# THE ROLE OF EHEALTH APPLICATIONS FOR CLINICAL SERVICES IN RESPONSE TO COVID‑19 PANDEMIC

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**Abstract**
*Using digital technology to provide support, medical consultations, healthcare services, and to track the spread of the coronavirus has been identified as an important solution to curb the transmission of the virus. This research paper aims to summarize the digital technologies used during the COVID-19 pandemic to mitigate the transmission of the COVID-19 in India; establish the extent to which digital technology applications have facilitated mitigation of the spread of COVID-19 in India; and explore the facilitators and barriers that impact the usability of digital technologies throughout the pandemic. An increasing number and variety of digital health applications have been available throughout the pandemic, such as Aarogya Setu, My Gov, smartphone mobile health apps, machine learning, and artificial intelligence. Each technology has played a particular role in curbing COVID-19 transmission in India. Different users have gained benefits from using digital technology during the COVID-19 pandemic and different determinants have contributed to accelerating the wheel of digital technology implementation during the pandemic. This study aims to explain the role of digitalization in controlling COVID-19 during pandemic period.*

***Keywords: Digitalization, eHealth Applications, COVID-19, Aarogya Setu.***

## Introduction
In December 2019, the Corona virus disease 2019 (COVID-19) was discovered in Wuhan, China. Then, in a very short time, the virus spread worldwide. To March 2022, records show that almost more than 520 million people have been infected with COVID-19 and more than 4 million people have died of the disease. COVID-19 has been defined as an acute respiratory syndrome with a continuous cough, a high-grade fever, and shortness of breath. Because of the rapid spread of COVID-19, the World Health Organization (WHO) declared it a pandemic. Around the world, many healthcare systems have been affected and challenged due to the enormous number of cases that need healthcare services.

In general, the COVID-19 pandemic has created many challenges for both individuals and healthcare systems. So the Government announced lockdowns and quarantine to prevent the spread of the virus, since it was discovered that the virus is more active in social areas. The quarantine, stay-at-home, and social distancing policies were implemented to control the spread of the infection. Research indicates that many healthcare systems were vulnerable in the face of such a pandemic, as it has increased existing challenges such as staff shortages, personal protective equipment (PPE) shortages, and intensive care unit (ICU) and hospital bed capacities. This extraordinary situation imposes extra challenges on the existing healthcare systems.

## Digital Health Solutions
A smartphone app used by over 60 million people. Drones in the sky tracking people's movement and checking their temperature. Facial recognition cameras reporting to the police on whether someone has broken quarantine. Using digital technology to provide support, medical consultations, deliver

healthcare services, and track the spread of the virus has been identified as a vital solution to help to curb the transmission of the virus.

Although digital technology in healthcare services was introduced decades ago as remote healthcare services, the presence of the pandemic has dramatically boosted its applications and development as an important factor to mitigate the disease and to break the cycle of disease transmission. Digital health solutions have both hard and soft innovations. Hard health innovations involve the remote use of medical devices, and soft health innovations are defined as the knowledge to operate and monitor the devices, as well as the patients.

The terminology associated with the digitalization used to provide healthcare during the pandemic reflects the sources, mode, or the services that accompany the technology. For example, 'Aarogya Setu' is the mobile app used for digital health services that provide routine check-ups for confirmed COVID-19 patients in India, such as monitoring vital signs and tracking symptoms of the disease. In another example, the electronic intensive care unit (eICU), the healthcare provider uses a live video camera to monitor ICU patients in another hospital, and to provide support for other healthcare providers. A summary of the various digital health applications and their uses during COVID-19 is provided in the online Supplementary Material.

The pandemic has been a powerful trigger for accelerating the implementation and adoption of digital technologies to mitigate the spread of COVID-19 and to provide healthcare in India. This is confirmed in the available literature, which presents promising outcomes of using digital solutions to control the spread of the virus. Other literature has focused on facilitators and barriers to the implementation, adoption, and sustainability of digital technology during COVID-19 and in future pandemics. Accordingly, we can see that digital technology applications in healthcare delivery are a trending topic, and they may become the mainstream mode of care delivery. Even though healthcare services are improving because of digital health technology use, more understanding is needed. Therefore, the paper aims to summarize and synthesize the currently available evidence that assesses the use of digital technology to provide healthcare during the COVID-19 pandemic in India.

**Digital Technologies Have Been Used during COVID-19 in India**
Reducing the transmission of the virus was the first health priority in countries during the initial outbreak of COVID-19. A wide variety of digital technologies and healthcare innovations were initiated or activated to help in care delivery, to screen infected people or track them, to minimize the infection and mortality rates, to estimate the number of infections, and to flatten the curve.

**Table 1: Digital Technologies Users in India 2022**

| Sl.No. | Technology/Application | Users in Million |
|--------|------------------------|------------------|
| 1. | Aarogya Setu | 114 |
| 2. | AI | 47 |
| 3. | My Gov | 90 |

Source: Health Data Sources, MeSH-2022.

**Aarogya Setu**
Aarogya Setu app is being deployed is symptomatic of this lack of introspection. Aarogya Setu was designed as a 'digital contact tracing' app which can inform users whether they are at risk of COVID-19 infection, to help people self-quarantine and allow them to approach public health authorities. However,

reports are emerging on a daily basis of how this app, which was intended to be 'consensual' and voluntary, is now being mandated by the Central government, for everyone from government employees, to delivery workers and construction workers.

## Artificial intelligence (AI)

Artificial intelligence (AI) via infrared thermal cameras and thermometers has been installed in crowded places such as airports and other areas of public transportation, schools, and workplaces to identify and screen infected people and monitor their temperature, as a high temperature (fever) is one of the symptoms of the disease. In addition, polymerase chain reaction (PCR) tests, other laboratory tests, and digital technologies such as mobile health apps that screen symptomatic and non-symptomatic COVID-19 patients have been implemented to gather real-time data about infected and non-infected people in several countries.

## My Gov

My Gov mobile application that enables people to scan the barcode before entering commercial and social areas. This application provides information to the health services about the capacity of the location or if there are any infected cases. Also, these mobile applications allow people to book their vaccination appointments and to provide proof that they have had completed their vaccinations.

## Determinants of Digital Health during COVID-19

Before planning to implement digital health solutions to mitigate COVID-19, the stakeholders or policymakers must consider the determinants that impact adaptations and adherence. One important determinant is ensuring easy access to basic and advanced communication technologies or digital health platforms for individuals. Another determinant is the existence of well-trained healthcare providers to lead and operate the platform, as well as a 24/7 technical support team to fix any technical issues. Third, the proposed digital health platforms must be secure for data transformations. Fourth, the platform users' needs must be considered, for example, hearing and visual impairments in elderly people.
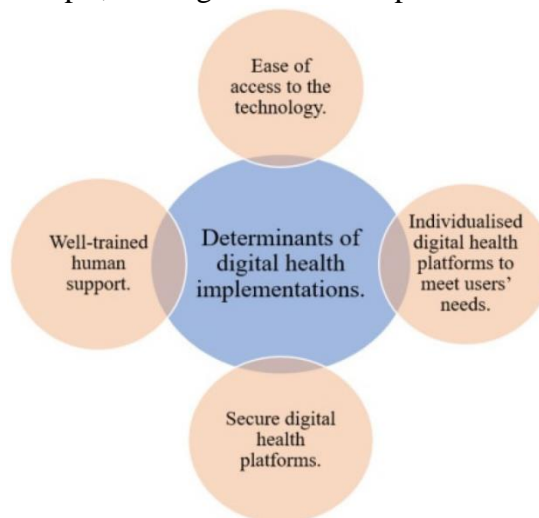


## Virtual Intensive Care Unit

This application of digital health in the ICU has dramatically increased due to the COVID-19 outbreak in the last two years to overcome the shortage of healthcare professionals and to support family visits to critically ill patients. Cross-sectional data about applying a virtual ICU during the pandemic showed positive results in decreasing physiological stress, anxiety, and improving staff morale. Also, a virtual ICU is a very effective way to share feelings of happiness and relief between family members. It was

obvious that this approach facilitated experts' shared opinions during the COVID-19 pandemic in India, as well as overcoming staff shortages.

## Technology and Computer Literacy

Another facilitator is that the pandemic has happened at a time when individuals of all ages have wide access to advanced digital technology. Technology literacy and usability were already at a higher level than in previous years. Producers had designed simpler devices (smartphones and tablets), internet communication was available everywhere, internet and smart devices were affordable, and trust in technology to receive care had increased. All these factors together facilitated the adoption and diffusion of digital health technology to curb the COVID-19 pandemic. However, this might not be the case in the countries where Digital Health applications have already been challenging before the COVID-19 outbreak. The below table 2 shows the users data of digital technologies. In this table, there is a huge increase in the number of users after the year 2018 Covid-19 pandemic period.

**Table 2: Smart Phone Users**

| Sl.No. | Year | Users in Millions |
|--------|------|-------------------|
| 1. | 2018 | 493.96 |
| 2. | 2019 | 636.73 |
| 3. | 2020 | 749.07 |
| 4. | 2021 | 845.68 |
| 5. | 2022 | 932.22 |

Source: India Smartphone Yearly Consumer Study, 2023

## Access Real-Time Data

Using the digital health platforms on a large scale during the pandemic has offered numerous opportunities to access real-time data. India has collected data on asymptomatic COVID-19 patients via mobile apps. These data have been linked to other clinical datasets, for example, genome sequencing data, to provide robust information about the pathology of the virus. Furthermore, real-time data about symptomatic and asymptomatic COVID-19 cases have helped to visualize the prevalence of the virus and to discover new variants.

## Cost-Effectiveness

Without a doubt, the pandemic has placed a big economic burden on most countries, and, in some locations, it has destroyed what has already been achieved to develop healthcare systems. However, in India digital technology has helped to minimize the cost burden. The digital health technology successfully provides timely disease management, with lower costs. Daily symptoms screening for suspected or positive COVID-19 patients has helped to provide rapid disease management by providing the required support and preventing the consequences of hospital admission. There is evidence that daily screening of symptoms via digital health solutions, in conjunction with a polymerase chain reaction (PCR) test, can reduce the number of new COVID-19 cases. This approach also helps to reduce the cost compared to other strategies such as hospital screening or providing no interventions.

## Findings of the study

This use of digital technology is disproportionately affecting poor and marginalised communities. In a country where an estimated 65% of the population does not have internet access, let alone a smartphone and constant power supply, making a smartphone app as the focal point to determine people's livelihoods will leave out the millions who cannot rely on Internet connectivity or power access.

Moreover, 'social distancing' is an impossibility for the millions who are dependent on daily wages for their livelihoods, and enforcing the same through surveillance and punitive measures like enforced quarantine, will likely compound their difficulties.

## Future Perspectives

To enhance these digital health applications during the pandemic and beyond, stakeholders must consider the following recommendations. First, sustainability of digital health technology in routine care in the face of future pandemics. Second, analyzing the cumulative experience from the use of digital health technology will enable the provision of accessing healthcare and the control of future pandemics. Third, develop digital health solutions that are more affordable and easier to use. Fourth, consider innovations and digital health technology in training and routine care practice. Fifth, user-led innovations should be included in the design and development of digital solutions.

## Conclusions

In conclusion, digital health during the COVID-19 pandemic has been identified as an essential tool to mitigate the transmission of the virus. Digital technology has provided different applications and has played various roles in curbing the pandemic. Stronger healthcare systems have had a more rapid implementation of digital technology during the pandemic than poor and vulnerable healthcare systems. Several facilitators and barriers have been identified in the literature regarding the implementation of digital health during the COVID-19 pandemic in India.

## References

1. Pant and Lal, 2020, "Aarogya Setu App: A tale of the complex challenges of a rights-based regime" The Wire.
   https://thewire.in/tech/aarogya-setu-app-challenges-rights-based-regime.
2. G. Shahane, 2020, "Opinion: Does Aarogya Setu really work?" Livemint (2020).
3. M. Tarafdar, Q. Tu, B.S. Ragu-Nathan, T. Ragu-Nathan, (2021), "The impact of technostress on role stress and productivity", Journal of management information systems, 24 (1) (2007), pp. 301-328.
4. Coronavirus: Centre tones down mandatory clause on Aarogya Setu app, Deccan Herald (2020).
   https://www.deccanherald.com/national/coronavirus-centre-tones-down-mandatory-clause-on-aarogya-setu-app-838992.html
5. R. Berger, "Digitalization in the Era of COVID-19."
   https://www.rolandberger.com/en/Point-of-View/Digitalization-inthe-era-of-Covid-19.html
   (accessed May 5, 2020).
6. M. W. Hasanat, A. Hoque, F. A. Shikha, M. Anwar, A. B., Hamid, and H. H. Tat, "The Impact of Coronavirus (COVID-19) on Digitalization in India," Asian Journal of Multidisciplinary Studies, vol. 3, no. 1, 2020, pp. 85-90.
7. Aditya Kapoor (2020), "Digital healthcare: The only solution for better healthcare during COVID-19 pandemic?", Indian Heart Journal, Volume 72, Issue 2, March–April 2020, Pages 61-64.
8. Sera Whitelaw (2020), "Applications of digital technology in COVID-19 pandemic planning and response", The Lancet Digital Health, Volume 2, Issue 8, August 2020, Pages e435-e440.
9. Doshi A, Dressen JR, SFHM JCS. Keep Calm and Log On: Telemedicine for COVID-19 Pandemic Response. 2020;15(5), 302-304. [PubMed].
10. Mann DM, Chen J, Chunara R, Testa PA, Nov O. COVID-19 transforms health care through telemedicine: evidence from the field. J Am Med Inform Assoc. 2020. [PMC free article] .