



## **Addressing the Challenges of Containing Covid-19 Spread in a Rural, Poor Area in India: A Case Study**

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### **Authors' contributions**

*This work was carried out in collaboration among all authors. Author MLF conceived the idea of writing up this case study, conducted the literature review, and served as lead author of the manuscript. Author BP oversees the screening study in Vellore, Tamil Nadu, India, and contributed to writing of the manuscript. Authors RS and DW serve as co-PI of the screening study in Vellore and contributed to the writing of the manuscript. All authors read and approved the final manuscript.*

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### **ABSTRACT**

The rapid spread of COVID-19 in 2020 has illustrated how transmissible, virulent, and unpredictable this novel coronavirus is. As of mid-December 2020, over 73.6 million cases have been recorded, with 1.64 million deaths attributed to the disease. This most probably is an underestimate given that testing has been spotty and that an unknown number of asymptomatic individuals are not counted in the statistics. Also, the difference between reported confirmed cases

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and deaths varies by country, with Low- and Middle-Income Countries (LMICs) bearing the highest burden [1].

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## 1. INTRODUCTION

COVID-19 is challenging governments regardless of low-, middle-, or high-development status Countries with the most sophisticated health care systems are overwhelmed, finding it extremely difficult to keep up with the flood of patients requiring care. Dealing with COVID-19 in LMICs is more difficult because the health care infrastructure is generally poorer than that in developed nations, and most LMICs are financially unable to deal with the economic consequences of the virus.

In India, the world's second most populous country, an estimated 1.3 billion people are at risk of COVID-19 infection [2]. As of mid-December 2020, India has the largest number of confirmed cases in Asia and the second highest number of confirmed cases in the world [3]. Almost 10 million cases of Covid-19 have been recorded in India, with 144,000 deaths attributed to the disease [4]. Screening and treating COVID-19 patients in urban areas is challenging, but doing so in rural areas presents different challenges. Almost 70 percent of the Indian population live in rural areas [5]. The challenges and difficulties of educating the rural population about COVID-19 are complicated, including addressing the fear of getting tested because of the social stigma. Further, the economic need to work often runs counter to measures to contain the spread of the virus.

Kumar et al. [6] presented the potential consequences of COVID-19 on India's rural population. Our project illustrates ways to address the challenges in educating, screening, and treating those in rural areas in Tamil Nadu. We focus on the rural Vellore district of Tamil Nadu, an area of almost 6,000 square kilometers, with a population of almost 4 million (as per the 2011 census data). Vellore is the home of the Christian Medical College (CMC), one of the leading medical schools in India, and its hospital, a state of art tertiary care center. CMC also runs a secondary-level health center (RUHSA) 25 kilometers from Vellore town, which is where our study is based. RUHSA serves a population of approximately 140,000, the majority

of whom are in the lower economic strata. Literacy rate is 64 percent among men and 52 percent among women; individuals are primarily involved in agricultural work, either farming or working as agricultural laborers.

By end of December 2020, there were over 810,000 recorded cases of COVID-19 and 12,000 deaths in Tamil Nadu [7]. In an effort to stem the spread of COVID-19 in the neighboring rural communities, RUHSA is providing continuous health education messages about COVID-19 disease. The objective is to educate and change behavior. Since there is little agreement over the meaning of 'social distancing' in poor, rural regions of India, we developed various informational messaging (written and using picture diagrams) on feasible social distancing, the importance of changing hygiene practices, cough etiquette, the wearing of face masks, quarantining if testing positive, and the importance of travel restrictions.

Our goal is to not only educate the local population, but also empower the rural communities to adopt prevention strategies by means of community education in an effort to stem the spread of the virus and establish on-going monitoring as well as refinement of need-based educational approaches in our target communities. We rely on an established network of trained health care workers (HCWs) who, pre-COVID-19, routinely visited rural settlements and villages to deliver basic primary care and health education. The HCWs, who live in the local communities, have been enlisted to distribute posters and flyers and to encourage individuals who have symptoms of infection (i.e., dry cough, fever) to self-refer to RUHSA fever clinic for testing.

We also are gathering information through qualitative key informant interviews to assess understanding of COVID-19, knowledge of disease prevention measures, and thoughts about the impact of the disease on their life. Further, we are undertaking an analysis of capacity and resilience of relevant health services, focusing on primary care services at the forefront of COVID-19 response in the rural communities. In particular, we are interested in

assessing how these services can best adapt within prevailing resource and healthcare system constraints.

Fighting COVID-19 requires a coordinated and unified effort. We are complementing the services provided by the Tamil Nadu government to develop an effective urban-rural statewide COVID-19 strategy, which includes community surveillance, implementing preventive strategies appropriate for the local communities, and providing testing. As part of a community outreach program, a walk-in-testing kiosk at the RUHSA campus was set up to complement the limited number of mobile testing facilities provided by the government health authorities.

We are using the COVID-19 testing criteria developed by the India Council of Medical Research (ICMR) for symptomatic patients [8]. These individuals undergo a nasopharyngeal swab by a trained technician and samples are transported in a viral transport media tube maintained at 2-80C to the CMC virology laboratory for analysis. The samples are tested by real time RT-PCR test and reports are conveyed through the Hospital Infection Control Committee (HICC) to the project team at RUHSA within 24-48 hours. Real time RT-PCR is a recommended test by US Centers for Disease Control and Prevention (CDC) and by the ICMR for diagnosis of SARS-CoV-2. Individuals are informed of their results through mobile telephone and the test results are reported to the Tamil Nadu government daily.

All COVID-19 positive cases are placed on CMC's established management pathway, which includes isolation and, if necessary, hospitalization. The asymptomatic and mild symptomatic positive patients are asked to self-isolate at home or in the COVID ward of CMC. Our team carefully examines the facilities in the homes of the infected and provides advise/counseling on how to isolate the patients with mild disease in their own homes. Moderate or severe patients are admitted to CMC's SARI ward or ICU, respectively. Asymptomatic or mildly symptomatic patients who are discharged from the hospital following at least three days of no fever are advised to home quarantine for next 14 days; re-testing for COVID-19 with RT-PCR is not required as per government policy.

Our work in the rural villages provides an essential addition to COVID-19 testing and

treatment to this population and obviates the need for people to travel to Vellore, which can be as far as 40 kilometers from many of the local villages. Our objective is to provide screening and testing in the local, rural villages to identify, isolate, and do contact tracing to stem the spread of the virus in these resource-poor settings. Our efforts will enhance the limited contact tracing done by government officials in an effort to identify and quarantine individuals.

## 2. CONCLUSION

Laxminarayan et al. [9] provided empirical evidence of the transmission dynamics of COVID-19 in Tamil Nadu as well as in Andhra Pradesh, and clearly illustrate the importance of epidemic control measures. The spread of COVID-19 in India, especially in the rural areas, is presenting a challenge for local and state governments. COVID-19 screening and treating is often complicated by lack of knowledge of how to prevent infection and by a poor healthcare infrastructure. This is especially true in rural communities. The Indian news media is referring to COVID-19 as "The Rural Surge" [10].

Our project, the first of its kind in Tamil Nadu, illustrates a multi-pronged approach to empower rural communities to adopt prevention strategies, including relying on easy to understand health messages and neighborhood Community Health Workers trained to educate and encourage people to learn about COVID-19 and to get tested if symptomatic. We believe that increasing awareness of when, where, and why to get tested; providing instruction about hygiene practices and COVID symptoms; and providing guidelines about when to seek medical attention will do much to help stem the transmission of COVID-19 in the local populace.

Our larger 'screen and treat' study, the first of its kind in Tamil Nadu, will provide much needed information about the extent of the disease spread among rural populations, the ability of the local health systems to provide necessary medical care to those who test positive, and how to best inform and engage communities to protect themselves against infection. Our strategy, a small but an important piece to quantify the impact of COVID-19 in rural communities, could be used as a guide by others dealing with the virus in similar geographic areas.

## CONSENT AND ETHICAL APPROVAL

As per international standard or university standard guideline participant consent and ethical approval has been collected and preserved by the authors. IRB approval for this project was granted by CMC. Community Empowerment for Screening and Testing.

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## COMPETING INTERESTS

Authors have declared that no competing interests exist.

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