya Setu APP on your mobile phone



12. Do not discriminate against anyone impacted by COVID-19 or associated with COVID care.
13. Seek information on COVID -19 from credible sources and do not circulate misinformation.
14. In case of symptoms of cough, fever or difficulty in breathing call National toll -free helpline 1075 or State helpline numbers.
15. Seek psychosocial support for any anxiety or stress.

Messaging developed by MoHFW were shared with Department of Drinking Water & Sanitation Rural Development, Ministry of Panchayati Raj & Ministry of Housing and Urban Affairs to carry it to the last mile.

OSD(H) wrote to Chief Secretaries of all States/UTs to amplify COVID-19 Appropriate Behaviours. Subsequently the government decided that Department of Drinking Water & Sanitation would also develop collaterals & the campaign would be steered by the Empowered Group on Information Communication & Public Awareness. This material was further disseminated by Health ministry through the ASHAs & Community Health Workers.

C2.6 Panel Discussion on Television

Doordarshan, Prasar Bharati a public service broadcaster under Government of India, was leveraged by MoHFW to take the discourse on the evolving scenario of COVID-19 to the public across the country. Viewers were provided a bi-weekly update through a Special Interactive Phone in Programme on Corona Virus of one-hour duration on Wednesday & Saturday between 07:00 PM to 08:00 PM, since 8th April, 2020 through DD-National Network. Doordarshan, Prasar Bharati provided this service free of cost. Subsequently from 23rd May 20 Prasar Bharati shifted the programme from DD-National to DD-News once a week on Saturdays aired between 07:00 PM to 08:00 PM. DD-News also came forward to support broadcast of several Audio-Visual spots pertaining to COVID-19 on pro bono basis. These were mostly pertaining to Do's & Don't's, Mental

Health, anti-stigma campaign, celebrating COVID Warriors & COVID-19 Appropriate Behaviours (CAB).

C2.7 States/UTs and COVID-19 Communication

COVID-19 outbreak placed unprecedented demand on our health system and has generated plethora of challenges for all of us. In absence of specific drug for treatment and vaccine for prevention, communication regarding personal & respiratory hygiene along with physical distancing and wearing of face cover/mask remained at the core of preventive measures.

While Health authorities worked on formulation and dissemination of relevant guidelines on various issues, it was recognized equally that to control the outbreak it is essential to empower the community so that they can take the ownership of restricting the spread of disease. The vast challenge was to generate awareness amongst people across all ages and all sections of the society to adopt desired behavior change to combat COVID-19. Therefore COVID-19 guidelines & advisories issued by the Government were immediately shared with all the States/Union Territories. These were further developed as appropriate IEC materials to be utilized optimally through print, electronic, social media, outdoor publicity, bulk messages & other newer media's.

C2.8 Miscellaneous Activities

When International flights were re started after the lockdown to carry back stranded Indians MoHFW stepped in to provide the first set of communication material to Ministry of Civil Aviation Likewise Ministry of Health & Family Welfare also prepared posters & pamphlets in English, Hindi & vernacular languages for the Ministry of Railways to be distributed to passengers. During this period the Ministry actively engaged on various social media platform including Facebook, Twitter, YouTube and Instagram. This included inspirational series on healthcare personnel, details regarding homemade reusable face covers and other awareness material.

C3. RESEARCH AND DEVELOPMENT

Government of India actively launched and implemented multiple research and development initiatives through various ministries and departments. Indian scientists from across the country have come up with over 200 Covid-19 related technologies including tracing and testing solutions

Government of India actively launched and implemented multiple research and development initiatives through various ministries and departments, and also extended funding support to organizations, engaged in combating the COVID-19 pandemic. Indian scientists from across the country have come up with over 200 COVID-19 related technologies including tracing and testing solutions.

Research and development related Initiatives of GoI can broadly be categorized under 3 Ts of Tracking, Testing and Treating.

- A. Tracking and Surveillance
- B. Testing/Diagnostic kits
- C. Treatment and prevention.

a. Tracking and Surveillance

Since 15th February 2020, Indian Council of Medical Research has initiated sentinel surveillance to detect community transmission of COVID-19. The surveillance sites were scaled up to 51 sites by 15th March 2020 and more and more sites are being added on continual basis.

On 13th March 2020 India became the fifth country globally to isolate the COVID-19 virus strain, which is essential for development of drugs, vaccines and diagnostic kits. Research and technological innovations under tracking and surveillance can broadly be classified into three categories:

- i. Products and Models
- ii. Research studies
- iii. Mobile applications

a1. Product and Models

- I. *Digital IR thermometer*: The design of IR Thermometer is available open source and complete technical know-how is available to manufacturers across India for free to allow the manufacturing of these thermometers on large scale.
- II. *Machine Learning model*: The model aims at identifying the risk factors associated with mortality of SARS-Cov-2 infected persons using a supervised machine learning approach. The model reveals the key predictors of mortality in COVID-19 patients.
- III. *Jarvis thermal camera*: New thermal camera has been developed under video analytic platform, JARVIS (Just a Rather Very Intelligent System) effective in scanning crowded places like airports, railway stations and hot spots. It reduces time and human efforts required in identification of individuals with high body temperature in a crowd or gathering.
- IV. *T-ray Thermography device*: A team of researchers are working on developing artificial intelligence-based terahertz radiations (t-rays) scanning unit to address the limitations of infrared scanners in accurate and early detection of corona virus patients.
- V. *Fever detection system*: Researchers have proposed the development of a technology for a 'fever detection system' to help contain the epidemic. It uses face detection technology and the infrared energy that a body emits. Software constructs the heat map of the exposed skin and calculates temperature.
- VI. *Drone thermal screening*: A drone equipped with infrared camera which can help in thermal screening of groups without human intervention and identify suspected cases.
- VII. *qXR tool*: Progression monitoring tool 'qXR' screen chest X-rays, detects ground glass opacities and consolidations indicative of COVID-19.
- VIII. *COVID India Seva*: Ministries of Health & FW, Science & Technology, and Earth Sciences, GOI, launched an interactive platform, a

twitter seva solution, aimed at enabling transparent e-governance delivery at large scale, especially in crises.

a2) Research Studies

Modelling of epidemic spread in Indian urban conditions:

The project aims at modelling the epidemic spread taking urban conditions into the account. The project intends to assist epidemiologists and decision makers with (a) understanding the effectiveness of imposing and lifting various kinds of restrictions (b) anticipating hospital needs (c) devising testing strategies.

a3) Mobile Applications

Several innovative apps have been launched for various activities of tracking and surveillance of COVID-19. Apps that have been developed and are in implementation stage are tabulated below (Table 11).

Table 11: Salient features of mobile applications

Name of Application	Salient features
Go corona go	Helps to identify people who may have crossed paths with COVID-19 +ve subjects using Bluetooth and GPS. Generates risk scores. It has geofencing feature for quarantine patients.
Sampark-O-meter	Can indicate areas on map with maximum coronavirus infection possibility. Can provide timely alerts and control the spread.
SAFE	Smart Authenticated Fast Exam has 3 dimensions of verification-location, identity and time.
Coronavirus suspect surveillance system	Unique tracking application that cannot be tampered. Can do geofencing. System will get alert, if geofencing is violated.
Monitoring system app.	Developed in record time. It is applied to identify, undertake live surveillance, track, monitor and provides real-time analytics.

Name of Application	Salient features
QScout platform	Pandemic response care platform is used for contact registration and tracing.
No Que now	Social distancing app to help people maintain social distancing while they purchase essential groceries. Not available on play stores. Customer needs to go to URL Noquenow.com
Trace COVID-19	Traces contacts and automatically intimating them and authorities

Some of the applications which are still in development or early implementation stage are:

Manu: Uses Bluetooth to measure distance between the smartphones. Govt. approval received for initial trial in West Bengal.

Quarantine app: Will live track the patients who are in home quarantine and those who have tested positive. The app is still work in progress and developers are in early stages of discussion with the government.

Kawach: ensures social distancing and reminds timely sanitization terms. Technology is internally tested and ready for commercialization and mass production.

Table 12: COVID-19 related Indian apps available for free download

Application	Salient features
Aarogya Setu	Based on Singapore's 'Trace together, Aarogya Setu app is used in contact tracing of the suspect corona virus cases, reducing time and error in manual identification. Helps the administration to take necessary timely steps. Available in 11 languages.
Corontine	To track people escaping quarantine. Helps authorities to track asymptomatic carriers and prevent spread of disease.
Corona kavach	COVID-19 risk-tracking app uses person's location to assess they are in high risk zone or not.



Application	Salient features
Cova app	On-demand delivery app launched by Govt. of Punjab
Mahakavach	A digital contact tracing app launched by Govt. of Maharashtra.
Test yourself	Launched by Gov. of Goa, an automated solution for the citizens to carry out a self-assessment test for COVID-19.
Quarantine monitor	Used by police department to track people with history of foreign travel in the past two months
Delhi-Corona	Launched by Govt. of Delhi, provides information related to availability of hospital beds and ventilators.
GoK app	Launched by Govt. of Kerala, offers updates from GOK, news, government notices, helpline numbers and other details are available on the app

b) Treatment and Prevention Technologies

Major events and landmarks in Research and Development related to “Treatment and Prevention Technologies” for COVID-19:

- I. In April, *India COVID-19 Clinical Research Collaborative Network* was established to enhance the clinical understanding of COVID-19 in the country so as to develop specific clinical management protocols and further R&D for therapeutics. For this purpose, a central database of clinical and laboratory parameters of hospitalized COVID-19 cases is being created. National Guidelines for ethics committees reviewing biomedical and health research during COVID-19 pandemic were also launched by ICMR. The Indian Council of Medical Research (ICMR) invited proposals for fast track funding for Translational Immunology and Cellular Therapeutics approach targeting COVID-19 in following areas:
 - a. Cell based approaches for treatment or prevention of COVID-19 and associated disease sequelae:

- b. Biologics or small molecule-based modulation of immune system for therapy or prevention
- c. Immunogenetics and molecular epidemiology-based population studies on COVID-19 – consortium approach
- d. Novel diagnostic approaches for patient stratification and risk assessment for severity of sequelae.

ICMR partnered with Department of Science and Technology (DST), Department of Biotechnology (DBT) and Council of Scientific and Industrial Research (CSIR) to evaluate the antiviral properties of investigational products/ repurposed drugs/devices/technologies, etc. and released, “Guidance for evaluation of novel application for COVID-19” along with list of institutes where innovators could refer their products.

- II. In May 2020, the AYUSH Sanjivani App to generate data on acceptance and usage of AYUSH advocacies and measures among the population and its impact in prevention of COVID-19. Effectiveness of Ayurveda Formulation as an adjunct to ‘Standard of Care’ for the Treatment of Mild to Moderate COVID-19: A Randomized, Open Label, Parallel Efficacy, Active Control, Multi-Centre Exploratory Drug Trial was launched. ICMR fast tracked the roll out of the global ‘Solidarity’ trial launched by the World Health Organization (WHO) to help in finding an effective treatment for COVID-19. Four potential anti-viral agents, Remdesivir, Chloroquine/ Hydroxychloroquine, Lopinavir-Ritonavir and Lopinavir-Ritonavir with Interferon ($\beta 1a$) are being evaluated in the trial,” An international randomised trial of additional treatments for COVID-19 in hospitalised patients” was also included. ICMR then initiated a multi-centre clinical trial, titled “A Phase II, Open Label, Randomized Controlled Trial to Assess the Safety and Efficacy of Convalescent Plasma to Limit COVID-19 Associated Complications in Moderate Disease” (PLACID Trial).
- III. ICMR launched the call for intent for the study titled “A Phase II, Open Label, Randomized

Controlled Study to Assess the Safety and Efficacy of Convalescent Plasma to Limit COVID-19 Associated Complications". Department of Health Research launched guidelines for "Establishment of a network of biorepositories in India" to establish organized and dedicated biorepositories of clinical samples of COVID-19 patients. judicious use these samples, promote Indian academia, industry and commercial entities for developing novel solutions for COVID-19 prevention, control and treatment and to conduct research to better understand the COVID-19 disease in the Indian scenario.

In addition, several technological innovations for treatment and prevention of COVID-19 were undertaken; that can broadly be categorized into Four categories.

1. Drugs and Vaccines.
2. Disinfection system.
3. PPEs.
- 4 Other innovations.

c1) Drugs and Vaccines

- I. *Identification of drugs by computation:* Department of Biotechnology along with Drug Controller General of India, has developed a Rapid Response Regulatory Framework to provide expedited regulatory approvals for all diagnostics drugs and vaccines. The team has developed computational technology for identifying existing drugs against COVID-19. It is a proven technology and has helped in developing drugs for diabetes and psoriasis previously.
- II. *Nasal Gels:* Research teams have proposed a gel that could be applied in the nasal cavity or on masks that will provide a strong layer of defence. Objective is to inhibit the binding of the viral component with the host cells and to eradicate the threat by inactivating or killing the virus. This is under the stage of development.
- III. *Subunit Vaccine for SARS-Cov-2:* Several research and technology development projects have been initiated to develop a

rapidly producible vaccine for protection of frontline workers, senior citizens and individuals with comorbidities. Team is attempting to design and test variants of the spike glycoprotein of COVID-19 as vaccine candidates. Spike protein has been developed and the design showing the best results in animals will advance further.

c2) Disinfection System

UV-C based disinfection system: UV-C system is a proven technology to sanitize the microorganisms infected non-porous surfaces. Several products have been developed based on this technology:

- i. *Minus Corona UV Bio test:* This device is an ultraviolet (UV-C-254nm) based robot that will sterilize hospital corridors, wards, ICUs and wards without exposing anyone to contaminated environment.
- ii. *UV-Tech fitted sanitizing trunk:* Trunk shaped device fitted with ultraviolet germicidal technology to sanitize vegetables, purse, currency notes, papers etc. technology is ready for commercialization.
- iii. *Corona oven:* Use of UV-C light in combination with design parameters to sanitize surface of various surfaces in healthcare and household settings.
- iv. *Portable UV sanitizers:* can be used in sanitizing currency notes, masks, wallets. It is effective against Crimean-Congo Haemorrhagic fever and Nipah virus. Trials are being conducted in lab
- v. *UV-C led Disinfecting system:* to sanitize large areas like metro trains, buses for quick disinfection procedures at public spaces and hospital environment. Can also be used to decontaminate reusable PPEs. Still at research stage.
- vi. *Sterilization system for medical accessories:* Advanced photo catalytic Oxidation Sterilization System based on UV-light and metal oxide nano particles catalyst panels. The product is tested at AIIMS and got confirmation for its effectiveness.

Other disinfection and infection control systems:

- vii. *Disinfection drones*: Drones to disinfect hard to reach areas. Still at research stage.
- viii. *Mist sanitizer system*: Transportable system for quick sanitization.
- ix. *Anti-microbial coating*: One-step curable anti-microbial coating that can be applied to textile, plastic, etc could kill a range of viruses. Research proposal has been developed.
- x. *Foot controlled water tap*.
- xi. *Antimicrobial Fabric*: research teams have developed non-toxic, affordable and infection proof fabric to prevent nosocomial infections. Fabric can be stitched into bedsheets, uniforms, curtains etc. it is said to kill 99.9% of pathogens in 1-2 hours. Pilot is being run at AIIMS.
- xii. *Disinfection walkway*: Known as Pneumatic Variant Disinfection Walkway and hydraulic variant disinfection walkway for places with high foot falls.
- xiii. *Road sanitization Unit*: A tractor mounted road sanitization system that can be deployed for highways, toll plazas, housing complexes, sports arena etc.
- xiv. *Electrostatic disinfection system*: electrostatic spraying for disinfection and sanitization of

public places e.g. hospitals, poultry, trains, buses, airports etc. technology is ready for commercialization.

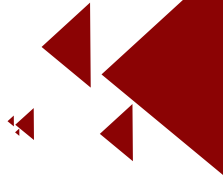
- xv. *Hands free hand sanitization and washing system*: mechanically operated by foot for dispensing liquid soap and water.
- xvi. *D-Nano disinfectants*: A solution based on nanotechnology principles in the form of surface coat to eliminate harmful germs. It is a combination of TiO₂, Silver, zinc and copper in nano form.
- xvii. *Airon ionizer machines*: Helps to control the virus, bacterial and fungal infections in a closed environment like a room. It generates negatively charged ions (10/second). Its detergent type property helps in breakdown of the outer protein of the allergens, viruses and bacteria.
- xviii. *Other products*: for example, Antimicrobial soaps, herbal soap,

c3) Personal Protective Equipment (PPEs)

Face masks and Shields:

- i. *Low cost 3-D face shield*: Spectacle-type design costs Rs. 45.
- ii. *3D printed antimicrobial face shield*: low cost, easy to wear having good chemical stability, non-fragile and easy to clean. Designed and developed, ready for commercialization.
- iii. *3D based face shields*:
- iv. *Masks with replaceable filters*: A two layered filter mask with replaceable water-resistant filters that can resist up to 90% of contaminated aerosols.
- v. *Full face mask*: Design uses A4 size Over-Head projection film for face protection using Fused Deposition Modelling with polylactic acid filament for frame.
- vi. *Bubble helmet for ventilation*: An alternative for the traditional oxygen mask. The device will help the patients to overcome breathing problems and avoid using a ventilator facility. System is developed and tested.
- vii. N-95 masks, N-99 masks.





Body suits:

- i. *Bio body suits*: For protection against liquid radionuclide.
- ii. *Personal protective overall suit*: developed through indigenous materials and innovative manufacturing processes and got certified. Recently DRDO has made changes and made them comfortable for healthcare workers to use it for long hours without any discomfort.

d) Other Innovations

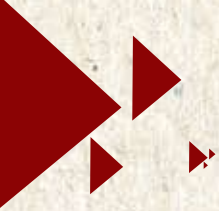
- i. *Smart stethoscope*: Can listen and record heartbeats from a distance. It can be connected to mobile or a laptop. Healthcare professional can approach a patient, capture lung sounds and send them for analysis to experienced doctors. Product is developed and patented.
- ii. *Logix smart COVID-19 Kit*: This kit is an In vitro diagnostic test that uses CoPrimer™ technology for the qualitative detection of the RNA from SARS-Cov-2. Product is at marketing stage.
- iii. *Handheld health monitoring system*: a remote patient health monitoring system, that generates alert when health parameters of patients exceeds the threshold. It measures temperature, ECG, EMG, GST, Pulse. It can be connected to smart phone or computer, low cost, battery operated.
- iv. *Robot Zafi*: A robot that can be deployed in isolation ward for delivery of food and medicines to patients. Work is in progress for another robot for collection of biomedical waste from the wards. Deployed for demonstration at Stanley Medical College Hospital Chennai.
- v. *Negative pressure room*: Based on the Korean model, scientists have created negative pressure room that ensures that released droplets of the infected person do not stay suspended and I sucked out through ventilation.
- vi. *Light weight structure for quarantine hospitals*: Light-weight and pre-fabricated

structure by employing precast units. Research under progress.

- vii. *3D printed hands-free objects*: The product is easy to design and development of prototypes. Can be used to open or close windows, drawers, doors, keyboard, press elevator buttons (both verticals and horizontal) to minimize the risk.
- viii. *Remote Mini ICU*: An Artificial intelligence powered, wi-fi enabled product with a highly accurate respiration monitoring system that could monitor the vitals of 100s of patients. The product connects to doctors through video when the patients are moving into severe or critical stage.
- ix. *Tele-ICU Platform*: With this platform RADAR One intensivist can cater to the needs of 60-80 sick patients in multiple locations by using real-time video communication platform to coordinate with bedside providers at a moment's notice.
- x. *HCARD*: The robotic device HCARD (Hospital Care Assistive Robotic Device) can help frontline healthcare workers in maintaining physical distance. The product is ready for commercialization.

Several of these initiatives are at a preliminary trial stage, and time will tell which of these technologies are effective. Nonetheless these efforts tell us that the Indian ecosystem for innovation worked overtime during this early phase of the pandemic, and with the support of government institutions some were launched. This momentum will need to be sustained in order to deliver national responses at scale.

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MINISTRY OF HEALTH AND FAMILY WELFARE
Government of India
Nirman Bhawan, New Delhi