EFFECTIVENESS OF TELEMEDICINE HEALTHCARE SERVICES IN RURAL AREAS OF BANGLADESH: A STUDY ON SELECTED VILLAGES

Efektivitas Layanan Kesehatan Telemedicine di Daerah Pedesaan Bangladesh: Studi pada Desa Terpilih

Md. Mafizur Rahman[1], ***Md. Arifur Rahman**[1,2]
[1]Department of Public Administration, Faculty of Social Science, Jagannath University, Dhaka, Bangladesh
[2]Associates for Innovative Research and Development Ltd., Dhaka, Bangladesh
Correspondence*:
Address: Distillery Road, Gandaria, Dhaka, Bangladesh | e-mail: arifurrahman4515@gmail.com

Abstract

Background: The healthcare system in Bangladesh faces challenges in providing equitable access and quality healthcare to rural and remote communities compared to urban areas. The country has incorporated telemedicine into its healthcare system to address these issues.
Aims: This study aimed to assess the effectiveness of telemedicine services in rural Bangladesh.
Methods: The study employed a mixed-method approach that included survey questionnaires and in-depth interviews. A total of 100 participants were selected for the questionnaire survey for quantitative data, and 20 in-depth interviews were conducted to collect qualitative data.
Results: The findings indicate that telemedicine has garnered a positive reception among rural residents. An overwhelming 86% regarded telemedicine as a cost-effective healthcare option. Impressively, 44% reported accessing telemedicine services within 10 minutes, demonstrating their accessibility. Furthermore, a majority (54%) expressed satisfaction with telemedicine services. However, dissatisfaction was noted concerning the physical environment of the telemedicine centers.
Conclusion: Overall, telemedicine in Bangladesh has proven effective in terms of cost savings, time efficiency, and gaining significant acceptance among rural residents. To further improve healthcare accessibility, expanding telemedicine centers to reach every remote union in Bangladesh is imperative. Additionally, raising awareness, providing ICT and telemedicine education, and ensuring affordable and reliable internet connectivity will maximize the potential of telemedicine services, ultimately benefiting underprivileged rural populations.

Keywords: healthcare, rural Bangladesh, telehealth, telemedicine

Abstrak

__Latar Belakang:__ Sistem layanan kesehatan di Bangladesh menghadapi tantangan dalam menyediakan akses yang adil dan layanan kesehatan berkualitas bagi masyarakat pedesaan dan terpencil dibandingkan dengan wilayah perkotaan. Negara ini telah memasukkan telemedicine ke dalam sistem layanan kesehatannya untuk mengatasi permasalahan ini.
__Tujuan:__ Penelitian ini bertujuan untuk menilai efektivitas layanan telemedicine di pedesaan Bangladesh.
__Metode:__ Penelitian ini menggunakan pendekatan metode campuran yang mencakup kuesioner survei dan wawancara mendalam. Sebanyak 100 peserta dipilih untuk survei kuesioner untuk data kuantitatif, dan 20 wawancara mendalam dilakukan untuk mengumpulkan data kualitatif.
__Hasil:__ Temuan menunjukkan bahwa telemedicine mendapat sambutan positif di kalangan penduduk pedesaan. Sebanyak 86% responden menganggap telemedicine sebagai pilihan layanan kesehatan yang hemat biaya. Yang mengesankan, 44% melaporkan mengakses layanan telemedicine hanya dalam 10 menit, dan ini menunjukkan aksesibilitasnya. Selain itu, mayoritas (54%) menyatakan puas terhadap layanan telemedicine. Namun, terdapat ketidakpuasan mengenai lingkungan fisik pusat telemedicine.
__Kesimpulan:__ Secara keseluruhan, telemedicine di Bangladesh telah terbukti efektif dalam penghematan biaya, efisiensi waktu, dan mendapatkan penerimaan yang signifikan di kalangan penduduk pedesaan. Untuk lebih meningkatkan aksesibilitas layanan kesehatan, perluasan pusat telemedicine untuk menjangkau setiap serikat pekerja terpencil di Bangladesh sangatlah penting. Selain itu, meningkatkan kesadaran, memberikan pendidikan TIK dan telemedicine, serta memastikan konektivitas internet yang terjangkau dan andal akan memaksimalkan potensi layanan telemedicine, yang pada akhirnya akan memberikan manfaat bagi masyarakat pedesaan yang kurang mampu.

__Kata kunci__: layanan kesehatan, pedesaan Bangladesh, telehealth, telemedicine

Introduction

Healthcare in Bangladesh is still a burning issue due to its high-density population and inadequate organizational and infrastructural capacity. The current population size of the country is 165 million, among which 113 million people live in rural areas (Dhaka Tribune, 2022). With this vast population in the rural area, it becomes the government's responsibility to provide equal health services and access to the rural people as to the urban. However, reaching rural people with equal health services is still challenging due to geographical, infrastructural, and human resource barriers. The HRH (Human Resource for Health) Data Sheet 2019 shows an estimated 8.3 doctors, nurses, and midwives per 10,000 population (Ministry of Health and Family Welfare, 2019). Addressing these barriers, the Government of Bangladesh (GoB) developed an innovation in its health sector with telemedicine. Telemedicine uses electronic communication technology to exchange health or medical-related information from one place to another to improve the patient's clinical health status (American Telemedicine Association, 2017). Instead of visiting the doctor physically, telemedicine allows patients to communicate with a doctor using technology. Considering the challenging healthcare conditions of the country, telemedicine service can be a blessing (Akhtar, Alam and Siddiquee, 2019). It is an effective instrument for providing healthcare from a distant location (Prodhan, Rahman and Jahan, 2016a). Telemedicine has been defined by the World Health Organization (WHO) as "the delivery of healthcare services, where distance is a critical factor, 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 the continuing education of healthcare providers, all in the interests of advancing the health of individuals and their communities" (World Health Organization, 2010). The primary intention of telemedicine service is to enhance healthcare services to geographically underprivileged and medically underserved populations by delivering high-quality care at a reduced cost as well as with greater convenience (LeRouge and Garfield, 2013).

The concept of telemedicine is not very new in Bangladesh. The Ministry of Health and Family Welfare (MOHFW) initiated e-health services in 1998 to improve public healthcare systems, though telemedicine was founded in 1999 (Hoque and Bao, 2015). However, it has remained beyond the reach of much of the underprivileged population due to inadequate attention (Nessa *et al.*, 2008). In partial fulfillment of the Digital Bangladesh Vision 2021, telemedicine was adopted under MOHFW in several public hospitals in 2010 (Zobair, Sanzogni and Sandhu, 2020). Since then, a number of public and private telemedicine initiatives have been undertaken within the country.

Telemedicine could serve as a less expensive and easier means to deliver medical services to a large number of people in remote places while utilizing limited resources (Hudson, 2006; Chavula, 2013). A previous study found that telemedicine has significantly reduced the cost and travel time of patients as compared to its counterpart conventional approach (Sorwar *et al.*, 2016). It has the potential to improve access to quality health services in remote places (Nessa *et al.*, 2008).

In addition to economic considerations, consumer satisfaction is an important issue to consider when designing a telemedicine program because it indicates how effectively the medium satisfies patients' expectations (Kruse *et al.*, 2017). Prior research identified that factors like social influence, perceived usefulness, and satisfaction positively affect an individual's intention to use telemedicine services. In contrast, other factors like resistance to change and technology anxiety negatively influence it (Rahman and Hoque, 2018). Another study found that patients' expectations for adopting telemedicine health services are highly influenced by self-efficacy,

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telemedicine experience, enjoyment, and prior satisfaction (Zobair, Sanzogni and Sandhu, 2019).

However, the journey of telemedicine in Bangladesh has never been so flawless. Several impediments still affect the successful implementation of telemedicine services within the country. Hakim (2016) mentioned that lack of adequate funding, patients' worries concerning telemedicine, a lack of public education for the use of e-health services, software weaknesses to deal with growing workloads, a lack of technically competent workers, lack of a complete legal structure regarding telemedicine, shortage of telemedicine-related policy, and an absence of telecommunication network in a few parts of the country are some of the issues that affect telemedicine implementation in public hospitals of Bangladesh. This is supported by Khatun and Sima (2015) have also agreed to the facts; however, Zobair *et al.* (2020) argued that organizational ineffectiveness, quality of care, motivation of the health staff, and patients' trustworthiness are the prevalent barriers to telemedicine service in rural public hospitals. Moreover, the patient's data security in the existing telemedicine system is a matter of concern (Nusrat *et al.*, 2019).

The above literature indicates that a few studies have been conducted considering the potentiality and the prevalent challenges and barriers to implementing telemedicine services. However, very little or no exploratory research is available on the consumers' perception regarding telemedicine in the local context of Bangladesh; particularly, no studies have been conducted in the study area. Therefore, this study aims to explore the effectiveness of a telemedicine healthcare service among rural people in Bangladesh. The geographic variances and people's orientation to various localities have substantially made the paper unique, and it will further assist the concerned authority in taking the required actions to improve the service effectiveness and acceptability among rural people in Bangladesh.

Method

Research Design
A mixed-method research technique was used, which combined quantitative and qualitative approaches. Mixed-method data collection facilitates exploring, unraveling, and understanding issues, situations, and relationships (Aminuzzaman, 1991). A questionnaire survey was used to gather quantitative data, and in-depth interviews were conducted to collect qualitative data. The study was conducted at three selected villages of Mollahat Union of Nalchity Upazila in Jhalakathi District of Bangladesh as the Telemedicine Program is implemented in this area by the Department of Biomedical Physics and Technology, University of Dhaka, with support from a2i Program of the Bangladesh Government.

Sampling and Participants
For quantitative data (phase I), a total of 100 participants were selected for the questionnaire survey, and 20 in-depth interviews were conducted for collecting qualitative data (phase II) through purposive and snowball sampling. The statistical formula determined the sample size at 90% confidence level and 7% marginal error for a population of 350. The original result of the sample size was 98.99 which was rounded to 100 to ensure the accuracy of the data and validate the findings. The eligibility criteria for participating in this study were rural people who have used telemedicine at least once in their lives.

Data Collection Procedure
Data were collected in two phases. In phase I (quantitative part), a semi-structured questionnaire was developed after reviewing relevant available literature by the researchers. The questionnaire includes a brief introduction of the study, purposes, confidentiality, and consent of the respondents on the first page. The participants completed the questionnaire in the presence of the researchers. The questionnaire was divided into four sections in which they had to fill in the socio-demographic details (e.g., gender, age, educational qualification, and occupation)

as well as the respondents' perception and experience of telemedicine service. A group of expert researchers examined the validity of content.

In Phase II (qualitative part), data were collected through in-depth interviews (IDI) consisting of open-ended questions such as "Where do you usually visit to seek healthcare services?"; "What do you know about telemedicine?"; "How do you perceive the conventional way of healthcare and telemedicine healthcare from your point of view?"; "Which way of healthcare service is more convenient and why?"; "Tell me about your telemedicine experience and how satisfied you were with the service?"; "How was the environment of the telemedicine center?"; "How do you think the service is trustworthy to you?"; "What difficulties or disruptions have you faced while getting the service?" Finally, the participants were asked to "Give some recommendations to improve the effectiveness and acceptability of telemedicine service among rural people in Bangladesh." Most of the interviews took around 30 minutes, and, together, the audio was recorded with the consent of the participants. The researchers also took field notes during the interviews to record additional important information.

In this study, the participant's native language was used for data collection and then translated into English for analysis. The linguistic accuracy of the language was assessed and verified by proficient linguists to ensure its semantic integrity.

Data Analysis

The quantitative data (Phase I) was analyzed using the Statistical Package of Social Sciences (SPSS) software. The collected data underwent a comprehensive review process, which involved conducting various frequency and data checks to ensure accuracy and integrity.

For qualitative data (phase II), after the interviews were completed, verbatim transcription was conducted by expert transcribers. The transcripts were carefully and thoroughly read. Then, the transcripts were compared with the audio recordings to identify any missing information. A thematic analysis of the texts was performed by using manual coding.

Result and Discussion

Characteristics of the Participants

The quantitative data analysis shows that, among the 100 participants, 54% were female, and 46% were male. Most of the participants were in the age range of 48-57 years (30%). Among them, 13% were illiterate, and only 5% had completed graduation and above levels of education. The majority of the participants (33%) were involved in agriculture and 10% were students. Socio-demographic details of the participants are demonstrated in Table 1.

Sources of Information

When asked about how they came to know about telemedicine, most of them (46%) reported through a door-to-door campaign program from neighbors (33%), relatives (14%), and friends (7%). Participants' opinions regarding the sources of information about telemedicine are presented in Figure 1. However, the majority of the participants reported that the campaign programs were not held frequently. There is a huge gap in information and awareness about telemedicine within the consumer. A participant described the situation below: "Most people in this area do not know that such services exist and what they offer. I have worked as a campaigner for this service. I have been to people's doors to make them understand telemedicine and invited them to experience it. But this small-scale campaign program is not enough to reach everyone in this area" [IDI-01; female; age: 32 years old].
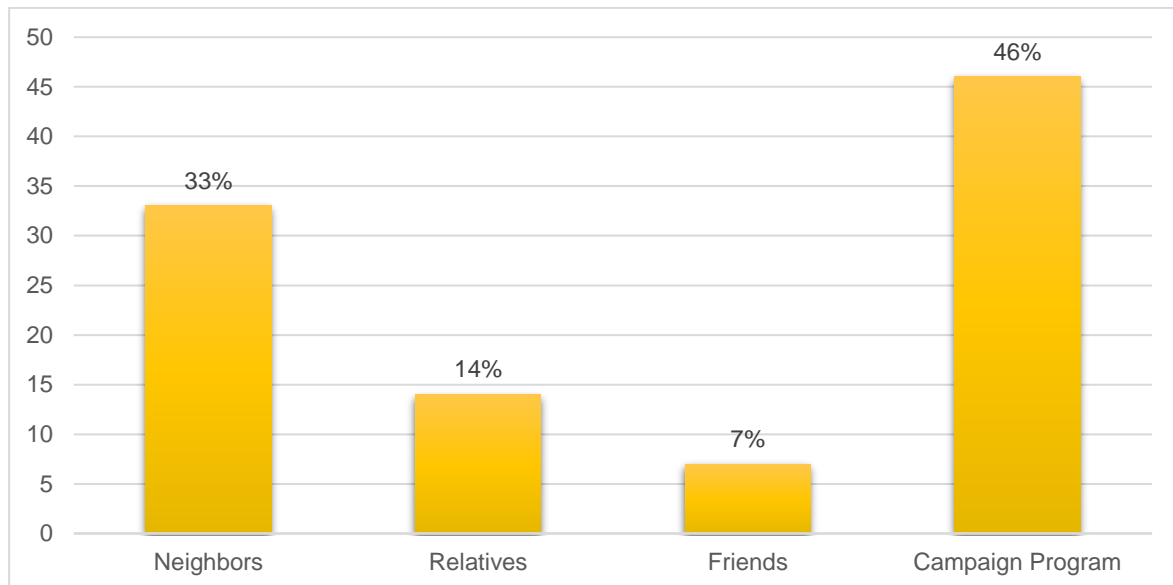
Figure1. Sources of Information about Telemedicine

Table 1. Socio-demographic Characteristics of the Participants (*N* = 100)

Measure	Items	Frequency	%
Gender	Male	46	46%
	Female	54	54%
Age Group	18-27	16	16%
	28-37	17	17%
	38-47	23	23%
	48-57	30	30%
	58 and above	14	14%
Educational Qualification	Illiterate	13	13%
	Primary	40	40%
	Secondary	28	28%
	Higher Secondary	14	14%
	Graduate & above	5	5%
Occupation	Agriculture	33	33%
	Business	12	12%
	Service Holder	11	11%
	Self Employed	21	21%
	Student	10	10%
	Others*	13	13%

*Housewife

Participants' Knowledge of Telemedicine and ICT

Prior and proper knowledge of any service is crucial to understanding the impact and effectiveness of the service. Telemedicine is a technological service system, so the knowledge of ICT is also interlinked with the knowledge of telemedicine. Most participants (44%) reported having 'poor' knowledge of telemedicine, while only 2% reported having 'excellent' knowledge. Regarding the knowledge of ICT, most of the participants (36%) reported 'poor,' and 34% reported 'very poor.' Details of participants' responses regarding knowledge of Telemedicine and ICT are shown in Table 2.

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Table 2. Participant's Knowledge

Knowledge of Telemedicine			Knowledge of ICT		
Rating*	f	%	Rating*	f	%
1	20	20%	1	34	34%
2	44	44%	2	36	36%
3	24	24%	3	20	20%
4	10	10%	4	8	8%
5	2	2%	5	2	2%

*Rating: 1= very poor; 2= poor; 3= good; 4= very good; 5= excellent

Knowledge of ICT and telemedicine plays a critical role in forming people's trust in telemedicine. Having a proper knowledge of technology helps to understand the telemedicine process better. The study findings supported that rural people have poor knowledge of technology and telemedicine, which corresponds to the findings of a previous study (Chowdhury, Sunna and Ahmed, 2021). Lack of knowledge about ICT and the basic knowledge of telemedicine about what it is or the process of how it works impacts their perception of the telemedicine service. Their unknown fear of the complexity of the process leads to avoidance of taking telemedicine services. A similar study (Khan, Rahman and AnjumIslam, 2021) also suggested that shortage of ICT access and lack of knowledge regarding telemedicine are the barriers to the use of telemedicine.

Cost Saving and Time Efficient Service Delivery

Among the participants, 86% opined that telemedicine service costs less than a physical healthcare center's service. According to them, they also have to spend travel costs to get healthcare services from other physical healthcare centers. On the other hand, 14% opined that it is not less than the cost of other healthcare centers. One of the reasons behind their opinion was that they have easy access to public hospitals. Participants' opinions about the cost of service are presented in Figure 2.

Most participants (44%) reported having to wait about 10 minutes for the service while 28% and 18% of the participants reported waiting 15 and 20 minutes, respectively. The rest, 10%, have to wait for about 25 minutes. Serials of patients and time for connecting with doctors were reported as a few reasons for their waiting time. Details of participants' responses regarding the waiting time for service delivery are shown in Table 3.

The opinions of a few participants regarding the cost and time effectiveness of telemedicine are expressed as follows: "I am a day laborer. It is difficult for me to bear the cost of a private hospital. On the other hand, traveling a long distance to seek healthcare from a public hospital also requires a good amount of money. Telemedicine has made it easier for me. Now I, my family members, can easily consult with quality doctors at a lower cost" [IDI-11; male; age: 42 years old]. "I am a small businessman. I have to deal with several issues all day, so sometimes, I can't make time to take my family members to clinics for health consultations when they are sick. Small issues are mostly ignored. But telemedicine made it easier for us. The telemedicine center is near my house and a much less time-consuming process than traveling elsewhere" [IDI-20; male; age: 43 years old].

The present study found that in terms of cost and time saving, telemedicine has significantly reduced the amount of time and cost required for the users to access healthcare services. The cost of the service is lower than that of a physical healthcare center. Rural underprivileged people are mostly deprived of quality healthcare services because of poor economic conditions. In that case, telemedicine serves people at a very low cost. The findings show that the cost of a telemedicine service is around BDT 100-300, which the users considered to be lower than the conventional way of seeking healthcare services. Moreover, telemedicine helped people reduce travel costs, which is an additional advantage for them. Before telemedicine, people had to travel to the city hospitals or clinics to get any primary healthcare services, which required more time. Rural people are mostly engaged in daily activities or labor for their livelihood, so their payments are also on a daily basis. It was difficult for them

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to avoid their daily labor just for a primary check-up as it affected their economic condition. As a result, their primary healthcare was neglected in most of the cases. However, telemedicine has reduced their stress in regard to getting at least their primary healthcare. Being nearer to their location, they can easily visit the center for a primary health consultation. Moreover, the waiting time for getting the service is very low compared to the physical healthcare centers. Prior studies conducted in a similar context also correspond to the result and agreed that telemedicine has been a very cost and time efficient service (Prodhan, Rahman and Jahan, 2016b; Sorwar *et al.*, 2016; Akhtar, Alam and Siddiquee, 2019; Atmojo *et al.*, 2020; Salsabilla *et al.*, 2021).
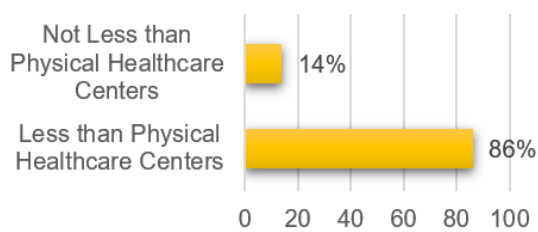

Figure 2. Participants' Opinions about Cost

Table 3. Waiting Time for Service Delivery

Time (Minutes)	f	%
10	44	44%
15	28	28%
20	18	18%
25	10	10%

Participants' Satisfaction Regarding Telemedicine

Patient satisfaction is another key indicator for measuring effectiveness. Satisfaction lies in the expectations of the patients. The study found that the rural patients were mostly satisfied with the telemedicine service. Most of the participants (54%) expressed their satisfaction level with the service as satisfactory, and a moderate number of people (36%) were neutral with the service. However, none of the users expressed dissatisfaction with the service, and a few (6%) were highly satisfied. The providers'

and the doctors' behavior, service quality, and the service's usefulness have a key impact in determining the patients' satisfaction. Moreover, the low cost and the less time-consuming characteristics of the service played a significant role in determining the patients' satisfaction. Previous studies in Bangladesh have supported this finding indicating that majority of the telemedicine users were highly satisfied with the service and the behavior of service provider (Rahman and Hossain, 2016; Sorwar *et al.*, 2016).

Participants' Trust Regarding Telemedicine

Patients' trust is a significant indicator of acceptance of telemedicine services. According to Akter et al. (2011), trustworthiness in telemedicine is crucial for establishing patients' confidence and assuring their desire to reuse the system. The findings of this study suggested that most of the participants (48%) were neutral about the trustworthiness of the service, but none of them think the service is not trustworthy. However, the service was trustworthy to a significant number of participants (42%), and to a few participants (6%), it was very trustworthy. Similar results were found in a previous study conducted in Bangladesh showing that only 1% have no trust in telemedicine (Rahman and Hossain, 2016).

Participants' Opinions about Internet Connection Stability

Internet connection stability is a key issue in telemedicine service delivery as the whole process depends on it. Most of the participants (64%) opined that there was no disruption in the service due to internet connectivity. However, a significant portion of the participants (36%) stated they had faced internet instability while receiving the service.

One of the participants described the situation as follows: "While the doctor was talking, it was not very clear. Some words were stuck, and sometimes, I had to repeat my words several times. The service provider told me it might happen due to poor internet connection" [IDI-12; male; age: 20 years old].

Internet connection stability is another crucial factor in delivering telemedicine services effectively. With the advancement of technology and the telecommunication sector, most of the geographical areas in Bangladesh are now covered with internet connectivity. However, issues with the speed and stability of the internet connection remain. The study revealed that, although more than half of the service seekers didn't face any difficulty with internet connectivity, a considerable number of the service seekers reported difficulties. Sometimes, the connection is totally lost, and the system can't work out. Many times, it lags while communicating with the doctors. This disruption hampers the attention of the service seekers as well as the doctors. Also, the service providers mentioned the high cost of the internet packages. Previous studies (Zobair *et al.*, 2020; Khan *et al.*, 2021; Rahman *et al.*, 2022) also argued that low speed of internet connectivity and high cost of infrastructure are significant barriers to the adoption of telemedicine services.

Participants' Opinions about Telemedicine Services and Center

The present telemedicine program is found to be providing only primary treatments such as – fever, cold, pain, blood pressure, and other related complications. Participants opined that it could be better if the service area could be increased, especially for gynecological problems and having at least one female service provider. Even with these limited facilities, this program has proven effective and achieved success in rural areas. Other studies conducted in similar settings comply with the present study's finding (Brear, 2006; Froehlich *et al.*, 2009; Akhtar, Alam and Siddiquee, 2019).

Regarding the resource availability and the physical environment of the telemedicine center, this study found that some required instruments, such as the Electrocardiogram (ECG) machine, were not available. Moreover, the physical environment of the center was not up to the mark. A good environment and resource availability at the center influence the patients to have trust in the service. Usually, for providing telemedicine service, a computer or laptop for operating telemedicine software and contacting doctors, a printer for printing prescriptions, and a weight measurement machine, stethoscope, blood pressure measuring tool, and ECG machine to measure the health condition of the patients are necessary. A prior study (Kruse *et al.*, 2018) also found that a lack of appropriate resources and equipment is the potential barrier to telemedicine adoption.

Limitations of the Study

There are some limitations in this research, leading to further research opportunities. First, this study analyzed only one telemedicine center and the study area was limited to a single sub-district in Bangladesh due to time and budget constraints. Future studies might include additional telemedicine centers to test the generalizability of the findings. Second, the study was conducted on a small number of respondents. Future research could include a higher number of respondents to attain better variations of the data. Finally, this study was limited to Bangladesh. Combining this study with cross-sectional data from similar developing countries can provide a more comprehensive picture of the effectiveness of telemedicine globally.

Conclusion

In essence, the study findings revealed that telemedicine has gained acceptance among rural service seekers and is contributing effectively by providing a quality healthcare service to remote people at a reduced cost and consuming less time than other forms of healthcare services. Although this service is limited to primary healthcare only, it greatly impacts the health status of disadvantaged rural people as they can access the service easily. However, a lack of awareness among the people keeps most rural people out of reach of the service. There are inadequate campaigning programs regarding telemedicine services. Also, the high cost of the internet and low bandwidth connection is another obstacle to delivering

the service properly. Furthermore, immediate and continuous actions should be implemented to enjoy the full potential of this great innovation. It is possible to alleviate the limitations and obstacles are with the support from the concerned authority and by appropriate government measures and actions. Expansion of telemedicine centers, a proper mechanism for creating awareness among people, educating people with the knowledge of ICT and telemedicine, ensuring an optimal level of internet bandwidth, proper allocation of necessary tools in telemedicine centers, establishing proper monitoring mechanism for every telemedicine center and engaging people by ensuring their trust might be helpful in this regard.

Abbreviations

WHO: World Health Organization; GoB: Government of Bangladesh; HRH: Human Resource for Health; ICT: Information and Communications Technology; a2i: Access to Information.

Declarations

Ethics Approval and Consent Participant
This study is part of a bachelor's thesis; therefore, ethical approval was granted by the Examination Committee. A detailed consent form was developed and distributed among the potential respondents of the study; however, only those willing to participate in the survey and interview voluntarily were considered as the study respondents.

Conflict of Interest
The authors declare that there is no significant competing financial, professional, or personal interests that might have affected the performance.

Availability of Data and Materials
Not applicable.

Authors' Contribution
Both authors contributed to the conception and design of the study, material preparation, data collection and analysis. MAR developed the initial manuscript draft, and MMR commented on previous versions. Finally, both authors read and approved the final manuscript.

References

Akhtar, R., Alam, S. and Siddiquee, N.K.A. (2019) 'Telemedicine: an ICT based healthcare approach to ensure health service for all', *International Journal of Community Medicine and Public Health*, 6(9), p. 3732. https://doi.org/10.18203/2394-6040.ijcmph20193961

Akter, S., D'Ambra, J. and Ray, P. (2011) 'Trustworthiness in mHealth information services: An assessment of a hierarchical model with mediating and moderating effects using partial least squares (PLS)', *Journal of the American Society for Information Science and Technology*, 62(1), pp. 100–116. https://doi.org/10.1002/asi.21442

American Telemedicine Association (2017) *What is Telemedicine*. Available at: http://www.americantelemed.org/about-telemedicine/what-is-telemedicine#.U-b7gIBdWt0.

Aminuzzaman, S.M. (1991) *Introduction to Social Research*. Dhaka, Bangladesh: Bangladesh Publishers.

Atmojo, J.T., Sudaryanto, W.T. and Widiyanto, A. (2020) 'Telemedicine, Cost Effectiveness, and Patients Satisfaction: A Systematic Review', *Journal of Health Policy and Management*, 5(2), pp. 103–107.

Brear, M. (2006) 'Evaluating telemedicine: lessons and challenges', *Health Information Management: Journal of the Health Information Management Association of Australia*, 35(2), pp. 23–31. https://doi.org/10.1177/183335830603500206

Chavula, H.K. (2013) 'Telecommunications development and economic growth in

Original Research

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10.20473/jaki.v12i1.2024.97-107

Africa', *Information Technology for Development*, 19(1), pp. 5–23. https://doi.org/10.1080/02681102.2012.694794

Chowdhury, S.R., Sunna, T.C. and Ahmed, S. (2021) 'Telemedicine is an important aspect of healthcare services amid COVID-19 outbreak: Its barriers in Bangladesh and strategies to overcome', *The International Journal of Health Planning and Management*, 36(1), pp. 4–12. https://doi.org/10.1002/hpm.3064

Dhaka Tribune (2022) 'Census 2022: Bangladesh population now 165 million', *Dhaka Tribune*, 27 July. Available at: https://www.dhakatribune.com/bangladesh/2022/07/27/bangladeshs-population-size-now-1651-million (Accessed: 1 August 2022).

Froehlich, W., Seitaboth, S., Chanpheaktra, N. and Pugatch, D. (2009) 'Case report: an example of international telemedicine success', *Journal of Telemedicine and Telecare*, 15(4), pp. 208–210. https://doi.org/10.1258/jtt.2008.081001

Hakim, A.I. (2016) 'Expected Challenges to implement Telemedicine service in public hospitals of Bangladesh', *Journal of Social and Administrative Sciences*, 3(3), pp. 231–244. https://doi.org/10.1453/jsas.v3i3.939

Hoque, M.R. and Bao, Y. (2015) 'Cultural Influence on Adoption and Use of e-Health: Evidence in Bangladesh', *Telemedicine Journal and E-Health: The Official Journal of the American Telemedicine Association*, 21(10), pp. 845–851. https://doi.org/10.1089/tmj.2014.0128

Hudson, H.E. (2006) *From Rural Village to Global Village: Telecommunications for Development in the Information Age*. Mahwah, N.J: Routledge.

Khan, M.M., Rahman, S.M.T. and AnjumIslam, S.T. (2021) 'The Use of Telemedicine in Bangladesh during COVID-19 Pandemic', *E-Health Telecommunication Systems and Networks*, 10(01), pp. 1–19. https://doi.org/10.4236/etsn.2021.101001

Khatun, F. and Sima, Mst.R.K. (2015) 'Impact of ICT on Health Services in Bangladesh: A Study on Hobiganj Adhunik Zila Sadar Hospital', *SSRN Electronic Journal* [Preprint]. https://doi.org/10.2139/ssrn.2591201

Kruse, C.S. Krowski, N., Rodriguez, B., Tran, L., Vela, J. and Brooks, M. (2017) 'Telehealth and patient satisfaction: a systematic review and narrative analysis', *BMJ Open*, 7(8), p. e016242. https://doi.org/10.1136/bmjopen-2017-016242

Kruse, C.S., Atkins, J. M., Baker, T. D., Gonzales, E. N., Paul, J. L. and Brooks, M. (2018) 'Factors influencing the adoption of telemedicine for treatment of military veterans with post-traumatic stress disorder', *Journal of Rehabilitation Medicine*, 50(5), pp. 385–392. https://doi.org/10.2340/16501977-2302

LeRouge, C. and Garfield, M.J. (2013) 'Crossing the Telemedicine Chasm: Have the U.S. Barriers to Widespread Adoption of Telemedicine Been Significantly Reduced?', *International Journal of Environmental Research and Public Health*, 10(12), pp. 6472–6484. https://doi.org/10.3390/ijerph101264 72

Ministry of Health and Family Welfare (2019) *HRH Data Sheet-2019*. Available at: https://hsd.portal.gov.bd/sites/default/files/files/hsd.portal.gov.bd/page/e620d076_40f0_4f38_a87a_7897e006a91d/MOHFW_HRH_Data%20Sheet%202019.pdf

Nessa, A., Ameen, M. A., Ullah, S. and Kwak, K.S. (2008) 'Applicability of Telemedicine in Bangladesh: Current Status and Future Prospects', in *2008 Third International Conference on Convergence and Hybrid Information Technology*, pp. 948–953. https://doi.org/10.1109/ICCIT.2008.236

Nusrat, S.A., Ferdous, J., Ajmat, S. B., Ali, A. and Sorwar, G. (2019) 'Telemedicine System Design using Blockchain in Bangladesh', in *2019 IEEE Asia-Pacific Conference on Computer Science and Data Engineering (CSDE). 2019 IEEE Asia-Pacific Conference on Computer Science and Data Engineering (CSDE)*, Melbourne, Australia: IEEE, pp. 1–5. https://doi.org/10.1109/CSDE48274.2019.9162401

Prodhan, U.K., Rahman, M.Z. and Jahan, I. (2016a) 'A survey on the telemedicine in Bangladesh', in *2016 International Conference on Computing, Communication and Automation (ICCCA). 2016 International Conference on Computing, Communication and Automation (ICCCA)*, Greater Noida, India: IEEE, pp. 857–861. https://doi.org/10.1109/CCAA.2016.7813835

Prodhan, U.K., Rahman, M.Z. and Jahan, I. (2016b) 'A Systematic analysis on the Telemedicine Services in Bangladesh.'

Rahman, H., Al Ameen, M., Ullah, S. and Kwak, K. (2022) 'Use of Telemedicine in Bangladesh: Current Status and Future Prospects', 7(2), pp. 1–13. https://doi.org/10.5281/zenodo.6407570

Rahman, M.S. and Hoque, R. (2018) 'Factors Affecting the Adoption of Telemedicine in Rural Areas of Bangladesh'. Available at: https://web.archive.org/web/20200323173228id_/https://aisel.aisnet.org/cgi/viewcontent.cgi?article=1606&context=amcis2018

Rahman, T. and Hossain, M.A. (2016) 'Peoples' Perception towards Telemedicine: A Case Study on Rural Area of Bangladesh', *Information and Knowledge Management*,6(4).

Salsabilla, A., Azzahra, A.B., Syafitri, R.I.P., Supadmi, M. and Suwantika, A.A. (2021) 'Cost-Effectiveness of Telemedicine in Asia: A Scoping Review', *Journal of Multidisciplinary Healthcare*, 14, pp. 3587–3596. https://doi.org/10.2147/JMDH.S332579

Sorwar, G., Rahman, M. M., Uddin, R. and Hoque, M. R. (2016) 'Cost and Time Effectiveness Analysis of a Telemedicine Service in Bangladesh', *Studies in Health Technology and Informatics*,231, pp. 127–134. https://doi.org/10.3233/978-1-61499-712-2-127

World Health Organization (2010) *Telemedicine: Opportunities and developments in Member State*. Available at: https://www.afro.who.int/publications/telemedicine-opportunities-and-developments-member-state (Accessed: 1 August 2022).

Zobair, K.M., Sanzogni, L. and Sandhu, K. (2019) 'Expectations of telemedicine health service adoption in rural Bangladesh', *Social Science & Medicine*, 238, p. 112485. https://doi.org/10.1016/j.socscimed.2019.112485

Zobair, K.M., Sanzogni, L. and Sandhu, K. (2020) 'Telemedicine Healthcare Service Adoption Barriers in Rural Bangladesh', *Australasian Journal of Information Systems*, 24. https://doi.org/10.3127/ajis.v24i0.2165