GUJARAT'S PUBLIC HEALTH RESPONSE TO COVID-19: DOCUMENTING THE PROCESS, MARCH TO OCTOBER 2020

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Preface

In Gujarat, as elsewhere, COVID-19 presented a novel and serious challenge to the public health system. How do some of the key personnel in this system, who were closely involved in developing and implementing the response to COVID-19, describe it? This is the key question that this document tries to answer. We draw on interviews with 35 members of the government, ranging from the top levels of the bureaucracy charged with responding to the pandemic to frontline medical and public health staff. The interviews were conducted mainly through telephone or video-communication platforms. The time period covered in the interviews extended from mid-March 2020 to late October 2020, about seven-and-a-half months. The interviews were designed to be conversations around the five key five pillars recommended by WHO in its Covid-19 Strategy Update, April 2020: 'coordination and planning' as the overall context for the response; mobilizing society to limit exposure; finding, testing, isolating and caring for COVID-19 cases to limit transmission; providing clinical care and maintaining essential health services to limit fatalities; and customization of strategies to local contexts. The interview guidelines were developed and discussed by the core documentation team (the five authors of this document); interviewers outside this team were oriented through video conferencing. Most of the interviews were audio or video recorded. Each interview lasted about 30 to 40 minutes. The transcripts or notes were coded, and then clustered using the themes indicated by the five WHO pillars mentioned earlier. Every effort has been made to report the voices of the respondents as faithfully as possible. Appendix 1a lists the details of the persons interviewed and Appendix 1b presents the list of interviewers. Secondary data made available by the Department of Health & Family Welfare, Government of Gujarat has been used to supplement the interviews.

This document confines itself to the process of developing and implementing the public health response, as it is articulated by the respondents. It does not address other aspects of the overall response to COVID-19. The exercise was also not designed to be an assessment or evaluation by the authors. Any evaluative statements in this document, therefore, represent the respondents' views. The need for this document arose from a desire to present a narrative that might provide insight into how the system responded. COVID-19 no doubt presented, and continues to present, a difficult challenge. In the absence of proven treatment or vaccines, the entire focus had to be on preventing transmission. Following its first case, Gujarat, like most other large Indian states, showed an exponential rise in the overall cases as well deaths. However, as the trends reveal (see Appendix 2), the state seems to have been able to contain the transmission. The perspectives and experience of those who contributed to this response would offer lessons and insights for others involved in the fight against COVID-19.

We thank Dr. Jayanti Ravi, Principal Secretary (Health and Family Welfare), Government of Gujarat, for suggesting that such an exercise should be undertaken, and for making the necessary arrangements for the interviews. Without her encouragement and keen interest in learning about the progress of this project, timely completion of this report would have been impossible. The support of Dr. Anil Mukim, Chief Secretary, Government of Gujarat, enabled the undertaking of this project. We are also grateful to Dr. Rajiv Kumar Gupta, Additional Chief Secretary (Forest & Environment) and Shri Pankaj Kumar Additional Chief Secretary (Revenue) for sparing their time and sharing their experiences. Both these interviews were scheduled for just 20 minutes, but extended to 45 minutes. The others in the system whose contributions were particularly helpful include Dr. Vinod Rao, Secretary (Economic Affairs & Nodal Officer, Vadodara region), Shri Milind Torawane, Secretary (Economic Affairs & Nodal Officer, Bhavnagar region), Ms. Sonal Mishra, Secretary (Narmada Water Resources, Water Supply & Kalpasar Department & Nodal Officer, Surat region), and Dr. Rahul Gupta, Industries Commissioner,

Gandhinagar & Nodal Officer, Rajkot region. The inputs shared by Shri Banchhanidhi Pani, Municipal Commissioner (Surat Municipal Corporation); Shri Manoj Aggarwal, Police Commissioner (Rajkot) and Ms. Remya Mohan Moothadath, District Magistrate & Collector (Rajkot) were critical in understanding the contextualization of strategies to local conditions.

We are grateful for the support and help extended by the following members at the Department of Health and Family Welfare: Shri Jai Prakash Shivahare, Commissioner (Health); Shri J.D. Desai, Former Mission Director, NHM; Additional Directors (Health, Medical Services, Family Welfare); Directors (SIHFW, AYUSH); Executive Director (SHSRC); Deputy Director (Epidemic); Regional Deputy Directors (Health – Gandhinagar, Rajkot); General Manager (GMSCL); Program Officer (Mental Health); Medical Superintendents, Government Medical College hospitals (Rajkot, Surat); Deputy Commissioner (Health & Hospitals – SMC); Medical Officers of Health (SMC, VMC); members of the Faculties of Medicine, Community Medicine Departments of Government Medical Colleges (Ahmedabad, Surat) and Chief Operations Officer (GVK-EMRI)—all of them were closely involved in managing COVID-19 from the first day. Dr. N. B. Dholakia, former Additional Director, Family Welfare and Medical Services, Government of Gujarat reviewed the manuscript. A final word of thanks to the team at State Health System Resource Centre (SHSRC) for coordinating and facilitating the interviews.

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SUMMARY

- In Gujarat, as elsewhere, COVID-19 presented a novel and serious challenge to the public health system. How do some of the key personnel in this system, who were closely involved in developing and implementing the response to COVID-19, describe this response? This document tries to answer this question through interviews with 35 members of the government, ranging from the top levels of the bureaucracy to frontline medical and public health staff.
- > The time period covered is mid-March 2020 to late October 2020.
- The document confines itself to presenting the participants' views on the process of developing and implementing the public health response. It does not address other aspects of the overall response to COVID-19. The exercise was also not designed to be an assessment or evaluation by the authors.

The key themes that arise from the accounts of the personnel are the following:

- The initial response in March as setting the tone for the response with a series of important steps such as putting together a team, planning medial infrastructure, instituting surveillance, and undertaking widespread awareness campaigns.
- The constitution of a Core Committee headed by the Chief Minister to review the situation, ensure inter-departmental coordination and make key strategic interventions such as setting up a committee for transparent procurement; regular video conferences with the districts; appointing empowered nodal officers for the problem areas with decisions taken on the phone, dealing with the media and press through transparent and regular briefings; and taking help of central teams.
- > Learning from the available information and applying this learning judiciously to Gujarat.
- Managing the tensions between the need for a standardized response based on recommended practice and the freedom to local administrators to innovate depending on the local context. Thus, along with standardized guidelines, training interventions, and innovations such as the mobile medical van, the 'Dhanvantari Rath', there were a number of context-specific responses.
- Reworking the strategies as experience built up, especially visible in the clinical response.
- Careful attention to meeting the 'perception challenge' and 'legal management challenge' arising from social scrutiny of governmental actions.
- A variety of Mass Communication, Inter-Personal Communication (IPC) and Social and Behavioural Change Communication (SBCC) communications.
- Surveillance as key to the public health response; with extensive use of ITIHAS and Aarogya Setu.
- Dhanvantari Rath to reach out to those unable to come out of their zones, along with extensive use of 104 and 108 services.
- Hospital preparedness, mobilization of health and medical staff who report satisfaction at their response to the pandemic; action to overcome the initial scarcity of equipment such as PPE; and tele-mentoring.
- Setting up new laboratories to help scale up testing to 11,000 RT-PCR tests.
- > AYUSH as an adjunct intervention, for extensive distribution of protective formulations.

1.0 INTRODUCTION

Gujarat's first two cases of COVID-19 were reported on March 19, 2020—a 32-year-old man from Rajkot, who had returned from Saudi Arabia and a 21-year-old woman from Surat, who had returned from the UK. Soon after this, many cases were reported in Surat and Ahmedabad. The number of cases then started increasing and peaked in September 2020. Figures 1.1 and 1.2 present a snapshot of the movement of certain key indicators, based on data collected and put out in the public domain by the Government of Gujarat. Appendix 2 presents further details of the trends observed on certain key parameters. The picture presented by these key indicators is intended as background to understanding the process of responding to COVID-19, as it is described by this study's respondents. The rest of this introduction presents a brief profile of the health systems of Gujarat and the initial response of the Government of Gujarat. The main body of the document is organized into five chapters, the strategic response to COVID-19, information-education-communication and the use of media, the public health response, the medical and clinical response, and city-specific case studies to illustrate the contextualization of the overall strategy. These chapters are followed by a concluding chapter. Appendix 3 presents a few illustrations.



Figure 1.1: Testing, Cases and Outcomes, up to/ as of October 31, 2020

Jul Sep Mar Apr May Jun Oct Aug Cases reported peaked in September 15849 28795 34997 40959 35550 Recovery has progressively improved, with recovery higher than detected cases in October 74% 94% 96% 109% Case Fatality Rate is declining 0.75% 6.65% 5.11% 2.06% 1.66% 1.05% Testing increased up to September 161733 391114 1567059 2086192 1479599 Test positivity rate has decreased 10% 7% 2% 2% 2%

Figure 1.2: Month-wise Trends of Core Epidemiological Indicators, Gujarat

Source: Department of Health & Family Welfare, Government of Gujarat.

1.1 Gujarat and its Health Systems

The western Indian state of Gujarat covers an area of 196,024 km² and exhibits fairly high levels of industrial and agricultural development, and literacy (79.3 percent). The state's population is 60.38 million (2011), which is about five percent of India's population. The public health services in the state are provided broadly by three divisions: Public Health (mainly promotive, preventive and primary health care by medical officers and paramedical staff), Medical Services (specialist care by surgeons, physicians and others) and Medical Education (teaching, research and tertiary level clinical services at medical colleges). However, the system was experiencing a human resource shortage and drafting people from other departments to help in dealing with the COVID-19 emergency was inevitable. In addition, Indian medicine systems are represented through the Ayurveda hospitals and clinics; the state also runs homeopathy clinics. The Gujarat Ayurved University has recently been converted to ITRA (Institute of Teaching and Research in Ayurveda) and was declared by the Government of India as an Institute of National Importance. This indicates the general spread and quality of Ayurveda and AYUSH institutions as well as the popularity of these forms of medicine in the state. Gujarat has achieved significant improvement in key health outcomes (MMR: 75, NMR: 19, IMR: 28) over the years and fares better than the national average. It has made significant progress towards Universal Health Coverage through the implementation of the AB-PMJAY and HWC schemes. It has 200 beds in the empanelled hospitals per lakh of PMJAY-eligible beneficiaries and ranks fourth among all states in the operationalization of Health and Wellness centres.

In the context of COVID-19, a public health crisis, the response has understandably assumed the public health system to be the main instrument for containing the pandemic and treating the complications. However, the manner in which the private sector was involved is best captured in the case studies of Ahmedabad and other cities presented in the last section of this document. The Ayurveda and Homeopathy system (part of AYUSH—Ayurveda, Yoga, Unani, Siddha and Homeopathy) has played a supportive role through its provision of protective medicinal formulations. In matters of limiting the transmission of the virus, the government has relied on societal compliance with the recommended

measures such as wearing face masks and maintaining social distancing, and on lockdowns, both nationally determined and locally decided.

The Health and Family Welfare (HFW) Department had to spearhead the fight against COVID-19 on behalf of the Gujarat Government. Like all other countries and states, the state had no experience of dealing with such a pandemic of this scale and complexity. Whatever little knowledge it had was based on the experiences of countries affected by the Corona virus. Simultaneously, the Public Health Department of the state was faced with certain internal issues at that time. For instance, it so happened that the Technical head of the division dealing with public health had left just taken voluntary retirement before the pandemic struck and the successor who was appointed was faced with an entirely new, unprecedented and tough situation. Also, the COVID-19 challenge was new for the senior officers heading the various divisions at the Commissionerate of Health. However, the HFW Department, accountable as it was for the outcomes, used the lockdown period to mobilize the entire health workforce for the fight against COVID-19. A slew of innovative interventions to mobilise human resources by decentralising recruitment at the district levels, having a special bond scheme allowing for counting twice the period of time if the incumbent was on COVID-19 duty, and empowering the District Collectors to offer a top up or incentive to fill the vacancies were adopted.

The government also mobilized a large number of senior officials from various other departments to support the HFW Department in managing the crucial services and special geographical areas. However, this influenced the manner in which policies were implemented or locally contextualized. First, a command-and-control approach was not possible given the diversity of local contexts and the varied senior human resources mobilized; this made a peer-based approach necessary. Second, while certain basic cardinal principles were followed across the state in responding to the pandemic, following from this approach, multiple strategies and implementation approaches took shape based on the local contexts and the perspectives of the specific officers and teams addressing the local challenges. A sensitive coordination of the diverse bureaucratic leadership approaches was warranted and adopted. Third, the diverse leaderships also meant that there were varied approaches and a strictly and meticulously planned approach could not always be followed. The unknown nature of the disease and the real time learning and unlearning further added to the complexity of the situation. Over time, the ability of the team, especially the leadership of the Health Department, to learn, unlearn and relearn and be able to support and nurture varied approaches to respond to COVID-19 in different cities, districts and contexts itself came to be seen as a strength. There are two sides to this coin—the evolution and formulation of this overall strategy of responding based on city or district context, propelled by multiple leaders, had its own advantages in terms of handling local challenges and achieving breakthroughs with locally appropriate responses. Nevertheless, when things did not work out as expected, it was seen, in the media, judiciary or even within the bureaucracy, as the overall responsibility of the Health Department. However, the daily meetings of the state-level core group (to be discussed later), which were often very animated, yet giving space for diverse points of view, ensured that the real-time lessons from the successes and failures of various strategies and approaches were quickly and nimbly adopted and ploughed back across districts as a state-wide stratagem, thus minimizing the incoherence and significantly helping to coordinate and harness the efforts of the entire HFW Department in dealing with such a challenging pandemic of unprecedented severity.

1.2 Initial Response

The administration initially had to depend on information about the novel-Corona virus and COVID-19 derived from the experiences of other countries, but very soon, national experiences started accumulating. Though the first cases of COVID-19 in Gujarat was reported only on March 19, 2020, preparations had already begun before that since it was apparent that it was only a matter of time before Gujarat would also be affected. The key elements of the initial response to COVID-19 included the following:

- Putting together a team and ensuring that it was mentally prepared to face the challenges that were sure to arise constituted an initial step.
- Learning from the experiences of countries that had been hit by COVID-19, hospital beds, PPE kits and ventilators were seen as key factors in the COVID-19 response.
- Checkpoints at airports, with screening and quarantine of international travellers, were set up. This step was taken in the middle of February 2020, but was made stricter in March.
- Awareness campaigns about regular and thorough handwashing were initiated.
- In Gujarat, there was a ban on the manufacture of alcohol-based sanitisers, but that was lifted.
- Going by the initial reports on the possible efficacy of hydroxychloroquine (HCL), the government arranged to procure about 10 million tablets.
- Door-to-door surveillance was instituted, and health staff were instructed to be prepared.

Gujarat's first two cases included a 32-year-old man from Rajkot, who had returned from Saudi Arabia and a 21-year-old woman from Surat, who had returned from the UK. Very soon, cases were reported in Surat and then Ahmedabad. The initial focus of the government was on anticipating how the disease would progress, so that steps could be taken to prevent the transmission of the virus and to deal with the hospitalised patients. With Principal Secretary (HFW) bearing the overall responsibility for COVID-19 management, a supplementary management structure was set up to deal with COVID-19 whereby one senior IAS officer was put in charge overall and four senior IAS officers were made nodal officers for four different regions. Initially, Shri Pankaj Kumar, ACS Revenue was given the responsibility for the Ahmedabad and Gandhinagar regions with special responsibility for getting the 1200-bed COVID Hospital at Ahmedabad readied. After mid-May, Dr. Rajeev Kumar Gupta was asked to coordinate for the Ahmedabad Corporation and Shri Pankaj Kumar was asked to coordinate for the state. The other nodal officers included Shri Mahendrabhai Patel (Surat), Dr. Vinod Rao (Vadodara) and Dr. Rahul Gupta (Rajkot). COVID-19 guidelines and treatment protocols were issued by the end of March. In between, a national lockdown was imposed on March 24. The decisions that the government had taken before the lockdown and soon after the lockdown was imposed are summarized in Table 1 below.

| Date | Decisions of government | | | | | |
|--|--|--|--|--|--|--|
| March 13 | 13 Epidemic Diseases Act and Disaster Management Act invoked. | | | | | |
| March 15 School, Colleges, Theatres, Gymnasium, Swimming Pools Closed. | | | | | | |
| Online classes for schools and technical colleges started. | | | | | | |
| March 17 | Statue of Unity closed down. Daily sanitization measures for public transport and GSRTC buses. | | | | | |
| | Screening of all international travellers in to Gujarat made stricter. | | | | | |
| March 19 | First two cases reported. All tourist places closed down. Examination and recruitment | | | | | |
| | examinations postponed. | | | | | |

Table 1.1: Early Decisions

| March 20 | Decision to provide grocery and PDS rations for month of April in advance. Also advance pension to all those beneficiaries of social welfare scheme such as aged, differently abled pension. Restriction to entry of people to Government offices. Restaurant and hotels closed for dine-in. Only take away or home delivery allowed. Shopping malls (non-essentials) closed. |
|----------|---|
| March 21 | Decision to set up 1200-bed facility in Ahmedabad, 500-bed in Surat, 250-bed in Rajkot and 250- bed facility in Vadodara. Government started to operate with 50% staff on rotation basis for all non-essential services. |
| March 22 | Quarantine facilities (631 in four cities and 4271 in other districts) made operational. All shops, malls and other businesses to remain closed except for essential services to remain closed until March 25. Ban on passenger and taxi services until March 25. Ban on inter-state buses, taxis and cabs until March 31. |
| March 23 | Review and infrastructure set up for delivery of essential services such as milk, vegetables, groceries and pharmacy. |
| March 24 | Special Task force set up. All Government offices closed till March 31. |
| March 25 | Decision to provide one-month ration free to 60 lakh labourer families and 3.25 crore people and distribution to begin from April 1. Besides 3.5 kg wheat and 1.5 kg rice per person, 1 kg sugar, 1 kg salt and 1 kg pulses per cardholder to be given. Special management team to facilitate supply of milk and vegetables, fruits State Government requested GOI to extend short-term credit repayment period by 3 months to June 30. Pass system started from districts to support movement of persons and goods in essential goods category |
| March 26 | Control rooms at State (1070 & 079-23251900) and each district (1077) set up. Vadil Vandana Yojana announced to take care of and provide food and groceries to aged, lonely and other needy persons. Enforcement of lockdown, issuance of need based passes. Food kitchens for labourers and homeless in industrial units and construction workers. Date for bill payment of electricity for the month of March–April extended to May 15. No fixed charges on electricity charges for small units and commercial units for month of April. |
| March 27 | Contribution to CM Relief Fund to fight Corona declared tax exempt from Income Tax under 80 G. Contribution from over 3500 donors amounting to over Rs. 12.5 crore received on the first day. Food packet preparation systems for migrant labourers instituted. |
| March 28 | Grant of Rs 1500 through DBT to all students of various residential schools/hostels of SC/ST/OBC who have left their hostels just before lock down. |
| March 29 | Free ration to migrant labourers for the month of April for those who have cooking facilities or food packets for them until lock down time. |
| March 30 | 24*7 Helpline #1100 launched to assist, counsel and advise quarantine people to allay their anxiety and provide mental health support. 100-bed facilities set up in all districts and two senior officers assigned special responsibility. |

Source: Based on information supplied by Department of Health & Family Welfare, Government of Gujarat.

These steps indicate that some time before the first case was reported in March 19, a sense of urgency had started to develop, and a strategy to respond to the pandemic whenever it hit had started to take shape. For example, surveillance steps were some of the first large-scale interventions. The government, in an effort to prevent the spread of COVID-19, started a special house-to-house survey on March 23, 2020. The Family Health Survey was carried out through Techo+ Plus App. The steps to be followed, like how to conduct surveys and how to enter data, were described through guidelines and in the form of video. The survey was planned to cover the whole of Gujarat, with micro-planning being done by the Chief District Health Officer in all the districts and the Medical Officer of Health in the corporation area. The coordination of the programme was done by the Collector in each district and the Municipal Commissioner in the Corporation area. In the survey priority was given to those who had come from abroad, COVID-19 positive patients and their close contacts, people mentioned in the line list provided by 104 and 108, suspected patients diagnosed by private practitioners, and self-reported suspected patients—the survey of available passengers was conducted on priority, based on the details of passports and other personal details. The survey was carried out by a team of two persons, one paramedical staff (FHW, MPHW, ASHA) and one non-paramedical staff (Teacher, Anganwadi worker, etc.). In the house-to-house survey out of the total population of Gujarat, 6,57,13,341, 6,44,25,028 (about 98%) were covered by April 5, 2020. In this survey, 3558 out of 95574 people with domestic travel history, and 296 out of 20156 people with international travel history, were identified as ILI/SARI cases and medical check-up carried out. In addition, a Doctor support app was created for ILI / SARI reports registered by private doctors and hospitals. By April 22, 2020, 214 private doctors had registered.

The second round of special house-to-house survey was organized from April 7, 2020. In this, priority was given to cluster containment area, suspected patients identified by private practitioners through Doctor Techo, survey of people mentioned in the line list provided by 104 and 108, suspected cases detected by My Techo application, and self-reporting. Among the prioritized surveyed 1,41,16,971 people 15,234 were identified as ILI. From among these, 12605 people were treated and 2672 people referred to Medical Officers-of these people, 606 suspected patients required testing. By April, only the government hospitals were functioning and they were taking in a number of people affected by COVID-19. As a senior medical administrator comments, "By late March, those who came to the hospitals were the most severely affected, gradually the less affected came. However, many of the severely affected who were brought to the hospitals late could not survive. For the hospital staff there was little time to do much the patients had to go straight to the ICU. The disease was so new; it took time to understand it. This was a difficult time. The lights would never go off, people worked endlessly. Every day things were changing and new information came in, but it had to be authenticated before we could act." When the pandemic actually hit, the nature of the virus meant that the environment changed very rapidly and there was very little time to learn; decisions had to be taken based on information that was at best not comprehensive. The strategy took shape as decisions were taken and the results studied—all in a rapidly evolving situation. The details of this strategy are presented later, but an overall perspective, drawing on the inputs provided by various key stakeholders leading the response, is presented below by way of background.

2.0 STRATEGIC RESPONSE TO COVID-19: AN OVERALL PERSPECTIVE

2.1 Core Governance Structure

A key initial step that provided an overall direction to the response to the Corona virus was the constitution of a Core Committee headed by the Chief Minister to review the situation daily. The members of this committee included the Deputy CM and Health Minister, Chief Secretary, and the Secretaries of key Departments including Health & Family Welfare. This helped in the inter-departmental coordination responding to COVID-19 required the involvement of many departments. Senior IAS officers and Gujarat Administrative Service officers were deputed to support the Health Department. From the early days, the administration was keen to learn from research, and so tracking the progress of the surveillance, the clinical experience and the morbidity patterns was seen as important. (A formal research committee was set up later.)

From March 20, the Core Committee met every day in the evening so that a daily stock-taking of the situation and analysis could be done, appropriate decisions could be taken fast with all the key stakeholders voicing their views and discussing animatedly to arrive at a concerted and accepted action plan owned by all. This Core Committee continues to meet regularly. Some key strategic decisions included setting up a high-powered for transparent procurement; regular video conferences with the districts; appointing empowered nodal officers for the problem areas with decisions taken on the phone—"a nimble bureaucracy in action", dealing with the media and press through transparent and regular briefings; taking help of central teams—for instance, a team comprising Dr. Randeep Guleria of AIIMS, NITI Aayog member Dr. Vinod Paul, Director General of ICMR Dr. Balram Bhargav and Additional Secretary in the Union Ministry of Health and Family Welfare Ms. Arti Ahuja visited Gujarat. The team endorsed the approach adopted and appreciated the work that was being done. Also, a State Task Force of eminent private doctors from the field of public health and clinical care was constituted to guide and advise the Health Department for deciding technical policy, guidelines and give advises to control of epidemic and clinical management of COVID-19 cases.

A second aspect of the governance at the highest levels was regular and widespread communication. On a daily basis, right from March end, daily media briefings were held by the Principal Secretary Health twice daily, and the Director General of Police and Secretary Information Department. During the lockdown, these bulletins were viewed extensively and helped keep the communication channels open. The communication covered the daily tally of cases, new policy decisions taken that day in the core group as well as new guidelines issued by the Government of India. This also helped bring about greater awareness and social and behaviour change communication, which was and is the only protection against COVID-19, even as of today. Efforts of the government ranging from surveillance, diagnostics, treatment in the health sector as well as efforts related to other departments including police, law & order, civil supplies, migrant labour movement and a host of issues, were shared daily with the public through these press briefs and media interactions, which were keenly followed by the public.

The Chief Minister took the lead in early April to talk to the medical fraternity and others through conference calls to discuss the availability of services during the lockdown. Daily interaction through audio conference calls with all these stakeholders was being convened by the HFWD for getting private sector engagement in the COVID-19 response, which fructified soon, especially in cities like Ahmedabad, Vadodara and Surat. The state is endowed with a very good communication infrastructure. Video conferencing facilities were available right down to the taluka level. The communication also included other departments such as Revenue Department. A variety of control rooms, war rooms and the state

emergency operation rooms were set up, and these were crucial in ensuring smooth and continuous communication. Other steps included using SATCOM, (a special facility created in Gujarat under Department of Science & Technology whereby every village can be connected through satellite communication) to talk to ASHAs and train health workers; a variety of social advertisements and awareness program such as 'Apna Mudda', 'Apni Vato'; and 'Hello Doctor' on Doordarshan. Another aspect of the communication mentioned earlier was the daily briefings on COVID-19 that Principal Secretary (Health) gave on the electronic media until the intensity of the disease came down.

2.2 Learning from Available Information

A second aspect was learning from the available information and applying this learning judiciously to Gujarat. Initially, the key sources of information about the virus and the management of COVID-19 were international and national experiences, and the guidelines that ICMR issued regularly. Based on prior experience of pandemics, it was evident that surveillance, both active and passive, was critical. In addition, the broad principles of testing, contact tracing, isolation and treatment were already being discussed internationally when the Corona virus appeared in Gujarat. However, applying whatever little was known in practice was a key action point. For example, for surveillance, the careful application of ITIHAS and Aarogya Setu Apps resulted in progressively refining the containment strategies. The initial containment zones were larger, and as the disease came under control, the data helped in demarcating smaller areas. The strategy of Micro containment zone was more feasible and more acceptable to the people; it was found to be equally effective. Initially, testing facilities were very limited, with B.J. Medical College handling the entire load. With time testing facilities were created at all medical colleges in the state and also permission to test granted to private laboratories accredited to NABL. Very soon, based on a study of what was possible, the facilities were expanded, and when rapid antigen testing was introduced after about two months, the testing process could be accelerated. Another example was the use of the Pulse Oximeter to screen suspects who would be at high risk. After this knowledge became known in early April, it was tried out in a few places, and then applied widely as a tool to early identify high risk patients with low oxygen saturation with the aim of reducing mortality.

Searching for relevant information was an ongoing process at the administration and medical professional levels. For example, the Chambers of Commerce was tapped for training on ventilator use. A local group of experts was set up for reviewing world literature, and there were daily meetings to discuss the knowledge generated. The experts included Additional Directors of the Health Department, Professors of Medical Colleges and private medical professionals. The guidelines put out by the Government of India were studied carefully, and general information on what was reported in the media from other states was collated.

The medical fraternity was equally concerned about gathering knowledge. As one senior professional put it, "We were in touch with our colleagues in the US and UK, and with our batch mates, and others who could help. We were searching for web-based information and listening to a variety of podcasts. We tried to learn anything worth learning, rapidly. A number of images and reports were shared and discussed. Fortunately, we could learn from other locations that were ahead of us in the disease outbreak. This was especially important until end-June when the severity of the cases started decreasing. Prior to that we saw cases that we would not forget all our lives. The ICUs were overworked. For some people, we could not do anything. The aggression of the disease was surprising." Thus, while gathering knowledge and maintaining good communication were important, the rapid and unpredictable progression of COVID-19, at least in the first three months, gave little reaction time.

2.3 Standardization and Innovation

A third aspect related to the above was managing the standardization imperative with allowing local administrators the freedom to innovate depending on the local context. Thus, from the state-level, there were a number of guidelines, training interventions, standardized innovations such as the 'Dhanvantari Rath', a mobile van that played a crucial role in testing and treatment, and centralized initiatives such as tele-mentoring. At the same time, there were a number of context-specific responses. For example, the approach to engage private doctors was different in the two cities of Ahmedabad and Vadodara; there were localized innovations such as doorstep doctors and COVID Community Isolation Centres. This approach was necessary given the novel nature of the challenge and the spread and intensity of COVID-19.

2.4 Reworking Strategies

A final aspect of the perspective was reworking the strategies as experience built up. For instance, learning about the importance of oxygen: initially, invasive ventilators, which were the main type available, were used, but later on other non-invasive methods like high flow nasal oxygen and proning were also introduced. This helped improve the outcomes. The reworking was specifically visible in the various changes that were made in the guidelines, driven either by experience or by new information. For example, when advice regarding some drugs such as hydroxychloroquine was overturned, the guidelines had to be immediately modified. Another example would be the wearing of masks, which was not initially mandated. The government really did not have much choice in such reworking; but there are other areas that illustrate how learning resulted in reworking strategies. The experience with the statelevel core committee had been good, and so the approach at the district level was modified by instituting a core committee headed by the District Collector in every district. Another example is the redeployment of the workforce. Since different districts peaked at different points of time, a method to identify surplus workforce in some districts and temporarily assign them to districts that needed more resources was put in place. Staff (doctors, nurses, lab technicians, and others) were reassigned for 15 day-stints, and arrangements made for their stay in controlled conditions—the locals working with them also had to stay in the designated residential facilities.

In sum, putting in place a governance structure at the highest level that demonstrated political and executive commitment, applying knowledge as and when it became available, generating novel approaches and standardized guidelines centrally, but allowing the experienced administrators at the local city and district levels to contextualize these, and reworking strategies as experience accumulated, are key features of the overall response. This is best captured by the reflections of a top medical administrator: "Once the rapid test was made available, it was a great boon. We ramped up the numbers, and there was no cap. The corporation areas, cities and the rural areas were given a free hand to do as many tests as they were capable of. This went along with the decentralization of decision-making and work execution. Anyone would be surprised by the powers given to the District Collector. Whether it was recruitment of specialists, or purchase of necessary material, all powers were decentralized. They could get it done, get post facto approval from higher authorities, and inform what was undertaken. Whatever was received from relief funds or grants from the centre was put at the disposal of district administrations. Local authorities were free to rope in the private sector. As in other states, the government did not have adequate number of specialists."

2.5 Responding to the 'Perception Challenge' and 'Legal Management Challenge'

Another view of the challenges that had to be faced is presented by the top leadership in charge of the COVID-19 response in terms of three dimensions: (a) "the actual COVID-19 challenge", that is, responding to the virus and the complications it caused; (b) "the perception challenge"—handling the social communication challenge, reducing the sense of fear and panic that was evident in many areas; and (c) the "legal management challenge", that is, responding to public scrutiny and the legal challenges to the government's approach. The first two are discussed in detail later, but a note on the third challenge follows.

Responding to the legal challenges was an important part of the broader COVID-19-related actions; "all the government's actions were under regular scrutiny" and so various groups in society were keenly following the steps taken by the government. "A number of PILs were filed in the Hon'ble High Court and some observations were made by the Court. We provided our responses. The whole process was helpful since the government learned from the questions put to it and from the framing of the responses." The government had to respond to a series of public interest litigations filed against it on various COVID-19 issues, including issues not covered by this document. The Gujarat High Court issued a series of orders, starting with an observation as early as March 13 on the precautionary measures to be taken against COVID-19 on the Court's premises and in wider society. Other areas on which the High Court passed orders include protective equipment for healthcare professionals, use of private hospitals for treating COVID-19 patients, testing kits and testing of healthcare workers, the payment of one-way train fare for migrant labourers, cooked meals for the homeless, listing people who had returned to Gujarat after attending a religious event in Delhi, compensation for those who had died of COVID-19, and so on. At the same time, the Court warned against frivolous PILs and encouraged civil society actors to cooperate with the government. The early PILs had been disposed of by April 17. Unusually, the High Court also took cognizance of an anonymous letter written by a resident doctor of Ahmedabad. It also dealt with a PIL filed by the Ahmedabad Medical Association against testing in private laboratories requiring clearance from public health officials. In August, the High Court directed the government to prepare a report on the status of the Corona response, though it noted that "all the necessary steps are being taken to combat the situation of COVID-19 pandemic" and appreciated the fact that the top political leadership was visiting the severely affected cities. The Court also refused to accede to a plea to reveal the names of COVID-19 positive patients after the government changed its earlier policy of identifying the positive cases citing social ostracism of patients as a reason. In brief, the role of the judiciary in both complementing the executive in policy matters and providing a forum for deciding on issues arising from social scrutiny of the state's actions, has been evident in Gujarat's COVID-19 experience.

Since the actions of the government were under constant scrutiny, maintaining open channels of communication, responding to the feedback and criticism from a variety of social actors in a constructive manner, and taking corrective action, were key concerns of the Department of HFW. In the early phase of the pandemic, there was a widespread panic in the community. To address this, the government decided to use transparent proactive risk communication. Daily press briefings were held, initially twice a day, with transparent reporting of the COVID-19 situation. The government's efforts to tackle the situation were also presented through these briefings. The media did sensationalize the fatalities that occurred in the early days of the pandemic, and to address this, the briefings highlighted the recovery rate. In addition, sharing stories of people, especially above the age of 80 years, who had recovered from COVID-19, in the media was adopted to allay fear and panic among the people.

In the initial phase, only government facilities were managing COVID-19and they were quickly overwhelmed. Further, the public system was the focal point for referral of all critical cases—these patients showed poor survival outcomes due to late admission, and very little knowledge about the disease and the paucity of tools to treat such severe cases. This led to apprehension in the minds of the people regarding the quality of the care being provided at the dedicated COVID-19 facilities, so much so that the high court demanded a response from the government and set up a panel to review the response. The government responded promptly to all the questions posed by the judiciary and announced it was open to scrutiny and monitoring by other state and national agencies. As noted earlier, the judiciary expressed its satisfaction with the services provided; the National teams which were sent to Gujarat also expressed their satisfaction. The Department of HFW took several measures to quell the apprehensions in people's minds. These included 24x7 CCTV monitoring of COVID-19 services with direct feed to the Chief Minister's dashboard; wide dissemination of the services available in the public system; broadcasting interviews with recovered Corona patients as well as those under treatment; sharing video documentation of service delivery, success stories and good practices; and countering misleading and often false information spread through social media. Electronic and social media were used to spread factually accurate information in order to create awareness among people. A website with a dedicated COVID-19 dashboard was created and regularly updated to reflect the most recent status. Television spots, radio jingles, hosting and tele-interviews with doctors, celebrities and eminent personalities, were used to counter myths and create awareness about COVID-19. (These are described in more detail later.) At one point in time, the government services came under severe criticism from the print media, with one outlet even labelling a key hospital a "dungeon". The government responded by inviting the editors of newspapers to observe the Chief Minister's dashboard; details about the state's response were also shared with them. This approach served to at least keep a dialogue going. The members of the task force that was handling the response compiled a FAQ booklet and held Facebook Live sessions to address people's concerns. Daily COVID-19-related sessions by experts were hosted on television channels. There was extensive interaction with private doctors, medical associations and civil society. The political and administrative leadership regularly engaged with the frontline service providers to address their issues and motivate them. All these measures are believed to have helped in addressing many of the issues that arose as a result of the social scrutiny of the government's actions. We now turn to the details of the public health, clinical management and social communication responses.

3.0 INFORMATION EDUCATION COMMUNICATION, MASS MEDIA AND TRAINING

Given that the novel Corona virus was something that Gujarat and the rest of the world were facing for the first time, knowledge about the virus and the disease it caused had to be developed from scratch. However, what was known was that its spread had to be contained by ensuring that people changed their usual social behaviour. Thus, Information Education and Communication (IEC) came to be one of the earliest interventions to fight the virus. The primary goal of IEC was to ensure that the right message went out to the right people so that the ensuing behaviour change could interrupt the transmission of the virus. Government of Gujarat started its IEC activities on January 31, 2020, about six weeks before the first case was reported.

The strategies adopted include Mass Communication, Inter-Personal Communication (IPC) and Social and Behavioural Change Communication (SBCC). Messages under these strategies were constantly redesigned as new knowledge about the virus and its containment arose. At the district level, local need-based strategies were developed to ensure their contextual relevance.

The main base for the strategies was the information supplied by the Government of India and WHO. From the very beginning, the prepared content included preventive measures (hand washing, social distancing, wearing masks, precautions taken during quarantine, guidelines for travellers), promotive measures (immune boosting healthy diet, breathing exercises, ayurvedic formulations, etc.) and curative measures (when to seek treatment). The content also targeted different strata of the population, such as the elderly, pregnant women, persons with co-morbidities, young adults, health care providers, police personnel, etc. It also targeted day-to-day activities (e.g. public gatherings, buying vegetables, gathering at places of worship, use of lifts in buildings). The messages had to be cleared by key decision-makers before they were put out. Because of the pandemic, routine health activities suffered, and so the IEC material had to include content about malaria, dengue and immunization, along with its COVID-19 messages. The content also included endorsement by celebrities, religious leaders, and senior doctors. Appreciation of corona-warriors such as doctors, healthcare workers, police, and sanitation workers through 20-minute documentaries was received well. Information regarding telemedicine, the 104, 108 and 1100 helpline numbers, precautionary steps to be followed in the unlock phase, and reverse quarantine steps, was also an important input into IEC.

"Video quickies" were prepared and featured on YouTube, websites, social media handles like Facebook, Instagram and Twitter. More than 2200 creatives were prepared for various social media sites. 'Namaste Gujarat' sign was placed in all government offices, and LCD/LED screen advertisements put out at railway stations to spread awareness. After the unlock, the government started the Vijay Rath, an initiative of the Press Information Bureau and UNICEF; this included drama teams of four members visiting different regions and raising awareness regarding COVID-19. Other tools used included television, newspaper, radio, social-media, hoardings, banners, leaflets and daily press briefs. Initially, Gujarati television news channels were targeted with advertisements five to seven times a day. Later, radio jingles on seven FM radio-stations were added. Half-page long advertisements were placed in 93 Gujarati, English and Hindi newspapers. With the technical support of UNICEF and other departments such as Panchayat, Tribal Welfare and ICDS, training modules were prepared and webinars done for health care providers.

When there was negative propaganda about the Government's preparedness, conditions in the hospitals, availability of medicines and other issues, the IEC approach had to prepare evidence-based rebuttals in the form of videos that were distributed to news and social media. Stories of recovered and

discharged patients were prepared to build confidence in the population. The IEC staff compiled hundreds of success stories and interviews of the patients; these and the content from more than 50,000 phone calls made to the helpline numbers helped in generating content for the responses.

One of the early problems that IEC had to address was the social stigma attached to not just to the patients but their families as well. On March 29, the 1100 helpline for telephonic counselling was inaugurated. Initially, round-the-clock counselling was made available through medical officers, AYUSH doctors, psychologists and psychiatrists. Some psychiatrists from the private sector were also hired. About 400 calls were handled every day.

According to the administrators in charge of all these activities, very early on it was realized that helping people overcoming a sense of panic and avoiding fear-related problems was important. This view was supported by the top political leaders (the Chief Minister and Deputy CM) and Principal Secretary (Health). Thus, it was easy to set up the infrastructure like hiring the toll-free lines, the 24*7 helplines, identifying the counsellors and other resources, and so on, in a matter of two days.

Constant communication with the health workers was also important. Every Saturday, there was a program called "ASHA-Ek Arogya Chetna" telecast through satellite through BISAG (Bhaskaracharya Institute for Space Applications and Geoinformatics) to reach 47000 ASHAs and other health workers across Gujarat with interactive phone-in facility to guide them and respond to their doubts and queries. One health worker composed a song on SUMAN-K (an acronym in Gujarati) for hand washing method that was popularized. Motivational videos, videos on Yoga, steam inhalation were also used for demonstration. Periodically, members of the Gram Sanjeevani Samitis, Mahila Arogya Samitis (urban areas) and sarpanches also attended. Viewing of this programme by ASHAs was immediately followed by discussion by medical officers at PHC level so as to ensure ASHAs correctly understood the topics discussed. Since the programme was also live telecast in a specific channel, general public also watched and interacted occasionally. The recordings were re-telecast continuously on open channel Vande Gujarat 2 for those who missed it initially. On Fridays, a message from Principal Secretary (Health) would go to the ASHAs. "Saptadhara" which includes seven modes of cultural communication e.g. puppet shows, rangala-rangali shows, etc. have been used to train the workers. A number of positive stories were communicated to the ASHAs, so that they can in turn use them during their interactions with children, elders and others in the community.

3.1 IPC toolkit

An Inter-Personal Communication tool kit was developed in collaboration with the Centre for Social and Behaviour Change, Ashoka University, and piloted in Mahisagar District. It is believed to have evoked a good response. The assumption was that mass media outreach had to be complemented by interpersonal communication through the frontline workers to sustain behaviour change. A training-of-trainers program was conducted, and the trainees in turn trained more than 2500 frontline workers. This toolkit essentially had six cards with basic information and key expected behaviours on one side that had to be shown to the people, and the explanations and messages on the side facing the frontline workers. Interpersonal communication skills were developed around 'GATHER' — Greet, Ask, Tell, Help Explain, Return. The frontline workers felt the kit was a useful replacement for the information pamphlets or oral messages that they were hitherto using. The toolkit was more pictorial and people in all age-groups or with very little education were able to understand better. The messages were specific, short and to the point and avoided difficult words. Every service provider was given coloured good quality printed material. A higher

acceptance of messages was observed in the field. The experiment was replicated in Surat Municipal Corporation area and Rajkot Corporation area, and then scaled up in the districts.

3.2 Training through the State Institute of Health and Family Welfare

The State Institute of Health & Family Welfare (SIHFW) coordinated 33 district training teams, around 30 ANM schools, one training centre in Rajkot, 5 divisional training centres and 2 FHW training centres. As soon as lockdown was declared, all the available facilities such as hostels and nursing hostels were notified as quarantine centres. Training was initiated to cover a range of staff, from medical officers to ASHAs—about 1.5 lakh in all. Since physical training was not possible, COVID-19-related online modules had to be developed. CISCO WebEx webinar platform was made available to the institute; in addition, SATCOM through BISAG was available. The staff were using such platforms for the first time, but very quickly the SIHFW team learnt how to use it. People from Critical Care Intensive Association, staff from medical colleges, and others helped. A start was made with ventilatory care training and dealing with emergencies. The trainees included nursing staff, physiotherapists, dentists, AYUSH, Medical Officers and others; three IDs were provided to each Medical college, one ID to each district training centre and two IDs were kept as reserve. The Nursing Council of Gujarat also organized webinars for their students and nurses; Zoom platform was also used. Even with restrictions in place, some physical gatherings of staff had to take place for organizing the training.

Overall, the training is reported to have been handled quite well; the medical colleges were actively involved and assisted the SIHFW whenever requested to do so. In Gandhinagar, clinical management training was started though the online platform; challenging cases were discussed and the knowledge shared. Thereafter, with the help of the Government of India, telemedicine was introduced, and e-Sanjeevani modules prepared. The district hospitals and medical college-affiliated hospitals presented their cases and received advice from the team. The Government of India had started a training program for COVID-19 through the 'Integrated Government Online training' (iGOT) on the DIKSHA platform for capacity building of doctors, nurses, paramedics, technicians, Auxiliary Nursing Midwives (ANMs) and others. The content covered clinical management, ICU care, infection prevention and care, usage of PPE and many other topics. Gujarat estimated that only about a fifth of its workforce would be able to follow the English-language training modules. Therefore, SIHFW translated all the modules for all the cadres into Gujarati. The technical content was sent to Government of India, and after approval, uploaded on the iGOT platform. About 9 lakh personnel registered, and by September 2020, about 7 lakhs had undergone training.

Given the fluid nature of the emerging situation, new guidelines were being formulated by the government regularly. Whenever new guidelines came up, SIHFW organized an online satellite webinar for the district-level, and they in turn spread the training further. Though the WebEx platform could accommodate 1000 people, given technological constraints, only about 250 were enrolled at a time. Though online training was the only feasible option given the COVID-19 situation, the trainers felt that engagement might have been lower than in face-to-face training. However, the trainers could spot some individuals committed to self-learning.

In an effort to train students, a training-of-trainers program was initiated for nursing colleges. The content covered donning, doffing, infection control, biomedical-waste management, and clinical care COVID-19.

From their COVID-19 experience, the senior staff at SIHFW feel that the following may be considered in the future: keeping medical and nursing colleges outside the purview of lockdown, with education continuing and the pandemic guidelines being followed; for emergency situations, some short-term training interventions can be thought of. For instance, nursing students who have passed a one-year course can be trained for 6 months and can be utilised as nurses. The COVID-19 situation has also accelerated the development of a comprehensive electronic network for the state for training and knowledge sharing. Work on this should be completed soon. Infection Prevention and Control Training was a special experience; in the early days, Government of India teams had remarked that infection control practices in Gujarat were not satisfactory, and so teams of SIHFW and other institutions worked on online training for this, with the support of Principal Secretary (Health), who personally attended some of the programs in Surat.

4. THE PUBLIC HEALTH RESPONSE: FINDING, TESTING, ISOLATING AND CARING FOR COVID-19 CASES

Surveillance was the key word in the public health response. It was a round-the-clock process; it was "neither morning nor evening, neither day nor night" for the staff—they were "glued to their mobiles at all times. At any point of time, they would be put on a WhatsApp video call or a Zoom meeting." The staff structure begins with the ASHAs, who is a community person and the link between health and the community. Along with the ASHA, the ANM and the Anganwadi worker constituted the "AAA team". The ASHA workforce was numerically strong, with about 45000 in rural areas and 18000 in urban areas. However, for coordinating the surveillance, the key person was the Medical Officer, and the MO was supported by the Health Workers. The AAA and the health workers worked as the response unit. This unit carried the necessary equipment like pulse oximeter. If it found anyone with respiratory problems, it advised them to get tested or get admitted. The key elements of the Surveillance strategy were: ITIHAS and Arogya Setu; dedicated COVID-19 helplines; Dhanvantari Rath; Testing; Early Identification; and Micro-containment.

4.1 ITIHAS and Aarogya Setu

These two apps were used in combination to track the movement of the positive patients based on their mobile use. ITIHAS (IT-enabled Integrated Hotspot Analysis System) is a platform to identify probable/ emerging hotspots so that community surveillance, early identification activities and other preventive measures could be undertaken. The two apps could track the movement of cases and their contacts. ITIHAS was then able to project the situation of an area of about 150 metres radius. Basically, the output was a prediction based on self-assessment from Aarogya Setu data and exposure of different regions to COVID-19 positive patients in the previous 15 days. For each Pincode at Sub-Post Office level, data from the associated cell towers was used to generated a COVID score. Based on the analysis areas were colour-coded and action initiated: Pink=Immediate scrutiny; Amber=Scrutiny; Deep Blue=Immediate Watch list; and Light Blue=Watch list. Pink and amber areas were the ones where the positive cases had moved a lot, indicating that the chances of other cases being present there were high. Surveillance was immediately initiated in these pink and amber areas. The overall monitoring was done both at the taluka and district levels. Liaison officers were appointed, and they would make random calls to these areas and talk to the functionaries. ITIHAS was used extensively to identify hotspots and emerging hotspots, to initiate surveillance and awareness activities, and to mobilize the Dhanvantari Raths.

4.2 Dhanvantari Rath

The Dhanvantari Rath was basically a medical van with a medical officer and other functionaries such as a pharmacist, a paramedic and a lab technician, and all basic equipment including pulse oximeter. They were used to start OPDs in every nook and corner in identified critical geographic areas. This was done so that people who might have got infected but could not go to a hospital or a clinic could be identified and treated. The Deputy MOH monitored the Dhanvantari Raths in urban areas and the PHC structure did this in the rural areas. Route plans were fixed, and the vans were busy for three hours in the morning and three hours in the evening. Often, when the load was heavy, the Raths functioned for longer. Later on, the Raths carried the Rapid testing kit and AYUSH medicines and functioned like a doorstep service. They also displayed the Do's and Don'ts such as social distancing. To avoid overcrowding, they used a token system, so that people in the queue could wait at a distance. At the peak of the pandemic, 1328 Dhanvantari Raths were operating, covering more than 3500 locations daily.

The first operations were under the Ahmedabad Municipal Corporation with 100 Raths, and later the intervention was scaled up across the state. The state already had prior experience of using such mobile units in tribal and remote areas, and so it was easy to develop the idea for COVID-19 purposes.

4.3 104 and 108 Services

The 108 service was already well established by the time COVID-19 struck, but its response during COVID-19 has been particularly appreciated. The 108 service included 650 ambulances, of which about 100 were dedicated exclusively for COVID-19-related calls, home-hospital transfers, and transfer between isolation centres and homes. Very strict SoPs for disinfection after attending a call were put in place. During the lockdown, the 108 service was particularly useful since other modes of transport were not available. Overall, about a third of the calls made to 108 are COVID-19 related. All 108 staff were provided PPEs and training to deal with COVID-19. The government also facilitated the work by deputing an additional 200 nursing staff and doctors when the work volume peaked. The coordination with the hospitals was aimed at obtaining up-to-date information on the availability of beds, so that the time taken to admit the patient to an available bed was minimized, and the ambulance could be sanitized in time for the next call. All the 650 ambulances carried oxygen supply (2 jumbo cylinders) and about a quarter of them had advanced life support.

Initially 104 was the only health helpline which could provide credible information. Initially nearly 40 response officers attended to about 3000 calls per day. People called 104 with questions about healthrelated issues, delivery of vegetables, migration of labourers, and other services and announcements. The government realized very quickly that 104 had to be strengthened and so a team including senior IAS officers took charge and increased the response officers to 120. The number of calls attended peaked at 25000 per day. Gradually people came to realize that 104 was a dedicated COVID-19 helpline and calls related to quarantine procedures, issues during quarantine, anxiety during quarantine, noncompliance with quarantine protocols were made. The service was useful in tracking calls related to fever, cough, breathing difficulties and other symptoms consistent with COVID-19. Through this, an idea of the possible disease burden and transmission in various talukas and districts was obtained. The data was regularly shared with key stakeholders. The Chief Minister's office also reviewed the service, and soon 104 started providing outreach services as well. A fleet of 100 vehicles was formed in Ahmedabad city and later expanded to other areas. Over time, the call volume decreased and as of end-September had stabilized to around 8000 calls a day. Most of the 108 paramedics are young and took precautions. However, about 70 tested positive during routine check-up, and about 10 had to be hospitalized for recovery.

The 104 service played an important role in surveillance. It had an algorithm-driven software for data capture and the response officers managed the data; if there were health complaints, the Health Advisory Officer (HAO) was brought into the picture. They then ascertained whether the symptoms related to a simple cold or COVID-19. Very early on, an additional service, 1100, was started in April to deal with anxiety among the population; 104 managed the backend.

4.4 Testing and Tracking

Under the testing strategy, apart from the government facilities, private facilities have been allowed to provide services at subsidized rates. Currently 73 laboratories, 41 government and 32 private, have been allowed for testing. Antigen testing is done at PHC, CHC and through Dhanvantari Raths. Some

corporations have set up kiosks for antigen testing as well. About 70,000 tests are being done daily (as of mid-October), which include both RT-PCR and antigen tests.

In both non-containment and containment zones across various districts, large-scale surveys for signs and symptoms of COVID-19 were conducted a few times. Exact figures are not available but most of the population was surveyed. As of late September there were about 20,600 active containment zones wherein active surveillance activities were being carried out. Another 20,000 containment zones were delisted after surveillance revealed no cases. Surveillance continues in non-containment zones.

Follow-up of 104 information: The 104 helpline was available to people to report symptoms. The medical teams responded to these calls by visiting the callers to test and follow up with advice on treatment or admission to hospitals. If the person tested positive, the containment zone declaration procedures were initiated. All the inhabitants in that zone were surveyed. Each team surveyed almost 50 houses every day to check for suspected cases. Such daily surveillance was continued for two to three weeks until no suspect cases were reported. All those who had come into contact with the positive case were listed. Of these, high-risk contacts, defined as those in close contact, staying in the same room with the patient or dealing with patient care without PPE, were then identified for quarantining either at home or at a designated centre. Low-risk contacts were advised to self-monitor and report to a facility if symptoms developed.

Reverse quarantine: The concept of reverse quarantine is that high-risk and vulnerable population like old-aged, children, pregnant women and those with comorbidities should not come in contact with COVID-19 cases. Implementation of this strategy has been difficult, since it is difficult to remove the vulnerable people from their own homes for a period of two weeks. However, the idea that vulnerable people have to isolate themselves has been communicated.

Process of contact tracing: A COVID-19 patent becomes infective two days before symptoms are exhibited. Thus if a patient reported to a health facility for testing saying that he has had symptoms for three days, and he tests positive, a list of all the persons he came into contact with for the last five days would be made. Then the contacts would be divided into high-risk and low-risk contacts. High-risk contacts are those close contacts of the patient who have a high risk of getting infected and hence are made to undergo strict home quarantine, or facility quarantine in case they violate home quarantine. Low risk contacts are warned about their risk of turning positive and counselled to stay at home and monitor their health and visit the nearest healthcare facility as soon as they developed any symptoms. The Medical officer of the PHC / UHC concerned was entrusted with the responsibility of making this contact list. In case the contact belonged to some other area, the MO of that area would be informed for follow up. This entire procedure of contact tracing was usually completed within 24 to 48 hours.

The ASHAs have been a key element in the workforce that has been in the forefront of the response to COVID-19. There is one ASHA for every thousand population and two multipurpose health workers, one male and one female per 5000 population. In other words, there are seven people available for every 5000 people. The state and district authorities are reported to have regularly built up their capabilities through online and SATCOM based training. The government has filled up several vacant posts, including doctors' positions, through recruitment and outsourcing. The calls made directly by the Chief Minister to employees and even ambulances are reported to have been motivational. The use of the latest technology such as GPS systems in the ambulances that enable computer-aided dispatch, and smart phone-based tracking, is also reported to have helped greatly in fulfilling the surveillance mandate.

5.0 THE CLINICAL AND MEDICAL RESPONSE

The treatment strategy has relied on the following elements: putting in place a Treatment Protocol; Tele-Mentoring; better oxygen therapy; home isolation and AYUSH interventions. The hospital-system strengthening has focused on Hospital Preparedness; managing ventilators, ensuring supply of medicines and PPE kits; human resource management; and capacity building. The strong surveillance helped in the early detection of COVID-19 and with facilitating home-based treated. The vulnerable patients are now under the ambit of Sanjeevani Ghar Seva, and are monitored by phone or a daily visit. If the parameters deteriorate then the patients are immediately advised to reach a hospital. The paramedics play a key role in managing this aspect of home-based treatment, since steps like testing for oxygen saturation are something that average individuals would not be able to do their own. The enlisting of private beds in places like Ahmedabad (see the case on Ahmedabad) also relieved the large government hospitals like the Civil Hospital and SVP, which could then concentrate on the more serious cases.

According to the top leadership, the specific factors that helped in the response to COVID-19 included the following:

- Ensuring hospital preparedness: the guidelines from various medical societies such as the CDC in the US and those in the UK, and from the ICMR, have helped in fine-tuning the hospital preparedness. A good example is provided by the non-invasive use of oxygen through HFNC which made a significant impact on the treatment.
- Tele-mentoring was started with the aim of dissemination of the standards and protocols amongst the treating doctors in bigger hospitals through didactic sessions from state experts. Gradually it imbibed another objective of case discussion and management in consultation with experts and experiences from other places. Lately, it has become an important strategy for districts that do not have the required technical and medical expertise.
- Quick action to overcome the initial scarcity of equipment such as PPE addressed the concerns that health workers had.
- Protecting staff: Most of the frontline treating squads are postgraduate students, and nurses. They are the ones who spend hours in the wards and having close contact with patients. Training and constant messaging about strict use of PPE and proper techniques of donning and doffing has helped, in restricting the infection in this frontline treating squads.
- Treatment protocol, and administering life-saving drugs, especially for those with comorbidity, have contributed to controlling mortality.
- Setting up new laboratories has helped scale up testing. Gujarat now has capacity to do 11,000 RT-PCR tests.

These factors are corroborated by hospital administrators who feel the main challenges were the following: protecting medical workers with the right clothing and protective equipment; monitoring the occupancy of Oxygen beds, ICU beds, and general ward beds; monitoring all COVID-19 hospitals and sending data to the head office; and monitoring patients isolated at home and admitting them to hospital in case their oxygen levels fell. Some of the important steps which helped the people in the frontline were displaying the ICMR treatment protocol at the bedside—these were amended from time to time; augmenting the supply of ventilators from 700 to 3,000 fairly rapidly and the use of HFNC; tackling oxygen cylinder problem in some places by providing liquid oxygen; and training for

preparedness (including treatment protocols and guidelines by SIHFW Baroda). In addition, "The idea of 'COVID-19 warrior' promoted by the Chief Minister promoted a positive feeling of we will win." Such 'warriors' were duly felicitated to keep their morale high.

5.1 Development of the treatment protocol

The first meeting for the development of the clinical guidelines was held on March 22, 2020. The WHO protocol, very little peer-reviewed material, and some non-peer reviewed literature were available, and the protocol for Gujarat was finalized on March 24-25. The guidelines were released on March 28. The screening of the available scientific literature indicated that (a) some drugs had the potential to be effective against SARS COV 1; that was how hydroxychloroquine got considered; (b) some experiences from China had been reported but there was no way to judge how reliable they were—finally 18 papers were shortlisted as usable; (c) there wasn't much information about the infection or the disease. What was known was that there were acute respiratory symptoms, myocarditis or an inflammatory response, which is known as cytokine release syndrome or CRS. Some drugs used against CRS were known, for example, Tocilizumab; but whether corona-induced inflammatory response could be equated with CRS was not clear. Other aspects that had to be considered included complications like severe pneumonia, sepsis with pneumonia, and so on. Gujarat was the second state after Kerala to have its own guidelines, but the guidelines of the two states differed. For example, some papers from Taiwan and Italy had indicated that hydroxychloroquine could be useful, and so that was included in the Gujarat guidelines, along with caveats about when not to use it. The guidelines explained how COVID-19 had to categorized as mild, moderate or severe, and presented a flowchart on what to do based on the categorization. This was later adapted for use by AIIMS in its guidelines of April 22. Subsequently, Tocilizumab was added as an anti-IL6 agent in April—interleukin6 (IL6) is a cytokine associated with many inflammatory conditions.

According to a state expert, the implementation was not an issue. The senior faculty in many hospitals and colleges had been consulted during the preparation of the guidelines. However, there was a temporary problem in the availability of the newly recommended drugs vis-à-vis the high demand. For example, when hydroxychloroquine was considered as a treatment option initially, a scarcity of this, and even the antibiotic Azithromycin ensued. The response was to allow only prescriptions and ban stocking. Alongside the preparation of the treatment protocol, another team was developing a 200-page document on creating COVID care facilities—what a dedicated facility would look like, the human resources needed, the instruments, oxygen, ventilators needed. This helped in preparing for the time when the disease peaked in places like Ahmedabad.

The government also signed an MoU with Plexus-MD, an online platform to launch an e-certificate program CCMC (Certificate Course in Management of COVID-19). With the help of physicians, Community Medicine experts, anaesthetists and pulmonologists, video recordings of demonstrations, and important information related to management, prevention and control of COVID-19 were made available to medical students, interns and doctors. The guidelines were disseminated widely through social media, WhatsApp, and email.

5.2 Telementoring

At the suggestion of Principal Secretary (Health), telemedicine and telementoring were explored. This initiative began very early, on April 10, using the available WebEx platform. Telemedicine is on based teleconsultation, basically between medical specialists and patient, but now it tele-mentoring is the interaction between doctors involved in treatment of the COVID cases in different hospitals across the

state. Telementoring followed, to answer questions such as what is to be done when a patient arrives, what investigations are to be done, and so on. The next day, the doctor would be asked about the patient's progress and the changes in the parameters. This was telemonitoring. These sessions were held every day, from 12:30 p.m. onwards. Later on, the guidelines were converted into four slides, with a flowchart to help fit in a patient, after examination, against a particular stage of the disease. The protocol would then begin from there. This initiative progressed well, and after three months, it was realized that instead of a state-wide approach more localized approaches were needed. The state was divided into seven zones, and a physician made nodal officer in each zone. This led to 'regional telemedicine' by mid-July. So, the state sessions were held from 12.30 to 1.30 and the regional sessions from 3 to 5 p.m. Over time, the need for state-wide sessions came down. One more change made was to include people in private practice in some cities as participants, so that the capacity building would extend to the private sector as well.

There were some challenges. Internet connectivity was an issue in some places, but the participants could easily switch to their smart phones. The participants would attend even if they were engaged in some other work. Only when the patient load was very high, were the doctors unable to join on time. However, the best indicator of the usefulness of this approach is the use of some drugs such as Tocilizumab and Remdesivir, which were believed to be therapeutic interventions. However, rigorous evidence in their favour was absent, and so the selection of patients for these drug interventions had to be very precise to avoid harm. This is where teleconsultation and telemonitoring proved useful. Each case was discussed via telementoring and only when it was clear that this therapy was suitable, was the doctor confident of using it. These cases were specially followed up. A similar approach was followed with the drug, methylprednisolone in acute lung injury in COVID-19 patients. Later, in end-July, a large randomized trial, a recovery trial, generated some evidence regarding the usefulness of this drug in specific cases.

Another challenge was the readiness to deal with conflicting advice. The initial decision to use Hydroxychloroquine was based on evidence available at that time. When new evidence came in indicating that it may not be as effective as believed, it was withdrawn. Regarding Tocilizumab, the company itself (Roche) indicated that the evidence for its use was not conclusive. So, the approach had to be rethought. However, the analysis done by the Gujarat government doctors indicated that the evidence is at best mixed. In Gujarat's field conditions, judicious use of the drug was producing good results. According to the people leading the clinical response, what can be inferred is that when confronted with a novel problem, learning through trial and error, a willingness to incorporate new scientific evidence into ongoing practice, balancing the scientific evidence with ethical principles, and a readiness to withdraw previous guidelines, are the main lessons learned from the six months of COVID-19 experience.

The e-Sanjeevani teleconsultation also helped; about 300 consultants are involved. Any person visiting the sub-centres or PHCs (or through their own mobiles) can connect with these consultants who are based in Gandhinagar. Later on psychiatric consultation was also added to the e-Sanjeevani consultation.

5.3 A View from the Frontlines

The medical staff on the frontline played a key role in the defence against COVID-19. The experience of an officer, in the main hospital in Ahmedabad is illustrative. When the disease spread, the wards filled up very rapidly, with many patients showing symptoms of fear. The

supply of PPE kits was not an issue and he was able to focus on patient care. On his rounds, he noticed that even medical people were hesitant to go near the patients or touch them. He had to counter this fear through counselling. In addition, he had to ensure that every ward had a computer and printer, and the necessary information management system. Close coordination with the Hospital Superintendent was important; he also kept a diary noting down points related to improving COVID-19 management. Communication between patients and relatives was not easy until a cellular communication tower was installed soon after the pandemic broke out. (Later, in mid-June, patient-counsellors were recruited to make video-calls from their own handsets.) But he had to pay attention to communication, and in the process encountered deeply human experiences. For instance, he had written his phone number at various places in the hospital, and the relative of a patient called him to say the patient was not traceable. He took two days to trace the patient—a number of beds had to be checked; the patient had a mobile but no charger. He made a video-call to the relative and made the patient talk. The relative was very happy to hear that the patient was alive.

Others interviewed note the following about HOPES-T, an acronym for management of the moderate and serious COVID cases, which was developed by the government with inputs from experts. It stood for:

- H: Heparin (Prophylactic dose of UFH given for anti-coagulation if not at high risk of bleeding)
- O: Oxygenation (administering oxygen through nasal prongs, mask, or masks with breathing/ non-rebreathing reservoir bag, ventilator)
- P: Prone Position: 'Awake proning' used as a rescue therapy eliminating exertion: (patients to take complete rest and eliminate any exertion besides routine daily activities of basic needs)
- E: Eliminate exertion
- S: Steroid (for patients with progressive deterioration of oxygenation indicators, rapid worsening on imaging and excessive activation of the body's inflammatory response
- Tocilizumab to be used early stage of cytokine storm to reduce adverse events to overt bodily immune response against COVID-19.

It was observed that HOPES-T was better remembered by the treating physicians and found to be effective in the practice in the sense that many patients could be saved from getting converted from moderate to severe cases, and from severe cases to mortality.

5.4 Other Frontline Challenges

The first major challenge in the early days was to test quickly and quickly discharge those found negative. The second was opening wards rapidly and ensuring the necessary stationery such as pens, papers and other material for the staff. Managing the quality of food and ensuring some regularity in meal times was difficult—such concerns had to be brought to the notice of the hospital management. During late March to June, on average, doctors found it difficult to sleep for more than four hours every night. By end April, of the wards were full. Staff irregularity also increased because of the constant work pressure, and he had to talk to them regularly while presenting himself as a role model.

Very soon, the government recruited some staff; intern doctors were also added. The management protocols for mild cases, moderate cases, and severe cases were developed; the

simple algorithms were stuck to the walls and displayed in the ICUs. Putting in place these standard protocols helped; for example, what had to be done with critically ill patients, patients on ventilators, etc. became standardized. Decision-making moved toward team decision-making with the anaesthetist consulting the resident doctors. Other procedures such as monitoring oxygenation and using Tocilizumab (June 2020) and the use of anti-coagulants during thrombo-flammation (HOPES-T) were quickly learned.

Getting resources also became easier; in the building where he was working, CT Scan was not available. But once this came in May, it was possible to examine the pulmonary morbidities more carefully. There was no shortage of medicines, but managing the patient load, especially when there was lung fibrosis, proved a challenge. With experience, the treatment procedures could be worked out quickly; for example, managing patients whose lung lesions had cleared with oral steroids.

5.5 Resource Mobilization and Resourcing

The frontline staff note the steps taken to mobilize resources without any delay. An Additional Director (PH) who had served in the supplies department noted that the main message he received very early on was to focus on adequate supplies of PPE kits, sanitizers, masks, ventilators, etc. He notes, "As the demand for all these things was very hard to meet, the state government decided that a committee of senior IAS officers would decide on the prices for procurement. It was decided at the highest level that money would not be a constraint. Whatever was needed, would be supplied by any means at our disposal. The most important thing that we have observed is the political and bureaucratic commitment at the highest level. Even before we had any case, on a daily basis our highest officers used to meet, discuss, and understand the developments in other places and our preparation." This sentiment is echoed by others, who cite, for instance the training through the State Institute of Health & Family Welfare that was initiated before the cases picked up in the state.

The Gujarat Medical Services Corporation Limited (GMSC) was the implementation agency responsible for the procurement of medicines, surgical goods, medical equipment, instruments and diagnostic kits for all the healthcare institutions under the Government of Gujarat. The key concerns were to obtain competitive rates, ensure compliance with government procedures, ensure deliveries on time, and confirming the quality of the purchases. The need for equipment was realized even before the first case was reported. The hospitals and medical colleges drew up lists of equipment that would be required and sent them to GMSC, through the Additional Directors of Medical Services, Medical Education and Public Health. At GMSC, the technical experts (subject experts) examined the lists. For example, the triplelayered mask committee included an infection control nurse and physicians who developed the specifications after consulting the norms published by the Ministry of Health and Family welfare and ICMR. Once this was done, the requirements were placed on GEM (Government E-Marketing), after approval by the Special Purchase Committee set up by the government under the chairpersonship of Principal Secretary, Finance. This committee met regularly to ensure minimum delays in procurement over the first five months of the pandemic, it met more than twenty times, with each meeting taking up 12 to 15 items for discussion.

The usual procurement procedures including scrutiny and in some cases asking for samples (e.g. masks) were followed; the material would be procured, and quality checks carried out. In addition, GMSC had a market research team that looked at the specific requirements of COVID-19. For example, PPE kits were

used for HIV and industrial safety as well, and this team examined the requirements for COVID-19 to identify the right vendors.

Once the order was placed, the challenge was to make the procurement as quickly as possible. With lockdown in force, and e-marketing portal being a national portal with suppliers from Haryana, Delhi and other far-off places, this was a challenge. Movement of the purchases directly to the point-of-use was also implemented. Gujarat has 11 warehouses across the state that normally stock the medicines, kits, consumables, and some smaller equipment. The movement directly to the user destination was tried for the larger equipment, such as X-ray machine and multipara monitor. GMSC coordinated with the local collectors and the administrations in other states to see that all the suppliers were issued special passes so that they could transport their goods. At the recipient end, all the store managers, the medical superintendents of hospitals, and others, were instructed that someone should be available round-the-clock to receive the goods whenever they came. A team of biomedical engineers at GMSC and the biomedical engineers at the hospitals were instructed to install the equipment without delay. The installation was overseen by the maintenance department of GMSC.

For the consumables, for example triple layered mask or N95 masks, local purchase was encouraged. GMSC would publish the price at which it has procured these items on its website, and this would be taken as a reference price by the local hospitals. Local purchases dealt only with smaller quantities and lower purchasing power.

In about six months, GMSC has procured more than 5 lakh PPE kits, 4 crore triple layered masks, 19 lakh N95 masks for distribution to various hospitals. It also bought some ventilators initially, but later on stopped buying these (and PPE kits) when the central government started supplying the states. GMSC had to buy only about 70 high-end ventilators, but the centre has supplied about 3000 ventilators. In the case of ventilators, GMSC also managed inter-hospital transfers when demands rose temporarily in some cities such as Surat, Jamnagar and Rajkot. The GMSC believes that it managed this operation particularly well.

The tension of managing the technical side of the equipment mobilization had its funnier counterpart. For instance, initially there was a lot of fear about the virus, and everyone thought they had to wear PPE kits. A supplier walked into GMSC office and demanded that unless PPE kits were provided to all the labourers transporting the equipment to the hospitals, he would not move the goods. Convincing him that PPE kits were not required for touching the equipment took some time!

GMSC has also been involved in the procurement of material required for the AYUSH treatment protocol. It has also been managing the supply of special laboratory equipment for RNA extraction and RT-PCR machines, the procurement of special biosafety cabinets for the personnel working with highly infective material, supply of about 15,000 pulse oximeters for the Dhanvantari Rath, and a large number of ICMR-approved rapid antigen test kits.

While the overall experience over the last six months has been very positive, GMSC administrators feel that there is scope to reduce the procedural delays further. In addition, to overcome non-availability of technical experts GMSC is developing a Technical Specifications Bank. The experts are spread all over the state, and find it difficult to travel during the lockdown. Or, if the specs for ventilators had to be fixed, the anaesthetists would not be available since they were busy with patients. The procurement systems also discouraged small players and entrepreneurs. For instance, some people from NID had come to GMSC with student-designed kits. GMSC could guide them on the required specifications and

certifications, but they were too small to go through the procurement processes. Linking such inventors with entrepreneurs and large market players is a challenge for the future.

5.6 Addressing mental health

Soon after the pandemic had struck, it was realized that some medicines needed to treat mental illness were not available since private hospitals or clinics were closed. So telephonic prescription through the helpline was added. An SMS was sent to the caller and this had to be shown to the staff in any government facility or Medical College to obtain the medicine. In addition, 33 district mental health program teams consisting of a psychiatrist, psychologist, social worker and nurse were formed. These teams held about 500 camps during the lockdown for about 200,000 people, counselling and treating them for a variety of ailments. At the state level there was a group of 40 clinical psychologists, 60 psychiatrists and 40 social workers. The system covered destitute homes and special homes, like orphanages, old age homes, beggars' homes and women's shelters. The five Mental Hospitals took care of the severe cases, and also instituted telephonic follow-up and prescriptions. A training program was undertaken with the support of UNICEF to train 6000 people in psychological first aid, and about 1000 students of psychology and social workers were trained to work as links between professionals and the community. Yoga psychotherapy sessions were started online with the help of the Kutch University and the Om Foundation. A number of other programs in collaboration with NGOs were also held. A counselling program that included connecting patients with their family members through video calls, helping in routine activities, yoga sessions and recreational sessions, was initiated in Ahmedabad's Civil Hospital, and is reported to have been successful. The program was extended to Surat, Vadodara and Rajkot.

5.7 AYUSH

AYUSH (Ayurveda, Yoga& Naturopathy, Unani, Siddha and Homeopathy) Department has played an adjunct role in the COVID-19 response. In fact, this department was an early responder; an expert committee was set up on March 5 to develop guidelines for dealing with the Corona virus and these were displayed on its website so that the public could learn about the home remedies available as protective measures or immunity boosters. By mid-March, nodal officers to ensure the supply of material and to organize camps that distributed boiled herbal decoctions had been appointed. The department also reached out to the jails in an effort to distribute the medicines to prisoners, and distributed Amrut Pey decoction to government servants. Towards end-March, the guidelines from the AYUSH Ministry, Government of India, were adapted and distributed widely. In early April, training started using the iGOT platform, and on April 11, Ayurvedic/ homeopathic treatment was made available to asymptomatic COVID-19 patients who volunteered to receive the treatment. Later, in mid-May, this was extended to mildly symptomatic patients as well. The hospitals that the government ran were converted into COVID Care Centres and on April 16, the locations of the 568 government-run Ayurvedic clinics and 38 hospitals, and the 272 homeopathy clinics were publicized through the 104 service. Quarantine centres and hotspots were also covered by Ayurvedic formulations. The two main boiled decoctions used were Amrut Pey decoction and Sanshamani Vati, and the homeopathic medicine used was Arsenic album-30 potency. The other formulation used was Dashmoolkavath + Pathyadikavath 40 ml with 1 gm trikut. The Ayurved University, Jamnagar initiated some research studies. The department formed its own Research Committee on April 24. The department also initiated communication exercises through radio and private TV to popularize home remedies that were known to protect against infections—such as turmeric, basil and ardusi. The reach was quite widespread, and by September 15 about 8.9 crore doses of Amrut Pey decoction had reached 1.48 crore people, 45 lakh

doses of Sanshamani Vati had been supplied to 45 lakh people, and 3.9 crore people had received about 5.3 crore doses of Arsenic album-30.

6.0 CITY-SPECIFIC RESPONSES IN GUJARAT

This section describes in brief the experiences of four cities of Gujarat—Surat, Ahmedabad, Rajkot and Vadodara. The descriptions highlight selected strategies that may be of interest to a wider audience. They are not intended to be comprehensive accounts of all that the city administrations may have done.

6.1 AHMEDABAD

Ahmedabad happened to be the worst affected city in Gujarat. The first cases were reported in late March but over the next month and a half, the situation worsened with the number of cases rising and the fatality rate also showing high levels. After about a month and a half, the state government put in place a team comprising two senior IAS officers to lead the response to COVID-19. The more than 2500 private hospitals and clinics were closed and the three major government hospitals offering COVID-19 treatment were operating at nearly full capacity. The city had 74 Urban Health Centres (UHCs), 7 Community Health Centres (CHSs) and four municipal hospitals, but their outpatient departments were under stress. Strategies were evolved to respond to problems on many fronts. This write-up is based on interviews with the people who led the response and a report prepared by the Ahmedabad Municipal Corporation titled 'Amdavad Model: An Integrated Strategy of COVID-19 Management'. Readers are referred to that document for detailed data analysis and conclusions.

Increase in UHC OPD and Dhanvantari Raths

The first priority was to make the Urban Health Centre OPD services in the worst affected zones more active. Their initial failure seemed to be accentuating the problems caused by comorbidities. This, and the augmentation of Dhanvantari Raths (about 130 vans providing over 500 fever clinics at people's doorsteps) are rated by the administration as the most important steps in dealing with the comorbidities and reducing fatalities. With the onset of the monsoon, the Dhanvantari Raths also started addressing testing for seasonal diseases like malaria and dengue. They also carried out Antigen tests, referring the positive cases to hospitals or COVID care centres. In such cases, the Raths also informed the 104 service that the family members of the positive patients had to be tested at home. The Dhanvantari Raths were also integrated with the Pink Area Surveillance teams based on Aarogya Setu/ ITIHAS Data Analytics.

Increased House to House Surveillance

The number of surveillance teams and the frequency of house-to-house surveillance were increased substantially by deploying the available workforce (multipurpose health workers, ASHA, Anganwadi staff, teachers, etc.). For example, the Central Zone, which was the worst affected both in terms of disease incidence and fatalities, had about 1.2 million people in a 13 square kilometre area. This was covered thoroughly by more surveillance teams, with the houses being visited 20 times in just a few weeks.

104 Doctor at Doorstep Service

To cater to the patients unable to reach UHC or Dhanvantari Rath due to old age, co-morbid conditions or poor physical condition, the 104 Doctor at the Doorstep service was introduced. It involved a fully loaded ambulance with a doctor, two paramedics, medicines and medical equipment, which reached the house of a patient who called the 104 call centre. At its peak, the service operated 50 vans during the day and 25 vans during the night, and attended to over 60,000 calls in a period of four months. The vans also did antigen testing.

Opening of Private Clinics

The closure of the 2500 private hospitals and clinic had led to a reduction of the facilities available to people. Reopening them became a necessity. When negotiations with local medical associations failed, notices were issued under The Epidemic Diseases Act, 1897 directing over 200 private hospitals and clinics to reopen within 48 hours. By the first week of June many clinics had reopened, and the private hospitals OPD soon reached around 1.5 lakhs per day.

Requisition of Private Hospitals

This is believed to be an important step that was essentially a PPP model evolved through discussions with the local Medical Association, leading doctors and administrators of private hospitals. A consensus was reached on the sharing of beds and the fees that could be charged; 50% of beds in each designated private hospital were reserved for Ahmedabad Municipal Corporation and 50% could be used to treat private COVID-19 patients subject to the fee ceilings prescribed by the government. Some private hospitals challenged this in the High Court but the High Court upheld the government's move. NITI Aayog has since upheld this model and other states have adopted it. Within a fortnight, the number of hospitals providing COVID treatment went up from six to 74, and bed availability went up from 2363 to 7011. By end-August when vacant beds were 3000+ for more than a month, some beds were released and the hospitals denotified. When patients from other districts and states started coming to Ahmedabad, new hospitals joined the intervention. The administration feels that this step was most crucial in reducing the load on the government facilities. The private hospitals have also been encouraged to institute affordable Home Care packages (Rs. 500 – 1000 per day) for home isolation patients.

Corona GharSeva – Sanjeevani Rath

With the relaxation of ICMR guidelines for home isolation, many mildly symptomatic patients were permitted to home-isolate. The Corona GharSeva: Sanjeevani Rath was launched to take care of such patients. Beginning with 148 teams, two per UHC and 55 doctors for supervision, the number increased over time.

Intensive Patient Tracking System

A multi-layer system tracks each patient. The UHC has this responsibility and the Sanjeevani teams reach out to the patients. The 104 call centres carry out crosschecks. A team of 300 doctors, paramedics and officers visits and tracks hundreds of patients daily in 67 private hospitals.

Doctor Mitra

During the unlock phase, services had to be provided after office hours. Doctor Mitra was started by engaging doctors from near the UHCs on honorary basis to run the OPD from 5 to 9 p.m.

Corona Santvana

The Corona Santvana is a help line for psychologically stressed people. It runs from 9 a.m. to 9 p.m. The front-line team consists of four psychiatrists including one Senior Assistant Professor and three residents. If more professional help is needed, the caller is transferred to the psychiatry department of SVP/LG Hospital, where a back-up team of three psychiatrists takes over.

Innovations in Testing: First Phase of Screening & Testing Super Spreaders

The problem of super-spreaders was identified in May 2020 when some laxity in lockdown implementation had led to vegetable and fruit vendors, milk parlours, becoming super spreaders. A strict total lockdown was imposed for a week, exempting only milk parlours and chemist shops. The

time was used to test potential super-spreaders and issue health cards to them if they were negative. In the first round, about 12,000 super-spreaders were tested and 709 found positive (6%). Other categories of spreaders such as bank staff and temple staff were also identified.

A number of other innovations in testing have been evolved. For instance, partnering with 12 laboratories for high-resolution CT scan; large-scale testing on all highways leading into the city (11 kiosks and a dome for 500 people) which had covered (by end-September) 3,85,896 passengers on highways (4502 positive) and 31186 railway passengers (452 positive).

Usage of Aarogya Setu ITIHAS Data Analytics

This facility initially predicted emerging hotspots over a 2 square km area, which was not precise enough. By mid-June, data pertaining to 300m X 300m were available. With the help of the Aarogya Setu team, it was possible to narrow down the focus to about 150 m radius around a mobile tower. Intensive surveillance of the pink (severe) and amber (moderate) areas was initiated in June. Once a spot was identified, intensive screening was done; the results corroborated the ITIHAS predictions. The usage of data analytics was decentralized to the Dy. Health Officer in each zone so that they could identify the particular residential areas for deployment of surveillance teams. Since the number of "pink towers" was high, the ITIHAS team was encouraged to provide scores for the towers, depending on the concentration of cases. Pincode-wise scores of sub-post offices where multiple pink towers were located became available. This helped in reorganizing the surveillance strategy.

The Aarogya Setu/ ITIHAS Data Analytics based surveillance and massive Antigen based testing drive in each zone of the city followed a protocol to deploy 1100 surveillance teams consisting of essential health workers for the high score Pink towers and 2400 teams consisting of teachers, Anganwadi workers etc. to the less intensely pink towers.

- Every evening 5.00 PM the Dy. Municipal Commissioners, Medical Officer (Health), All the Dy. Health Officers would meet with the team of data analytics to identify the areas for surveillance and testing.
- 2. Next morning, the 3500 teams would go to the identified areas supported by over 400 Antigen Testing Teams.
- 3. Surveillance and testing would be carried out together and if more than three cases were found in one residential society and tower, then that would be declared a micro containment zone the same evening.
- 4. 100% testing of micro containment zones would be carried out the following day to trace and treat any remaining cases.

As in other cities, the frontline workers in the major hospitals in the city such as the Civil Hospital and SVP had to face the brunt of the disease. The doctors feel they have learned to deal with the new situation quite fast. This included dealing with deeply human issues. For example, elderly patients whose children were abroad and had no way to reach Ahmedabad when the parents died. Managing personal items being sent to the patients with strictness and at the same relaxing the rules in the case of phone chargers or spectacles through an internal courier service was a serious matter indeed. Dealing with a shortage of ward boys by getting people from outside and training them on the go was a task. Shortage of housekeeping agency staff by drawing on the resources of the Indian Railways and the Airport Authority was another measure.

6.2 SURAT

Surat is a key commercial city in Gujarat and is known for its textile and diamond cutting and polishing industries. It attracts a number of workers from other parts of Gujarat and other Indian states. When the pandemic struck the administration responded through both measures recommended by the state as well as its own initiatives. A key aspect of COVID-19 management was regular communication—the Municipal Commissioner regularly briefed citizens through various social media platforms like Twitter, Facebook and YouTube and the social media channel MySurat. Scrolls and FM Slots were used for mass awareness on SMS (Social Distancing, Masks wearing and Sanitizer) usage policy.

COVID Tracker for TTT IQ (Track, Test, Treat, Isolation and Quarantine)

The Surat Municipal Corporation (SMC) COVID-19 Tracker, developed in 48 hours, was used to track people with symptoms, and now has been upgraded into the SMC COVID-19 Management System. It covers Positive Patient Management, Hospital Management, Quarantine Monitoring, War Room Modules and Patient Follow-ups. It has tracked and monitored 4,47,855 people up to now through an Integrated Command and Control Centre (ICCC) that draws its information from Self-Declaration forms on the SMC website (60,619 self-declarations), calls received on helpline number (2070 calls), international traveller information, details from Private Clinics / Hospitals and Urban Health Centres, and door-to-door surveys.

Active Surveillance through APX-R Strategy

The APX-R strategy involved house-to-house survey by 2340 teams of 4670 primary health workers and other paramedical workers / teachers / clerical staff. The houses with ARI cases are marked "A", the houses with patients with co-morbidity and persons with age more than 50 years are marked with "P", houses without comorbid persons at home or locked houses are marked "X" and those who refused to give information are marked "R". These surveillance activities are followed daily in cluster containment area and on alternate days in non-cluster areas. The entire population has been covered about 20 times so far, and more than 3 lakh high-risk houses identified. All the ARI cases are visited by doctors for preventive, promotive, curative care and referral facilities.

Passive Surveillance through Jamini App

This app collects ARI patient details from Private clinics and hospitals so that doctors can visit them. 1734 Private clinics, 675 private hospitals and 51 UHC/PHCs are registered, and so far about 2,00,000 ARI cases have been reported of whom 26,666 have been referred to hospitals. SMC has now registered 35 radiology centres performing HRCT (High Resolution CT Scan of Chest to diagnose CORAD Level of COVID-19 infection).

Public Private Partnership for COVID-19 and non-COVID

Involving private doctors was another key aspect of the fight against COVID-19. Surat had experienced a plague and floods in the past, and during these times, the Preventive and Social Medicine Departments of SMIMER Medical College and Government Medical College had collaborated with private doctors' associations like IMA and GPA. During COVID-19 also, these associations, and especially the Muslim Doctors' Association, engaged with the government on issues such as case definition, early identification and treatment in government facilities. During the lockdown, these associations were instrumental in getting five large hospitals of Surat (Lokhat, Mission, Tristar, Mahavir and Venus) to start fever OPDs. The Muslim Doctors' Association came forward to start fever clinics in areas dominated by the Muslim community. Such initiatives, along with the fever clinics of the 50 UHCs in Surat, were important in handling COVID-19. In all, SMC has collaborated with 1734 Private clinics, 675 private hospitals for the

treatment of both COVID and non-COVID illnesses. SMC has partnered with 41 paediatric hospitals for vaccination of pregnant women.

Containment strategy and Suraksha Kavach Samiti

Based on multiple criteria like number of positive cases, population density, and geographic situation of an area, a containment area is finalized and declared as such through a notification. Door-to-door surveillance, placement of Dhanvantari Rath and Rapid Antigen Testing, IEC activities, etc. were then carried out. To bring about behaviour change and help citizens in the containment zones their basic needs about 1900 Suraksha Kavach Samitis were formed with a doctor/paramedical staff, president/ secretary of society, school teacher, student, recovered COVID-19 patient, women/ youth members and members of NGO/ Welfare groups. About 5000 similar committees have been formed at various institutions and factories. In all, about 5000 volunteers work for the committees, reporting on various matters including thermal screening and oxygen saturation reports.

Augmentation of Health Infrastructure

The SMC augmented its main hospital, the SMIMER Hospital, by converting a multi-level parking into a COVID-19 Hospital named SMIMER+ in April 2020. This had 540 isolation beds with Oxygen facilities exclusively for COVID-19 patients. To augment manpower, 164 doctors, 310 staff nurses, 39 lab technicians, 226 ward boys, 106 helpers and 2384 multipurpose health workers were recruited on contractual basis. Supply of life-saving drugs such as Tocilizumab and Remdesivir were procured and stocks maintained so that there was no waiting list.

Community COVID Isolation Centres (CCIC) and Health Centres (CCHC)

Very early in the pandemic, the Surat Municipal Corporation (SMC) approached the leaders of various communities with a proposal to start COVIDs Community Isolation Centre (CCIC). The communities agreed and bore all the expenses (beds, food, doctors, etc.). The SMC provided the technical and training support. The CCICs are used to provide treatment and isolation facility to the asymptomatic or mildly symptomatic patients for whom home-based treatment is not possible. For those communities which did not have their own community hall or other infrastructure, SMC provided municipal community halls. As of now, 20 CCICs are operational with 1,411 bed capacity which can be augmented by additional 1085 beds if need arises. In the view of SMC medical staff, these CCICs have been run very well. Teams from the Gujarat and Central governments have visited these centres and appreciated them.

Initially, the containment zones used to be large, covering about 200 to 500 houses, before the smaller zones were identified and micro-containment was adopted. The containment areas had to be provided facilities like groceries, vegetables and other necessities.

Psychosocial Health Cure Treatment

To counter the fear generated by COVID-19, Mass Calling Therapy, Mass Proning Therapy, Mental Health Screening and Discharge Counselling were taken up by SMIMER and Civil Hospitals. Mental health screening of patients and tele-counselling of family members was also done.

Aggressive Testing

Testing was carried out through about 180 centres located at Urban Health Centres/ Urban Community Health Centres/ Dhanvantari Raths. The SMC started testing 'super-spreaders' like rickshaw drivers, taxi drivers, drivers and conductors of buses, vegetable vendors, and cashiers of all banks in an effort to control the virus spread. In all, there are about 180 testing centres. The Commissioner felt that these

potential super-spreaders who were negative, could be used as ambassadors. They carried out IEC activities like wearing mask, keeping distance, practicing cough etiquette and applying stickers in their vehicles. Bus conductors wore masks and allowed only people with masks to enter the buses. A similar approach was used with delivery boys who worked for companies like Swiggy and Amazon. They were taught to explain to their customers the protocol to be followed.

SOP for Diamond, Textile and Migrant labours

Surat is known for its diamond and textile industries, but people gather here and work in dense clusters. The city has about 800 diamond polishing units that employ around 60,000 people. Some of the units are small, with only about 20 people, but most have around 200, and some employ 1000 workers. The industry associations (diamond and textile) in meetings with the Commissioner, evolved guidelines for their units. These included procedures to test workers and managers. The diamond industry association tied up with private laboratories for the testing and only negative workers were allowed to work. Guidelines were also framed specifying the maximum number of people and the manner in which lunch arrangements would be staggered. The textile industry association cooperated similarly. It sponsored IEC material and hoardings. There was an announcement system in the market by which people were reminded about masks, symptoms and testing every hour. Testing units were established in all markets with the help of SMC. Initially, the industry associations were slow to realize the gravity of the situation, but frequent meetings with the SMC during which the dangers involved in even one employee out of 100 contracting the virus were explained, helped in winning over the industry. SMC developed an app to keep track of returning migrant labourers. The passenger details received from the Railways was segregated by zone and follow-up done to ensure testing and 7-day quarantine.

Extensive Use of Pulse Oximeters

Given the importance of checking SPO2 levels, SMC has been widely using Pulse Oximeters to check the SPO2 levels of citizens during house-to-house surveillance as well as at Dhanvantari Raths and Public Health Centres / Urban Heath Centres. As of now, more than 5300 Pulse Oximeters are in use, 4700 by field and surveillance staff and 692 distributed to home isolated patients. The Dhanvantari Raths tested more than 35 lakh people and referred 3550 patients to hospitals because of low SPO2 level.

Other Activities and the Future

As in other districts, the Dhanvantari Rath and ITIHAS/Aarogya Setu have been used extensively for COVID-19 management. The key priorities now as articulated by the SMC are: remaining on high alert; continuing with the well-established testing and contact tracing mechanisms; keeping Behavioural Change Communication ongoing; preparing for vaccination—a dataset of high-risk persons has been prepared; ensuring that the SOPs for textiles, diamonds, migrants, restaurants, and others, which have been displayed on the SMC website, are followed; giving a push to the economy—especially the diamond and textile industries, private construction developers and mini-capital projects.

6.3 RAJKOT

Containment to Address Panic

The first case that was reported in Gujarat was from Rajkot, in a dense area called Jangleshwar. Initially, there was some panic, and since the lockdown was imposed soon after, the priorities were to address the panic and ensure that the disease did not spread to other areas. The response was containment, while ensuring that the people, most of them belonging to the weaker sections and minority community, did not face hardship in meeting their daily requirements. So arrangements of food, other daily essentials, medical services and even a mobile ATM were made. There were about 25 major streets in the area, and so the administration identified community volunteers from each street. These volunteers linked the residents with the municipal authorities, and were very helpful. The residents were also provided with AYUSH medicine. The volunteers worked to overcome any inhibitions the people might have had about consuming these medicines. This strategy worked well, and the number of cases within Jangleshwar area remained small, in single digits, during the entire lockdown.

A key part of the strategy was to set up a control room with different divisions to track the various aspects of managing COVID. 18 senior officers were put in charge of the different wards of the city. A core committee headed by the nodal officer, and comprising the District Collector, the Municipal Commissioner, and the District Development Officer met every day around 7 p.m. to review the daily activities and plan for the following day. The ward in-charges and the Health Core Team also met every day.

Addressing Infrastructure

The initial concerns centred around infrastructure, the number of oxygen beds, ICU beds, and the availability of doctors and health workers in adequate numbers. The state government had allowed a lot of autonomy to the district level, and this was helpful in avoiding delays. Because of this, it was possible to very quickly convert hostels into COVID-19 Health Centres by laying out oxygen lines and other facilities to handle the worst-scenario situation. Rajkot had a full-fledged government facility with 593 beds and 200 ventilators. However, to meet the anticipated demand, private designated COVID-19 hospitals were also set up with ceiling rates decided for the same. In rural areas, CHCs in remote places were converted into COVID health centres. While the infrastructure was being set up, the administration had to ensure that food, medicines and other essentials were available during the lockdown. The involvement of the private sector was also sought; 23 private COVID hospitals with 1288 beds and 11 private COVID Care centres with 453 beds, were approved. The Municipal corporation set up 880 beds in two care centres, one hostel and two shelters. One Community COVID Care Centre was established in public-private partnership mode.

Surveillance

Surveillance was a major task. It initially covered international and other travellers and their contacts. People returning from abroad had to use the COVID-19 RAJKOT app which was also accessible to the police so that they could monitor the movement of these people. There was also another tracking app for home isolation patients. From the initial focus on travellers, the focus soon shifted to the newly developed clusters, and passive surveillance by monitoring ILII and SARI cases.

The administration constituted teams drawn from officials of the revenue department, Municipal Corporation, and the police department. These teams were posted at specific areas and worked in three shifts of eight hours each. This team coordinated with the community and the volunteers, and monitored local developments. The health officials worked in parallel on the surveillance and

containment activities. In addition, house-to-house surveillance by the ground-level health workers from the primary and community health centres and the ASHAs and other departments was carried out in seven rounds in all the households of the 18 wards of the city.

Use of ITIHAS for Tracking

Another mechanism used extensively was the ITIHAS and Aarogya Setu tools which provided data on emerging hotspots. This helped in the scheduling of the Dhanvantari Raths. In addition, the private doctors were linked through WhatsApp groups, and they reported daily on the number of patients showing up and referred to tertiary care hospitals. In the village areas, a system of volunteers was created; each volunteer covered about 10 houses, and would report on the status of their houses through a form that was sent through the local health worker to the medical officer, and then it would reach the district level. This was particularly helpful in tracking any outsider entering a village during lockdown.

The contact tracing was done by another dedicated team. Initially, when a case was detected, the Call Details Record was examined; later, when the number of cases increased, the special team would take up contact tracing and complete its work in 24 to 48 hours. In the villages, the health staff did contact tracing.

Testing

The Dhanvantari Raths and Sanjeevani Raths were involved in the screening and treatment; 40 Dhanvantari Raths had screened and treated 12,45,021 people up to end-October, with 32 Sanjeevani Raths helping in the effort. In particular, testing of vegetable vendors, food-stall operators, delivery boys, and waste management workers was a key focus.

Dedicated testing vehicles were put in place. Anybody wanting to get tested could call 104 (about 15 104-vehicles were allotted for screening and testing), and a testing van would go to the residence. In addition, ten walk-in testing booths were set up in the municipal corporation area.

As the number of tests done in the state of Gujarat went up, the testing in Rajkot also went up. Even in September about 7,000 tests in the city area and another 2000 tests in the rural areas were being done. The RTPCR capacity was augmented; up to mid-July about 6500 tests had been done, but by end-Oct, the number had crossed 37800. Antigen test booths were set up in the 5 CT scan centres in the city. The private sector was involved in the testing; 6 private labs for RTPCR tests, 17 for antigen tests and one for antibody tests were approved.

Tracking Home Isolation

A system to track home isolation cases was put in place. As soon as a person was recommended for home isolation, the data went to a call centre. The corporation would in turn, share the data with the field-level health workers and the team, so that they could monitor the patient. It would also make calls to talk to the staff. If some assistance was needed or if the patient had to be shifted to a government facility, a team of doctors would assess the situation and take a call as to whether the patient could remain under home isolation or had to be shifted.

A couple of initiatives specific to Rajkot are now recounted.

Involving Local Doctors

In collaboration with the local chapter of the Indian Medical Association, a list of physicians, intensivists and anaesthetists, about 160 doctors in all, was prepared. They were divided into teams, and each team would visit the civil hospital to examine the critical patients for three hours in the morning and three hours in the evening. This was done voluntarily by the doctors and there was no cost to the government. The patients felt they were being provided extra care since these were highly respected doctors working in the private sector. This activity was continuing as of end-October 2020.

Psychological Wellbeing

Rajkot paid attention to an issue that is normally not attended to: psychological wellbeing during a pandemic. Noticing that the people, especially the elders, were facing psychological problems, a Psychological Intervention Centre was set up at the Collectorate in association with the Saurashtra University and the Psychiatry department of the Civil Hospital. Soon after the first case was reported, a protocol for dealing with psychological wellbeing was developed. By March 24 a team had been finalized under the leadership of the District Collector. There were seven experts as members and about 40 counsellors. It was basically a call centre where people could get advice and expert help. The service was made available to those under quarantine as well as to the administrative workforce. The problems that people reported were classified into medical problems, logistics problems and psychological problems; each category needed a different response. The call centre numbers were publicized widely through print and electronic and social media, and five parallel telephone lines were kept for incoming and outgoing services. The centre started functioning on March 26, 2020. The centre evoked a good response and within a short time managed to respond to about 6000 calls. An analysis of the data by the centre revealed that the most common psychological issues faced by people who were home quarantined (5711 calls) were Depression and Aggression and Irritability which accounted for about a third of the problems, followed by Obsessive Compulsory Disorder, General Anxiety, Major Anxiety, Panic Attacks, Domestic Violence, Loneliness, Addiction, Suicidal Tendency, family problems. The counsellors handled the therapy on the basis of the diagnosis; for instance, talk therapy for General Anxiety. The problems noted among the facility-quarantined people (889 calls) showed a slightly different pattern; depression, panic attacks and loneliness accounted for about two-thirds, and suicidal tendencies were much higher than in home-quarantined people. Parents whose children were studying elsewhere were particularly affected but were counselled.

Other Initiatives

In addition to the above, Rajkot, in line with what other districts did, made extensive use of AYUSH formulations, covering more than 15 lakh people with the decoction supplied by the government. The district also allotted about 250 staff for a mask-wearing campaign, and imposed some fines for offenders, since compliance with mask wearing had to be enforced. The administration also created a public awareness clip titled 'Test is the Best', and created a variety of standard operating procedures for different segments of actors in the economy.

6.4 VADODARA

Vadodara adopted a three-pronged strategy that involved COVID-19 Containment; COVID-19 detection and COVID-19 management, both inside the city and beyond it.

Zoning Strategy

A key part of the containment strategy was the zoning approach followed. The city was divided into four colour-coded zones. The red zones were those where there were positive cases of local transmission; the orange zones were those that had high numbers of suspect cases; the yellow zones were those that had vulnerable populations, and included slums and slum-like areas. Finally, the green zones were low-risk areas. The approach followed in these zones is presented in the following table.

| Zone | Movement Restrictions | Surveillance | | | |
|------------|---|-------------------------------|--|--|--|
| Red Zone | Completely Sealed and Lockdown with use of | Daily house to house | | | |
| | Police force | surveillance for SARI/ILI | | | |
| Orange | Intensive patrolling and drone surveillance | House to house surveillance | | | |
| Zone | was used to restrict movement of people, | for SARI/ILI to be covered in | | | |
| | though the area was not completely sealed | 3-4 days | | | |
| Yellow | The emphasis here was to prevent any | Periodical house to house | | | |
| Zone | ingress of persons into the area by | surveillance for SARI/ILI | | | |
| | barricading | | | | |
| Green Zone | Normal lockdown conditions, people urged | Self-surveillance | | | |
| | to self-isolate | | | | |

This approach produced especially good results especially in the very densely populated yellow zones where the spread of infection in the vulnerable populations was controlled. For example, Nagarwada is an area where the first positive case in Vadodara was detected. The administration sealed off the population of 3,500, closed all the community kitchens, sealed off the slum areas, and did not permit people to enter the area. Yellow-zone areas were demarcated as protected zones and people were not permitted to come inside. This helped to reduce transmission substantially.

Preventive Measures

The second aspect of the strategy was taking preventive measures. Once a week dose of hydroxychloroquine was given to all frontline workers and direct contacts of positive cases. Also, the entire population was covered with homeopathic medicine as recommended by AYUSH Ministry. The once a month dose covered 21 lakhs in the city and 12 lakhs in the rural areas. Immunity-boosting ayurvedic formulations were supplied to 6 lakh people free of cost in the containment zones. This effort was complemented by about 1500 chemists and druggists who started selling the medicines at maximum retail price. Another aspect of the strategy was engaging about 7000 teachers, with the support of the teachers' union, to undertake door-to-door surveillance. The teachers were trained for the task. At one stage hydroxychloroquine was administered to the vulnerable populations with their consent.

Preparation for Infrastructure and Personnel

Being prepared for beds, oxygen, NRBP, Bi-PAP and ventilators was an important element of the strategy. Hospital bed occupancy was not allowed to cross 75%; when this figure was reached, new

facilities were created. For example, a 400-bed hospital was expanded to 1,500 beds, and the 800-bed hospital was converted into a 2,000-bed facility. The total capacity reached 6,000 beds, and now, only about 50% are occupied. At the same time, plans are ready to meet any challenge from an increase in the infection in rural areas.

Designated COVID consultants, about 2400 allopathic and AYUSH doctors, were appointed on May 4, 2020, to undertake symptomatic diagnosis as per recommended guidelines, regularly monitor patients through a voice or video call and help in the supply of medicines to the patients.

Engaging the Community

In the early days (April) there was a fear of the Corona virus and lack of cooperation of the community with health workers; for example, people were not accepting frontline workers living in their societies. The administration collaborated with the *Baroda Muslim Doctors Association* and the Muslim Education Trust to set up COVID Care Centres, where even Hindus were admitted. This was a breakthrough and set a good example of community engagement. This demonstrated the importance of getting the community on board as a stakeholder, minimizing conflict, saving time, and expanding care provision. This initiative helped in avoiding conflict between care-givers and care-receivers. BMDA teams of doctors and paramedics helped in the screening and medical interventions in selected red and orange zones, and helped the local UPHC teams. Further, COVID Care Centres were set up by the Muslim Education Trust in five schools, with capacity of up to 2000. The coordination with minority community leaders helped address the concerns of the minority community.

Dhanvantari Raths and 108

The Dhanvantari Raths are believed to have been particularly helpful. They were launched on July 1, 2020 and managed to reach out to about 8000 to 10000 people every day through 34 Raths in the city. In addition, 32 Raths were operational in the rural areas. Each Rath was managed by a medical office, a lab technician and an auxiliary health worker, and did the screening, taking blood samples, dispensing medicines and referring patients to the hospitals for RTPCR sampling.

An Intelligent Referral System, which worked in combination with the 108 ambulance service, was launched on August 1, 2020. The ambulance service was mapped with the Hospital Bed Management module on the Municipal Corporation's website. Using this, the 108 could shift a patient through the shortest route possible. The employee of the ambulance obtained the details of the bed, the nodal officer's name and number by clicking on a map at the COVID corner on the website.

Engaging Private Hospitals

Vadodara relied on self-regulation by private hospitals and did not take recourse to requisitioning or court intervention. Discussions were held with the private hospitals and the hospitals came up with self-declared undertakings. They willingly agree to offer 3500 beds in a phased manner till October 1. There was no reservation of beds for the government in private hospitals. Ultimately, the private hospital self-regulated market rates were much lower than in other cities; the price cap for treatment was decided and agreed upon by the Private Hospitals Association of Vadodara, SETU. The surplus material was shared between government and private hospitals; for instances ventilators were obtained on a nominal rent (Rs. 50,000 per ventilator per month), and the government supplied Tocilizumab and Remdesivir to private parties when there was a temporary shortage, on the condition that they would be replaced later. Regular meetings with the physicians' and anaesthetists' associations also resulted in well-known private doctors agreeing to visit isolation wards in an honorary capacity to help the GOTRI and Railways

Hospitals. To ease the Mediclaim process, insurance companies also pledged to hasten the cashless claims.

Reworking the Clinical Protocols

A special task force was formed to review the treatment protocols, and new thresholds of the critical markers were decided to ensure timely and appropriate treatment. Two infectious disease specialists guided the local physicians in the use of injectable medicines like Tocilizumab and Remdesivir.

Clustering of Dedicated COVID Hospitals

Clusters of small healthcare facilities were linked to the larger health care facilities or lead hospitals, and review done through video conferencing on alternate days. The responsibilities of the lead hospitals included pooling of resources, periodic review and upgradation of clinical protocols of the cluster hospitals under them and act as the first point of referral for the cluster hospital.

Using Data and Analysis

An online dashboard provided real-time information on bed occupancy; citizens could view this on the Municipal Corporation's website. The hospitals were required to update the status on the portal at least twice a day.

At the headquarters, the district leadership closely followed emerging trends in Europe, USA and other parts of the world. Local data was also analysed and discussed regularly. For instance, when mortality in Muslim-dominated areas came down, the discussion of the trends confirmed the faith in the steps that were being taken. The current data was also used to make projections so that all stakeholders understood the gravity of the situation. As the nodal officer put it, "It was important to convey a sense of emergency, and not tone down the seriousness of work ahead. For example, to handle the flow of rural patients, one floor of a hospital is dedicated to rural patients, but 15 dedicated hospitals in the rural areas are being readied in anticipation of a rise in rural infections."

Visits to the hospitals every alternate day by the nodal officer ensured that the commitment of the top leadership was evident to all those involved in the battle against COVID-19. The personal involvement of the officer in studying the data also helped. In April, based on the information available and the Oxford study, fatality rate projections were made. In May, it was predicted that the crisis would last until October in Vadodara City, and peak in July. This helped in increasing the number of ventilators from 140 to 500 in a phased manner. The Medical Colleges are now using data from door to door surveys, to predict patient inflow for the next 15 days ahead. Alongside, the team is also analysing hospital treatment data and practices. At one stage invasive ventilators were being used regularly, but with experience, the Bi-PAP, NRBP, High Flow Nasal Cannula Oxygenation were felt to be more effective, and the treatment leaned towards a conservative approach. At the time of writing, of the 310 patients in intensive care, less than 30 were on invasive ventilators, the rest were on Bi-PAP (non-invasive, where survival chances seem to be better). However, some facilities have only invasive ventilators, and so the administration is planning for high-end Bi-PAP ventilators.

7.0 CONCLUSION

In conclusion, the various themes that emerged from the interviews and were covered in the earlier sections, may be summarized as follows (Table 7.1 and Figure 7.1). (The Research and Innovation column includes items that were mentioned but not followed up in the interviews.)

| Leadership & Governance | Health System Strengthening | Surveillance & Testing | Treatment | Awareness & Behaviour change | Research and Innovation |
|----------------------------|--------------------------------|---------------------------|-------------|------------------------------------|----------------------------|
| Core | Hospital | Dhanvantari | Tele- | IPC | Global and |
| committee | preparedness | Rath | mentoring | | National trials |
| State level | HR | Aarogya Setu | HOPES-T | Community | COVID |
| Task Force | management | ITIHAS | | Engagement | Research |
| | | | | | Committee |
| Decentralized | Capacity | Community | Treatment | Risk | AYUSH trials |
| management | building | Surveillance | protocols & | communication | |
| | | | guidelines | | |
| | Logistics, | Micro | AYUSH | Mass | |
| | Equipment, | containment | | awareness | |
| | PPEs and | | | | |
| | Drugs | | | | |

Table 7.1: Key Elements of the Integrated Strategy





Source: Department of Health & Family Welfare, Government of Gujarat.

The elements in Table 7.1 that constituted Gujarat's integrated public health response to COVID-19 also encompass many continuous efforts and locally contextualised initiatives that were designed to tap into the local strengths within the system and to overcome some of the weaknesses. They seem to have given some dividend. Gujarat is likely to remain below other large states as far as the progression of epidemic in the weeks ahead is concerned.

What is clear from all the interviews, without exception, is the immense sense of pride and satisfaction that the respondents feel when they talk about a challenge that has been faced, in their view, successfully. The going has been hard, both personally and professionally; to quote one respondent, it was "neither morning nor evening, neither day nor night" when facing COVID-19. Many of those battling COVID-19 have themselves fallen prey to the virus. At the same time, the respondents would be the first to point out that while there has been progress in the battle against COVID-19, this cannot be claimed to be victory over COVID-19. "The efforts to contain the pandemic have to go on, and evolve based on experience and emerging evidence." This is good advice, since with the onset of winter and the festive season, and experience elsewhere in the world, one needs to be prepared to deal with the unpredictable nature of the behaviour of the Corona virus. One element, however, that COVID-19 seems to have forced the state to adapt to is the "new normal" — a phrase that has become popular among many public policy actors. This challenge has been a catalyst for various reforms and measures aimed at strengthening the existing health system, which will ultimately help in the future. Proactive community engagement is another aspect that will have to be continued with in order to prevent the transmission of such communicable diseases. Much of the future progress depends on society adhering to the advice and prescriptions regarding good behaviour, such as wearing face masks, maintaining social distancing, avoiding places where the spread is more likely, and adopting other hygiene measures. High health literacy among people, sustained safe behaviour in the community and a strong health system will help combat COVID-19 and future public health emergencies. Ultimately, the lessons learned about current shortcomings and how they can be overcome are the most important outcomes of a crisis.

APPENDIX 1a: List of people interviewed

| | Name | Designation |
|----|----------------------------|--|
| 1 | Dr. Rajiv Kumar Gupta | Additional Chief Secretary (Forest & Environment), GoG |
| 2 | Shri Pankaj Kumar IAS | Additional Chief Secretary (Revenue), GoG |
| 3 | Dr. Jayanti Ravi | Principal Secretary (HFW), GoG |
| 4 | Shri Jaiprakash Shivahare | Commissioner (Health), GoG |
| 5 | Dr. Vinod Rao | Secretary (Primary & Secondary Education), GoG / Nodal Officer Vadodara |
| 6 | Shri Banchhanidhi Pani | Municipal Commissioner, Surat Municipal Corporation |
| 7 | Shri Milind Torawane | Secretary (Economic Affairs) / Nodal Officer Bhavnagar |
| 8 | Ms. Sonal Mishra | Secretary (Narmada), GoG / Nodal Officer Surat |
| 9 | Shri Manoj Aggarwal | Police Commissioner, Rajkot |
| 10 | Dr. Rahul Babubhai Gupta | Industries Commissioner, Gandhinagar / Nodal Officer Rajkot |
| 11 | Shri J. D. Desai | Former Mission Director (NHM), GoG |
| 12 | Ms. Remya Mohan Moothadath | Collector, Rajkot |
| 13 | Dr. Dinkar Rawal | Additional Director (PH), HFW Department, Gujarat |
| 14 | Dr. R. Dixit | Additional Director (ME), HFW Department, Gujarat |
| 15 | Dr. H. K. Bhavsar | Additional Director (MS), HFW Department, Gujarat |
| 16 | Dr. Neelam Patel | Additional Director (FW), HFW Department, Gujarat |
| 17 | Dr J. O. Madhak | Director (SIHFW), Vadodara |
| 18 | Dr. A. M. Kadri | Executive Director, SHSRC, Gujarat |
| 19 | Dr. Bhavna Patel | Director (AYUSH), HFW Department, Gujarat |
| 20 | Dr. G. C. Patel | Deputy Director, (Epidemic), HFW Department, Gujarat |
| 21 | Dr. Chetna Desai | General Manager, Gujarat Medical Service Corporation Ltd. |
| 22 | Dr. Bina Vadalia | Regional Deputy Director (Health), Gandhinagar Region |
| 23 | Dr. Rupali Mehta | Regional Deputy Director (Health), Rajkot Region |
| 24 | Dr. Ajay Chauhan | Program Officer (Mental Health), HFW Department, Gujarat |
| 25 | Dr. Pankaj Buch | Medical Superintendent, PDU Government Hospital, Rajkot |
| 26 | Dr. Ragini Varma | Medical Superintendent, Civil Hospital, Surat |
| 27 | Dr. J. K. Kosambiya | Professor, Community Medicine, Government Medical College, Surat |
| 28 | Dr. Bipin Amin | Additional Professor, Medicine, BJ Medical College, Ahmedabad |
| 29 | Dr. Ami Parikh | Professor, Medicine, SVP Hospital, Ahmedabad |
| 30 | Dr. A. Bhagyalaxmi | Associate Professor, Community Medicine, BJ Medical College, Ahmedabad |
| 31 | Dr. Kartikey Parmar | Assistant Professor, Medicine, BJ Medical College, Ahmedabad |
| 32 | Dr. Ashish Naik | Deputy Municipal Commissioner (Health & Hospital), SMC |
| 33 | Dr. Devesh Patel | Medical Officer of Health, Vadodara Municipal Corporation |
| 34 | Dr. Pradeep Umrigar | Medical Officer of Health, Surat Municipal Corporation |
| 35 | Shri Jashvant Prajapati | COO, GVK-EMRI, Gujarat |

APPENDIX 1b: List of interviewers

| | Name of Interviewer | Designation |
|----|-------------------------|--|
| 1 | Dr. Vijaya Sherry Chand | Professor & Chairperson, Ravi J. Matthai Centre for Educational Innovation |
| 2 | Mr. Gautam Patel | Policy Advisor, Formerly worked with Government of Gujarat |
| 3 | Mr. Aadarsh Pillai | Lead Consultant & Director, 360 Degree Resource Solutions, Ahmedabad |
| 4 | Dr. J. K. Kosambiya | Professor, Community Medicine, Government Medical College, Surat |
| 5 | Dr. Shobha Misra | Professor, Community Medicine, PDU Medical College, Rajkot |
| 6 | Dr. Mohua Moitra | Associate Professor, Community Medicine, Government Medical College, Surat |
| 7 | Dr. A. Bhagyalaxmi | Associate Professor, Community Medicine, BJ Medical College, Ahmedabad |
| 8 | Dr. Sangita Patel | Associate Professor, Community Medicine, Baroda Medical College |
| 9 | Dr. Irfan Momim | Associate Professor, Community Medicine, Government Medical College, Surat |
| 10 | Dr. Shikha Jain | Assistant Professor, Community Medicine, BJ Medical College, Ahmedabad |
| 11 | Dr.Kalpita Shringarpure | Tutor, Community Medicine, Baroda Medical College |
| 12 | Dr. Harsh Bakshi | Team Leader, SHSRC, Gujarat |
| 13 | Dr. Parimal Patel | Consultant, SHSRC, Gujarat |

| | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Total |
|----------------------------|-------|-------|--------|--------|--------|---------|---------|---------|---------|
| Total cases | 84 | 4311 | 12399 | 15849 | 28795 | 34997 | 40959 | 35550 | 172944 |
| Average Daily new Cases | 6 | 144 | 400 | 528 | 929 | 1129 | 1365 | 1147 | |
| Case per million | 1.3 | 65.5 | 188.5 | 240.9 | 437.7 | 531.9 | 622.5 | 540.3 | |
| Average Active cases | 38 | 1298 | 5651 | 5858 | 10934 | 14618 | 16346 | 14980 | |
| Discharged | 5 | 608 | 9306 | 13751 | 21237 | 32875 | 39449 | 38888 | 156119 |
| Discharge rate (%) | 6% | 14% | 75% | 87% | 74% | 94% | 96% | 109% | |
| Total Deceased | 6 | 208 | 824 | 810 | 593 | 581 | 431 | 266 | 3719 |
| CFR (%) | 7.14% | 4.82% | 6.65% | 5.11% | 2.06% | 1.66% | 1.05% | 0.75% | |
| Death per million | 0.09 | 3.16 | 12.52 | 12.31 | 9.01 | 8.83 | 6.55 | 4.04 | |
| Total sample tested | 1566 | 62441 | 147923 | 161733 | 391114 | 1567059 | 2086192 | 1635819 | 6053847 |
| Test per million | 24 | 949 | 2248 | 2458 | 5945 | 23818 | 31708 | 24863 | |
| Positivity rate (%) | 5.4 | 6.9 | 8.4 | 9.8 | 7.4 | 2.2 | 2 | 2.2 | |

APPENDIX 2a: Monthly COVID-19 Dashboard Indicators



APPENDIX 2b: COVID-19 Trends in Gujarat

Note:

In the initial phase, there was an explosive rise in cases and deaths. These curves were flattened over time. Recovered cases trend is increasing while the death has stabilized. Active cases trend stabilised in August and September. It has been decreasing in October.

APPENDIX 2c: New Deaths and Case Fatality Rate



Note:

In the initial phase, there was high CFR since little knowledge and experience was available regarding the behaviour of the virus and progression of the disease. Soon, the clinical response was adapted and the outcomes improved. Daily Deaths and CFR have been reducing consequent to improvement in patient management. Although fluctuations in deaths are visible, CFR has shown a steady decline.



APPENDIX 2d: Daily Tests per Million and Positivity Rate

Note:

With limited testing facilities, fewer tests and selective testing were done, leading to high test positivity in the early days. With upscaling of testing infrastructure, positivity initially increased as highly probable suspects were tested and more cases were picked up. Subsequently, testing criteria were relaxed and rapid antigen testing introduced which greatly increased the tests being conducted and positivity coming down. High testing was continued but the positivity remained unchanged and hence the testing was decreased without any change in positivity, thereby decreasing the burden on the system.

APPENDIX 3

Chief Minister's Dash Board: Monitoring the hospital care directly from CM's office





1200-bed Designated COVID Hospital Civil Hospital Ahmedabad



Community COVID-19 Isolation Centre





Field Activities