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ISBN: 978-81-928670-6-9

COVID-19 GOVERNANCE IN INDIA

(A Special Issue under Disaster Governance in India Book Series)

Series - 5 (March, 2024)

Centre for Disaster Management (CDM)

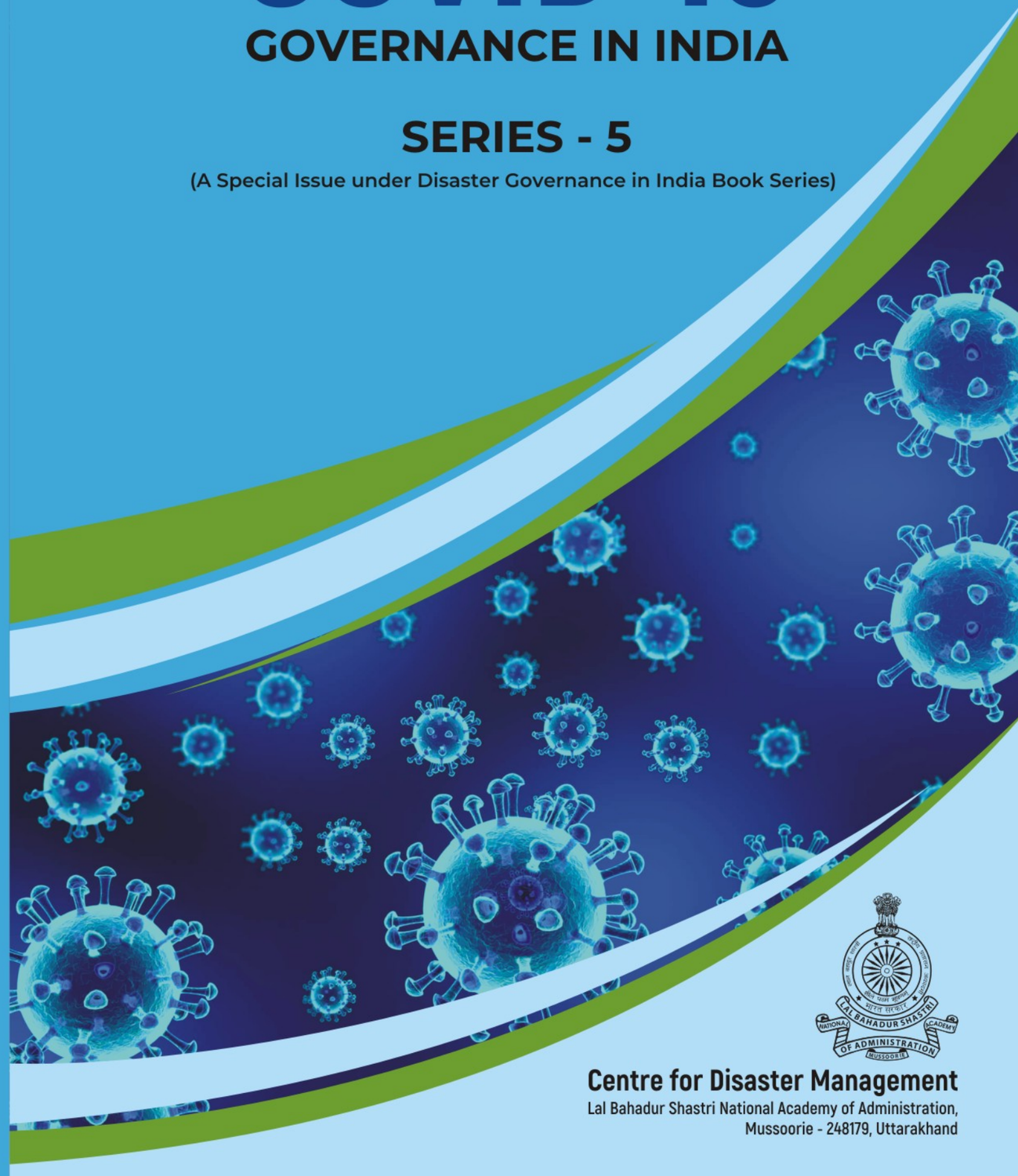
Lal Bahadur Shastri National Academy of Administration (LBSNAA),
Mussoorie - 248179, Uttarakhand
EPABX: 0135-2222000 (Extn-2385)
Telephone: 0135-2632655; Fax: 0135-2632350, 2632720
Email: cdm.lbsnaa@nic.in

COVID-19

GOVERNANCE IN INDIA

SERIES - 5

(A Special Issue under Disaster Governance in India Book Series)



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Designed and processed by
Vidya Art Press, Dehradun

DIRECTOR'S MESSAGE

Sriram Taranikanti, IAS
Director,
Lal Bahadur Shastri National Academy of Administration, Mussoorie

The unprecedented COVID-2019 crisis has underlined the criticality of effective response as never before. Responsiveness has emerged as a yardstick for measuring the success of Governments across the world in tackling this calamity. Adopting a multi-pronged cross-departmental approach, supported by the collective expertise and experience of specialists and frontline workers has become the need of the hour.

Needless to say, the crisis is far from over, and the road ahead is long and challenging. Although the strategic initiatives systematically taken in the past few years have placed us in an enviable position of being in significant control of the situation, massive challenges still remain and there is no room for complacency. Hence, to define the way forward more comprehensively, the importance of period feedback, analysis and interpretation of programmes, plans and policies to reassess their status from time to time, cannot be overstated.

As the world bravely battled against COVID-19, the gravest health crisis of times, we have seen a total paradigm shift in the way we live and work. The pandemic has led to the emergence of a new and radical construct of societal norms and governance. The country has adopted a cross-departmental approach in the formulation and implementation of the COVID-19 protocol geared towards engineering a sustainable ecosystem for co-existing alongside COVID-19. The country has set forth novel strategies curated to sensitize, motivate and inspire citizens to collaboratively combat the deadly virus, through virtual awareness platforms, digital campaigns and institutionalisation of health, educational, agriculture, industrial and employment operations both in the rural and urban areas.

The lockdown provided an opportunity to not only upgrade our level I, II and III COVID care facilities in the states and to stock up our supplies but also to forge new partnerships with the best health professionals from India and abroad to train our doctors on the latest protocols for COVID patient management. There have been a number of success stories, which all have contributed to our overall understanding of such kind of management, thus adding significantly to the learning process.

I would like to thank the Centre for Disaster Management, Lal Bahadur Shastri National Academy of Administration who have worked on those success stories and have been able to compile a special issue titled: COVID-19 Governance of India, Series-5. Hopefully, the document will be equally useful for both the trainees and the administrators in the field. I want to congratulate the CDM Team for this publication and also place on record my appreciation for the contribution made by the faculty & staff of CDM who contributed in various capacities for bringing out this book.

I would also urge all to go through this compilation carefully and add to the knowledge base.

(Sriram Taranikanti)

PREFACE

Abhiram G. Sankar, IAS
Director,
Centre for Disaster Management

The COVID Pandemic that gripped the entire world has underlined the criticality of effective response as never before and once again highlighted need of health facility preparedness. Responsiveness has emerged as a yardstick for measuring the success of Government across the world in tackling this calamity. Government of India's integrated, multi-pronged action plan of containment and development involving cross Departmental approach, supported by the collective expertise and experience of specialists as well as frontline workers, paid rich dividends.

As the world bravely battles against COVID, the gravest health crisis of times, we have seen a total paradigm shift in the way we live and work. This issue highlights emergence of a new and radial construct of societal norms and governance. The novel initiatives undertaken by various district administrations adopting a cross departmental approach in formulation and implementation of COVID-19 protocol geared towards engineering a sustainable ecosystem for co-existing with COVID. The articles also highlight, all-inclusive approach adopted by administration involving community has set forth novel strategies curated to sensitize, motivate and inspire citizens to collaboratively combat the deadly virus, through virtual awareness platforms, digital campaigns and institutionalisation of heath, educational, agriculture, industrial and employment operations both in the rural and urban area.

The COVID Pandemic provided an opportunity to not only upgrade our health care facilities in the states but also to forge new partnerships with the best health professionals from India and abroad, and to upgrade and modify our protocols for COVID like patient management.

Needless to say, similar crisis may recur in future also new variants have emerged challenging the medical and scientific fraternity, in more ways than one. The strategic initiatives we have systematically under taken in these past few years placed us in significant control of the situation.

I would like to thank the Centre for Disaster Management, Lal Bahadur Shastri National Academy of Administration who have been able to compile the best practices adopted by District Administrations, PSUs and Institutions in the form of a Special issue of COVID-19 Governance of in India, Series-5.

I would urge all of you to go through this compilation carefully and add to the knowledge base for disaster management in the country, and will be useful for both the trainees and the administrators in the field. I would like to congratulate CDM Team for publication at the opportunity time.

(Abhiram G. Sankar)

CONTENTS

		Dr. Manikantan.J *Dy. DMO* *COVID Control Room,* *IDSP, Kollam, Kerala* ***Dr. Shobha*** *Medical Officer (MO)* *COVID Control Room,* *IDSP, Kollam, Kerala* ***Dr. Timmy Rodrigrier George*** *District Epidemiologist* *COVID Control Room,* *IDSP, Kollam, Kerala* ***Dr. John Mathew*** *District Epidemiologist* *COVID Control Room,* *IDSP, Kollam, Kerala* ***Priyanka Sajeev*** *District Epidemiologist* *COVID Control Room,* *IDSP, Kollam, Kerala* ***Sreekumar*** *Dy. DEMO* *COVID Control Room,* *IDSP, Kollam, Kerala* ***Ajith Kumar*** *DLT* *COVID Control Room,* *IDSP, Kollam, Kerala* ***Sudheer.K*** *DLT* *COVID Control Room,* *IDSP, Kollam, Kerala* ***Vijeesh.V*** *JHI* *COVID Control Room,* *IDSP, Kollam, Kerala*	

Research & Development and Public Health
Initiatives to meet the challenges of COVID-19 Pandemic in India: Insights from Experiences of Ministry of AYUSH, Government of India

Vaidya Rajesh Kotecha

Abstract

The outbreak of COVID-19 has highlighted the need for strengthened health systems including traditional medicines. Accelerated research and development programmes are the need of the hour in all aspects of health care. The Ministry of AYUSH took several initiatives to tap into the potential of AYUSH systems to contain the impact of the COVID-19 pandemic. Active steps taken by the Ministry has had a positive impact on the society in fostering awareness in the country about the disease, informing the public about measures to improve immunity and mitigating the impact of the pandemic. The Ministry was steadfast in providing support to AYUSH stakeholders all through the crisis, which facilitated them to play noteworthy roles in the fight against the pandemic.

Keywords: AYUSH, Guidelines, Advisories, Integration, COVID-19

1.0 Background

Corona viruses are a large family of viruses that can cause respiratory infections in humans. These infections cause illnesses ranging from mild diseases like common cold to more severe diseases such as severe acute respiratory syndrome (SARS), Middle East respiratory syndrome (MERS), and COVID-19. COVID-19 is caused by the severe acute respiratory syndrome Corona virus 2 (SARS-CoV-2), a new virus that has not been previously identified in humans. (WHO 2020)[1]. The outbreak was declared a Public Health Emergency of International Concern in January 2020 and a pandemic in March 2020 by World Health Organization (WHO). Wide range of symptoms of COVID-19 have been reported including fever or chills, cough, shortness of breath or difficulty breathing, fatigue, headache, nasal congestion or runny nose, muscle or body aches, sore throat, new loss of smell or taste, nausea or vomiting, diarrhoea (WHO 2020)[2]. The estimated incubation period is between 2 to 14 days with a median of 5 days. Despite the serious concerns about the case fatality rate, COVID-19 is usually mild in majority of cases, and most patients recover spontaneously with supportive care, especially children and young adults. Data from several countries suggest that 14%-19% patients are hospitalized and 3%-5% need intensive care unit admission. Advanced cases of COVID-19may develop difficulty in breathing. Severe complications such as multiple organ failure can lead to death. The risk of developing severe COVID-19 increases in older adults and people of any age who have serious underlying medical conditions such as cardiovascular disease, diabetes mellitus, or lung disease. (Centers for Disease Control and Prevention, US 2020)[3] COVID-19 is primarily transmitted from person-to-person through respiratory droplets.

In India, the first case of COVID-19 was documented on 31st January 2020. (WHO 2020)[4]. As on 5th January, 2021, 10.4 million cases of COVID-19 were diagnosed in India, 9.98 million have recovered and more than 150 thousand deaths have occurred due to COVID-19. (COVID-19 Data Repository by the Centre for Systems Science and Engineering at Johns Hopkins University 2020)[5]. Currently care for patients with COVID-19 is primarily supportive. The primary focus of management is to relieve symptoms and prevent respiratory and other organ failure. There is currently no specific treatment recommended for COVID-19, however different prophylactic and treatment options are under investigation. (WHO 2020)[6]

The outbreak of COVID-19 has highlighted the need for strengthened health systems and accelerated research and development programmes, including on traditional medicines (WHO Africa 2020)[7]. Several countries such as India, China, South Korea, Japan etc. issued and regularly updated guidelines drafted by clinical experts recommending preventive measures and treatment modalities for COVID-19 through traditional medicine to provide clinical guidance (Lin Ang 2020)[8]. The need to search for universally acceptable clinical evidence of the efficacy of herbal medicines for the treatment of COVID-19 led to endorsement of a generic protocol for phase III clinical trials of herbal medicine for COVID-19 by the Regional Expert Committee on Traditional Medicine for COVID-19 formed by WHO, Africa Centre for Disease Control and Prevention and the African Union Commission for Social Affairs in September 2020.[7]

The Ministry of AYUSH has also taken several initiatives to tap into the potential of AYUSH-based measures to contain the impact of the COVID-19 pandemic. Broadly these initiatives include fostering awareness in the country about the disease, informing the public regarding measures to improve immunity and mitigate the impact of the pandemic, and providing support to AYUSH stakeholders. This article highlights the significant initiatives taken by the Ministry of AYUSH during the COVID-19 pandemic and their impact in addressing this scenario effectively.

2.0 Public Health Advisories

The Ministry of AYUSH issued an advisory on 29th January 2020containing measures to protect oneself from COVID-19 and to improve immunity (PIB 2020)[9]. In addition to advice on hygiene practices such as frequent hand wash, use of face mask etc., the advisory also listed simple home remedies easily accessible to general public. On 6th March 2020, an official communication was sent from the Ministry to all the States/Union territories of the country with more specific suggestions related to AYUSH remedies on augmentation of general immunity. (MoAYUSH 2020)[10]Another advisory from the Ministry recommended self-care guidelines duly vetted by eminent Ayurveda experts for preventive health measures and enhancing immunity with special reference to respiratory health (MoAYUSH 2020)[11].

The Ministry also launched a campaign on "AYUSH for Immunity" through webinars. More than fifty thousand people participated in the online event on 14.08.2020 which launched the campaign (MoAYUSH 2020).[12] The Ministry published a weekly campaign bulletin on "AYUSH for Immunity" to disseminate health promotion messages in the general public.

3.0 AYUSH COVID-19 Dashboard (MoAYUSH 2020)[13]

Ministry of AYUSH launched AYUSH COVID-19 Dashboard furnishing the details of guidelines related to AYUSH measures for improving immunity, official communications, research undertaken on COVID-19, AYUSH drugs and medicines for prophylaxis and management etc.

4.0 Mobilization of Human Resources

As part of the efforts to achieve maximum stakeholder mobilization, the Ministry communicated to the Heads of all Ayurveda, Siddha, Unani and Homoeopathy institutes for appropriate utilization of available infrastructure facilities such as Hospital (IPD& OPD), pathology laboratory, intensive care unit etc. along with medical and paramedical staff to combat the COVID-19 pandemic. Accordingly, various AYUSH hospitals were designated as quarantine centres, isolation centres and COVID care centres by respective State Governments. Also, Hon'ble Prime Minister addressed the stakeholders of the AYUSH Sector on 28th March 2020 to provide their services whenever needed by State Governments. Around 850 thousand AYUSH doctors, paramedic staff and students offered their services for clinical management, surveillance and management of COVID isolation centres and quarantine wards by enlisting themselves as COVID warriors on government portal. Details of trained AYUSH personnel were made available at state/district administration and they are being utilized in fight against COVID-19 as and when required. AYUSH personnel also obtained training from concerned government platform on continuous basis. The Ministry also had written to the Health Ministry offering for integrating and utilising the huge AYUSH infrastructure to combat the pandemic and also to principals of all Ayurveda, Siddha, Unani and Homoeopathy (ASU&H) colleges (approximately 727) for offering their services to local health authorities for utilisation of the facilities by them as the situation arises.

5.0 National Repository on AYUSH COVID-19 Clinical and Other R&D Initiatives (MoAYUSH 2020)[14]

This repository has been developed to provide information related to AYUSH R&D initiatives, COVID-19 related AYUSH clinical trials sponsored/collaborated by the Ministry of AYUSH and others agencies, COVID-19 related scientific publications and AYUSH Guidelines. This repository is available on AYUSH Research Portal of the Ministry.

6.0 Calling of scientific evidence-based ideas for COVID-19 (MoAYUSH 2020)[15]

The Ministry of AYUSH worked on an online mechanism for crowd-sourcing of ideas for scientific evidence-based solutions from the AYUSH systems to combat the epidemic.

Through this channel, suggestions based on scientific explanations and proposals on therapies and procedures based on standard scientific guidelines for prophylaxis and management ofCOVID-19 pandemic were invited. The Ministry designed a mechanism through modifying the existing Extra Mural Research scheme to support short term research projects for evaluating the impact of AYUSH interventions/medicines in the prophylaxis and clinical management of COVID-19 (MoAYUSH 2020)[16] (https://ayushportal.nic.in/COVID.aspx).

7.0 Inter-disciplinary AYUSH R&D Task Force

The Ministry formed an Inter-disciplinary AYUSH R&D Task Force chaired by Prof. Bhushan Patwardhan, Vice Chairman, University Grant Commission and members including scientists from prominent organizations such as ICMR, AIIMS, DBT, CSIR and premier AYUSH Institutions on 2nd April 2020 (MoAYUSH 2020).[17]The Task Force formulated and designed clinical research protocols for prophylactic and add-on intervention studies in COVID-19 patients. Four different interventions were selected for the clinical study, namely Ashwagandha for prophylaxis and Yashtimadhu, Guduchi-Pippali and AYUSH-64 (a poly herbal formulation developed by CCRAS) as adjunct to standard of care for COVID-19 management.

Further, the Task force constituted 7 working groups to deal with various aspects of clinical research viz., to prepare clinical & public health approach of practice: Guidelines for State Govts., to plan and execute Clinical Trials (with two subgroups viz., for pre and post infection prophylaxis and working group for stand-alone treatment), Test materials and their Total Quality Management, Experimental Studies (Preclinical research), Screening committee for short listing ideas/ proposals & Call for Proposals, Nutrition and Nutraceutical (Global markets) and Epidemiology, Survey and Documentation. The task force has drafted the guidelines for AYUSH Clinical Studies in COVID-19 covering various aspects of clinical trial protocols (MoAYUSH 2020).[18]The Task Force has also taken up proposals received from screening committees of Research Councils under the Ministry and proactively explored possibilities for research based on available leads.

8.0 Clinical and Pre-Clinical Studies on COVID-19

The Ministry of AYUSH issued a gazette notification to facilitate undertaking of research on COVID-19 through AYUSH systems on 21st April, 2020 (MoAYUSH 2020).[19] The notification included in its ambit prophylactic measures and interventions for the quarantine, asymptomatic and symptomatic cases of COVID-19, with a view to generate scientific evidence.

Taking forward the recommendations of the Interdisciplinary task force, 105 clinical research studies and basic experimental studies have been initiated at approximately 136 centres by Research Councils and National Institutes under the Ministry through Intra-

mural and collaborative research mode. The Ministry has signed MoU with Council of Scientific & Industrial Research (CSIR) and Department of Biotechnology, Government of India for furtherance of evidence-based research (PIB 2020).[20] These studies are being conducted on AYUSH formulations as prophylactic interventions in high-risk population residing in containment zones and as standalone or adjunct to standard of care in COVID-19 management. It includes 39 prophylactic, 11 stand-alone intervention, 20 add-on treatment to standard care, 11 observational and 05 survey studies as well as 19 experimental studies (Figure 1). The system wise studies include 60 studies of Ayurveda, 20 studies of Homeopathy, 11 studies of Siddha, 03 of Unani and 11 of Yoga & Naturopathy (Figure 2). Clinical research studies are being conducted on AYUSH interventions such as *Ashwagandha, Chyavanprash, Guduchi ghan vati, Guduchi-Pippali, AYUSH-64, Yashtimadhu, Kabasura Kudineer, Nilavembu Kudineer, Arsenicum Album, Unani Joshanda, Khamira Marwareed, Tiryaq e Arba* etc.

The collaborative institutes for these studies include AIIMS New Delhi, King George Medical University Lucknow, Institute of Medical Sciences BHU, Govt. Medical College Nagpur, DMIMS, Wardha, KEM Hospital Pune, NIPER Kolkata, different ESI hospitals, Department of Biotechnology, Government of India institutes such as RCB and THSTI etc. The core outcomes of the interim analysis of these studies demonstrated good prophylaxis against COVID-19, early clinical recovery and achieving early negative RT-PCR results, reduction in the duration of hospital stay, prevention in further progress to severe stage and complications, and improvement in quality of life. The pre-clinical studies have been undertaken in collaboration with DBT and ICMR institutes to explore the anti-inflammatory, immune-modulatory and anti-viral properties of different AYUSH interventions. The interim outcomes of these studies are encouraging.

Further, as per the information retrieved from CTRI website, total 197 AYUSH studies were registered in the Clinical Trial Registry of India between 1st February 2020 and 24th August 2020. As an outcome, the majority of these studies aimed at clinical recovery from COVID-19 (n = 112). The proportion of comparative studies (n=148) was more than single arm studies (n=43) (Bhapkar 2020: 1-8).[21] The Ministry also constituted a Project Management Unit to coordinate these studies and providing technical assistance throughout all phases of the studies conducted at different centres.

9.0 AYUSH Sanjivani Mobile Application based Population Study (PIB 2020)[22]

The mobile application was developed and launched by Ministry of AYUSH to generate data on acceptance and usage of AYUSH advocacies and measures among the population and its impact in prevention of COVID-19 (Chiluveri 2020: 63-66).[23]A cross-sectional analysis of the data generated through the AYUSH Sanjivani app from 4thMay 2020 to 31stJuly 2020 was done to evaluate the pattern and extent ofutilization of AYUSH-based measures, benefits obtained, association between the use of AYUSH-based measures and incidence of COVID-

19, symptomatic status, and duration of use of AYUSH measures.The findings of this study highlight that a good proportion of the representative population has utilized AYUSH measures across different regions of the country, during the COVID-19 pandemic and have considerable benefits in terms of general well-being and reduced incidence of COVID-19.

10. Integration of Ayurveda and Yoga Interventions in the 'National Clinical Management Protocol'

The Ministry has set-up an Interdisciplinary Committee for Integration of Ayurveda and Yoga Interventions in the 'National Clinical Management Protocol: COVID-19' chaired by Dr V M Katoch, former Director General, ICMR and group of experts to crystallize the outcomes and interim trends of COVID-19 studies (MoAYUSH 2020).[24] The Committee has formulated its First Report & Recommendations based on the interim trends of ongoing and completed AYUSH studies on COVID-19 and experimental and clinical published data indicating potential benefits and safety of AYUSH interventions. Based on NITI Aayog and ICMR recommendations on the basis of committee report, the Ministry of AYUSH has issued the National Clinical Management Protocol based on Ayurveda & Yoga for management of COVID -19 on 6th October, 2020 enabling uniform clinical management (PIB 2020).[25]

11. National Clinical Management Protocol based on Ayurveda and Yoga for management of COVID-19(MoAYUSH 2020)[26]

This protocol is developed by committee of experts from premier AYUSH national institutes and research organizations. The document is approved by the Chairman, Interdisciplinary Committee for inclusion of Ayurveda and Yoga in the management of mild COVID-19 and Interdisciplinary AYUSH Research and Development Taskforce on COVID-19 of the Ministry of AYUSH. This protocol is for the management of mild COVID-19 cases. The Ayurveda protocol includes general and dietary measures and specific treatment guidelines as per the clinical condition of the patient. It incorporates guidelines for prophylaxis, management of asymptomatic and mild COVID-19 cases and post-COVID management. The Yoga protocol is for the primary prevention from COVID-19 and post-COVID care by improving the respiratory and cardiac efficiency, reducing stress and anxiety and enhancing immunity.

12. Scientific Publication of outcomes of COVID related Research Studies

The Ministry constituted an advisory panel on 29th July, 2020 to provide their inputs and suggestions for finalization of the manuscripts related to the outcomes of the research studies on COVID-19 for publication in scientific journals of high repute. Till date, the panel has reviewed 21 manuscripts and seven of them are submitted in high impact indexed journals.

13. Guidelines for Registered AYUSH Practitioners

Guidelines for registered practitioners of respective system of AYUSH were prepared through concerned team of experts to support the registered AYUSH practitioners in the management of COVID-19 pandemic (MoAYUSH 2020).[27] The Guidelines were vetted by the Interdisciplinary AYUSH Research and Development Task Force of Ministry of AYUSH. The guidelines have brought a considerable degree of uniformity in the management of COVID-19 through AYUSH interventions and measures. The Ministry also released the "Telemedicine Practice Guidelines" for AYUSH practitioners to combat the current need in the wake of COVID-19 outbreak by providing rapid access to medical practitioners (MoAYUSH 2020).[28,29]

The Ministry also issued an order regarding prevention of dissemination of misleading information about AYUSH services by stopping publicity and advertisement of AYUSH related claims for COVID-19 on 1st April 2020 (MoAYUSH 2020).[30]

14. Management of COVID-19 with AYUSH interventions in states

Some States/UTs of the country allowed management of COVID-19with AYUSH interventions, based on the specific guidelines of the concerned States/UTs. Till April 2020, 8 states in India viz., Madhya Pradesh, Tamil Nadu, Karnataka, Punjab, Rajasthan, Delhi, Gujrat, Telangana had started taking steps to incorporate AYUSH in COVID 19 pandemic.(Economic Times 2020)[31]Kerela state government published an action plan of outlining the Ayurveda strategies (including constitution of Ayurvedic COVID 9 response cells) for prevention, mitigation and rehabilitation of COVID 19 patients in the state.[32] Referring to the advisory issued by Ministry of AYUSH, Government of NCT, Delhi issued an advisory for incorporation of AYUSH based solutions including changes in diet plans of COVID-19 patients and using AYUSH drugs in addition to standard protocol for prevention and management of COVID pandemic.[33] Similarly, the guidelines of Ministry of AYUSH were referred to by the Government of Madhya Pradesh in issuing Guidelines for protection against COVID-19 infection and making people aware of the immunity enhancing medicines, diet and lifestyle as advised by AYUSH systems of medicines.[34] Gujarat and Maharashtra governments also referred to the guidelines issued by Ministry of AYUSH, while issuing their guidelines regarding prophylaxis and management of asymptomatic cases through AYUSH modalities. AYUSH Medicines were distributed in the containment zones by forming teams of AYUSH doctors. Referring the notification issued by Ministry of AYUSH, Maharashtra government issued a notification to permit conduction of research projects involving COVID-19 cases by scientists and doctors in the state.[35]

15. Commerce in AYUSH

In India, the share of Ayurveda in total pharmaceutical market of the country is about 10% with an estimated amount of 300 billion Indian rupees. During pre-COVID period, this market registered 15-20% growth annually. The first quarter of FY 2020-21,

however, witnessed growth between 50-90% for many enterprises. There is a significant increase in the demand for immunity and wellness products. In the purview of increasing demand of 'immunity booster' characteristics in food items, new products are being launched by established stakeholders. Global plant-based ingredients market demand is expected to hit USD 13 trillion by 2025, according to a new research report by Global Market Insights, Inc. (CISION 2019).[36] Consumption of Ayurvedic medicines/products has increased during COVID-19 pandemic with the Indian Medicines Pharmaceuticals Corporation Limited (IMPCL), a government enterprise and manufacturer of Ayurveda and Unani medicines, registering sales of 696million rupees upto August 2020 as compared to previous year's 267.3 million rupees. IMPCL has sold medicines for prophylaxis of COVID-19 of approximately 300million rupees to the various Central/State institutions/Autonomous as well as in open market across the country during this pandemic period (The Hindu 2020).[37]

The AYUSH Ministry has also constituted a core group of experts to identify and propose formulations for prophylaxis, management of COVID-19 and post-COVID care which are in line with classical principles of Ayurveda and have substantial leads from the ongoing research studies on COVID-19 for taking them forward for drug development and commercialization (MoAYUSH).[38]

16. Conclusion

The overall experience of the AYUSH Sector during this COVID-19 pandemic suggests that an effective alliance has developed among the different AYUSH organizations to take forward the initiatives to combat the Corona Virus swiftly, Successful conduction of integrative research in different levels of healthcare set-ups, active participation of state government in effective implementation of initiatives, widespread acceptance of AYUSH measures by general public as observed by public utilization trends and proactive approach of AYUSH pharmaceutical industry during this scenario illustrate this. During the panicky situation of COVID 19 pandemic, the active steps taken by the Ministry led to create overall awareness in the society regarding improving the immunity and health through simple measures as mentioned in different streams of traditional medicine of the country.

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Management of COVID-19 in Gujarat: Lessons for Public Health Policymakers

Mahaveer Golechha[1], Sonalini Khetrapal[2], Dileep Mavalankar[1]

Abstract

The Coronavirus disease 2019 (COVID-19) has been declared a pandemic by WHO, owing to its rapid global transmission and alarming ability to quickly overwhelm health-care services as a result of patients requiring critical care. The state of Gujarat was early epicenter of the disease and also vulnerable to COVID-19 due to several entry points, large scale industrial clusters and urban slum areas. With its meticulous, pre-emptive, pro-active and graded strategies, the state has managed the COVID-19 pandemic effectively. The Gujarat model is based on robust surveillance, proactive leadership and governance, public-private partnership, risk communication and community engagement. The present paper highlights lessons and best practices for country and region to build resilient and responsive system against this pandemic and future public health emergencies.

Keywords: Pandemic, Public Health, Policy, Industrial Clusters, Gujarat Model, Resilient

1.0 Introduction

The COVID-19 pandemic has led to dramatic global disruption as governmental agencies struggle to manage this unprecedented crisis. WHO declared COVID-19, a pandemic on March 11, 2020, and has called for governments to take 'urgent and aggressive action' to change the course of the outbreak (Golechha, 2020).

The state of Gujarat with population of about 60 million has taken several steps for containment of COVID-19 pandemic well before implementation of nationwide lockdown, which involves the followings- setting up of special screening desks at the international airports in the city of Ahmedabad and Surat for the passengers arriving from abroad; surveillance of high risk population; mandatory reporting of SARI/ILI; capacity building of front line workers and ramping up of necessary infrastructure.

On March 19, 2020 the state of Gujarat reported its first two cases, one in Surat and another in Rajkot, who had returned from New York and Mecca, respectively (The Economics Times, 2020). Gujarat is extremely vulnerable to COVID-19 due to several entry points in Gujarat for people returning from COVID-19 infected regions, large scale industrial clusters and urban slum areas. The Government of Gujarat on 13th March, 2020 enforced various sections of the Epidemic Diseases Act,1897 and issued a regulation regarding COVID-19 (Government of Gujarat, 2020a). Initially, Gujarat was one of the early epicenter of the COVID-19 pandemic of India and also reported higher case fatality rate than national average. However, with its meticulous, pre-emptive, pro-active and graded strategies, the state has managed the COVID-19 pandemic effectively.

The state has sequentially ramped up capacity- health infrastructure, provision of tertiary care, testing facilities, isolation and quarantine centres, manufacturing of essential commodities and equipment's. While there are gaps in state's COVID-19 response, many innovations, best practices and lessons have also emerged and it is worthwhile to document them. The present paper highlights lessons and best practices for country and region to build resilient and responsive system against this pandemic and future public health emergencies.

The Gujarat model is based on robust surveillance and door-to-door screening, proactive leadership and governance, early identification of cases and effective contact tracing, public-private partnership, risk communication and community engagement, implementation of stringent lockdown and ramping up of tertiary and secondary care provisions. This public health policy planning has brought the situation in Gujarat, considerably under control.

2.0 Epidemiological Dynamics

The state has reported the first two cases of the COVID-19 on 19th March 2020 in Rajkot and Surat (The Economics Times, 2020). The cases were rising sequentially and by the end of March the state has reported 74 cases. On 21st March, the government partially locks down four cities - Ahmedabad, Surat, Vadodara and Rajkot for breaking the chain of transmission. On 22nd March state has reported first death due to COVID-19 in Surat. On 31st March, Government of India identified the city of Ahmedabad as a COVID-19 hotspot in the country as 3 patients died out of total 5 cases in the city (Government of Gujarat, 2021).

Gujarat towards the end of April contributed to 12.7% and 14.5% of the total and active case load in India. The number of cases by end of April, May and June were 4,395, 16,794 and 32,643 respectively. Further, July, August, September, October, November months reported 28795, 34997, 40959, 30687, 36836 and 25519 cases in respective months. And for December and January months total number of cases were 35258 and 16502 respectively. Initially, the state was among the states, which have reported highest cases in the country. The state was one of the initial epicenters of the pandemic in the country.

The 7-day Compound Daily Growth Rate (CDGR) for Gujarat steadily declined from 18.7% on 16 April to 2% on 30 July, whereas the India CDGR stood at 3.5% at that time (see Figure 1). By end of April, Gujarat ranked number 2 in the country in terms of total reported cases (see Figure 2). However, the state's robust public health policy response against the pandemic has led to significant control of COVID-19. As seen in below figure, Gujarat's contribution to the total active cases in the country has declined almost continually since mid-May. Presently, the state is ranked 13th in the country in terms of total reported cases (see Figure 3).

3.0 The Gujarat Model

The Gujarat model become template for the policymakers and public health practitioner for breaking the chain of transmission and effective management of COVID-19. The Gujarat is able to managed the pandemic with its COVID-19 response strategy of actively following four T's – Tracing, Tracking, Testing and Treating. This approach included activities like proactive screening, public-private partnership, ramping up of infrastructure and robust surveillance. The Gujarat containment strategy was largely based on WHO's pillars of the public health response for COVOD-19, suggested in its Operational Planning Guidelines to support country preparedness and response (WHO, 2020). The administration also integrated learning from other settings for COVID-19 containment. Considering the success of Gujarat model of COVID-19 containment with its effective management strategy, it is worthwhile to explore various steps taken and response strategy implemented by the government and policymakers. The Gujarat model employed following steps for curbing the pandemic (Figure 4).

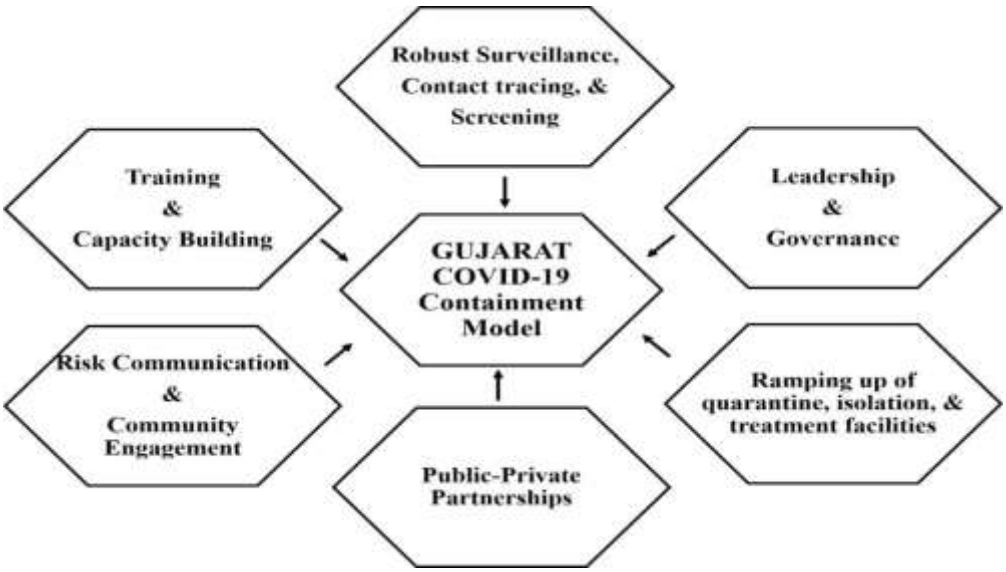

Figure 4: Gujarat COVID-19 Containment Model

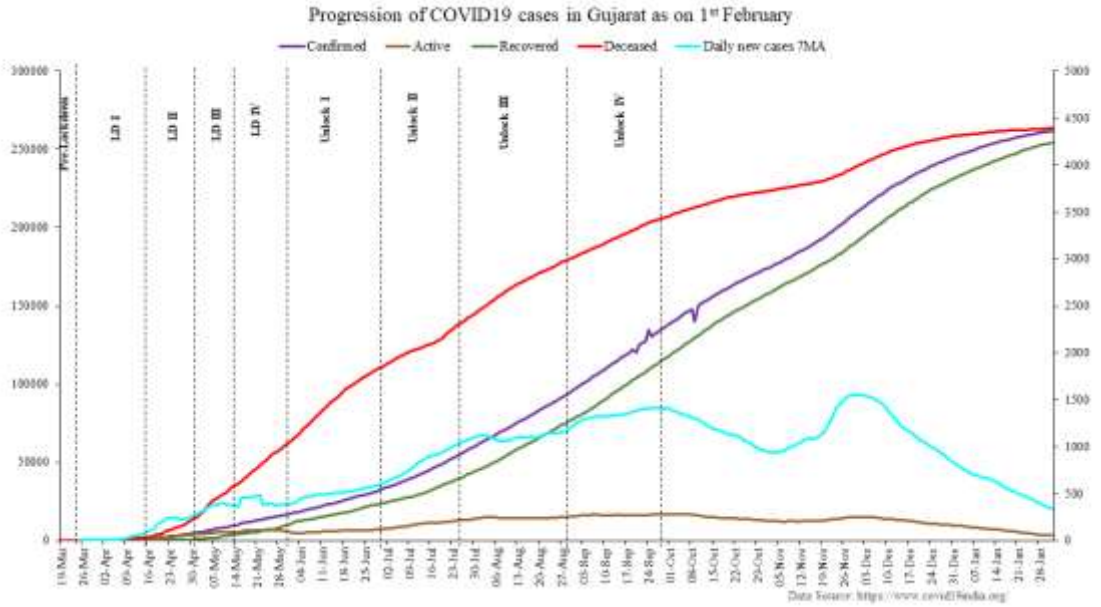

Figure 1: Progression of COVID-19 cases in Gujarat as on 20th December, 2020

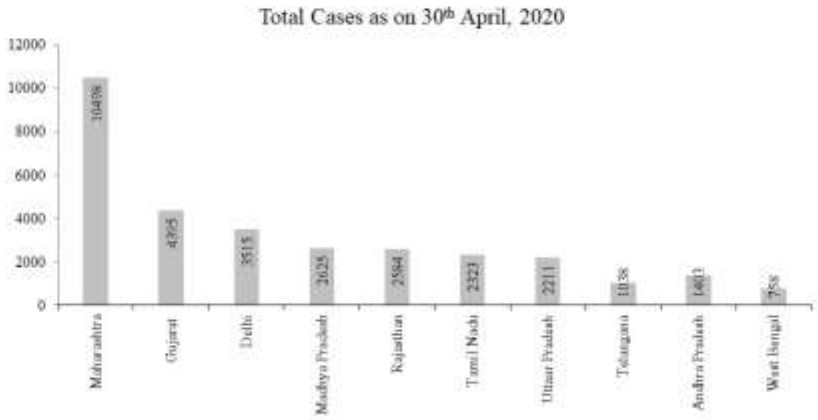

Figure 2: Total number of COVID-19 cases in most affected Indian states

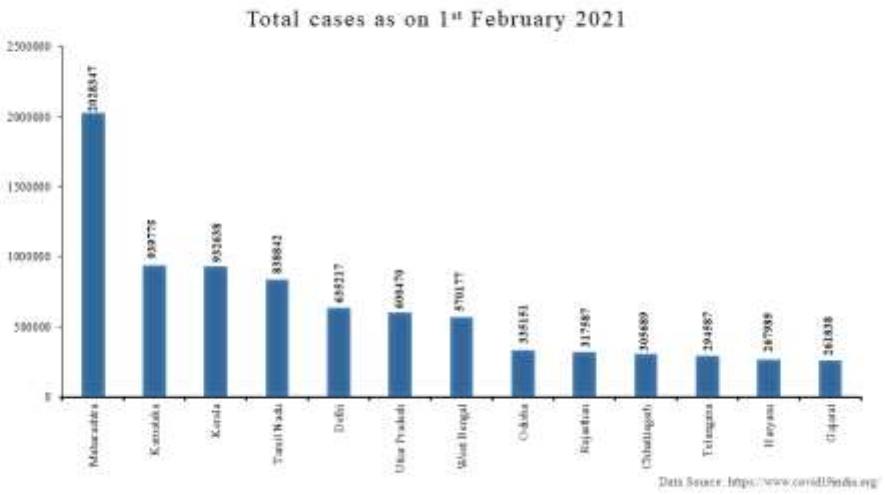

Figure 3: Total number of COVID-19 cases in most affected Indian states (till 20th December, 2020)

3.1 Leadership and Governance

The leadership and governance is essential function for effective management of public health emergency and the pandemic (Nicola et al., 2020). The state government has acted early, quickly and coordinated effectively with districts and municipal administration. Several public health teams have been trained and deployed to the initial epicenters with continuous monitoring by state leadership including the chief minister, health minister, and senior bureaucrats. The Chief Minister (CM) command and control room has been set up for real-time monitoring of the situation and taking immediate decision for efficient management (The Hindu, 2020). The CM continuously monitored the COVID-19 containment strategies and various schemes on real-time basis through interactive dashboard. The CM and senior officials also reached out to various sections of the society, members of the government, the civil society and citizens through the platform. The government has constituted State level COVID-19 taskforce for providing technical guidance to the health department (Government of Gujarat, 2020b); Core Committee for state level real time monitoring; and special committees for effective implementation of various strategies for COVID-19 containment.

The government has also enforced various provisions of Gujarat Epidemic Disease COVID-19 Regulations, 2020 on March 13 specifically for COVID-19 containment (Government of Gujarat, 2020b). The COVID-19 regulations were supplemented with the n-COVID-19 guidelines for (i) case identifications, (ii) basic infection prevention control measures, and

(iii) standard precautions to be followed during the care and treatment of suspected patients.

As the initial epicenter of the COVID-19 pandemic in the country was Ahmedabad, to provide special attention and priorities the containment of COVID-19 in the city. The state government has appointed senior administrative officer for providing the necessary guidance and supervising various activities implemented by the Ahmedabad Municipal Corporation. Furthermore, a senior administrative officer has also appointed as nodal officer for Civil hospital, Ahmedabad for ramping up of tertiary care infrastructure and setting up of dedicated COVID-19 hospital. The health department at various levels has collaborated with other line departments for various containment activities, especially door-door-screening, risk communication and supply of essential groceries. This multi sectoral approach has ensured the effectiveness of lockdown.

Undoubtedly, lockdown is an effective strategy for containing the transmission of infection. However, this is very challenging for larger sections of the society and led to large scale economic disruptions. The CM has announced economic relief package of INR 14,000 crores under "Aatmanirbhar Gujarat Package" (Self-reliant Gujarat) to give economic relief across different sectors and sections of the society.

3.2 Robust surveillance, contact tracing and screening

The effective pandemic response is largely based on surveillance, which provide essential information for timely decisions. The surveillance is pivotal for the development and implementation of evidence-based interventions during a pandemic event (WHO, 2017). Contact tracing and quarantining of positive cases are the major strategies for containment of pandemic.

The leadership acted with utmost urgency, implemented surveillance much before the detection of the first case. The mainstay of the state's COVID-19 containment response was robust community surveillance and contact tracing. The government deployed the army of thousands front line workers for surveillance and contact tracing. The healthcare workers with Personal Protective Equipment (PPE) suits knocking on door after door for screening, paying particular attention to houses or workspaces in the vicinity of positive cases. The surveillance teams have carried out the mammoth task of screening millions of people within few weeks.

The initial high case fatality rate has raised alarm for timely action and implementation of strategies. The state has focused on early surveillance, aggressive contact tracing and timely diagnosis to reduce the number of deaths and breaking the chain of transmission. The state has identified early hotspots where intensive surveillance and contact tracing is required. It was test-trace-isolate approach initially implemented in Gujarat. The teams were assigned clusters for aggressive conduct of the testing-and-tracing drill.

All public and private health facilities were mandated to report any case of Severe Acute Respiratory Illness (SARI)/ Influenza like Illness (ILI) to the local authorities (CDHO/MOH) for presumptive surveillance actions. The administration has coordinated with respective line department for an extensive and effective contact tracing to quarantine those who came in contact with infected patients. The government has also launched GIS-based mobile application to monitor the movement of home-quarantined population.

Recently, Gujarat Institute of Disaster Management in collaboration with NIC has developed a technology based solution named "Advanced COVID-19 Syndromic Surveillance System (ACSyS)" to timely trace the suspect cases of COVID-19 for containment of the pandemic (GIDM, 2020). Further, the government has also set up 104 fever helpline from 20th March, 2020 for reporting of suspect COVID-19 cases and addressing citizen queries. The health department deployed more than 300 personnel in the helpline center.

For 24x7 surveillance of containment zones, the police department deployed technological based solutions, like, CCTV cameras, drones and Hydrogen Balloon Based Surveillance. The hydrogen gas balloons are equipped with pan-tilt-zoom (PTZ) cameras helped to police to monitor the situation on their phone.

3.3 Ramping up of infrastructure, quarantine and isolation facilities

The administration at various level was also building the infrastructure along with surveillance and screening. While contact-tracing, surveillance and screening are cornerstone for the containment of the pandemic, but setting up large quarantine and isolation centres, ramping up tertiary care facilities are also essential for meeting the challenges of public health emergencies. The government has converted schools, marriage halls and community centers into quarantine facilities with food, regular check-ups and free healthcare and testing. The Government made free arrangements for institutional quarantine for travelers and students in 31 districts of the state who were brought back through Vande Bharat Mission scheme. The government has partnered with hotels for providing quarantine and isolation facilities. Gujarat was the first Indian state to set up a dedicated COVID-19 hospital. The government has ramped up three tier treatment facilities for management of COVID-19 cases. These includes, 316 Dedicated COVID Care Centres (DCCC) with 24823 beds for mild cases and asymptomatic cases; 101 Dedicated COVID Health Centres with 3408 isolation beds, 1278 oxygen supported beds and 167 ICU beds and 147 ventilators for clinically positive and moderate cases, and 302 Dedicated COVID Hospital with 21671 isolation beds, 13539 oxygen supported beds and 4823 ICU beds and 3259 ventilators for severe cases. The state has established total 719 COVID-19 facilities with about 69,000 beds and 3,400 ventilators. Patients were isolated and treated in each of these facilities based on severity of symptoms. These facilities are in line with Government of India guidelines.

The state government implemented the continuum of care strategy of "Test, Track and Treat. The government followed the testing strategy Indian Council of Medical Research (ICMR) formulated and implemented national COVID-19 testing strategy. Initially, all the suspected samples of the passengers were sent to the National Virology institute at Pune, but by end of March the state has set up laboratories in 6 medical colleges. The state has swiftly increased the testing capacity with establishment of total 42 laboratories with 23 Government laboratories and 19 Private laboratories for RT-PCR. The state has deployed various testing strategies as per ICMR guidelines. As on 1st February, the state has conducted 10,87,1308 tests and built up daily capacity of 70,000 tests (see Figure 5).

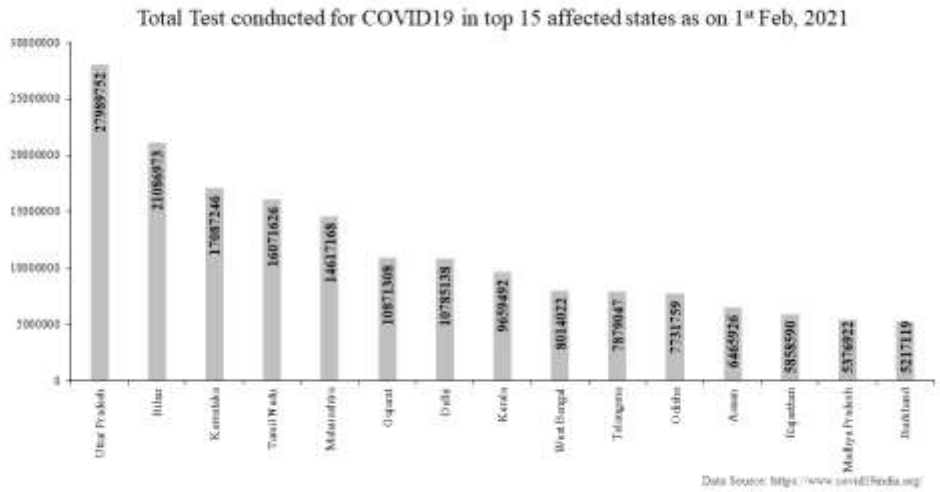

Figure 5: Total number of COVID-19 test conducted in most affected Indian states.

3.4 Risk-communication and community engagement

Community participation and risk communication are always crucial for controlling the pandemic and other epidemic outbreaks (WHO, 2020). The government also implemented well planned strategy for Information Education Communication (IEC) and risk communication. The involvement of the public was paramount if any effort or initiative had to be successful. The IEC strategy includes awareness through newspapers, signage's, small videos on TV slots, radio jingles, and social media.

The government has also developed COVID-19 Risk Communication package for healthcare facilities for guiding healthcare workers about protecting them from infection and preventing spread of COVID-19. The Chief Minister and senior officials frequently interacted with citizens and civil society group for providing them accurate information

and various steps taken by government for COVID-19 containment. The government has also started 104 helpline for providing information about COVID-19 to the population. This helpline is one stop solution for all COVID-19 related queries, providing transportation and testing to the population. Through the helpline people are reporting suspected cases of COVID-19 and home quarantine violations. Initially the call center received 50-100 calls daily, increasing to 400-500 daily calls with executives responding to more than 20,000 daily calls during the peak period. The administration has deployed more than 300 employees in the call center to cater to queries.

The health and family welfare department has also established 1100 helpline for the patients who are home quarantined or quarantined at government facility. The 1100 helpline also provided mental health counselling to the quarantined population. The government has also launched a public campaign 'Hu pan Corona Warrior', 'I am also a Corona Warrior' with the aim of promoting public health interventions- mask use, social distancing and washing hands frequently. The government also engaged celebrities for creating awareness of appropriate behavior and health etiquette. The government established COVID-19 tracker through ***https://gujCOVID19.gujarat.gov.in/*** for keeping citizens updated about accurate information. This has helped suppress incorrect data and fake information.

3.5 Training and capacity building

Training and capacity building is one of the important building block for managing public health emergency and the pandemic. The government has taken active efforts for training health care workers and frontline workers across the state. The state is leading in harnessing the potential of Integrated Government Online Training (iGOT) platform. More than 9,69,379 registered on the portal and about 6,98,314 completed the training. The government has also signed the MoU with plexus MD for an e- certificate program- CCMC (Certificate course in management of COVID-19) to train medical students and frontline healthcare workers. The State Institute of Health and Family Welfare (SIHFW) also conducted tele mentoring sessions for interns and medical students. Every Saturday, grand clinical rounds were conducted in state by online platform. Case presentations were done by various centers. This has improved the clinical outcome and also led to reduction in mortality due to COVID-19. Training programs also conducted on sanitization, about collection of biomedical waste, and precautionary measures to handle biomedical waste.

3.6 Public-private partnership

The coronavirus pandemic has shown us the importance of public and private sectors partnership during an emergency response. The public health emergencies of COVID-19 magnitude, necessitate catalyzing make-shift and long-term PPPs to remediate unprecedented burdens on the healthcare system. The state has a long history for utilizing the potential of PPP for public welfare. The state has taken several steps and implemented

strategies for engaging private sector effectively in management of COVID-19. The state has collaborated with private sector for ramping up tertiary care infrastructure for treating COVID-19 patients. Various municipal corporation has enacted provisions of Epidemic Act to fix the price of COVID-19 treatment and also taking control of beds in private hospitals. The government blocked the 50% beds in private hospitals and the cost was borne by the government. The state government has also collaborated with Civil Society Organizations (CSOs) and NGOs for providing foods and other essentials to poor, vulnerable and migrant populations. The administration also empaneled the private laboratories for ramping up testing capacity. Private practitioners also helped government in surveillance and screening. Some private organizations also provided facilities for quarantine and isolation centers.

3.6 Best-practices

Dhanvantari Rath (OPD on wheels): The COVID-19 has impacted health services significantly, as COVID-19 becomes the main focus of health systems and hospitals. Many of the large hospitals have been dedicated to COVID-19 treatment. This led to significant disruption of non-COVID essential health services, some of them require regular monitoring and interventions. A unique and innovative example has been set by the Gujarat, western state of India, through the Dhanvantri Rath (Press Information Bureau, 2020). The government mobilised the fleet of more than 1180 OPD on wheels for providing non-COVID essential healthcare services to the doorsteps of the people in the state. So far, more than 3.5 million OPD consultations and 9149 referrals have been made across the state. These mobile clinics are equipped with adequate human resources- medical officer, paramedical staff and educators for community awareness about COVID-19 and testing equipment, pulse oximeter, essential medicines and IEC material. The intervention has also helped the authorities in COVID-19 containment through timely identification of cases of ILI, SARI and fever.

4.0 Conclusion

The COVID-19 pandemic is emerging, many new insights and strategies are evolving from best practices deployed by many countries. The present article discusses how state of Gujarat being once a coronavirus hotspot of country has managed COVID-19 pandemic. The state has come a long way in its fight against the pandemic. The 'Gujarat model' has been an example for successful management of COVID-19. The WHO has appreciated the efforts taken by government for COVID-19 containment and also suggested to take up various measures being implemented in the city of Ahmedabad as a case study for rest of India and other countries. The state has shown that irrespective of exasperating circumstances, it is possible to manage the pandemic with proactive leadership, robust surveillance and screening, public-private partnership and community engagement.

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Targeted Public Distribution System (TPDS) Response to COVID-19 Pandemic

Department of Food & Public Distribution
Ministry of Consumer Affairs, Food & Public Distribution
Government of India

1.0 Introduction

As the COVID-19 containment procedures imposed unprecedented curbs on the economic activities throughout the country, it led to a scarcity of staple foods and price hikes due to reduced cultivation, disruption in supply chains, and shortage of labour, reduced employment, and reduced purchasing power of the people. Thereby, adversely impacting the food and nutrition security of the poor and needy people in the country.

To safeguard the country's most vulnerable population during the testing times, the Government tapped on its most powerful weapons in the arsenal i.e. the **Targeted Public Distribution System (TPDS)**, a program jointly managed by the Central and State/UT Governments for the distribution of subsidized food grains to about 81.35 Crore beneficiaries (almost two-third of the country's population as per Census 2011) under the ambit of **National Food Security Act, 2013 (NFSA).**

Through TPDS, food grains are distributed at highly subsidized Central Issue Prices (CIP) of Rs. 3, 2 and 1 per Kg of Rice, Wheat and Coarse-grains respectively and as per the entitlements of beneficiary households under NFSA. Presently, more than 80 Crore beneficiaries in the country covered under Antyodaya Anna Yojana (AAY) and Priority Household (PHH) categories of NFSA are receiving subsidized food grains through TPDS on monthly basis, where an AAY household is entitled to receive 35 Kg food grains per family per month, while a PHH category household is entitled to receive 5 Kg food grains per person per month.

As already mentioned, TPDS is operated under the joint responsibilities of the Central and the State/UT Governments, wherein the Central Government through Department of Food & Public Distribution and the Food Corporation of India (FCI) has assumed the responsibility for procurement, storage, transportation and bulk allocation of food grains to all States/UTs. The operational responsibility of allocation of food grains within the State/UT, identification & inclusion of eligible households/persons under NFSA, issuance of ration cards to them, distribution of food grains through Fair Price Shop (FPS) including licensing and monitoring of the FPSs, etc. rests with the respective State/UT Governments. Under NFSA, this vast system of cooperative federalism has been the anchor of India's food security program for decades and in the wake of novel Coronavirus pandemic, it

swiftly came to the fore to provide massive advantage to the country's poor and vulnerable in their fight against hunger and food insecurity.

On March 24 2020, the Hon'ble Prime Minister Shri. Narendra Modi ji announced a strict nationwide lockdown in a bid to prevent the progression of the novel coronavirus. Subsequently, the Government, with an aim to ameliorate the hardships faced by the poor and needy, announced the 'Pradhan Mantri Garib Kalyan Package'. Pursuant to this, the Government rolled out a special purpose scheme, namely "Pradhan Mantri Garib Kalyan Anna Yojana (PM-GKAY)" through which the Government almost doubled the quantity of monthly food grain being normally distributed to all beneficiary households under NFSA. Thus, under PMGKAY, all NFSA beneficiaries were provided additional 5 Kg food grains per person per month, free-of-cost, over and above their normal NFSA entitlements. Initially, this additional free benefit under PMGKAY was provided for a period of three months (April to June 2020). However, with the crisis continuing, the program was later extended for another five months (July to November 2020).

Besides PMGKAY, the Government also announced a separate allocation of food grain under the "Atma Nirbhar Bharat Scheme" aimed to ensure supply of free-of-cost food grains to all migrant/stranded migrants and all those who are not covered under NFSA or any State PDS scheme and were in need of food grains at the scale of 5 Kg per person per month for a period of 2 months (May and June 2020). The immediate objective of this was that no poor/vulnerable person should suffer from the non-availability of food during the time of unprecedented crisis. The box below provides an overview of these special schemes:

Box 1: Food Security Measures during Pandemic

Prime Minister Garib Kalyan Anna Yojana (Phase-I) | Date announced: 26 March 2020

Entitlement: 5 Kg of free foodgrains (rice/wheat, or their combination) per person per month and to all NFSA beneficiaries under AAY and PHH categories.

Number of targeted beneficiaries: >80 Crore NFSA beneficiaries

Duration: April, May, and June. Allocation: 121 Lakh Metric Tonnes (LMT)

Prime Minister Garib Kalyan Anna Yojana (Phase-II) | Date announced: 30 June 2020)

Entitlement: Extension of free foodgrains distribution to NFSA beneficiaries at the same scale of 5 Kg per person per month in both AAY and PHH category

Number of targeted beneficiaries: >80 Crore NFSA beneficiaries

Duration: July, August, September, October, November. Allocation: 201 LMT

Atma Nirbhar Bharat Scheme | Date announced: 12 May 2020

Entitlement: 5kg of free foodgrains per person per month to migrant/stranded persons/ families, not covered under NFSA or any State PDS scheme.

Number of envisaged migrants/stranded migrants: 8 Crore.

Duration: May and June. Allocation: 8 LMT *(distribution extended up to 31.08.2020)*

2.0 How the Government managed to feed more than 80 Core beneficiaries during the pandemic?

The Government was able to pull up the herculean task of feeding such a large population, that too amid the COVID-19 restrictions owing to the presence of extensive and established TPDS infrastructure in place. To distribute the grain, the Central and State/UT Governments relied on its robust logistical network, which involved the use of massive rail & road transportation network supported by Air & Sea logistics with last mile gaps in some non-motorable, hilly/difficult terrains being plugged through use of horses/mules to even helicopters of the Indian Air Force and Army. The experience of States/UTs serving remote and inaccessible areas through airdrops, in-land and water transportation, use of horses/mules, etc. came of great use in ensuring timely supply of food grains all over the country including remote and inaccessible areas.

During the period April to November 2020, the Department had allocated a total of nearly 680 LMT food grains. About 350 LMT were allocated to States/UTs for distribution under normal NFSA/TPDS. Additionally, 321 LMT were allocated for free-of-cost distribution under Pradhan Mantri Garib Kalyan Anna Yojana (PM-GKAY) and 8 LMT under Atma Nirbhar Bharat Scheme (ANBS).

It has been seen that an average of about 93-94 percent food grains per month was successfully distributed under the regular NFSA and PM-GKAY during this period despite multitude of challenges and adhering to all COVID-19 protocols. Similarly, under ANBS against an estimated number of 2.8 Crore migrants/stranded migrants by States/UTs, about 2.74 Crore persons (98 percent) received the free ration for a period of 2 months. Moreover, an independent survey by 'Dalberg' has also shown very high level of satisfaction among the NFSA beneficiaries with respect to availability and distribution of food grains through TPDS under both normal NFSA and PM-GKAY during the pandemic.

Additionally, realizing the immense potential of 'One Nation One Ration Card (ONORC)' as long term strategy and plan to serve the migrants, its implementation was also announced by the Hon'ble Prime Minister during his address to the nation on 30th June 2020. Since then, it has been made an integral part of the PM's Technology Driven System Reforms under Atma Nirbhar Bharat Abhiyan (ANBA) to empower the migrants to seamlessly access entitled NFSA food grains anywhere in the country by using their same/existing ration card along with biometric/Aadhaar authentication on a electronic Point of Sale (ePoS) device at the FPS of choice anywhere in the country. As a result, while adding upon the cluster of 12 States in January 2020, another 20 States/UTs have been integrated under ONORC during May 2020 up to December 2020, covering nearly 69 Crore (about 86 percent) NFSA population in these States/UTs to seamlessly access their subsidized foodgrains through ONORC plan.

The lockdown and the fear of pandemic caused disruptions in the otherwise well-oiled system, which were overcome by the consistent efforts and hard work of the officials working at all levels. Exemplary coordination was established between all stakeholders through regular video conferences and rigorous monitoring. Despite hiccups, experts and beneficiaries say that the pandemic has validated the existence and efficiency of the public distribution system.

3.0 Few glimpses of TPDS at the fore during COVID-19 pandemic

Un-interrupted supply of foodgrains were maintained throughout the period, even to the remotest of islands in the Andaman & Nicobar Islands, Lakshadweep and the most perilous and harsh topographical locations to make certain that every beneficiary is provided with their rightful share of PDS foodgrains in time.

Extensive use of ships and boats to reach out to farthest of islands of Andaman & Nicobar and Lakshadweep.

Timely food security of beneficiaries located in villages located in international borders & other areas of Arunachal Pradesh all other parts of the country where road transportation was disrupted due to torrential rain and landslides through regular air dropping of foodgrains.

Glimpses of Indian Air Force Helicopters lifting the foodgrains from their bases and air dropping at difficult to reach locations for assured food security of people during the pandemic.

In the absence of normal markets, PDS food grain served as the lifeline of people even in the remotest of villages, inaccessible & non-motorable mountainous and hilly regions.

Regular supply of foodgrains were maintained in difficult terrains of Jammu & Kashmir, Himahcal Pradesh, Uttarakhand through the use of Horses, Mules, etc.

Despite the multitude of COVID-19 challenges and & looming threats of the disease, the entire front-line FPS dealers and many more in the distribution network of PDS supply chain geared up for timely and efficient distribution of foodgrains to all beneficiaries in the country.

Glimpses of COVID-19 protocols (Social Distancing, use of Face Masks, PPE Kits, Hands Sanitation, in practice during the distribution of foodgrains throughout the country.

Airdropping of food grain packets by IAF in non-motorable & difficult terrains. Indian Army also supported wholeheartedly for the transportation and distribution of foodgrains to beneficiaries in remote & sensitive areas of the country.

Triple Zero Campaign

Innovative steps for COVID 19 control in Kollam District

Dr. Sandhya.R*, Dr. Sreelatha.R, Dr. Manikantan.J, Dr. Shobha, Dr. Timmy Rodrigrier George, Dr. John Mathew, Priyanka Sajeev, Sreekumar, Ajith Kumar, Sudheer.K, Vijeesh.V

Abstract

Triple zero campaign was a target oriented decentralized intervention plan aimed to reduce incidence, transmission and deaths due to COVID 19 as part of post-election /Sabarimala pilgrimage/X-mas and New year surge and was done in a phased manner. This helped to bring down the anticipated surge in the initial phase and also to detect the surge in the second phase. This campaign helped us to identify the 3 Cs – "Closed contacts, Clusters and Crowded places" which need special attention. The campaign also covered infection control practices, timely referral adhering the referral protocol, strengthening of NCD clinics, e-Sanjeevani and post-COVID clinics. These all were practiced along with the basic policy- test, track, treat and by increasing the IEC.

Keywords: Incidence, Transmission, Cluster, Referral protocol, Campaign

1.0 Introduction

Triple zero campaign was a target oriented decentralized intervention plan to reduce the morbidity and mortality associated with COVID 19. The triple zero campaign was planned post- election, pre-Christmas-New Year in view of Sabarimala pilgrimage to prevent surge of COVID cases and campaign launched on 15.12.2020.

2.0 Objective of the Campaign

a. **Zero infection:** To test all the vulnerable groups of population involved in the election campaign and other high-risk group. To strengthen the inspection of government and private hospitals doing COVID care for the infection control practices, Inspection of private labs doing COVID testing, and to increase the awareness.
b. **Zero transmission:** To strengthen the IEC on SMS – Social Distancing, usage of Masks and Sanitization. To strengthen the quarantine measures for the cases who are under home treatment, contacts of positive cases and international/interstate travelers.
c. **Zero Deaths:** To ensure timely referral of cases to the treatment centers based on disease categorization. NCD control by strengthening NCD clinics and e-Sanjeevani-teleconsultation program.

3.0 First phase

The first phase was planned to cover 60% of the target population who got exposed during election. The Test Positivity Rate (TPR) that was initially between 10 and 11 came down between 8 and 9 till December 31 -2020 (Fig 2). This was due to increased testing (Fig 1), tracking of contacts and treating. Each LSGD was given a target to achieve testing. Centralized mechanism to monitor the attainment of testing target of each LSGD and to reinforce and motivate to achieve the same was functional from the district control room.

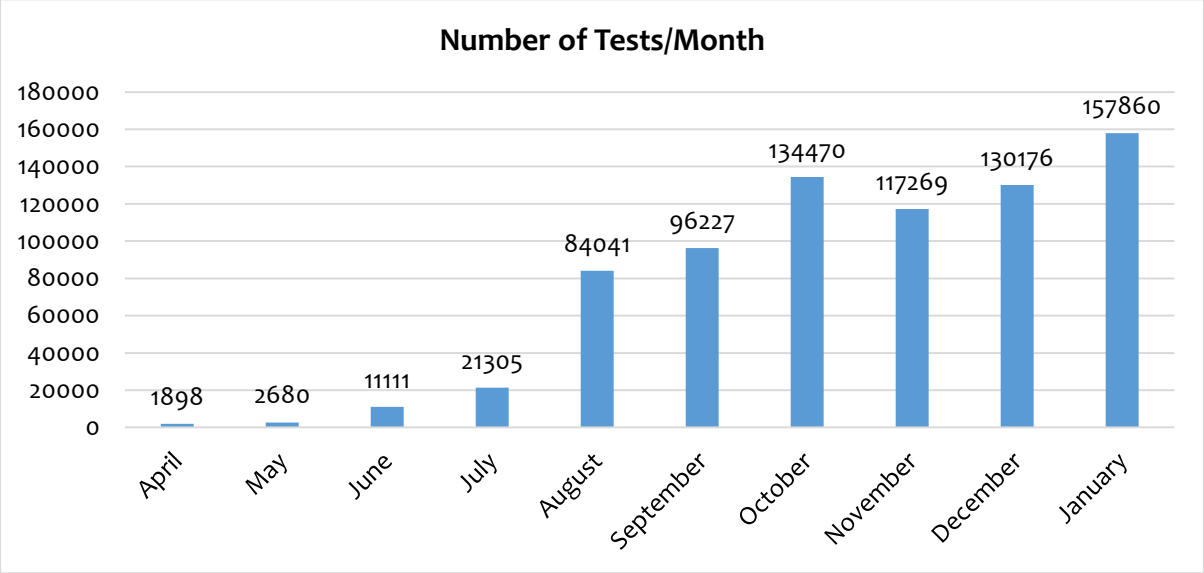

Fig 1: Number of Tests done in the district each month

4.0 Second phase

Then the second phase started on January where focus was given to close contacts, crowded places, closed spaces and cluster areas. An increase in number of cases was observed with an increase of TPR in this phase. The further exploratory analysis came up with the conclusion that non-compliance of SMS at work places, asymptomatic cases, high risk contacts, Influenza like illness (ILI) cases refusing to test are added to the increase in the burden of disease. The increased cases and the resulting clusters at cashew factory, migrant sites and NREG's were as a result of increased socialization among the people there without complying to the SMS protocol during lunch time at the dining area.

The planned intervention is to increase the testing among ILI cases, contacts and clusters to 100%. Along with strengthening of awareness programs among public and legal enforcement of penalization for non-compliance to COVID protocol could play a crucial role in bringing the cases down and thereby controlling the surge.

Strategies planned in the district and going on in the district to test all the contacts, ILI cases, and Cluster contacts along with IEC could play a cardinal role in the control of COVID 19 in the district.

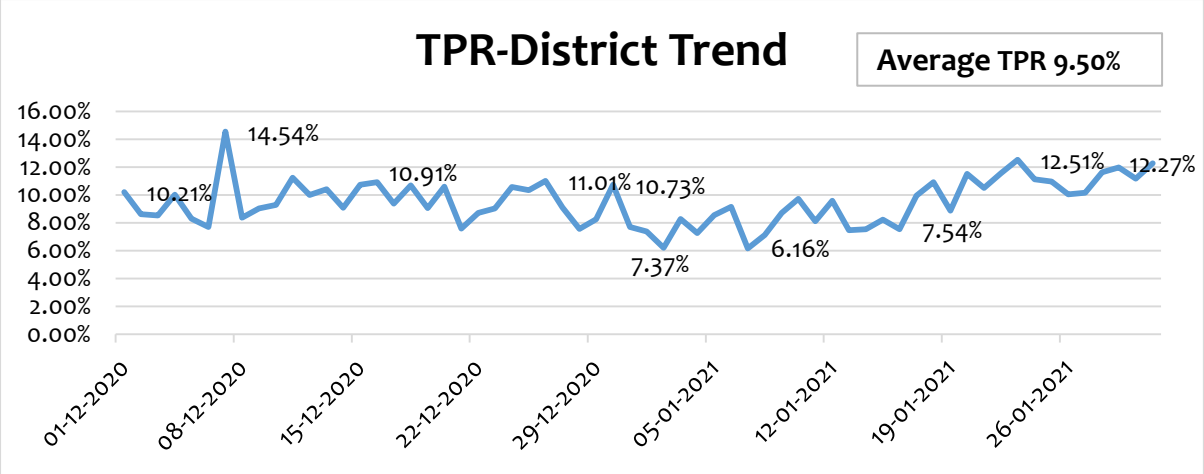

Fig 2: District TPR Trend for December 1- January 31

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Managing Food Security during COVID lockdown

Rajagopal. A* and D.K. Shukla

Abstract

Along with the historical war with Corona virus, India had to fight many other battles during the pandemic – fight to ensure that no one in the country suffers for want of food during the countrywide lockdown and resultant disruptions was one of the biggest of them. This was spearheaded by Food Corporation of India (FCI) with the support of Department of Food and Public Distribution, Government of India. During the lockdown, FCI ran the largest ever food logistic operations in its 56 years history, performing at almost double the productivity levels as compared to normal times, when the whole country was under shut down. This case study is about FCI's fight against all odds during the pandemic to ensure food security to 1300 Million people of the country.

Keywords: Food Security, FCI, Pandemic, Food Supply Chain

1.0 Introduction

Ramlal, a poor daily wage-earner from Hazaribag, Jharkhand was walking back to his hut late in the evening of 24th of March 2020. He had worked in a road construction site as a casual worker that day. It is not every day he gets work. But he was lucky to find some casual job or the other for the last one week. He was humming the tune from an old Rafi song. If another week goes like this, he may actually have some surplus money at the end of the month!! Suddenly he saw some commotion near the market. People were gathered near the TV set in the hair cutting saloon and were saying something like 'lockdown'. It took him some time to understand what is going on looks like there will be a countrywide lockdown for next 3 weeks during which everything will be closed – from markets to shops to schools to worksites and even buses and trains. It took some time for the idea to sink in and then with absolute shock he thought about the 5 stomachs he will have to feed.

At the same time, somewhere in Punjab Avtar Singh has just returned home after a hard day's work in field in Hoshiarpur in Punjab. He was in a jovial mood. His wheat crop had come up very well and was ready for harvest in a week. With the government mandi just a kilometre away, he had nothing to worry as government will buy his crop at Minimum Support Price. Suddenly his wife who was watching Prime Minister's address on TV came running and gave the news – there will be a countrywide shut down from 25.03.20 for 3 weeks when no activity will be permitted. Avtar Singh sank into the bed with his hands on the head. What will happen to his crop? How will he repay his crop loans?

At New Delhi, D.V. Rao was about to have his dinner and watching TV. Prime Minister was addressing the nation and had just made the statement about 3 week's national lockdown. As a senior bureaucrat he was aware that there will be some restrictions imposed to contain the spread of virus since it has already been declared as a National Disaster. But a countrywide lockdown was not expected. As Chairman and Managing Director of Food Corporation of India (FCI) he knew he will have a herculean task ahead – to ensure that there is no shortage of food grains anywhere in the country during the pandemic. With the whole country in lockdown with severe restrictions on movement of people and goods he tried to visualize how he is going to do it.

2.0 Food Corporation of India

The Food Corporation of India (FCI) is a Public Sector Undertaking established under an Act of parliament. The primary functions of FCI were Procurement, Storage, Movement, Transportation and Distribution of food grains on behalf of the Central Government. Procurement of food grains is made from farmers at Minimum Support Price (MSP) and is distributed to vulnerable sections of the society covered under National Food Security Act (NFSA) at Central Issue Price (CIP) through the Public Distribution System (PDS). The Food Corporation of India coordinates its functions through a country wide network of offices with Headquarters at New Delhi, 5 Zonal Offices, 26 Regional Offices and 160 Divisional Offices. FCI has staff strength of 20,888 people (Annexure I) and regular labour of 34,087 and about 70,000 contract labours (Annexure II).

In a normal year, FCI along with state procuring agencies procure about 79 Million Metric Tonnes (MMT) of food grains (45 MMT rice and 34 MMT wheat) (Annexure III) from the surplus producing states of the country. These grains are then moved to deficit states spread across the country for distribution under PDS. On an average about 40 MMT food grains are moved over an average distance of 1500 kms annually by rail, road and water ways (Annexure - IV). About 65 MMT are distributed (Annexure -V) across the country under PDS and other Welfare Schemes of Government of India.

With the onset of Corona, government announced nation-wide lockdown with effect from 25.03.2020. With severe restrictions for movement of people and vehicle, maintaining the food supply chain became a big challenge. However, it was obligatory on the part of FCI to ensure that food grains reach every part of the country in those most challenging times. The organization had to find ways and means to achieve this task. Considering the fact that countrywide lockdown affected the livelihood of crores of people, government responded with a series of additional allocations as per details given in Table No.1.

Table No. 1 – Additional schemes announced by Govt. of India during lockdown

Sl. No	Scheme	Purpose
1	Prime Minister Garib Kalyan Ann Yojana (PMGKAY)	To provide 5 Kg food, grains to every NFSA beneficiary free of cost, in addition to normal allocation of 5 kg per person
2	Atma Nirbhar Bharat/ Migrants workers	To provide free food grains to migrant workers
3	Non NFSA card holders	To cover people who were not covered under NFSA due to exclusion errors
4	Scheme for NGOs	To support NGOs engaged with humanitarian efforts to provide food to stranded workers.

These additional allocations created abnormal stress on the supply chain system of FCI which was already strained due to lockdown. Suddenly the organization was faced with a situation where it had to function at double the normal productivity levels when there was a country wide lockdown imposing severe operational constraints. Since the food security of 130 crore people of the country, including 81 crore vulnerable beneficiaries of NFSA, were at stake, FCI had to find a way to surmount this challenge and serve the country in its hour of need.

3.0 Organizational response

FCI had to work out a strategy to surmount the situation. Three issues had to be tackled immediately.

1) The workforce of the organization as well as support systems like labour and transport contractors, hired godown staff, ancillary service providers etc. were to be onboarded and readied to face the challenge.
2) Some solution had to be found to undertake uninterrupted supply chain operations to deliver required quantities of food grains in every nook and corner of the country.
3) Find ways to undertake procurement of wheat as well as Rabi paddy which start arriving in the markets from 1st of April, without creating COVID hotspots.

4.0 Readying the workforce

The team of about 20,888 people working in 192 administrative offices and more than 2000 depots, spread across the length and breadth of the country were to face the challenge and deliver in compelling working conditions. Similarly, the concerns of more than 1,00,000 workers who undertake the manual bag handling operations for the Corporation were also to be addressed. It was equally important to have a centrally coordinated structure which will monitor and support the field operations.

In order to ensure swiftness in decision making, a core team of officers was constituted at the HQ level with 6 General Managers headed by an Executive Director, drawn from various verticals. This committee was mandated to examine and take decision related to any operational issue that may come up. This helped in fast decision making and rapid response to issues coming from the field units.

Specific communication channels were created using WhatsApp and other communication tools, ensuring speedy information dissemination. It was ensured that every instruction or guideline reached the heads of field units directly and immediately. Simplified formats were designed to capture the operational data pertaining to movement of stocks, issue of food grains under various government schemes, State wise sufficiency of stock etc. for easy monitoring on a daily basis.

In order to give people a level of comfort, a generous ex-gratia package was implemented with the approval of the board and the ministry, ensuring monetary compensation to the family of any employee or labour who may unfortunately get infected and die due to COVID-19 while on duty. Even those employed under contract systems were covered under this scheme. This acted as a morale booster to everyone working in the field.

Special care was taken to ensure that unnecessary travels by people were avoided. All transfers were kept on hold. Mandatory inspections including Annual Physical Verifications were either suspended or the periodicity was increased. Quality control inspections to be carried out by supervisory offices like Regional Office, Zonal office etc. were suspended. At Divisional level also, some inspections were suspended and periodicity was doubled for rest of the inspections.

It was decided and communicated that dependents of any staff/officer/labour dying during the pandemic due to COVID-19 will be given overriding priority for compassionate appointment. Provident fund advance procedures were simplified.

All kind of leaves given to officers were cancelled and everyone was advised to be at their respective headquarters for working from home/office and all offices were made to run with bare minimum number of personnel. In order to address the issue of lack of public transport, special arrangements were made to ferry labour to and from the depots, in coordination with State Transport Corporations in places like Mumbai. In some depots, arrangements for stay of the labour was made within the depot premises though the contractors and ensured their continuous availability while reducing their outside interactions. Regular sanitization of all work premises / areas, including trucks, railway wagons etc. were undertaken to prevent any kind of spread of the COVID-19 virus within the campuses/offices.

5.0 Managing the logistics

Every month, during the 2nd fortnight, Movement Plan meeting is held at FCI Headquarters (Hqrs) along with the Regional/Zonal representatives for finalization of movement plan for the next month. During the meeting, after threadbare discussion on anticipated procurement, sales under various scheme, vacant storage capacity in consuming region, space requirement in the procurement region etc. next month movement plan is decided. On the basis of movement plan finalized during the meeting, consuming regions submit their location-wise Dispatch Indents (DI) for wheat & rice and surplus regions submit their location-wise offerings for evacuation of stocks. On the basis DIs and offerings, linkages between dispatching and receiving stations are generated using Linear Programming (LP) tool and are submitted to concerned Railway Zones before 1st of every month for execution of the movement plan for the subsequent month.

However, Movement Plan meeting for the month of April 2020 could not materialize at FCI Hqrs due to the outbreak of pandemic. As per the requirement of food grains submitted by consuming regions initially, a movement plan of around 2 MMT was on the cards for the month of April 2020. However, on account of additional allocation of food grain free of cost to the tune of 4 MMT per month for three months (12 MMT) under Prime Minister Garib Kalyan Ann Yojana (PMGKAY) by GOI and credit facility extended to states for lifting their NFSA allocation of three months (13.8 MMT) on credit basis (4.6 MMT per month) at one go, the logistics challenge increased manifold.

The core team chalked out detailed movement plan to ensure that the quantity allocated to states under various schemes was readily made available in all the States as per the lifting plan given by the respective State Govt. A master data base was created at Head Quarters incorporating all the information such as Stock position, total requirement of food grain for next three months, likely procurement etc. to monitor overall scenario of the situation. From the master data, month-wise requirement of food grain was calculated and the additional food grain required to be moved was calculated on the basis of availability of stock, storage capacity and food grain demanded by respective state govt.

The logistic plan was made not only to meet the demand of the states, but also to replenish the food grain at various depots throughout the country to meet future demand in the coming months. FCI's readiness to provide food grain as per the demand of the state was also forecasted and it was observed that the FCI was in a position to meet the demand of all the states except Meghalaya as the entire demand of the state was to be met by road movement navigating hilly terrains.

On the basis of above analysis and input received from respective FCI regional offices, a revised movement plan of 5.20 MMT was finalized from surplus states to

consuming/deficit states for the month of April 20. It was almost twice the normal movement and about 3 times the original plan for the month.

Initially, due to imposition of curfew, sections 144 etc. in various parts of the country, problems were faced in organizing labours and trucks. It became more challenging as movement of food grain is highly labour intensive work. Organizing trucks and labourers for such large scale operations in around 200 loading points and 400 unloading points spread over the length and breadth of the country proved to be a daunting task.

The field officers coordinated with respective State Govts for exempting FCI staff/ Labours etc. from the lockdown as the services rendered by FCI were essential in nature. Passes were arranged for staff and labour from district administration for loading and unloading of food grains. In cases of difficulties, CMD also took up the matter with respective Chief Secretaries personally and issues were resolved.

Due to teething problems, only 17 rakes (One railway rake carries about 2800 Metric Tonnes of food grains) were loaded on the first day of lockdown but it slowly gathered pace with constant persuasions and debottlenecking the issues on a daily basis culminating in an all-time record single day loading of 102 rakes on 22.04.2020.

Frequent change in lifting plan by various state govt. increased the unpredictability of the requirements of movement. For example, West Bengal is a surplus state for Rice procurement and the Rice requirement for NFSA as well as Other Welfare Schemes (OWS) is catered by the State Govt. Hence no rice movement was planned. However suddenly on 08.04.2020, the State Govt. of West Bengal informed that it will lift 0.6 MMT boiled rice from FCI for the month of April and May under PMGKAY from FCI by 30.04.2020. Positioning of 0.6 MMT of boiled rice within 20 days when no space was available as the godowns were filled with wheat was a huge challenge. State Govt. was requested to lift wheat on priority basis to create storage space and boiled rice was planned from Odisha, Chhattisgarh, Andhra Pradesh and Telangana to meet the heavy demand. At one point, 77 rakes were on run for West Bengal. Despite all the odds, FCI was able to supply Boiled rice as per requirement of the state within the time frame and at no point lifting was affected due to non-availability of stocks with FCI.

Similarly, only rice was allotted under PMGKAY scheme to Gujarat and Delhi and the same was changed to wheat and rice during the middle of the month. During the second fortnight of April 2020, considering the requirement of Kerala State Govt., FCI Kerala submitted additional requirement of around 0.012 MMT boiled rice. FCI Karnataka submitted additional requirement of around 0.02 MMT raw rice considering the requirement of Karnataka State Govt. With a handful of labourers and officers/officials (50% strength as per GoI guidelines for containing spread of COVID-19) fulfilling the

requirement of food grains with such frequent changes in commodity was a big challenge. However, FCI successfully dispatched such huge quantity of stocks as per the requirement of these States even within very short notice.

In northeastern states, where most of the food grain movement take place by road, problems were faced at inter-state borders due to imposition of restriction on the movement of trucks and labour. However, the same were sorted out with timely and effective interventions at every level. Meghalaya was the only state which was posing a challenge as per the FCI movement plan due to its limited storage capacity and induction of stocks only by road. Initially problem was faced by FCI as trucks were detained at the Assam-Meghalaya Border and drivers were not allowed to enter into Meghalaya. However, the matter was resolved subsequently with the intervention at appropriate levels. FCI was able to position sufficient stock and state govt. lifted the stock within the given time frame.

With all the meticulous planning and timely execution, FCI moved 4999 rakes carrying about 14.0 MMT was moved from procuring states to consuming states during the lockdown period up to 30.06.20. At the same time, 4950 rakes carrying 13.85 MMT were unloaded too. Besides, 1,05,000 trucks carrying 1.69 MMT food grain was moved by road to various states including far flung areas like Ladakh, Arunachal Pradesh, Manipur etc. and 13 vessels carrying 0.016 MMT were moved to Lakshadweep and Andaman and Nicobar Island. Movement of food grains at such a large scale in short time enabled FCI to achieve all-time record food grains distribution to every vulnerable section of the society during the pandemic Details are in Table 2.

Table No. 2: Food grains stocks distributed during 25.03.2021 to 30.06.2020

Scheme	**Wheat (MMT)**	**Rice (MMT)**	**Total (MMT)**
NFSA(Regular)	5.71	7.05	12.76
PMGKAY	1.50	10.15	11.65
Scheme for non NFSA card holders	0.26	0.71	0.907
Other Welfare Schemes	0.39	0.49	0.88
Open Market Sale Scheme	0.58	1.02	1.59
Scheme for Charitable/NGOs etc.	0.001	0.009	0.01
Allocation to Migrants/stranded Migrants	0.18	0.46	0.64

Total	**8.62**	**19.89**	**28.51**

6.0 Procurement of grains amidst the pandemic

Wheat is a winter crop which is harvested during March-April period. FCI was about to start a new procurement season when the lockdown was announced. The next big challenge was to handle the estimated procurement of wheat and Paddy (Rabi crop) which was scheduled to commence from 01.04.2020. Due to the spread of the virus, the date of commencement of procurement was extended to 15.04.2020 and beyond in all procuring states.

FCI Procurement plans were already in place. Bu the challenge was to decongest the procurement centers (called mandies in local parlance) and ensure that they do not become COVID hotspots. In order to ensure this, number of purchase centers for paddy were increased from 10472 in previous year to 13627 in spite of the fact that FCI had to work at half the man-power strength, which incidentally happened to be already half of the sanctioned strength, as detailed in the Table. Similarly, number of purchase centers for wheat in RMS 2020-21 were increased from 14838 to 21869. Apart from Agricultural Produce Marketing Committee (APMC) mandis, large number of temporary Procurement Centers were opened at Depots and other places. This had resulted in a sharp reduction in the number of farmers serviced per purchase center, limiting the footfalls and possibility of infections.

The State governments/ FCI leveraged use of Information Technology (IT) to generate tokens through SMS to farmers indicating time slots to bring their produce to regulate arrivals. Every precaution was taken in mandies to prevent spread of the virus. Purchase center areas were regularly sanitized, cleaned and disinfected. Similarly, availability of masks and alcohol- based sanitizer were ensured to all. It was ensured that at the time of auction of food grain, only farmer and those essential for the auction were allowed to be present.

One of the biggest challenges faced was ensuring supply of sufficient packaging material for procurement. As per The Jute Packaging Materials (Compulsory Use in Packing Commodities) Act 1987, only Jute bags can be used to fill the purchased grains. However due to COVID 19 threat, all the Jute mills located in the producing hubs of West Bengal were closed down, stopping production of Jute bags and its supply. It became a huge crisis and immediate action was taken to arrange alternate product i.e., Plastic bags (HDPE/PP bags) by diluting the mandatory jute bag use conditions. Though the impact was lower as the production of plastic bags was mostly mechanized as against labour-intensive Jute bags, even this could not ensure total solution as manufacturing and dispatch of HDPE/PP bags were also adversely affected due to lockdown. In order to ensure regular supply of packaging materials, a decision was taken to permit use of used bags which are in good

condition instead of new bags to undertake wheat and paddy procurement. With all these timely and effective decisions, sufficient supply of bags was ensured to do procurement in every purchase center through-out the country.

Another big problem was the untimely rain which affected wheat crop in all the major producing states of the country. As per standard procedure, joint teams with representatives from GOI, FCI and State government had to be deputed to draw samples from the field, analyse them and suggest relaxation in uniform specifications wherever needed. This posed a major problem due to ongoing lockdown. However, it was not possible to wait as it would have meant heavy loss and distress to farmers whose stocks were affected in rain. Innovative and timely solutions were worked out for every such logistical issue and it was ensured that teams visited the affected areas and completed their work in a time bound manner. Based on the findings of these teams, recommendations/ timely decisions were made for relaxing the quality specifications extending relief to millions of farmers in the states of Punjab, Haryana, Madhya Pradesh, Rajasthan and UP.

Due the restrictions imposed by lockdown, private sector participation in food grain procurement came down considerably, leaving the farmers stranded with their crops. Government agencies stepped into this space and ensured timely procurement of produce from all farmers and recorded the highest ever procurement of wheat at 38.98 MMT, surpassing the previous high of 38.2 MMT achieved during 2012-13. Along with wheat, paddy procurement was also undertaken effectively by the government agencies resulting in the procurement of 13.13 MMT paddy during Rabi season of KMS 2019-20.

7.0 Conclusion

Delhi weather gets particularly bad during July with humidity adding to the summer heat. D.V Rao was in his office looking at the performance chart of FCI during the lockdown. The figures looked impressive. It was perhaps the highest ever such food grains supply chain operations handled anywhere in the world in such a short span of time. During 100 days from 23.03.2020 to 30.06.2020, FCI:

- ➢ Moved 15.7 MMT food grains at an average of 3.14 Million bags per day
- ➢ Unloaded 13.85 MMT food grains at the average of 2.77 Million bags per day
- ➢ Distributed 28.51 MMT food grains at the average of 5.7 Million bags per day

Along with procurement of about 52 MMT, this was quite substantial. Though we felt satisfied that food grains could reach every nuke and corner of the country, we just wondered, there were many things which could have been done better.

In Jharkhand, Ramlal was walking towards the work site after the lock-down was over. It had reopened the previous day and he was summoned. On his left he crossed an FCI depot. He looked at it with thankful eyes. What would have happened to my family, but for the food grains supplied by government, he wondered.

Avtar Singh was working in his farm in Punjab. He was preparing the land for sowing of paddy crop. He saw a truck carrying FCI food grains pass by. He smiled and thought, 'pandemic or no pandemic, I have nothing to worry, as long as the government cares for people like me'.

Annexure – I: Staff Position of FCI

CATEGORY	SANCTIONED STRENGTH	MEN IN POSITION
Category-I	1,111	884
Category-II	6,221	4,255
Category-III	27,345	13,246
Category-IV	7,361	2,503
Total	**42,038**	**20,888**

Annexure II: Labour Position of FCI

Labour System	Depots	Strength
Departmental	53	10,116
Direct Payment System	153	17,777
No Work No Pay	83	6,194
Total	**289**	**34,087**

(Note- The no. of contract workers is dynamic and keeps on changing on day-to-day basis. As of now, it is around 70,000.)

Annexure III: Procurement of wheat and Rice for central pool during last 3 years

YEAR KMS/ RMS	PRODUCTION (In Million MTs)			PROCUREMENT (In Million MTs)		
	WHEAT	RICE	TOTAL	WHEAT	RICE	TOTAL
2017-18	98.5	111.5	**211,2**	30.8	38.2	**69.0**
2018-19	97.1	116.4	**215,4**	35.8	44.4	**79.8**
2019-20	1,03.6	118.4	**219,0**	34.1	51.4	**84.1**

Annexure IV: Quantity Moved by FCI (Quantity in MMT)

Period	Qty. moved by Rail	Qty. moved by Road	Qty. moved by Waterways	Total

2017-18	35.32	6.70	0	42.02
2018-19	30.33	7.93	0.05	38.31
2019-20	29.60	9.23	0.05	38.88

Annexure V: Quantity of food grains distributed by FCI (Quantity in MMT)

Year	Wheat	Rice	Total
2017-18	25.29	34.66	59.96
2018-19	31.64	34.23	65.87
2019-20	27.18	35.13	62.32

A look back of COVID-19 pandemic and its scientific review

Rajib Ghoshal*, Achintya Bhattacharyya, Arindam Chatterjee

Abstract

Since its initial detection in Jan 2020, COVID-19 has spread across districts and union territories in India. However, effective containment and treatment have resulted in a large scale reduction in number of active cases and consequent deaths. From a peak of close to one lakh infections per day it has reduced to 18 to 15 thousands cases per day at present. Here, in this paper we review the origin and spread of the COVID 19 through the entire world and how the scientific decisions were made to stop the spread. The effect of almost every aspect of human life such as food habit, work, and mental as well as physical health has been pointed out and how they are managed is also discussed. Finally, the socio-economical status is also highlighted.

Keywords: COVID-19, Pandemic, Socio economical status, mathematical Model

1.0 Introduction

The COVID- 19 pandemic has affected almost every individual in general. Almost every part of the world is now affected by this virus. The declaration of pandemic by WHO on 11th March, has made almost entire world to announce lock down in almost every countries, either partially or fully. The invisible manifestation of a respiratory infection with symptoms ranging from mild cough and cold to severe pneumonia has lead to so many fatalities all over the world. The difficulty to control the spread of this newly detected novel corona virus has lead to confine ourselves at home. So many mathematical & statistical models have been predicted to control the spread of the virus without much success. Here, in this article we will review and discuss how every aspect of our life has been affected by COVID 19 pandemic and how our medical teams lead us to live a near normal life.

2.0 Application based essential health services

Different areas, even within the same country, may require different approach to designate essential health services and to reorient health system components to maintain these services. Decision-makers must balance the benefits of specific activities with the risks they pose for the transmission of the virus. The risk–benefit analysis for any given activity depends on the local disease burden and social context, the COVID-19 transmission scenario and the local capacity for service delivery at baseline as the pandemic evolves. Countries have different policies for public health social measures they implement to limit the transmission of COVID-19, and their approaches to easing these measures may also differ. Policies that restrict movement to limit transmission may create barriers to health care access and will influence the roadmap for restoring services. In particular, the

pandemic has placed unprecedented demands on individuals to self-manage many health needs and on informal caregivers — including families, friends and neighbors — who should be exempted from travel restrictions that could prelude them from providing needed care. In settings where high-burden infectious diseases have signs and symptoms overlapping with the COVID-19 case definition (such as malaria, pneumonia or tuberculosis, public health messaging will need to be adapted to ensure that people do not delay seeking care for potentially life-threatening illnesses. Furthermore, in areas where elimination and eradication efforts are under way, even short-term modifications in prevention and treatment approaches may rapidly reverse hard-won gains and have substantial long-term consequences. Where, how and from whom people seek health care may vary significantly by context.

In some communities, private sector providers and non-governmental organizations (NGOs), including faith-based organizations, are important stakeholders and key service providers. Rapid assessments at the national and sub national levels should guide strategic choices about policy and protocol changes, taking into account that pre-existing gaps in service delivery may be exacerbated during the outbreak. This is particularly important in countries with low capacity and in humanitarian settings, where services will be compromised more quickly. Adaptations and innovations need to account for limitations in resources and capacities. Well-informed and coordinated, adaptations made in the COVID-19 context have the potential to build health system capacity that can be sustained throughout the pandemic and beyond.

3.0 Mathematical and Scientific Models to control spread

There are so many mathematical as well as statistical models that have described the number of COVID-19 affected people every day and how to minimize the number. One of the most popular models was SIRD model. This model tried to correlate the number of the total infected people with the number of the people dying and recovering daily. Other mathematical models are described by interpretation data using different mathematics or statistics and predict the minimum number of days required to lockdown to reach the infected case nearly to zero.

4.0 Migrant workers

Indian migrant workers during the COVID-19 pandemic have faced multiple hardships. With factories and workplaces shut down due to the lockdown imposed in the country, millions of migrant workers tad to deal with the loss of income, food shortages and uncertainty about their future. Thousands of them began walking back home, with no means of transport due to the lockdown. In response, the Central and State Governments took various measures to help them and later arranged transport for them. A substantial number of migrant workers died during lockdown, due to several reasons.

5.0 Mental Health during pandemic

COVID-19 infection is expressed differently in children and adolescents. The incidents of infection in the minors have been reported world ide, which resulted in children being quarantined. Moreover, in many cases a single parent or both the parents are infected and quarantined. In either condition children are separated from their parents. Many countries have laid down strict quarantine policies as a measure to fight COVID-19 pandemic. Several adults, adolescents and children have been put in complete isolation to control the spread of infection. Although quarantining measures are for the benefit of the community at large, its psychological effects cannot be ignored. The children who are in isolation require special attention a s these children might be at risk of developing mental health problems due to grief caused by of parental separation. As during the formative years of life, the role of parents is very crucial, any disruption in the form of isolation from parents can have long term effects of perceived attachment of the child. It is found that separation from the primary caregivers can make a child more vulnerable and can pose a threat to a child's mental health. The children may develop feelings of sadness, anxiety, fear of death, fear of parents 'death and fear of being isolated in the hospital which may have a very detrimental effect on their psychological development. Children have emotionally pent up feelings of distress which may turn in wards into emotional fear or outwards towards acting out behaviour. They might feel separated or alone as they have limited knowledge and level of maturity to understand the implications of the current pandemic situation in their limited world.

6.0 Socio Economical Effect of Pandemic

On March 11, 2020 World Health Organization (WHO) declared corona virus disease (COVID-19) to be a pandemic disease, which is caused by a novel corona virus "severe acute respiratory syndrome Coronavirus-2 (SARS CoV-2) and till now it has affected about 213 countries. A nationwide lockdown (exempting essential services) was announced by the Honorable Prime Minister of India on 24th March 2020 for 21 days to prevent the spread of the COVID-19. Our nation, being a developing nation and emerging market, there was a vast socio-economic consequence of this lockdown. Our health care services were at the war front. Due to proactive government policies, there was a reduction in the rate of the spread of COV1D- 19. Other health hazards due to pollution, road traffic accidents, crimes including robberies, rapes, murders, thefts, etc., were decreased substantially.

People learned good hygiene and family bonding, which was further strengthened. Negatively affected sectors were trading companies, schools, and education, economy, stock markets, ongoing events in sports, politics, entertainment industry, transportation, and activities related to religious places, tourism and hospitality industry. Poor people were worst affected as they were daily wage earners, though the government tried to provide financial help and free ration. In spite of all the unprecedented pandemic and

tough working conditions, the primary care physician learned the innovative way to help patients and ease their suffering with proper advice and awareness.

7.0 Educational systems

COVID-19 and its Impact on Education System in India. The extreme impact of COVID-19 has shaken the world to its core. Most of the Governments across the globe have quickly closed academic establishments making an attempt to arrest the growth of COVID-19 pandemic. Government of India as a facet of the nationwide lockdown has closed each academic institution, as a consequence of which, learners from school-going kids to postgraduate college students, are affected. These nationwide closures are affecting almost the entire student force of universities colleges and schools.

UNESCO is supporting institutions in their efforts to mitigate the quick impact of faculty closures, particularly for extra weak and deprived communities, and to facilitate the coherence of training for all via distant studying. The UNESCO report estimates that the COVID pandemic will adversely have an effect on over 290 million college students throughout several international locations. The UNESCO estimates that round a large number of college students are affected in India. Therefore. The government provided e-leaming program. Quite a few e-tech companies have tried to leverage the occasion by providing free on-line lessons or engaging limits one-leaming modules. These measures have been met with overwhelming response by college students with some new companies witnessing as excessive a 25% uptick in e-leaming. Distant studying appears to be a viable alternative for college kids throughout this time as they provide handy, on the go and reasonably priced entry to e-classes. However, COVID-19 has prompted specialists to rethink the traditional mode of training. Digital training seems to be a viable reply for make up for within the shortfall for classroom training. Going forward, digital training is more likely to be built-in into mainstream training. This may allow inclusive training by encouraging studying throughout India. Furthermore, it's going to present an open door for educators to provide you with custom-made studying solutions for each pupil.

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