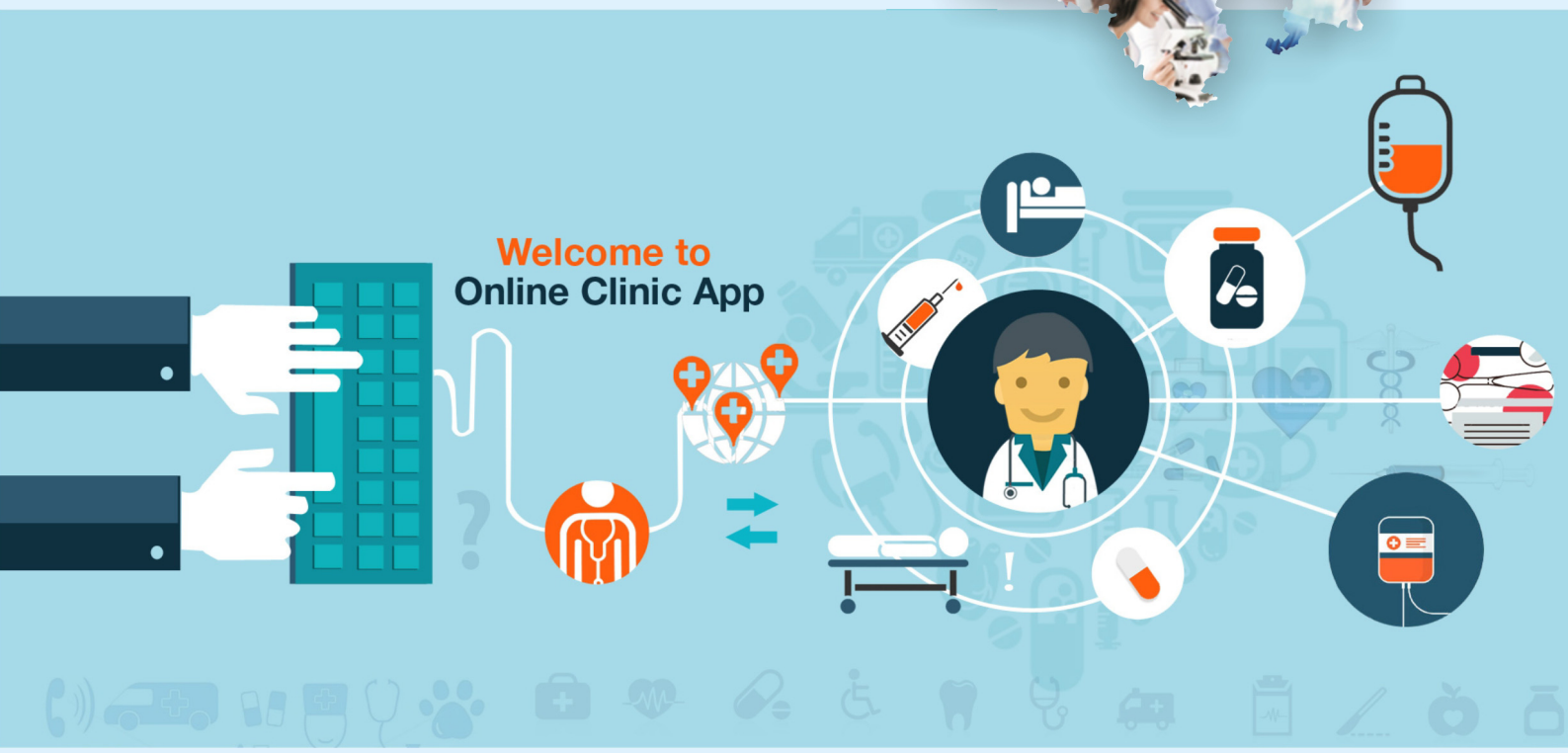
e-clinic

Services in Rajasthan, India

A Case Study



CUTS International

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Why Selected

Providing healthcare services to all has been a priority for the Government of India (GoI). A number of initiatives have been launched to achieve this. However, reaching out to the remote pockets of India and catering to the last mile citizens, through conventional modes of healthcare, has remained a challenge. Digital innovations and social enterprises have shown promise of overcoming this challenge through the use of ICT in providing healthcare services. E-clinics, one of the modes of telemedicine services, are believed to have been successfully providing primary healthcare services to remotely located pockets of Rajasthan, India. It, therefore, becomes important to not only identify and enhance the benefits they render, but also to align it with government's efforts of providing healthcare services to all. Thus, this case study.

Key Takeaways

- ICT enabled innovative solutions, such as E-clinics, have enabled access to essential services to the underprivileged and underserved areas.
- E-clinics are gaining popularity and acceptance among citizens over time and are considered as low-cost and effective mode of providing primary healthcare services.
- ICT has the potential of accelerating the efforts of moving towards achieving the objectives of SDG Number 3 of the United Nations (UN) 'Good Health and Well-Being'.[1]

Context and Project Origin

"*The enjoyment of the highest attainable standard of health is one of the fundamental rights of every human being without distinction of race, religion, political belief, economic or social condition*".[2]

The *Right to Health*[3] is one of the internationally agreed human rights and is equally essential as the right to food, shelter, work, education, information and participation[4]. Thus, it is the responsibility of the government to ensure that citizens are provided the means to exercise the right and live a healthy life.

Despite the improving status of healthcare services in India[5], the country is yet to reach a level where healthcare services for citizens may be deemed adequate. While Healthcare Access and Quality (HAQ) Index of the country has increased to 44.8 in 2015, up from 30.7 in 1990, a study by Lancet ranked India at 154 among 195 countries[6] on Global Health Metrics. India also has the poorest ratio of doctors and nurses per 1,000 population, i.e., 0.65 doctors and 1.3 nurses, respectively, among BRICS[7] nations.[8]

The situation is even more challenging in States with higher ratio of rural population, such as Rajasthan, which accounts for 75.13 percent citizens living in the rural areas.[12] As per the National Health Profile 2017[13], Rajasthan was attributed with 0.1 doctors and 0.35 healthcare workers per 1,000 population, which is way below the national average.

This suggests that the presently used modes of provisioning healthcare services alone have been inadequate to cater to the healthcare need of India. Thus, new and innovative solutions of providing healthcare services to the last mile are required to address these challenges. A few solutions have emerged, which have integrated the use of ICT in healthcare services. Popularly known as telemedicine,[14] its potential has been acknowledged universally and is being implemented in diverse ways by countries across globe.

Box 2.1: Insight # 1

In India, approximately 75 percent of medical dispensaries and 60 percent of hospitals are located in urban areas.[9] Aggravating the issue, 80 percent of doctors serve urban areas, barely catering to approximately 28 percent of the national population[10]. Rural population majorly depends on public healthcare facilities, which are struggling with challenges such as poor budgetary allocations and shortage of staff. Availability of doctors and skilled healthcare professionals is a concern, owing to their unwillingness to work in low resource settings[11].

What is Telemedicine?

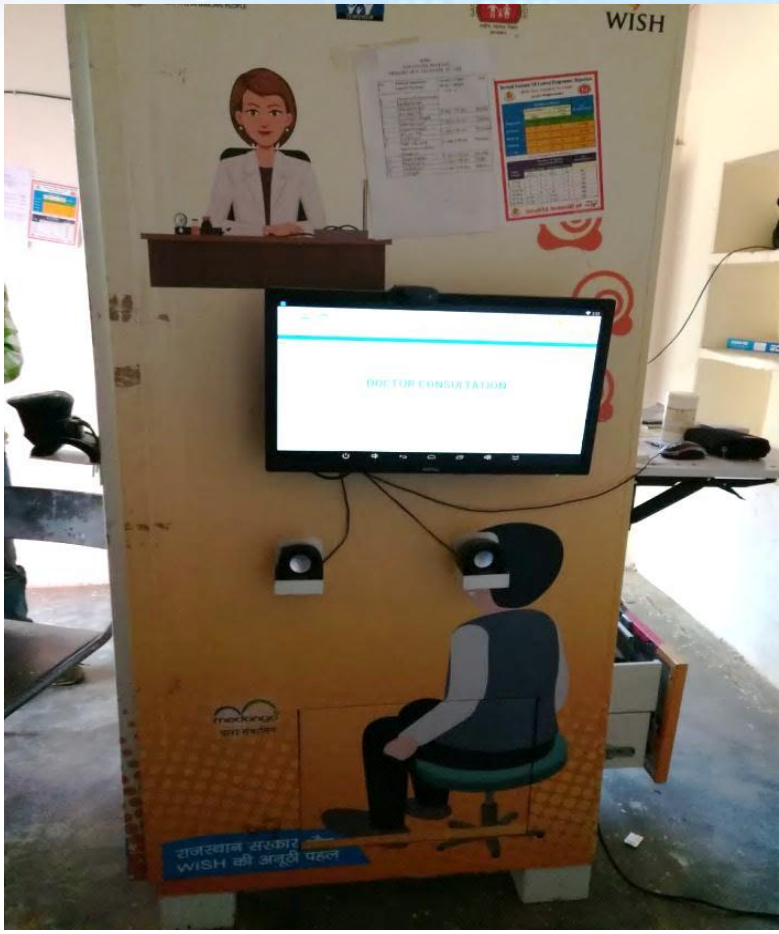
Where distance is a critical factor, delivery of healthcare services by all healthcare professionals using information and communication technologies for the exchange of valid information for diagnosis, treatment and prevention of disease and injuries, research and evaluation and for the continuing education of healthcare providers is in the interests of advancing the health of individuals and their communities.[15]

Realising the potential, the GoI has launched a number of programmes and initiatives to foster a telemedicine ecosystem in the country. Some of the prominent programmes include: National eHealth Authority (NeHA), National Telemedicine Network (NTN), National Health Portal (NHP), establishing National Resource Centre (NRC) and Regional Resource Centre (RRC) under National Medical College Network (NMCN), etc.

Similarly, the Government of Rajasthan has also implemented various telemedicine initiatives to provide effective and efficient healthcare services to citizens. A few of these are: Telemedicine Centre under National Health Mission[16][17]; E-health Service 'Ask a Doctor' at E-mitra kiosks[18]; Asha Soft[19]; E-aushadi[20].

Interestingly, one of the prominent modes of delivering telemedicine services in Rajasthan is via E-clinics. E-clinics in Rajasthan are primarily operated by private players, such as social enterprises, public-private partnership and Corporate Social Responsibility (CSR), and mostly render primary healthcare services. Showcasing the potential to address the issue of unavailability of doctors in rural areas, while also offering low cost primary healthcare services to citizens at the last mile, E-clinics are slowly gaining popularity in the state of Rajasthan, especially in the rural pockets.

As part of this case study, interactions with key stakeholders associated with E-clinics were undertaken in the form of citizen/user surveys and Key Informant Interviews (KIIs). Please refer to Annexure II regarding the



details about the survey methodology. Stakeholders included E-clinic service providers (Management), users of the E-clinics, Doctors and Ground/Nursing Staff of E-clinics. Government representatives from Central Ministry as well as State Ministry were also contacted.[21]

The Digital Solution

Typically, E-clinics are physical structures which dispense primary healthcare services to citizens by creating a virtual interface between doctors and patients, through the use of ICT. Doctors interact with patients over a video call, where patients explain their problems and accordingly doctors prescribe medication on a digitally signed prescription.

The entire process is managed by the e-clinic ground staff, which is usually comprised of nurses, pharmacists, etc. Apart from undertaking common clinical procedures, such as recording the vitals and checking various primary parameters and handing over prescribed medicines, the

staff also helps in facilitating the interaction between doctors and patients, capacitating patients in using ICT mode of interaction, assisting patients to explain their problems efficiently and helping patients to understand the prescription by the doctor. The staff also helps doctor in identifying the symptoms. This model effectively reduces the need of doctors to be physically present at the clinics to provide healthcare services.

A number of E-clinics are operational in the state of Rajasthan. These E-clinics are catering predominantly to the presently underserved populations in various districts, such as Udaipur, Tonk, Sawai Madhopur, Boondi, etc. All of these E-clinics provide primary healthcare services. Available literature and media reports highlight various benefits brought forth by these E-clinics. However, not much of primary research has been conducted to identify their true impact.

Primary Actors

E-Clinic Management: This case study encompassed three different E-clinic service providers, namely, Karma Healthcare, Narayana Health and Wish Foundation. While all three render similar and primary healthcare services, their business models are quite different. Karma healthcare is a for-profit enterprise while Narayana is operating its E-clinics as a part of their CSR initiative. Wish Foundation, on the other hand, has collaborated with the Government of Rajasthan to run Public Healthcare Centres (PHCs) in remote locations and the concept of E-clinics has been adopted for the same. Karma healthcare also provides technical support to a few of Wish Foundation E-clinics.

Service providers usually undertake a careful assessment of the prospective locations, through feasibility studies, before establishing E-clinics. Assessment is done on factors such as cost of infrastructure, workforce and training requirement, number of villages and citizens covered, etc. Service providers hire/appoint doctors, as per the requirements, to cater to healthcare services of the selected geography.

E-clinic Ground Staff: The e-clinic ground staff consists of nursing staff and pharmacists (for Karma Healthcare and Narayana Health) and/or AYUSH Doctors (only for Narayana Healthcare). The ground staff is physical representative of E-clinics, as it directly interact with patients before and after consultation with the doctors. At various locations, the ground staff plays a key role in forging a relationship with citizens and are involved in spreading awareness, promoting its uptake and also engaging in caretaking of E-clinics.

E-clinics usually have male and female nursing staff, as men find it uncomfortable to explain their problem to female staff and vice versa. The ground staff undergoes trainings provided by the service providers, pertaining to the use of ICT, basic troubleshooting, managing the E-clinics, etc. These trainings last from 7-30 days, depending on the existing capacity of individuals. From the KIIs, it was observed that, in most cases, the nursing staff belonged to nearby areas.

E-clinic Doctors: E-clinic doctors dispense the most important part of e-clinics, i.e., examining patients and prescribing treatment. The doctors interact with the patients, directly or indirectly, understand their health issues and accordingly prescribe treatment, along with guidance on preventive measures.

Narayana Health E-clinics and Wish Foundation E-clinics are associated with doctors from Narayana Hospitals and Mahatma Gandhi Hospital, Jaipur, respectively. Wish E-clinics had access to a large pool of doctors for patients to consult, which included general physicians as well as specialists. However, Narayana E-clinics had one dedicated doctor who was catering to all the patients, though treatment from specialists was often recommended by him from other doctors working in Narayan Hospitals. Karma Healthcare, which is not associated with any hospital, has empanelled a pool of doctors, general physicians and specialists, who serve their clinics not just in Rajasthan but also in a few other states as well.

It was observed that a lot of young doctors featured on these pools, which suggested that there is greater acceptance of E-clinics among young doctors.

Impact of E-Clinics

The experiences and challenges for the various groups of stakeholders, towards these E-clinics, primarily on their easiness and effectiveness of providing primary healthcare services, were gathered through primary on-ground interactions with them. The specific insights are given below.

Citizens

A total of 555 citizens were interviewed.
The respondents comprised existing users of e-clinics (276 respondents), former users (not using services anymore – 150 respondents) and non-users (who have never used – 129 respondents). Existing users were probed on reasons for opting for E-clinic services and also the effectiveness of services they render. The former users were probed on similar factors, added with their reasons for not using the services anymore. Finally, the non-users were interviewed to understand the reasons of never opting for E-clinic services. A few of the observations are mentioned below:

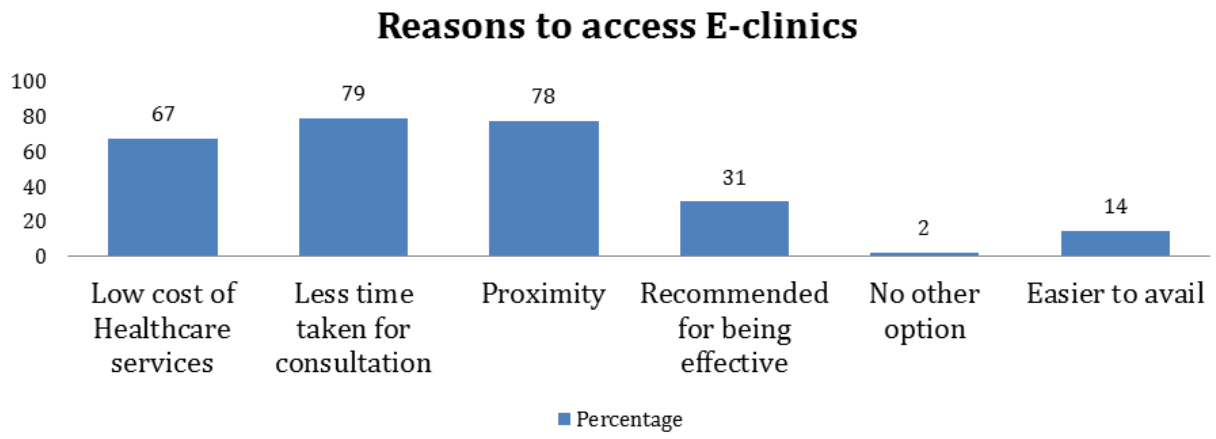
Existing Users

Reasons of Using E-clinic Service: Existing Users

The survey results (Figure 1) highlighted that approximately 79 percent respondents noted E-clinic consultations to take lesser time as compared to other alternatives, such as government dispensaries, PHCs and Community Healthcare Centres (CHCs). Further, 78 percent found E-clinics more convenient than available alternatives, as E-clinics were located in close proximity to their dwellings. On the cost factor, 67 percent of the respondents claimed that they preferred E-clinic services because of the lower costs of availing healthcare services.

This was an interesting insight, as only Karma Healthcare's services were paid, while for the other two service providers (Narayana and Wish), it was free of cost. It may be linked to another insight from the survey which highlighted that rural consumers were not keen to pay for doctor's consultation and were only willing to pay for medicines.

Figure 2.1: Reasons for Citizens to Access E-clinics Primary Healthcare Services



It was also observed that only 2 percent respondents of the existing users said that they were using E-clinics as there were no alternative services which were available in vicinity. Consumers still had to travel to towns to avail secondary and tertiary healthcare service. However, this result makes it evident that 98 percent of existing users had alternative healthcare services available and yet preferred E-clinics. This, in turn, suggests that E-clinics are preferred for their effectiveness and not just for their proximity.

User Satisfaction

Satisfaction of E-clinic services was gauged on cost-effectiveness, time-saving, accuracy of diagnosis of ailment, accessibility and reliability. It was observed that E-clinics fared highly (described below) on these parameters which suggests that the existing users are satisfied with the services E-clinics are rendering.

Figure2.1: Existing User's Experience

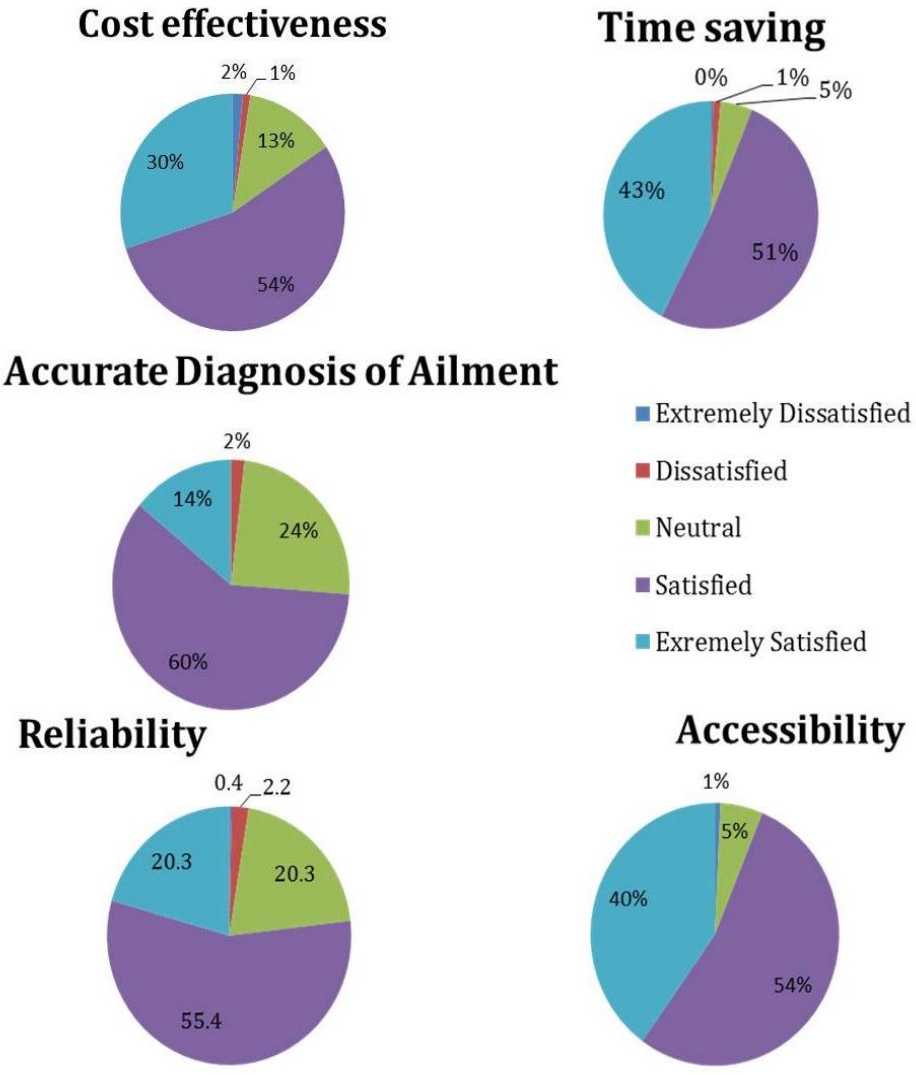


Table 2.1: Summary of the Parameters of Experience from Existing Users

Parameters	User Opinion		
	Extremely Satisfied	Satisfied	Neutral
Cost-effectiveness	30 percent	54 percent	13 percent
Time-saving	43 percent	51 percent	5 percent
Accurate Diagnosis of Ailment	14 percent	60 percent	24 percent
Accessibility of E-clinic Services	40 percent	54 percent	5 percent
Reliability	20 percent	55 percent	20 percent

Box 2.2: Impact #1: Big Relief from E-clinics

Narayana Meena (45) of village *Bili Mangri* of *Gram Panchayat* Karwal of Block Salumbar was suffering from stomach ache and gas problem for which he used to consult quacks.[22] They used to give him an injection every time (without proper medical examination or administration) and only advised him not to eat bread made from corn flour.

Despite multiple such visits to quacks, he found no relief from his ailment. Moreover, instead of his condition improving, he developed a lump due to injections, for which he had to seek treatment from district hospital.

Narayana came to know about the Karma Healthcare E-clinic and visited it to seek treatment from a specialist doctor for his persisting problem of stomach ache and gas. Since then he has experienced substantial relief in pain.

Now, Narayana does not consult quacks and dissuades others from using their services as well. He now actively promotes the use of E-clinic services to the people of his village and nearby.

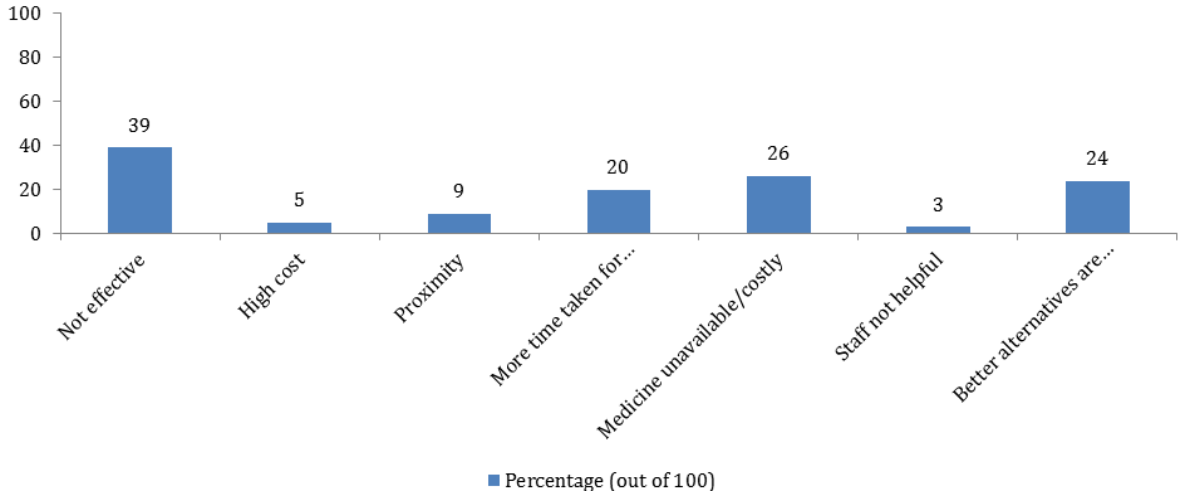
The results of the survey highlighted that E-clinics are highly appreciated by the exiting users on the aspect of cost-effectiveness, time-saving and accuracy of diagnosis of ailment, accessibility and reliability. Interestingly, many of these parameters are flagged as challenges or problems in delivering conventional healthcare services to rural areas of India.[23] While E-clinics might not be a panacea for solving all problems, they do present an effective and low-cost solution of providing healthcare services to the underserved.

Former Users

Reasons to Stop Using E-clinic services

Former users of E-clinic services were probed to understand their reasons for discontinuing use of primary healthcare services from E-clinics. The main reasons quoted by respondents are highlighted in the Table below.

Figure 2.3: Reasons to Stop Using E-clinic Services



Around 39 percent of the former users felt that they were not benefitting from the treatment and considered E-clinic services to be ineffective. About 5 percent of the respondents felt that the fee being charged was quite high (applicable only for Karma Healthcare). Since one E-clinic caters to a number of villages, 9 percent of the respondents, mainly from nearby villages, felt that E-clinics were located quite far from their place.

Some of the respondents (20 percent) said that they had to wait for a long time at the e-clinics to consult a doctor. This was primarily seen in the case of the E-clinic in Jaipur, which was associated with high footfall of patients. Twenty-six percent respondents claimed that either the prescribed medicines were unavailable at the clinic or were costly (only in case of Karma Healthcare).

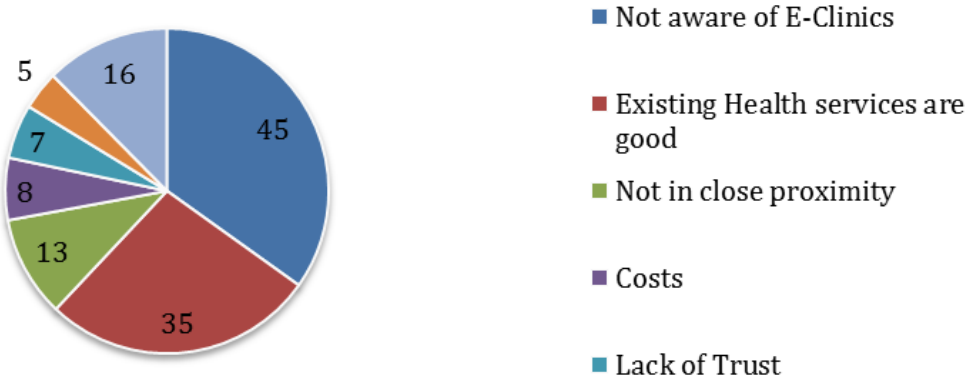
Nearly 3 percent of the respondents felt that the ground staff, stationed at the E-clinics, was unhelpful, which prompted them to stop using the services. Finally, 24 percent opined that they were content with the other alternatives available and prefer to avail their services, instead of E-clinics.

Non-Users

Perception about E-clinics

Non-users reflected the citizens who had never availed services from e-clinics, which was on account of various factors such as lack of awareness of users being content with the existing healthcare service, etc. The reasons for never using E-clinics services, given by non-users, are showcased in the graph below.

Figure 2.4: Reasons for Never Using E-clinic Services



Box 2.3: Insight # 2

Interesting insights emerged from the interactions with citizens. Some of these are given below:

1. One of the respondents pointed out that while people know about the "availability" of e-clinic in their area, they do not understand the "utility" of its services and thus do no avail them. People still fail to understand how a technology-based service can help them in availing advice from specialist doctors and also effectively improve their health.
2. It was found that e-clinic nursing staff assisting in the consultation between doctor and patient was often perceived as doctors by the patients, especially by the uneducated patients. Thus, it is confusing for patients to distinguish between nursing staff and a specialist doctor.
3. A retired employee claimed that the quacks also engage in spreading negative perception about the e-clinics, suggesting them that the interaction with doctors is pre-recorded.
4. For some users, e-clinics looked more like as offices and not regular clinics or hospitals.

For the remaining groups of stakeholders, KIIs were undertaken with E-clinic management, E-clinic staff and doctors engaged with E-clinics.

Viewpoint and Experiences

Management of E-Clinic Service Providers

E-clinics service providers claimed that catering to the healthcare requirements of citizens at the last mile was the primary motivation behind establishing E-clinics. Service providers interacted with for this case study took pride in serving the underserved. They unanimously opined that the rural pockets of India are struggling to receive adequate and quality healthcare services.

Further, the E-clinic service providers also opined that their services complement public healthcare services. Apart from reducing the burgeoning demand at Government Health Centres, E-clinics have given citizens an avenue of finding remedy for smaller ailments. The service providers mentioned that, earlier, citizens preferred to ignore early symptoms because of large distance to hospitals and dispensaries. This led to aggravation of health problem, which later impacted their social and economic well-being. Now, citizens, because of proximity to primary healthcare services through E-clinics, do not ignore medical issues and promptly avail healthcare services. Apart from smaller ailments, there is also an increasing demand for specialist doctor's services, such as skin, orthopaedic, gastroenterologist, etc.

The service providers also stated that most of the diseases, especially for children, are preventable and may be easily mitigated with adequate awareness and preliminary consultation with doctors. However, this requires citizens to understand that a child has to be brought to the hospital or E-clinics. Usually, home remedies are adopted, which worsen the case.

E-Clinic Ground Staff

The ground staff was highly motivated and satisfied with its efforts of providing primary healthcare services to the grassroots. They also claimed that, while the initial uptake of E-clinics services was slow, the pace has increased with rising awareness about e-clinic services and their effectiveness. They also narrated real-life instances of patients suffering from various ailments for a long time and how they experienced substantial improvement in their health, after consulting E-clinics. It was also observed that the average patient footfall, across different E-clinics, ranged from 8-40 patients per day, depending on the population density of its geographic location.

Interaction with the ground staff revealed that citizens have grown more conscious towards their health, as qualified doctors are readily available at E-clinics. Furthermore, they are satisfied with the quality of primary healthcare being provided by E-clinics. Since most of the ground staff belonged to same region/community, they easily connect with patients. They also highlighted the cases where patients required secondary and tertiary healthcare service and the procedure of referring such cases to the nearby government hospitals (community health centres/district hospitals).

Many e-clinics have also setup medical test facilities for blood, sugar, etc. The ground staff collected samples from patients and analysed it themselves or availed services from nearby laboratories, depending on the complexity of the test.

E-Clinic Doctors

Most of the doctors felt that they were doing a noble job by serving the underserved pockets of India. They opined that rural areas of India face an acute crunch of healthcare services and they were happy to contribute towards primary healthcare services to such areas.

They accepted their inability to service the rural areas in person, due to various factors such as family responsibilities, career growth, etc. Rural areas for them are characterised by lack of career opportunities, facilities and infrastructure, which keeps them from moving to rural areas. E-clinics have given them a platform to serve their *Hippocratic Oath* as well as manage their personal responsibilities. For some of the doctors interacted with, E-clinics also provided them an additional source of income.

Doctors also disclosed that, initially, they were sceptical about the concept of E-clinics. However, with time, they have grown comfortable to serve on this platform. They also claimed that E-clinics are gaining popularity with time and other doctors also inquire about their experience with E-clinics. Other doctors have also expressed their interest in joining E-clinics. Doctors also commented that currently E-clinics do not feature on the policies and rules of Medical and Doctor Councils and Associations in India. However, given its growth in recent years, it is expected to become a more mainstream medium of delivering healthcare services in future.

Box 2.4: Impact # 2: Inaccurate vs Accurate Diagnosis: Impact on Patient

One of the doctors described the criticality of diagnosing an ailment accurately before providing treatment to patients. This highlighted the importance of consulting only qualified doctors, instead of following home remedies or consulting quacks.

Jyoti (8), suffering from high fever, was brought to an E-clinic by her mother in Jaisamand, Rajasthan. She was continuously vomiting and was in high distress. The doctor's interaction with her revealed that she was consulting a quack for quite some time who has prescribed a few medicines and injections. Due to improper diagnosis, Jyoti's condition, rather than improving, kept on deteriorating.

Since the government CHC was at a distance, Jyoti's mother brought her to Karma Healthcare E-clinic. The E-clinic was suggested to her by a neighbour. After a preliminary check-up, Jyoti was diagnosed with Malaria, which the quacks had failed to identify, despite it being a common ailment during that season.

After proper diagnosis at the E-clinic, Jyoti's condition was considered serious and the doctor was of the opinion that, had it been a few more days of delay in availing professional medical treatment, her ailment could have turned life-threatening. However, with the prescribed medicines and treatment at the E-clinic, Jyoti's health improved quickly. A few days later, her mother visited the E-clinic with tears in her eyes, thanking the doctor and the staff for saving her daughter's life.

The doctors, when probed about differentiating between traditional in-person consultation and E-clinics, opined that, despite the differences, the nature of consultation remains the same for both. They mentioned that there is a definite lack of physical interface through which they can observe symptoms more closely though physical examinations, such as through palpation and hearing blockages through stethoscope, etc. However, this limitation has not critically impacted the operations of e-clinics and doctors are assisted by the ground staff on these.

Doctors also felt that there is a greater acceptance of E-clinics among rural population than urban population. The possible reason for this was suggested as the availability of multiple alternatives in urban areas. Further, they meet a lot of returning users and some have started recognising them by names. When asked about the advantages of the E-clinic model, one of the doctors was prompt to mention that physically a doctor may consult at only one clinic, while E-clinic allows them to consult multiple patients from different locations, covering larger scale and area.

While the case study brought forth numerous benefits of E-clinics to citizens, its effectiveness is hindered by a number of challenges. These range from infrastructural challenges to policy impediments. Some of these challenges, *vis-à-vis* various stakeholders, have been mentioned in the next section.

Challenges

From the interactions with relevant stakeholders, a number of challenges emerged which adversely impact the operations of these E-clinics. Some of these, for respective stakeholder group, are mentioned below:

E-Clinic Service Providers

1. **Infrastructure:** Unavailability or poor state of physical and digital infrastructure such as road connectivity, poor mobile and Internet services, electricity outages and high cost of necessary medical and ICT devices.
2. **Negative/False Publicity:** Negative publicity by quacks, results in denting the credibility of E-clinics among rural population, despite them rendering quality services.
3. **Lack of Government Support/Recognition:** There is lack of incentives provided by the government for promoting and scaling-up E-clinics, especially in case of for-profit enterprises. E-clinic service providers are often subject to constraints, such as capital requirement, return on investment, cost of operations, broadband connectivity, drug availability and capacity constraints, etc., which hamper their operations.
4. **Unsupportive Regulations:** As per regulations, E-clinics with no association with hospitals or government are also not allowed to stock medicines, unless they employ a pharmacist. Hiring a pharmacist leads to higher outlay for E-clinics. Furthermore, doctors are worried about the regulatory backlash regarding E-prescriptions and their uncertain liability towards patients, which acts as a deterrent for them to engage on E-clinic platforms.
5. **Human Resource Constraints:** E-clinics are usually required to recruit ground staff from the same region, due to language constraints, and social dynamics. This results in poor availability of human resources, which is further subject to high attrition, especially in case of women, who are subject to a lot of social responsibility and find it difficult to strike a balance between social and professional life. Added to this, the hesitation of first-time users in understanding a technology-oriented service also acts as a deterrent.

Ground Staff

1. **Capacity Building of Non-Users/First Time Users**: It is difficult for ground staff to explain the functioning of E-clinics to first time patients and non-users and instil confidence in them for availing their services. Orthodox mind-set of citizens, resistance to change

(from consulting doctors physically or being dependent on quacks and home remedies) and concerns over effectiveness of technology-driven models are common deterrents.

2. **Advertising/Promotion**: Visibility and awareness about E-clinics remains inadequate, which lead to a poor footfall. Reducing the influence of quacks on the local population is also a challenging task.
3. **Female Staff Concerns**: Women staff members encounter challenges of working with E-clinics, owing to commitments towards their families, working hour constraints and social dynamics involved.
4. **Discomfort in Explaining Problem:** Patients also face difficulty in sharing personal health problems with the nursing staff of opposite sex. This was predominantly the case with female patients with ailments such as gynaecological issues.

E-clinic Doctors

1. **Infrastructure**: Poor internet connectivity and quality are major challenges for doctors. Sometimes, the video quality is sub-standard to see the patient clearly, restricting efficient diagnosis of ailments, which leads to delays in consultation. Also, the poor reception of audio restricts the capability of doctors in understanding the problem of patients and suggesting appropriate treatment.
2. **Lack of Equipment/Facilities**: A few of the routine check-up equipment and modern medical testing facilities are unavailable at E-clinics. This may be attributed to high costs (like digital stethoscope) and poor availability in domestic markets. These facilities, if available, may help in enhancing the efficiency of E-clinic services, especially in identifying the symptoms.
3. **Limited Uptake Restricts Earning**: Poor visibility of E-clinics leads to limited uptake of its services. For private doctors, it thus becomes impractical to see their engagement with E-clinics as a primary source of income.
4. **Poor Capacity of Patients**: Poor capacity and awareness among rural population restricts their ability to use ICT products as well as engage efficiently on digital platforms. Thus, patients are sometimes unable to explain their problems to doctors effectively.
5. **Non-adoption by Government Health Centres**: Telemedicine and E-clinic models have yet not been fully embraced by Government Health Centres, which may pave new opportunities to doctors as well as increase the outreach of healthcare services.

Monitoring and Evaluation

E-clinic service providers, in order to ensure quality services to patients, have devised various checks and measures. Some of these are mentioned below:

1. Audio conversation between patients and doctors is recorded (as well as randomly selected video conversations) to ensure that doctors are rendering quality services to patients. (Karma Healthcare).
2. Usually, generic medicines are prescribed by E-clinics. A few of the non-generic, yet common, drugs have been shortlisted to be prescribed by doctors. In case a doctor needs to prescribe drugs outside this list, the same has to be reported to the management.
3. Each prescription is digitally signed and verified by the doctor.
4. E-clinics also organise health camps to gauge the perception about the quality of their services among users residing in vicinity.

Lessons Learnt & Recommendations

While the case study envisaged to test the hypothesis that "E-clinics have made it easier for citizens to avail effective primary healthcare assistance in the state of Rajasthan", it brought forth a number of insights. Some of these are mentioned below:

1. It may be concluded that that E-clinics have largely been effective and have also made it easier for citizens at the last mile to avail primary healthcare services. They also complement public clinic and hospital services.

2. E-clinics showcase immense potential towards achievement of SDG 3: Good Health and Wellbeing. Hence, it is imperative to forge a facilitating environment for telemedicine, especially E-clinics, to enable inclusive access of healthcare services in India.
3. While this study was restricted to the state of Rajasthan, similar model may be adopted for other parts of the country, albeit with certain localisations.
4. Enhanced efforts are required from the GoI and states, such as supporting and promoting PPPs and incentivising clinic establishment by private and for-profit enterprises. Such enterprises should also be linked to government schemes like BPL, MMNDY and Bhamashah.
5. While the e-clinics are popular among rural citizens, their visibility remains poor overall, especially among policymakers. Thus, there is a need for greater recognition of E-clinics and other modes of telemedicine by medical and doctor councils and associations in India. Telemedicine should also be included in the curriculum for medical courses. While this may promote further innovation, it will also attract a larger quantum of doctors to enrol on such platforms.
6. The current state of infrastructure is acting as an impediment to ICT-led solutions like E-clinics. There is a need to strengthen the infrastructure, especially in terms of quality and reliability of internet services, transport connectivity, electricity supply, etc.
7. E-clinics are unable to procure certain medical equipment and establish test facilities, owing to high costs and their unavailability in domestic markets. This constraint may be bridged by government subsidies on equipment procurement as well as incentives/support for establishing test facilities.
8. Regulations, such as the requirement of a pharmacist to distribute medicines, even for primary healthcare services, and restriction on the number of medicines (30) that may be stocked at village sub-centres, impact the feasibility of E-clinics. Thus, optimisation of regulations to maximise benefits are required. This may be done through the use of tools such as Cost Benefits Analysis, Regulatory Impact Assessment (RIA) and Regulatory Sandbox Approach.

This case study demonstrates a perfect example of how ICT is enabling the last mile connectivity of services. It will also contribute towards the achievement of SDGs, especially goal Number 3. This is not to say that E-clinics do not have limitations or are better than alternatives, but they provide a bridge between last mile citizens and healthcare services. These limitations may be minimised with further innovation and practical experiences in future, which will require enhanced support from the government. With the current Government of India focussing on digitalisation of processes, it may be expected that the citizens at the last mile will be the biggest beneficiaries.

Annexure I: E-clinic Service Providers

Three different E-clinic service providers were considered for the survey, namely: Karma Healthcare E-clinics; Wish Foundation SCALE Rajasthan E-clinics and Narayana Healthcare E-Health Centre Programme. All these E-clinics provided primary healthcare service and targeted the underserved regions of Rajasthan. Citizens (users, former users and non-users) of the villages where E-clinics are located, and villages in vicinity were interviewed to identify the impact of E-clinics.

The survey team interacted with various service providers and it was observed that the setup cost for an E-clinic ranges from Rs 150,000-200,000 and one E-clinic may cater up to 25,000 citizens.[24] In Rajasthan, it was observed that some E-clinics were operating from shipping containers, while some had brick and mortar structures.

The staff, usually nursing professionals, pharmacists or AYUSH[25] doctors, help in the smooth operations of these E-clinics. Despite their difference in qualifications, it was observed that they had overlapping roles and responsibilities. While some E-clinics only had nursing staff, some have a combination of pharmacist and nursing staff and others had only AYUSH doctors.

The staff acts as a first point of contact with patients, records their preliminary medical condition by measuring body temperature, pulse, weight, etc., and shares it with the doctor. Then they act as a direct mediator between patient and doctor (in some cases relaying information from patient to doctor and vice versa). They are also responsible for managing miscellaneous tasks, such as troubleshooting technical glitches, promoting E-clinics among communities, dispensing medicines and caretaking of E-clinics.

Minimal Requirements to Operationalise an E-clinic

To enable communication between doctors and patients, every E-clinic is equipped with certain basic ICT equipment. These include a computer system, audio-video equipment, including a TV screen, webcam, speakers and microphone. If patients seek privacy while discussing their ailments with doctors, these E-clinics are also provisioned with headphones and a closed environment. Apart from these, E-clinics also feature stable internet connection, usually a leased line broadband service, for video calling, a printer for printing receipts (in case of Karma Healthcare) and prescription by the doctors. Apart from ICT equipment, the E-clinics also had basic clinical equipment, such as stethoscope, weighing and height scale, thermometer, first aid kits, etc.

While there were certain similarities in the services offered by these E-clinics, different service providers followed different strategies and models. Some of these differences have been highlighted in Table given below.

Table I: Different Models of E-clinics Prevalent in Rajasthan

Parameters/ Service Provider Name	Karma Healthcare[26]	Narayana Health[27] E- health Centre Programme	WISH Foundation[28] SCALE Rajasthan
Business Model	A for-profit social enterprise	A CSR initiative by Narayana Health	A Public-private Partnership with Government of Rajasthan
Employees	Nursing staff and Pharmacist	AYUSH Doctor, Nursing Staff, Pharmacist	Nursing Staff
E-Doctors	A pool of contracted Private Doctors	Linked with Doctors from Narayana Hospital, Jaipur	Linked with Doctors from Mahatma Gandhi Hospital, Jaipur
Interface between Doctors and Patient	Direct (Patient-Doctor) Assisted by Nursing Staff	Indirect (Patient-AYUSH Doctor – Doctor)	Direct (Patient-Doctor) Assisted by Nursing Staff
Cost of Consultation	Paid by patients, (₹40 for consultation from General Physician and ₹100 for specialist Doctor); Valid for 5 days	Free for patients with Bhamashah[29] or Below poverty line (BPL) card, ₹30 for others; Valid for 5 days	Free for all patients
Cost of medicine	Paid by patients, Available at discounted prices from Maximum Retail Price (MRP)	Free	Free
Distribution of medicine	From the E-clinic, by pharmacist (If pharmacist if unavailable, then patient is referred to an associated pharmacy nearby)	From the E-clinic, by pharmacist	From the E-clinic, by nursing staff
Tests	Basic tests, such as blood sugar, haemoglobin, etc.	Basic tests, such as Blood sugar, Haemoglobin, etc.	None
Linkage with Government schemes	None	Yes, Bhamashah Scheme and BPL Card	Yes, Mukhyamantri Nishulk Dava Yojana (MNDY) and Bhamashah Card

Broadly, all E-clinics operational in Rajasthan function in the same way. Patients walk in to these E-clinics and are registered into the system by the nursing staff (Karma Healthcare and Wish Foundation) or AYUSH Doctors (Narayana Healthcare), hereinafter together referred to as 'Ground Staff'. The ground staff records the initial details of the patient, such as name, age, problem, blood pressure, pulse, visible symptoms, body temperature, height, weight, etc. According to the requirement, the ground staff interacts with the central controller, deployed by the service provider, and an appropriate doctor is contacted. If in case, the patient wants to consult a specialist, a specialist doctor is contacted.

Ground staff then shares the patient details with the doctor through a software.

This is followed by a video call between doctor and patients. In some models, such as for Wish Foundation and Karma Healthcare, the doctor directly engages with the patients. The patients explain their problems to the doctor and are examined through the audio-video equipment. Accordingly, the doctor prescribes a treatment, which may be a combination of exercises, dietary requirement, medical tests and medicines. As per the model adopted by Narayana Healthcare, the AYSUH doctor interacts with the patient and then relays the information to the doctor, thus acting and a mediator. Based on this, the doctor prescribes the treatment.

The ground staff, according to the consultation with doctor, enters information into the software, which includes the medicines prescribed. This information is then cross-checked by the doctor and authenticated with their digital signatures. Once authenticated, the prescription is printed by the ground staff and handed over to the patient. In case of Karma Healthcare, the total amount (consultation fees and medicine cost) and the dosage is announced over speaker by the software, once the consultation with doctor ends. This helps patients who may not be able to read the prescription. The ground staff, for all models, explains the prescription and the medicine dosage to patients.

The medicines prescribed by the doctors are distributed from the E-clinic or the pharmacy associated with the E-clinic. However, as per the regulations, a pharmacist is required to distribute medicines and, thus, a number of E-clinics have employed a pharmacist. Further, for all the models, if the patient requires medical assessment, which goes beyond the scope of primary healthcare service, they are referred to appropriate hospitals in nearby cities/towns.[30]

Annexure II: E-clinic Case Study Research Methodology

Objective of the Research

Gauge the effectiveness of technology, as an enabler of healthcare services, to the citizens at the last mile in the State of Rajasthan, India.

Rationale for Selecting Rajasthan for Survey

A recent report by *NITI Aayog,* entitled "Health States, Progressive India",[31] revealed that Rajasthan stands second from the bottom on Health Index among larger Indian States, bettering only the state of Uttar Pradesh. The report also noted that 19.24 percent of the auxiliary nurse midwife (ANM) positions at sub-centres and 47.3 percent of staff nurse positions at PHCs and CHCs were vacant in Rajasthan. Additionally, 14.9 percent of medical officer (doctor) positions at PHCs and 45.8 percent of specialist doctor positions at district hospitals were also vacant. The report also claimed that Rajasthan has only been able to operationalise 68 percent of the targeted number of 24x7 PHCs.

Further, Rajasthan had a number of E-clinics operational in the State. Some of these have been in service for more than three years. This could have helped in identifying the actual impact on ground, as quite some time had elapsed since these E-clinics have been running. Accordingly, its users must have experienced the actual impact of these E-clinics more closely.

Finally, given that headquarter of CUTS is in Jaipur, the capital of Rajasthan, with a strong network in all districts of Rajasthan, made Rajasthan as a worthy consideration for survey. Added to this, CUTS also has a Centre (Centre for Human Development), located at Chittorgarh, Rajasthan, which has been engaging on grassroots-level activities across the state for the last few decades. Thus, deep knowledge of the demography and wide experience of working in the region, Rajasthan was considered an appropriate location to undertake the survey for the purpose of the case study.

Hypothesis to be Tested

E-clinics have made it easier for citizens at the last mile to avail effective primary healthcare services in the State of Rajasthan.

Relevance for Conducting 'Primary Research' for the Case Study

- Limited information available in existing literature on user experience about E-clinics, and
- To gather first-hand information on user experience on the operational E-clinics in Rajasthan. This will be helpful in gauging the effectiveness of technology as an enabler to dispense healthcare services to the last mile.

Methodology for Conducting Primary Research

In order to test the above-mentioned hypothesis and achieve the project objective, the study was executed as a combination of desk and field-based research. While existing literature was scouted for data, a gap analysis was undertaken, which highlighted the lack of availability of user experience, the view of ground staff regarding such services and doctor's opinion about such models.

Accordingly, primary data collection was carried out through surveys and stakeholder interactions. The analysis of the data from primary and secondary sources highlights the qualitative as well as quantitative aspects.

While the quantitative analysis suggests the uptake of E-clinics along with its cost-effectiveness for citizens, the qualitative aspect highlights the efficacy of the service.

Table II: Sample Size for the Survey

S. No.	Name of the Service Provider	Location	Existing	Former	Non-users	Total
1	Karma Healthcare	Jaisamand, Udaipur[32]	35	27	16	78
2	Karma Healthcare	Karawali, Udaipur[33]	41	18	12	71
3	Karma Healthcare	Kurabad, Udaipur	32	16	14	62
4	Narayana Healthcare	Eidgah, Jaipur City	31	14	17	62
5	Wish Foundation - Karma Healthcare	Khanpura, Nainwa, Boondi	35	14	17	66
6	Wish Foundation	Bhajneri, Nainwa, Boondi	37	27	18	82
7	Narayana Healthcare	Sonwa, Tonk	31	15	18	64
8	Wish Foundation	KundliNadi, Sawai Madhopur	34	19	17	70
	Total		**276**	**150**	**129**	**555**

Endnotes

1 http://www.undp.org/content/undp/en/home/sustainable-development-goals/goal-3-good-health-and-well-being.html accessed on 01.06.2018

2 Source: http://www.who.int/mediacentre/news/statements/fundamental-human-right/en/, Last accessed on 20/03/18

3 Article 25 of the United Nations' Universal Declaration of Human Rights 1948 states that "Everyone has the right to a standard of living adequate for the health and well-being of himself and of his family, including food, clothing, housing and medical care and necessary social services."

4 Source: http://www.who.int/mediacentre/factsheets/fs323/en/ , Last accessed on 20/03/18

5 Source: http://www.healthdata.org/sites/default/files/files/policy_report/2017/India_Health_of_the_Nation%27s_States_Report_2017.pdf , Last accessed on 20/03/18

6 Source: http://www.thelancet.com/pdfs/journals/lancet/PIIS0140-6736(17)32130-X.pdf, Last accessed on 20/03/18

7 BRIC refers to a group of five countries namely Brazil, Russia, India, China and South Africa, which have an economic potential to compete with the world's largest and most influential economies. It was coined in 2001 by Jim O'Neill, chief economist at Goldman Sachs, and has been widely used ever since.

8 PWC: *Indian healthcare on the cusp of a digital transformation*

9 Source : https://assets.kpmg.com/content/dam/kpmg/in/pdf/2016/08/Report-on-healthcare-access-initiatives.pdf last accessed on 26.02.18

10 Source : https://assets.kpmg.com/content/dam/kpmg/in/pdf/2016/08/Report-on-healthcare-access-initiatives.pdf last accessed on 26.02.18

11 Source : http://www.indiaspend.com/cover-story/indias-great-healthcare-challenge-and-opportunity-46858, last accessed on 26.02.18

12 Source: https://www.census2011.co.in/census/state/rajasthan.html , Last accessed on 20/03/18

13 Source: http://www.indiaenvironmentportal.org.in/files/file/NHP_2017-1.pdf

14 The delivery of health care services, where distance is a critical factor, by all health care professionals using information and communication technologies for the exchange of valid information for diagnosis, treatment and prevention of disease and injuries, research and evaluation, and for the continuing education of health care providers, all in the interests of advancing the health of individuals and their communities. WHO, Telemedicine: opportunities and developments in Member States: report on the second global survey on eHealth, 2009, accessible at: http://www.who.int/goe/publications/goe_telemedicine_2010.pdf

15 WHO, Telemedicine: opportunities and developments in Member States: report on the second global survey on eHealth, 2009, accessible at: http://www.who.int/goe/publications/goe_telemedicine_2010.pdf

[16] Source: http://ehealth.eletsonline.com/2017/12/telemedicine-bridging-delivery-gap-in-rajasthan-healthcare/

[17] Source: http://nrhmrajasthan.nic.in/TM.htm

[18] Source: http://1stopaksh.in/index.php/news-updates/press-releases/159-e-health-service-ask-a-doctor-at-e-mitra-kiosks

[19] Source: http://ehealth.eletsonline.com/2015/05/healthcare-in-rajasthan/

[20] Source: http://ehealth.eletsonline.com/2015/07/rajasthan-the-hub-of-innovations-in-healthcare/

[21] This study does not feature perspectives of government representatives, as the study team was unable to obtain appointment from relevant department and ministries.

[22] Non-qualified informal rural health care providers

[23] Accessible at: https://www.hindustantimes.com/india-news/public-health-system-in-crisis-too-many-patients-not-enough-doctors/story-39XAtFSWGfO0e4qRKcd8fO.html and

http://www.who.int/hrh/resources/16058health_workforce_India.pdf last accessed on 26.02.18

[24] Source: http://www.mospi.gov.in/93-health-and-family-welfare-statistics last accessed on 26.02.18

[25] Ayurveda, Yoga and Naturopathy, Unani, Siddha and Homoeopathy (AYUSH)

[26] From http://karmahealthcare.in/karma-clinics/

[27] From https://www.narayanahealth.org/csr-health

[28] From https://www.wishfoundationindia.org/scale/rajasthan

[29] http://bhamashah.rajasthan.gov.in/content/raj/bhamashah/en/home.html#

[30] Based on field visit to one such e-Clinic of Karma Healthcare and http://karmahealthcare.in/karma-clinics/

[31] http://niti.gov.in/writereaddata/files/document_publication/Healthy-States-Progressive-India-Report_0.pdf

[32] Location selected based on random sampling method out of the 6 locations in Udaipur District.

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