Enabling remote Melghat's journey to self-sufficiency in Medical Oxygen

PATH

This case study is a part of a compendium of case studies that capture the unique experience of the National Stock Exchange (NSE) Foundation as it mobilized the efforts of the Centre for Health and Research innovation (CHRI) through Project CAVACH, a respiratory care coordination project.

This case study from Melghat in Maharashtra's Amravati district offers insights into the challenges faced in improving and strengthening oxygen systems in difficult-to-reach areas and highlights the collaborative efforts supported by NSE Foundation's project CAVACH in ensuring the resilience of vulnerable populations against similar crises in the future.

Introductions

Nearly 65 percent of India's population is rural, yet there remains a deep rural-urban gap in the health services system of the country. During the devastating second wave of the pandemic the number of COVID-19 cases in rural regions increased from 0.4 million in March 2021 to 3.1 million new cases within a month (Down to Earth, June 2021). As a result, the rural health care system in India was overwhelmed by the increase in caseloads.

Limited public healthcare services that were saddled with ill-equipped hospitals, staff shortages, and the lack of access to dedicated COVID-19 facilities left millions in rural India in want of adequate and timely medical care. By March 2021, media reported that Maharashtra was one of the worst affected regions in the country. Reports also showed that virus is moving faster towards the far-flung rural areas of Amravati district. (The Print, March 2021)

The state particularly battled the shortage of crucial resources such as ventilator beds, oxygen units and medical staff during this period. Far-flung and remote districts such as Amravati in the Vidarbha region were among the worst affected districts and witnessed an unprecedented surge in COVID-19 transmission and shortage of critical healthcare services.

Melghat: A remote region crippled with inadequate healthcare services

Melghat is a vast forested tract spread across blocks Dharni and Chikaldhara in Amravati district of Maharashtra. It is located in the remote Satpura mountain ranges and is listed among the nine tiger reserves in India. It is one of the most underdeveloped parts of the state with nearly 80% of the population, which is largely tribal, suffers from malnutrition and most live below the poverty line as farmers or laborers. Residents of villages in this region live in kaccha houses without electricity (>90%) and the literacy rates are extremely low (>50%).

As per Dr Ashish Satav, who established his NGO-Meditation, AIDS, Health, Addition, Nutrition (MAHAN) in the region in 1998 and has been working towards providing critical health services and reducing the number of deaths in the region with Dr Kavita.

"Socio-cultural practices followed by tribals have further added to the deprivation of the population; most of the tribals still seek traditional faith healers for their illnesses."

In addition, the population has limited access to public healthcare services. Many villagers inhabiting the region have to travel at least 100 km to reach an advanced healthcare facility to access medical aid. For the population of over 300,000 in Melghat, there are only 11 primary health centers, two rural hospitals and only one sub-district hospital. These facilities lack critical care units and critical patients are directly referred to the Mahatma Gandhi Tribal Hospital, a 30- bed charitable hospital run by MAHAN. The hospital also caters to patients from neighboring state Madhya Pradesh, which is barely 25 km away and as a result, remains pressed for services.

Limited access to medical oxygen during the pandemic

The lack of adequate infrastructure in the region to support oxygen therapy for COVID-19 posed a major obstacle for a charitable health facility like the Mahatma Gandhi Tribal Hospital. The PSA oxygen generation plant was available only at the district hospital, which was four

hours away from the facility. Although the Mahatma Gandhi Tribal Hospital had around 30 oxygen concentrators, the authorities mainly relied on oxygen cylinders as the primary source of oxygen due to lack of regular power supply. At the peak of COVID-19, an oxygen cylinder in the facility lasted for only an average of 2–3 hours while severe cases needed at least 30–40 liters of oxygen per day. The B-type cylinders were being provided by the vendor for Rs. 300 per cylinder, and the jumbo D-type cylinders were made available at Rs. 400 per cylinder. Also, the hospital had to ply their ambulances at their cost every day to refill and collect these oxygen cylinders from vendors.

An oxygen generation plant: a life-saving action

In March 2020, a 28-year-old male patient was referred by the sub-district hospital to Mahatma Gandhi Tribal Hospital. He was a migrant laborer from Bihar and was severely affected by COVID-19, suffering from acute respiratory distress symptoms with oxygen level (SPO2) at 48 per cent. While his SPO2 levels improved to 90 per cent with the use of an oxygen concentrator and ventilator, he required intensive care which was not available in the facility. The doctors had to refer him to the district hospital in Amravati. Unfortunately, the patient lost his life.

> *"It was then that we decided to build our capacity for a captive PSA oxygen generation plant to manage critical COVID-19 patients at our facility, and we started looking for potential donors. This is when we read about the NSE Foundation's Project CAVACH initiative to support charitable hospitals to strengthen their oxygen systems. We wrote to Ms. Rema Mohan, CEO, NSE Foundation seeking her support for setting up a PSA plant in Mahatma Gandhi Tribal Hospital.*"
>
> -Dr Ashish Satav

As NSE Foundation took Dr. Satav's request forward, CHRI conducted the site readiness assessment of the Mahatma Gandhi Tribal Hospital, Melghat in August 2021.

> "*We developed formats to assess the oxygen requirement of the health facility by doing an analysis of caseload, bed capacity, infrastructure, space available for the PSA plant installation. We also discussed the requirements*

> *of the facility with the health facility staff and hospital administration and concluded that a PSA plant of 250 LPM capacity would be sufficient to meet the hospital requirements. We supported the facility staff with adequate information on how to run and support the facility."*
>
> -Sachin Sathe, Public Health Coordinator, PATH

CHRI, with its rich experience in respiratory care management, provided technical assistance to the NSE Foundation's Project CAVACH, in procurement, installation and commissioning of the PSA oxygen generation plant by facilitating the medical gas pipeline system (MGPS), constructing the infrastructure for the plant and placing trained resources to manage the oxygen system. The Mahatma Gandhi Tribal Hospital, with inputs from the CHRI team, installed the MGPS in its facility using its resources.

Challenges faced on the road to a resilient future

Despite meticulous planning and available support structures, installing a PSA oxygen generation plant in Melghat came with a set of challenges due to the remoteness of the region.

> *"CHRI, mobilized by NSE Foundation's Project CAVACH, has provided end-to-end support for the PSA plant right from site assessment for civil and electrical work, procurement, installation, commissioning, and quality checks for plant functionalization in all the locations. We also provided support for vendor landscaping, finalization of vendors, and other documentation work involved. Initially for site assessment, due to heavy rains in the area, many contractors were reluctant to provide services. During festivals also we faced similar challenges where it was difficult to bring contractors onboard. We could manage the challenges only through repeated field visits and follow-ups."*
>
> - Rahul Arora, Project Manager, PATH

In addition to this, the transportation of the plant required meticulous planning and execution.

> "*There were some challenges related to transporting the plant to the site as to reach this region one has to cross the forest, mountains, and sharply turning roads of approximately 100 Km in the ghats, as the equipment could only be procured from Amravati.*"
>
> - Rahul Arora, Project Manager, PATH

Due to the remoteness of the region, very few local contractors in the region had the technical capabilities to execute this task. There were even fewer contractors willing to carry out the task owing to the high costs involved in setting up PSA plant the far-flung region. The CHRI team identified a civil engineering contractor outside of the district, who agreed to undertake the civil work needed for the PSA plant site at the Mahatma Gandhi Tribal Hospital.

> "*I am very thankful to the NSE Foundation's Project CAVACH for this support. They helped us at a time when we needed help the most. This intervention is very critical not only for Melghat but also for adjoining areas of Madhya Pradesh from where many of the patients come to our facility from the state.*" -- Dr. Ashish Satav

Building on the recent NSE Foundation's Project CAVACH support, the government is also planning to provide another PSA plant with 250 LPM capacity to this health facility. This will further ensure that the hospital to cater to COVID-19 and non-COVID-19 cases for the next 5–6 years. The PSA plant of 250 LPM capacity has been successfully commissioned in December 2021.

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About NSE Foundation's Project CAVACH

Project CAVACH is an initiative of the National Stock Exchange (NSE) Foundation, which was implemented by mobilizing the efforts of the Centre for Health and Research innovation (CHRI), an affiliate of PATH. Launched on 15th July 2021, Project CAVACH (COVID-19 and Vaccination Awareness Campaign for Health) aimed at strengthening systems related to the access of oxygen and the supply of other essential equipment in hospitals in remote regions.

NSE Foundation facilitated the establishment of five pressure swing adsorption (PSA) oxygen generation plants with capacities ranging from 250 LPM to 1000 LPM in Jharkhand and Maharashtra, where CHRI was engaged to provide on-ground support in procuring, installing and commissioning of these plants. In addition to this, the project supported the provision of small oxygen delivery equipment to 18 facilities in Rajasthan, Tamil Nadu, Assam, Maharashtra, Delhi, Jammu & Kashmir, and Nagaland.