

Impacts on the healthcare system of Telemedicine in Bangladesh during Covid-19 period

[A research project report submitted to the Research and Extension Center of Jatiya Kabi Kazi Nazrul Islam University for the partial fulfillment of the research 2021-22]



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Abstract

Telemedicine is an excellent means of healthcare for rural people in remote areas. At present people in remote areas cannot get proper healthcare due to low livelihood and they cannot afford doctor's fees, medicine fees and transportation fees. Although people in remote areas face various problems in epidemic situations like Covid-19, they try to get proper access to health care. As a result, our study will highlight their various problems faced by the remote rural people of Bangladesh during Covid-19 period and propose a solution for healthy life through telemedicine services. There are four main modules in our proposed system design such as pharmacy modules based on pharmacy owners, local doctor modules based on local doctors in remote areas, specialist doctor modules based on specialist doctors in remote areas or urban areas and electronic system modules are central to all modules. This research was conducted through the primary survey on the above four modules. Data were collected from different rural and urban areas of Bangladesh. After data collection we have processed the data through the statistical software R. From the result section we have seen that when Covid-19 was started in Bangladesh then normal medical services were greatly hampered. General patients suffered a lot for getting treatment. Then both government and other organizations started telemedicine services to start and continue the healthcare services for the people of Bangladesh. This research finds that initiatives were better during pandemic period and saves more life in Bangladesh. Based on the results of our primary survey, if the policy makers think wisely then the treatment system of Bangladesh will be enhanced and cost effective healthcare can be given through telemedicine service.

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Chapter One

Fundamentals of Telemedicine

1.1 Introduction

Telemedicine which literally means healing at a distance. Telemedicine is a type of medical service with the help of information and communication technology to provide health services to the patients located at any geographical distance through the summation of expert doctors, medical centers, special network etc. Providing telemedicine services in remote areas through telemedicine. Telemedicine reduces distance constraints and helps provide health care where there is a shortage of treatment.

Telemedicine is also referred to as telehealth, e-health and m-health. Telehealth is a place where patients can get urgent medical advice from a specialist doctor from a distance. Telemedicine is the process of seeking medical advice from urban-rural areas by telephone, mobile, video conference or online.

Telemedicine service was launched in Bangladesh in 1999 [1]. Till then various initiatives have been taken in telemedicine to spread this service. In this study, we are going to develop an advanced and sustainable system. Modern information and communication technology (ICT) is revolutionizing the way computers, the Internet, and cell phones can communicate with each other, search for information and exchange views. These technologies have great potential to help address contemporary global health issues. Emerged on another global survey of eHealth administrated in 2009, this report uses information communication technology to deliver healthcare services for telemedicine services [2].

The COVID-19 period has had an impact on the Bangladeshi telemedicine healthcare system. The first case of the Nobel coronavirus was identified in December 2019 in Wuhan, China. IN just three months, wildfires spread around the world. The first three known cases were reported on March 8, 2020, IEDCR [3].Coronavirus then spread rapidly throughout Bangladesh. Coronavirus spreads rapidly in rural areas of Bangladesh. We have looked at people infected with the coronavirus and found. that they have the respiratory syndrome. Most people are infected with the corona virus. Doctors, the army, and police were at the forefront in tackling the Bangladeshi coronavirus. They infected themselves with the corona virus while serving people. Many were infected with covid-19 at home but did not receive timely treatment. Many have died due to a lack of health care. Rural people did not get health care as compared to urban people. Although a number of people in Bangladesh have access to telemedicine services, many people have been deprived of telemedicine services, especially in rural areas. So telemedicine can be an easy solution for everyone to get the

health care of a specialist doctor from their own home. We have surveyed the remote rural areas of Noakhali and Dinajpur for our research.

We have surveyed many rural areas. Many rural people do not know about telemedicine. There are some reasons why rural people are deprived of telemedicine services. The issues we have come up with in our survey include internet system, device system. If these problems are solved, they will be able to use the internet and video conferencing to easily access the medical services or telemedicine services from urban to rural folk specialist doctors. Now it will be time to make arrangements for telemedicine services to reach rural areas.

1.2 Background of the Research

Telemedicine is an open and developing discipline that incorporates new technological advancements and responds to people's changing health care requirements. Telemedicine applications can be developed based on information exchange and interaction.

Telemedicine can be divided into two categories: store-and-forward or asynchronous and real-time or [4] Synchronous Telemedicine that exchanges pre-recorded data is known as store and forward. Two or more people at different times The Business Process is depicted in Figure 1.1.

Diagram of store and forward telemedicine in Business Process Modeling Notation (BPMN). The interaction between local and specialist doctors, as well as their activities, may be seen in the Diagram in BPMN.

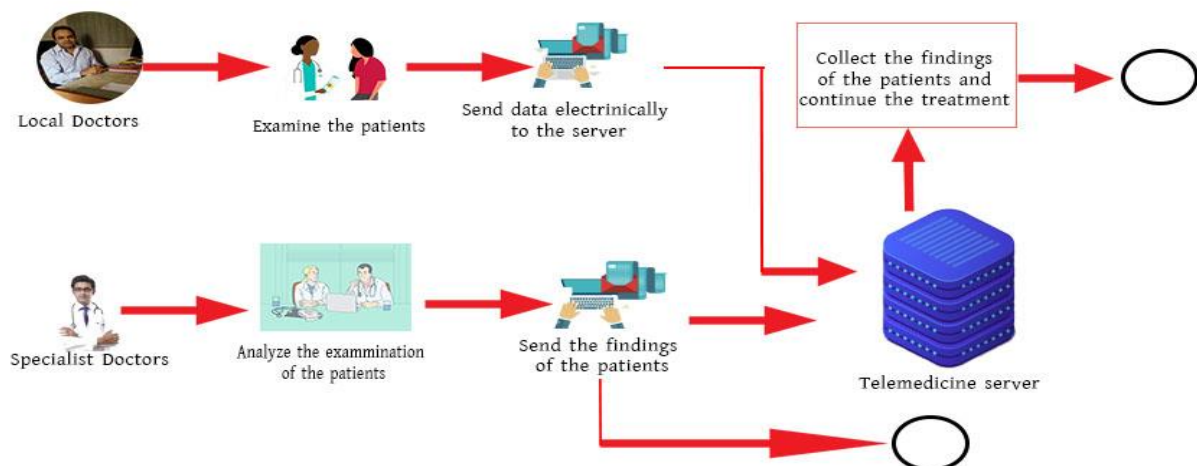


Figure 1.1: BPMN diagram of store and forward based telemedicine

Real-time or synchronous telemedicine services are needed the patient and the doctor must be present at the same time to exchange information, As with videoconferencing [5], real-time or synchronous telemedicine necessitates the simultaneous presence of the individuals concerned for immediate information exchange.

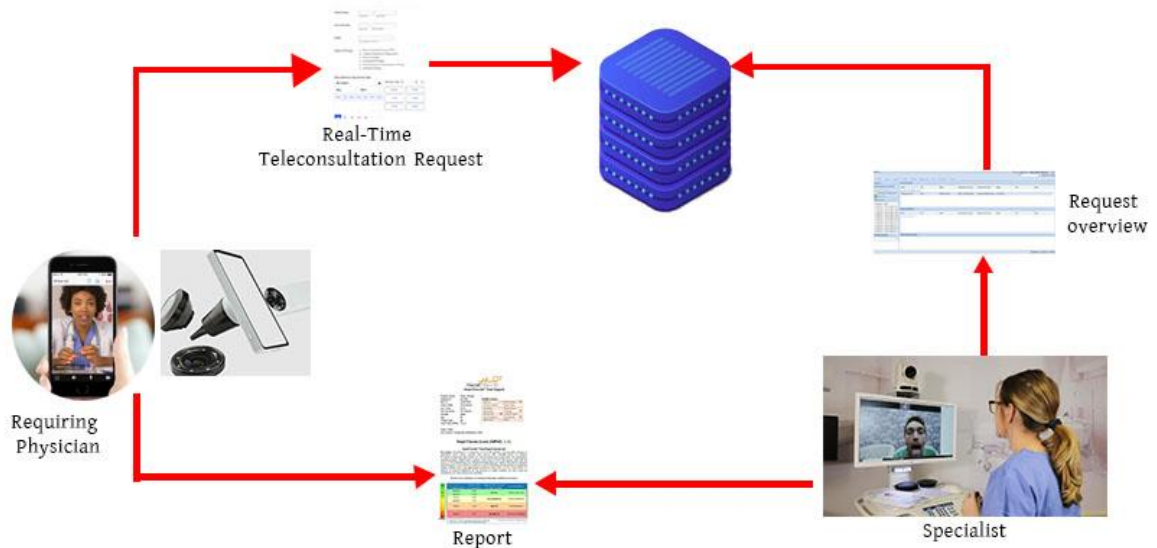


Figure 1.2: Real time based telemedicine

Here in this case both synchronous and asynchronous telemedicine cases, various patient information can be transmitted, such as communication through video, and audio [6].

Biometric measuring instruments can be used to perform initial tests such as heart rate, blood pressure, and ECG. Patients can be monitored remotely to monitor body position glucose levels. Now telemedicine services have become important. Telemedicine services are especially important for people in rural areas. Healthcare is now being transformed from hospital to telemedicine. Healthcare is constantly evolving. Healthcare at home through telemedicine. We have seen telemedicine applications in limited developed countries with the limited infrastructure used to communicate with healthcare providers, specialist doctors and tertiary care centers [7].

In this study, we saw the publication of a research paper entitled Real-Time Health Monitoring. Remote patients through the advanced real-time delivery system for telemedicine healthcare in Bangladesh [8].

Table 1.1: Population-Health workforce of Bangladesh

S.N	Description of the facilities	Ratio
1	No. of doctors per 10,000 population	5.26
2	No. of registered nurses per 10,000 population	2
3	No. of registered physicians per 10,000 population	2.56
4	No. of nurses per 10,000 population	1.56
5	No. of medical technologists per 10,000 population	0.14
6	No. of community and domiciliary health workers per 10,000 people	3.8
7	Hospital bed for 1528 population	0.79

Table 1.1 the current state of healthcare in Bangladesh in terms of population is shown in Table 1.1 We have seen that Bangladesh has a much smaller population than doctors, nurses and physicians. We have seen in the survey that most of the specialist doctors live in urban areas.

Types of health facilities under the Directorate General of Health Services (DGHS), Bangladesh is shown in figure 1.3:

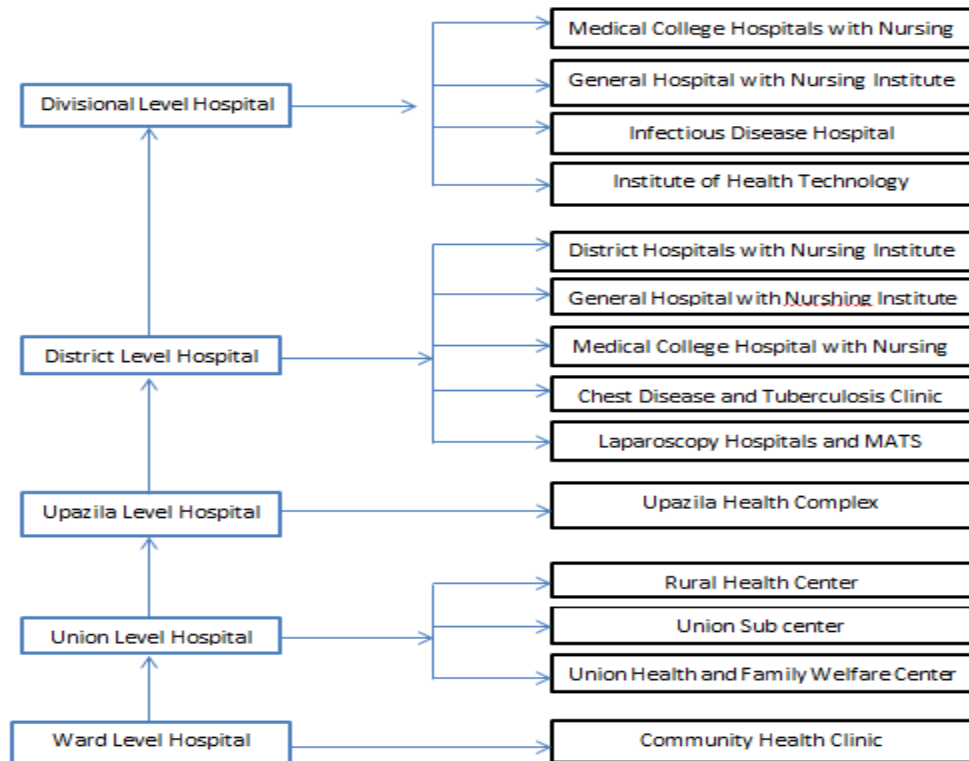


Figure 1.3: Health facilities structure of Bangladesh [1]

Primary health care is provided to people in rural areas of Bangladesh through wards and unions. Secondary health care facilities are provided to the people of Bangladesh at district and divisional level. Ward or district hospitals have less healthcare than city hospitals. There

are a number of Bangladeshi hospitals that provide high quality healthcare. Since Bangladeshi hospitals are limited in providing high quality healthcare, we can get health care from specialist doctors.

Bangladesh has made significant progress in developing and setting up telemedicine services in government hospitals across the country. The first telemedicine service in Bangladesh was launched in 1999[1]. The telemedicine service was store and forward based. Its progress has been initiated by many government and non-government government and non-government organizations.

1.3 Motivations of the Research

At present, Bangladesh is a developing country. In 2026, Bangladesh will enter the middle-income country. Improving health is a basic need for the people of the country. At present 61.82% people live in rural Bangladesh where healthcare facilities are very limited in Bangladesh. Most of the specialist doctors and healthcare centers in Bangladesh are city-based. Rural people have to travel from village to town to get proper health care. Bangladesh has a shortage of specialist doctors; a limited number of people in rural areas can get the services of specialist doctors. Considering the current situation in Bangladesh, utilizing telemedicine services which could be a suitable tool would benefit the rural people of Bangladesh through local health centers in Bangladesh. We have conducted a survey on current telemedicine in Bangladesh on specialist doctors, village doctors, condition of pharmacy Bangladesh and patients. The results of the survey are the main motivation for this research.

1.3.1 Survey Questionnaire

To conduct our research, we conducted a survey in which questions were asked about rural doctors, rural patients, specialist doctors, and pharmacy owners. We have seen that most of the people in Bangladesh live in rural areas. For them our questions were asked in Bengali and English since Bengali is our mother tongue, questions were made in English as well as Bangla for a better understanding of the people. There are 24 questions in the questionnaire for specialist doctors that consider their participation, expectations, roles, and financial issues. We collected data from local doctors, patients, and pharmacy owners in the same way. 17, 18, and 20 different questions were asked in each set. So 79 different questions have been analyzed for the four stakeholders. 490 copies of questions have been prepared for data collection. Sent online and offline and 461 were collected from different respondents.

Table 1.2: Summary of survey data collection

Target Person	Distributed Question	Collected Question	Percentage
Expert Doctor	40	26	65%
Local doctor	100	100	100%
Patient	300	300	100%
Pharmacy owner	50	35	70%

From the summary of the table 1.2, we can see that average acceptance rate of the questionnaires are 94.08%. Microsoft Excel is a spreadsheet created by Microsoft for Windows, macOS, and iOS. It includes a macro programming language called Visual Basic for Computing or Computing Power, graphing tools, pivot tables, and applications. We used Microsoft's statistical features for analysis. We got the result by extracting pie charts using the Microsoft function. Our survey estimates how much rural people know about telemedicine, the opinion of doctors, the condition of doctors for poor rural people.

1.4 Scope of Research

1.4.1 Research Context

We have seen that many developing countries in the world have faced many problems in providing health care. The people of the city are abandoning the healthcare of specialist doctors and not enough services for the rural people. If we talk about healthcare in Bangladesh, it is seen that people in urban areas get all the facilities starting from specialist doctors, but people in rural areas do not get all kinds of facilities. For healthcare solutions for people in rural areas, telemedicine can be an alternative and important solution.

Our proposed telemedicine system combines an advanced and proactive approach with local doctors, pharmacies, and specialist doctors. Through this proposed system, healthcare can be easily accessed to the people in rural areas.

Our research is about rural people so that they can easily get telemedicine services from their area. In this study, patients will be able to receive telemedicine services at home or at a local pharmacy for telemedicine services. Through the findings of the research, a secure and advanced telemedicine system will be created for Bangladesh.

1.4.2 Functionality and Performance

Important patient data is required for specialist doctors to take telemedicine health care in an automated manner. A system will be set up to collect information on rural diseases the patient will first register in this system and then get the services of a specialist doctor.

Local physicians will examine patients' primary health care for important information the report of the local doctor has to be submitted. The specialist doctor will examine the report and take necessary steps for the patient. We have seen in our research that there is a shortage of local doctors in rural areas. Healthcare can be extended to rural areas through telemedicine.

1.5 Research Objectives

A large number of people living in rural areas of Bangladesh can be provided health care through telemedicine. In our research, we have found the problems of health care in rural areas. People in rural areas do not get advanced treatment like in urban areas. People in rural areas will be able to seek the advice of specialist doctors in the city through telemedicine services. Telemedicine services will be delivered to the rural people through this system.

Most people in Bangladesh live in rural areas where healthcare is inadequate. Patients in rural areas have to travel to urban areas to seek the services of specialist doctors. The cost of service is constantly increasing. Telemedicine services will also play an important role in solving this problem. Using this system will greatly reduce the cost of healthcare for rural people. In order to receive telemedicine service fees from remote or rural patients, a mobile payment system needs to be introduced. The security of the telemedicine system is very important because it contains all the information.

1.6 Research Methodology

This section presents the steps of our work. These research methods and various data collection processes are used.

Firstly, we've created an ideal question to start our work on telemedicine. Questionnaires have been prepared in four sections with expert advice to prepare the questionnaire which includes patient, place doctor, specialist doctor and pharmacy owner.

Secondly, we conducted a survey of patients, local doctors, specialist doctors and pharmacy owners to gather information. They have been questioned off-line and on-line we were able to collect data from 461 people.

Thirdly, we process and analyze basic data using Microsoft Excel for data analysis.

Fourth, an improved system will be created by analyzing the reports at the field level. As if usable. Rural people will get better facilities.

Chapter Two

Review of Literature

2.1 Introduction

When did telemedicine first become popular? On-demand healthcare has long been a coveted item, from house calls to urgent care clinics. After all, no one plans on getting strep throat or a twisted ankle. The modern patient expects 24-hour access to their doctor, and physicians can now monetize distant support through telemedicine. Facetime and Skype may appear to be new, but telemedicine has been available for much longer than most people realize—since the first half of the twentieth century.

Radio transformed communication in the early 1900s. It wasn't long before innovators imagined how doctors could attend to patients over the radio, inspired by radio's rising importance in every industry from entertainment to national security. Under the headline "The Radio Doctor—Maybe!" in a 1924 issue of Radio News Magazine, an illustration of a doctor attending to a patient through video call is featured. This was merely an editor's vision of future technology at the time, but 90 years later, these aspirations would come true [9].

When did telehealth actually begin? In the 1940s, radiological images were conveyed 24 miles by telephone line between two townships in the world's first example of an electronic medical record transfer. In the 1950s, a Canadian doctor constructed a teleradiology system that was utilized in and around Montreal, based on this technique. As these methods grew in popularity, so did motion movies, and with contemporary film technology came serious ideas for video medicine. Clinicians from the University of Nebraska were the first to employ video communication for medical purposes. In 1959, the university put up a two-way television system to broadcast material to medical students across campus, and five years later, it connected with a public hospital to conduct video consultations.

The authors hoped to contribute to the whole story of telemedicine, the evolution of relevant information and communication technologies, and the broader healthcare environment, which dates back to ancient societies and continues to the present. They investigated the origins of current telemedicine applications in Europe, finding that they were pioneered in 1905 by a Dutch physician, Willem Einthoven, who used long-distance ECG transmission. After reviewing multiple sources, the authors can testify that the earliest clinical application of telemedicine was in cardiology, not radiology, as some may have claimed. In the 1920s, 1930s, and 1940s, patients' onboard ships at sea and on remote islands received radio consultations from medical centers in Norway, Italy, and France. Transmission of

radiographic pictures began in the early 1950s in the United States, followed by similar trials in Canada shortly after. In the late 1950s, the first structured telemedicine initiatives arose in the United States. It lasted nearly two decades until coming to an end when extramural funding was cut off. This was followed by a nearly ten-year break until a fresh wave of telemedicine initiatives and programs emerged on a far larger scale than its predecessor. In the United States and Canada, state and provincial initiatives spearheaded the last wave [10].

The University of Nebraska's research was based on the fact that telehealth technology now serves many rural populations without access to local physicians. Telemedicine made its debut in metropolitan settings in the early 1960s, with an emphasis on emergency treatment. In 1967, the University of Miami School of Medicine teamed up with the local fire department to send electrocardiographic rhythms to Jackson Memorial Hospital through radio. Remote medicine was now available to the general public [11].

Access to health care in Bangladesh is mostly concentrated in metropolitan regions. This indicates that there is a significant health-care disparity between rural and urban communities. According to the World Health Organization, 70% of Bangladeshis reside in rural areas.

Telemedicine is a relatively new development in Bangladesh. It first arrived in Bangladesh's rural areas in 1999, where medical care was difficult to come by. While early treatment lacked key technology infrastructure, the recent growth of bandwidth and networks into remote regions has made telemedicine more accessible to Bangladeshis.

Furthermore, the Bangladeshi government has established new telemedicine programs to help with health-care demands. In order to promote telemedicine organizations, the government formed the Bangladesh Telemedicine Association in 2001. The Sustainable Development Network Program was established in 2003 to encourage collaboration between diverse providers.

Every week, a boat transports laptops, medical equipment, and prescription printing devices to Bangladesh's remote districts. Individuals in need of medical attention can go to temporary medical clinics where they can get online access to doctors. These exams are comparable to those provided by established medical centers, in which patients can describe their ailment, ask questions, and receive prescribed medications.

Telemedicine is useful in Bangladesh for more than just treating illnesses. Individuals may also use this new technology to ask inquiries about their personal development, their child's development, and their nutritional needs. For many, this is a life-changing experience that not only aids in the treatment of illness but also broadens people's general knowledge and understanding who previously did not have such opportunities.

In 2018, a new telemedicine technique was introduced in Bangladesh. According to NPR, Teledaktar (TD) is the newest virtual medical service that is helping to expand access to medical treatment. By establishing improvised medical clinics in rural areas with little access to health care, TD is bridging the gap between doctors and patients in the country's most remote districts [12].

Despite the hurdles, Bangladeshi citizens can obtain appropriate health care. The incorporation of telemedicine into regular health care practices is one breakthrough in improving health care. Increasing the number of qualified physicians and expanding rural health facilities are two significant achievements in Bangladeshi health care. Furthermore, the government's launch of a stakeholder engagement with the United Nations Human Resource for Health (HRH) has resulted in more effective dialogues advocating for health-care expansion across the country. The future of medicine in Bangladesh is bright, thanks to new programs, partners, and technologies.

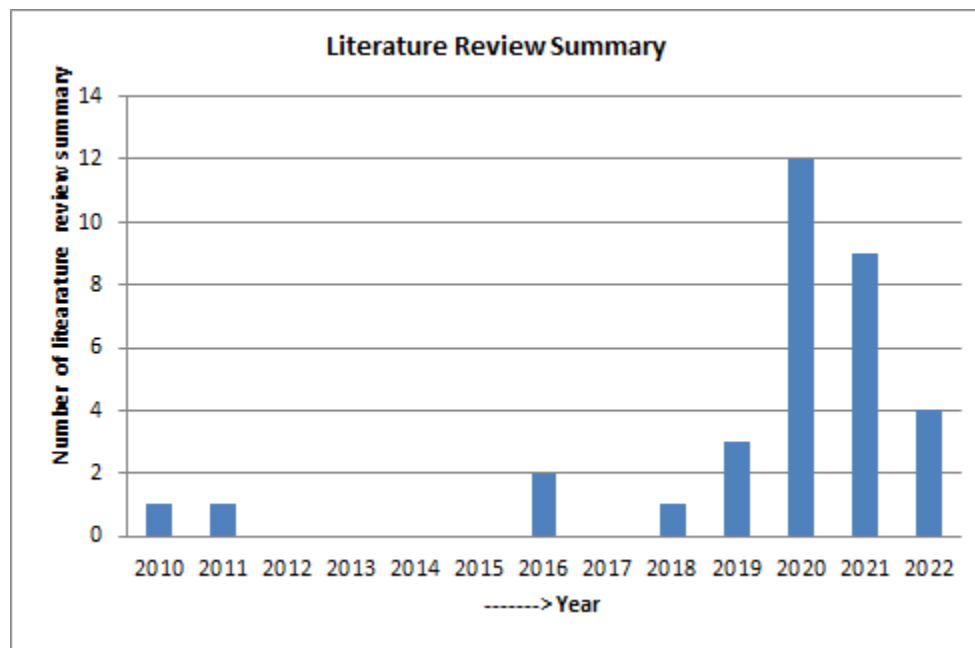


Figure 2.1: Year-wise literature review scenario

In this study, we'll create a cutting-edge, long-lasting telemedicine system for third-world rural populations. With the support of local and skilled doctors, distant residents will receive affordable basic healthcare services through the remote center. Reviewing freshly released studies will help us achieve the aim.

The telemedicine systems' technological components are also examined. This chapter finally suggests the parameters based on the analysis will be a part of the telemedicine system that is being developed.

2.2 Research on Telemedicine

This section discusses recent telemedicine activities by country, with the goal of demonstrating how recent research is expanding telemedicine services for the benefit of the global population. The chart 2.1 shows a summary of the literature review for each year. We will identify the key parameters that need be addressed in our proposed research to meet the standards of standard telemedicine after reviewing the related research.

2.2.1 Research of Telemedicine in Maldives

Early methods for prevention and containment of COVID-19 in the Maldives in 2020 were developed by Mariyam SUZANA and the researchers. According to the authors, the Maldives welcomes over one million visitors each year, putting it at danger of importing epidemic-prone diseases; it also has one of the world's most congested capital cities, giving it an ideal setting for infectious diseases. The authors' work discusses early COVID-19 prevention and containment strategies that helped delay the pandemic's introduction into the country and contained the initial wave of the outbreak in the Maldives.

Authors assess The Maldives' government took its first public health actions in January, and by March 2020, it had implemented over 200 interventions to combat the COVID-19 outbreak. Unlike many other countries, which imposed restrictions for weeks at a time, the Maldives utilized a progressive intensification strategy, enforced targeted restrictive measures rather than a national lockdown, and used a variety of communication tools to educate and involve the population. The public-private partnerships investigated were effective in both minimizing the loss of revenue to the tourist industry and breaking the transmission chain. The Maldives delayed the pandemic's arrival by around 90 days, and their testing rate remained the fourth highest among UN Small Island Developing States and the highest among South East Asian countries.

The author explains that managing a global pandemic in a resource-constrained, tourism-dependent, and import-oriented vulnerable economy necessitates decisive leadership, multi-stakeholder collaboration, strategic partnerships, and a prioritization of public health measures over economic considerations. To combat community transmission of the disease, more stringent procedures and stricter compliance are required [13].

2.2.2 Research of Telemedicine in Nepal

Saraswati Dawadi and the other researchers worked on Education Sector in Nepal during covid-19 period. The authors looked at how the Novel Coronavirus, also known as COVID-19, has wreaked havoc on all sectors of human existence, including schooling. The virus's

rapid spread wreaked havoc on the educational system, forcing educational institutions to close.

According to UNESCO, 1.6 billion children in 191 countries have been extremely malnourished. The temporary closure of educational institutions has had an impact. To lessen the impact, In diverse situations, educational institutions have reacted to the closure in different ways. Depending on the situation, kids, teachers, supervisors, and parents have a variety of possibilities. They have both material and human resources at their disposal.

According to the authors, to provide at least some form of educational continuity, most of the solutions must incorporate innovative technology (e.g., digital and mobile technologies paired with classic technologies such as radio and television). Because remote and online education rely on technology resources such as the internet and Wi-Fi, disparities in their availability are growing access and education quality differences. The impact of COVID-19 on the Nepalese education system is examined in this article, with an emphasis on school education. The essay presents a critical analysis and reflection on the opportunities and challenges the pandemic on education systems, available documents, reports, and news opinions. The findings of the authors suggest that the epidemic has had a significant influence on kids' learning and well-being, and that it may be widening the gap between advantaged and underprivileged children in terms of fair access to excellent education. Furthermore, the data reveal that Nepal has created a variety of ICT and education-related policies since 2000; nevertheless, the issues it is facing with Covid-19 are primarily due to its inadequate implementation techniques and incapacity to put such policies into effect [14].

During the Covid-19 period in Nepal in 2020, Dhana Ratna Shakya and the other researchers worked on Situation, Endeavors, and Future Direction. Authors' explanation COVID-19 infection spread quickly in Nepal, reaching the country within a month after its first appearance in China in December 2019, affecting all aspects of life and society, including health and education, as it did in other nations. We are unprepared for this new threat, which includes many unknown facts and uncertainties, at a time when well-developed systems based on modern science and technology appear to be drowning as well. We are attempting to assess our current position (trend) and reflect on the lessons (observations and messages) that we have drawn in many important areas of the B. P. Koirala Institute of Health Sciences' operations. We have been increasingly aware of the pandemic's negative consequences on academic, service, and research efforts, as well as all other areas. Authors Despite the difficulties, we were obliged to take small moves in a trial-and-error manner. This pandemic has exacerbated our health problems system into the surface and provides the ability to review, amend, and reform them. for everything students, patients, clients, teachers, faculties, personnel, and authorities are all stakeholders for fruitful travel, all must be in a healthy, balanced, and functional state [15].

2.2.3 Research of Telemedicine in China

Fang fang Cui and the other researchers worked on telemedicine in China regional telemedicine platform in 2021. In this research, the authors focused on a regional telemedicine platform that was established in 2014. To comprehend the deployment and service delivery procedures of a representative telemedicine platform in China, Authors examined the system design scheme and remote consultations done via the system.

The authors used a regional telemedicine platform with a centralized architectural system architecture to collect data on remote consultations done from 2015 to 2020. The authors employed graphs and statistical tools to describe the shifting patterns in remote consultation service volume, patient geographical and demographic distribution, and consultation waiting time and length. Multivariable linear regression models and binary logistic regression models were used to investigate the factors that influence consultation length and patient referral, respectively. The snowball sampling approach was used to get the opinions of 225 medical practitioners and 225 patients about telemedicine.

The authors got All levels of medical institutions and hospitals in all 18 cities of Henan Province, as well as some interprovincial hospitals, are covered by the regional telemedicine platform. Between 2015 and 2020, the platform handled 103,957 remote medical consultations, with an annual growth rate of 0.64 percent. 86.64 percent (90,069/103,957) of medical institutions (as clients) that applied for remote consultations were from less-developed regions, while 65.65 percent (68,243/103,945) of patients who applied for remote consultations were over 50 years old. Departments specializing in the treatment of chronic disorders, such as neurology, pulmonary medicine, and cancer, had a high number of consultations. The invited experts were mostly senior doctors with extensive expertise.

The Authors presented that the growth of telemedicine in China is on the rise and offers significant benefits, particularly to medical institutions in less developed areas and older individuals with limited mobility. The majority of remote consultations are for chronic illnesses. Both patients and medical professionals realize the value and necessity of telemedicine at this time. However, in order to improve the efficiency of remote medical services, the waiting time must be decreased further [16].

Fangfang Cui and other scholars collaborated on a cross-section study of telemedicine in China in 2020. The author emphasizes that while telemedicine is widely employed in China and has benefited a huge number of patients, little is known about its overall development.

The authors' goal was to conduct a countrywide survey to determine the overall installation and application of telemedicine in Chinese tertiary hospitals and to offer a scientific foundation for future telemedicine expansion.

Data was collected from 161 tertiary hospitals in 29 provinces, autonomous areas, and municipalities using the authors' approach of probability proportionate to size sampling. To compare the evolution of telemedicine, encompassing management, network, data storage,

software and hardware equipment, and telemedicine application, graphs and statistical tests were used. The association between these parameters and the telemedicine service effect was investigated using ordinal logistic regression. The author acquired Approximately 93.8 percent (151/161) of tertiary hospitals provided business-to-business telemedicine services. The virtual private network was the most extensively used type of telemedicine network, accounting for 55.3 percent (89/161).

Only a few tertiary hospitals haven't implemented data security and cybersecurity protocols. 100 (62.1%) of the 161 hospitals that took part in the survey used remote videoconferencing powered by hardware rather than software. Teleconsultation, remote education, telediagnosis of medical images, tele-electrocardiography, and telepathology were the top five telemedicine services implemented in hospitals, with coverage rates of 86.3 percent (139/161), 57.1 percent (92/161), 49.7% (80/161), 37.9% (61/161), and 33.5 percent (54/161), respectively. The average annual volume of teleconsultation cases per hospital was 714. The main charging services were teleconsultation and telediagnosis. The use of direct-to-consumer mode ($P=.003$), support from scientific research funds ($P=.01$), charging for services ($P=.001$), number of medical professionals ($P=.04$), network type ($P=.02$), sharing data with other hospitals ($P=.04$), and expertise level ($P=.03$) were all found to be related to the effect of teleconsultation in multivariate analysis. The effect of remote education was found to be strongly influenced by direct-to-consumer method ($P=.01$), research financing ($P=.01$), pricing for services ($P=.01$), formation of professional management departments ($P=.04$), and 15 or more instances of remote education per month ($P=.01$).

According to the authors, a range of telemedicine services have been adopted at tertiary hospitals in China with promising results, but telemedicine's sustainability and further standardization in China are still a long way off [17].

2.2.4 Research of Telemedicine in Pakistan

Fibha Syed and the other researchers proposed on telemedicine center in Pakistan for a tertiary care hospital in 2021. According to the authors, telemedicine is the creative use of technology to deliver remote patient healthcare services, particularly in the areas of emergency care and disease transmission.

In low- and middle-income nations like Pakistan, telemedicine is less developed, and there is little published literature on its function and efficiency. To relieve the burden on emergency rooms, their facility was created to triage individuals with COVID-19 symptoms.

In this research, the authors investigate the first month of operation of a Pakistani telemedicine/tele-triage facility. To see how it helped hospital administration during the COVID-19 pandemic. Between March 26 and April 25, 2020, the authors conducted research at the newly created telemedicine/tele-triage facility at the Shaheed Zulfiqar Ali Bhutto

Medical University (SZABMU) in Islamabad, Pakistan. Data was collected using a proforma over the phone to provide each caller with a C-Score (a C-score of >3 indicated observe at home, 3–5 indicated home isolation with confirmatory testing, and >5 indicated testing and transfer to hospital) that represented their COVID-19 risk and informed the nature of the advice given to them. Descriptive statistics were used to present the data. A total of 857 calls were received by the facility. Fever, cough, dyspnea, and flu were reported by 327 (38.2%), 268 (31.3%), 107 (12.5%), and 124 (14.5%) callers, respectively. Based on the proforma completion, 774 (90.3%) callers had a C-Score of > 75 (8.8%) callers had a C-Score of 3–5, and 8 (0.9%) callers had a C-Score of >5. Based on C-score, we advised COVID-19 testing to 83 patients (9.68%). Only one of the 83 individuals tested positive for COVID-19 out of the 64 who were tested. Authors were introduced. During a global pandemic, the center was able to support patients by offering a triage service, saving several unnecessary hospital trips and aiding in the protection of healthcare workers. Telemedicine holds a lot of promise for patients in low- and middle-income nations [18].

In 2021, Ayesha Humayun and her colleagues worked on healthcare strategies and initiatives. COVID-19 pandemic, according to the authors, is one of the world's most devastating disasters, posing a serious public health hazard. Low and middle-income nations (LMICs) are attempting to cope with the quickly changing global scenario while also attempting to reduce the epidemic and economic recession that has engulfed the world. This pandemic has caused huge changes in global and regional health-care delivery, with an increase in telemedicine to provide the essential services and a focus on disease control [19].

In 2021, Syed Sarosh Mahdi and other scholars embarked on a systematic review of telemedicine in Pakistan. Authors assess Telemedicine allows doctors to provide medical care to patients who are far away, and it has a lot of potential in underdeveloped countries like Pakistan. Telemedicine overcomes logistical challenges, supports ailing health systems, and aids in the formation of global networks of healthcare specialists. Due to the high level of implementation because of the high costs, low- and middle-income countries have failed to implement telehealth systems. The authors' goal is to give a review of Pakistan's region-based telemedicine services.

The writers' investigated Documents were found using databases such as PubMed (Medline), CINAHL (Cumulative Index to Nursing and Allied Health Literature), Scopus (EMBASE), and Google Scholar. To assess study quality, the Newcastle-Ottawa Scale (NOS) was used. The Newcastle-Ottawa scale determined that many of the papers included in the review (n8) were of good quality. Different indicators such as publication year, sample size, study design, techniques, motivation, and outcomes were used to further examine selected study features.

The authors' investigation yielded 955 publications, of which 11 were finally chosen for the review. These studies were also dubbed "region-based telemedicine implementation." Eight

of the 11 studies were done in Pakistan's metropolitan areas, while three were conducted in the country's rural parts. Many research has produced evidence on smartphone-based telemedicine interventions such as SMS, applications, and web-based telemedicine.

According to the authors, telehealth interventions such as mHealth, eHealth, telemedicine, and tele pharmacy have been used in Pakistan for the past two decades. These technologies must, without a doubt, become an important component of Pakistan's current health system in order to reap their full benefits [20].

2.2.5 Research of Telemedicine in Japan

Timothy Bolt and the other researchers worked on Therapy Characteristics for Psoriasis in Japan. Authors assessed with the advancements in psoriasis treatment, a number of clinical research and therapeutic alternatives are being investigated. A discrete choice experiment (DCE) was utilized in this study to determine treatment characteristic preferences for patients and physicians in Japan. Subgroup analysis was also used to look at differences between groups of patients and physicians.

The DCE was created with the input of clinical professionals in the treatment of psoriasis to ensure that the most relevant features were included at suitable levels in a way that was clear to both physicians and patients, according to the authors. Through an online panel, the study was conducted on parallel samples of Japanese physicians (n=161) and Japanese psoriasis patients (n=306). To estimate respondent preferences for treatment features, a conditional logit statistical model and subgroup analysis were used for each sample.

Better treatment efficacy, as measured by the proportion of patients achieving a 90 percent reduction in the Psoriasis Area and Severity Index score (PASI 90), lower risk of adverse events, and the availability of a bio-holiday are all important decision factors for both patients and physicians, according to the authors. For both samples, a low injection frequency is less important.

Furthermore, while both groups show a preference for receiving therapeutic injections from a healthcare professional rather than self-injecting at home, the patient sample shows a stronger preference. Although both samples prefer subcutaneous injections to intravenous injections, the physician sample places a greater importance on the type of injection.

The need of addressing both clinical efficacy and procedural issues in systemic, non-topical psoriasis treatments in order to secure physician and patient acceptance is highlighted in this study. In addition to efficacy (as evaluated by PASI 90), which is still a top priority in therapy, administration and development of novel medicines should also include process aspects including mode of administration and the possibility of a bio-holiday [21].

2.2.6 Research of Telemedicine in India

During COVID19 in India in 2021, Sambit Dash and other researchers worked on telemedicine. According to the authors, a nearly twelve-week nationwide shutdown in India during the COVID-19 outbreak limited access to routine healthcare. As a policy reaction, India's Ministry of Health and Family Welfare, which oversees telemedicine, established the country's first telemedicine guidelines. The authors argue that: guidelines must be expanded to address ethical concerns about the use of privacy, patient data, and storage; limited access to the internet and flaws in the telecom infrastructure impede widespread adoption of telemedicine; only by simultaneously improving both will telemedicine adoption become equitable; Indian medical education curricula should include telemedicine, and India should rapidly extend training to practitioners. They conclude that investing in telemedicine has numerous beneficial externalities for low- and middle-income countries (LMICs), including India, and that using this option can make healthcare more accessible and equitable in the future [22].

2.2.7 Research of Telemedicine in Sri Lanka

Dayani Jayasinghe and her colleagues studied the telemedicine adoption paradigm in Sri Lanka. The authors present the findings of a study that looked at the elements that influenced the spread of telemedicine in Sri Lanka's rural districts. A model was built based on a literature review, expert evaluation, and field research that included clinicians, hospital employees, and members of the general public from both rural and urban areas in three districts of Sri Lanka.

Officials from the health ministry, medical directors, and urban consultants were also contacted. The impact on culture, technology, and infrastructure when implementing a telemedicine system in rural parts of Sri Lanka was investigated using quantitative data from questionnaires and qualitative data from interviews. The Telemedicine in Sri Lanka (TMSL) model is discussed, which highlights the barriers to telemedicine acceptance in Sri Lanka. When installing a telemedicine system in Sri Lanka's rural areas, it is critical to have a thorough awareness of the country's culture as well as additional computing abilities [23].

Gumindu Garuka Kulatunga and other academics in Sri Lanka worked on telehealth during the Covid19 program in 2020. The pandemic of the Coronavirus Disease of 2019 (COVID-19) has forced healthcare workers to work with physical separation; as a result, telemedicine and telehealth are gaining traction.

Despite the fact that telemedicine/telehealth is a major component of healthcare in most modern countries, Sri Lanka has yet to fully realize its promise. The digital health ecosystem

is made up of numerous interconnected systems with the common purpose of delivering healthcare.

According to the authors, telemedicine solutions such as video conferencing, audio consultations, tele prescriptions, and prescriptions sent through SMS have all appeared in Sri Lanka over the last decade. These were created on the spur of the moment. As a result, both the medical community and the general public must grasp how Telemedicine and internet-based prescribing enable local healthcare delivery. The authors examine the current state of Telehealth services in Sri Lanka and address the need for laws to ensure that these services are used to their full potential [24].

2.2.8 Research of Telemedicine in United States, United Kingdom and Australia

On covid19 in 2020, Malcolm Fisk and his colleagues worked on telehealth possibilities. The authors look at how far Australia, the United Kingdom, and the United States promoted telehealth as a tool to help identify COVID-19 among older people who may live alone, be frail, or be self-isolated, as well as provide support to or facilitate the treatment of people who are or may be infected in the two weeks following the pandemic announcement.

Authors report on activities and initiatives undertaken by governments or their agencies (at national or state levels) in the three nations during the previous two weeks, as well as publications or recommendations issued by professional, trade, and philanthropic organizations. Various sources of information are consulted, all of which point to the potential benefits of telehealth in combating the epidemic. Except where telehealth is considered as a component, the objective of this study is not to gather or evaluate information that represents expanding knowledge about COVID-19.

According to the authors, the image that emerges for the three countries based on the recognized sources reveals a number of variances. These distinctions are centered on the nature of their health services, the amount of attention given to older people (and the conditions that can relate to them), different geographies (particularly rurality), and potential funding adjustments. The importance placed on maintaining quality safeguards in the context of their health services is shared by all three countries, even though such services are sometimes cited as preventing significant telehealth use.

Authors' response to the situation the COVID-19 epidemic is driving change, which could help telehealth gain traction in the aftermath. Some of the modifications might not be permanent. However, the momentum is such that telehealth will almost surely gain a deeper foothold within each of the three countries' health service systems, as well as growing acceptance among patients and health care providers [25].

Asim Kichloo and his colleagues worked on telemedicine for the current COVID-19 epidemic and its future in the United States in 2020. The authors performed research to assess the current state of telemedicine use in the context of the current COVID-19 epidemic and to assess the merits of continuing to use telemedicine in the future. Authors worked on telemedicine-related articles.

PubMed, Google Scholar, Cochrane Library, and Ovid MEDLINE were among the databases searched. Articles were chosen by three reviewers independently based on their relevance to the writers' topic. The authors searched for articles about telemedicine between 1990 and 2020 using the following keywords: telemedicine, telehealth, policy, COVID-19, regulation, rural, physical examination, and future. We found 60 articles in total, and after careful selection, we reduced the number to 42 articles that were relevant to our topic. Over the last few decades, telemedicine has advanced at a breakneck pace.

Issues with regulation and reimbursement have impeded its complete integration into the healthcare system, according to the authors. The Centers for Medicare and Medicaid Services have increased access to telemedicine services during the current pandemic.

Telemedicine's cost-effectiveness, ability to broaden access to specialty services, and potential to assist reduce the future physician shortage are all advantages moving forward. Lack of technology resources in some sections of the country, issues with patient data protection, and difficulties doing traditional patient examinations are all disadvantages. The authors elaborated. Changes must be taken in order to completely integrate telemedicine services into the healthcare landscape in order to be prepared for future pandemics and to reap the benefits of this service in the future [26].

2.2.9 Research of Telemedicine in Italy

During the COVID-19 Health Emergency in 2020, Ferorelli D. and other researchers worked on Telemedicine in Italy Medical Legal Aspects. Authors discussed Specialist Telemedicine, Tele-health, and Teleassistance are the three broad categories of telemedicine services. The Agreement between the Government and the Regions on the document bearing the title "Telemedicine—National guidelines," approved by the General Assembly of the Superior Health Council in the session of July 10, 2012, and by the State Regions Conference in the session of February 20, 2014, represents the first regulatory provision dedicated to the implementation of Telemedicine services in Italy. In terms of planning and making proper decisions that give timely tools to patients, various studies in the literature claim that information and communication technologies have significant potential to lower health-care expenditures. The fairness of access to health care is another apparent benefit.

According to the authors, the evolution of telemedicine poses a number of legal issues, ranging from authorization and accreditation profiles to patient confidentiality issues, the

definition and resolution of which, in the absence of specific regulatory provisions, is largely left to the assessment of the practices adopted thus far with the general regulatory framework. In terms of professional liability, it is vital to first establish that telemedicine is akin to any diagnostic therapeutic health service, given that it does not replace traditional health care but rather combines it to increase its efficacy, efficiency, and appropriateness [27].

In 2016, Roberta Pinna and other researchers worked on a Telemedicine project in an Italian region dedicated to healthcare excellence. The authors' goal is to illustrate how employing telemedicine to build a hub and spoke architecture can improve the quality of care in rural and remote places.

The authors used a case study approach, which was preceded by a quick theoretical focus on the function of the hub and spoke model and telehealth in improving healthcare service quality. The Remote project (resources and organizations models in telecardiology) was developed by the Department of Pediatric Cardiology of Brotzu, a tertiary hospital in Sardinia located in Cagliari (Italy), and CRS4 (Center for Advanced Studies, Research and Development in Sardinia) with the goal of developing a real-time low-cost telemedicine platform capable of supporting clinicians with the telepresence of a specialist in real time during echo cardiometry. When supported by organizational design, the authors believe that real-time telemedicine can promote novel treatment models while also supporting rational and effective resource use. The limits of the authors' research are related to the specific case studied; additionally, the conclusions are supported by other studies on health organizations. The hub and spoke approach, which is supported by telehealth adoption by health organizations, is advocated by the authors of this study.

The findings of the authors' study have normative relevance, and their implications can be applied to various clinical scenarios that require operator-dependent diagnostic procedures [28].

2.2.10 Research of Telemedicine in Europe

Authors worked on telemedicine in market study in Europe. The study's authors want to look at the European telemedicine sector and see what variables are influencing its growth. The study depicts telemedicine applications and solutions, as well as relevant technical standards and guidelines. It also discusses market dynamics and potential impediments to telemedicine solution adoption. Finally, the study evaluates the cost-effectiveness of larger-scale telemedicine deployment under present and future market conditions, in order to offer policymakers with recommendations and considerations for telemedicine deployment.

The primary and secondary data were analyzed using both qualitative and quantitative methodologies to fulfill the study's goal. A survey and interviews with key stakeholders in the

telemedicine market ecosystem are part of the first phase Scientific journals, research reports, and statistical data are all examples of the latter.

The authors of the paper acknowledge that EU policymakers have taken a number of successful steps to promote telemedicine use. Raising public awareness about the benefits of telemedicine, supporting large-scale projects where telemedicine can be tested and its benefits assessed, and legislative interventions by the EC or MSs to address some of the barriers to telemedicine adoption in the EU are all examples of additional interventions that would support wider deployment and uptake of the technology [29].

2.2.11 Research of Telemedicine in Germany

During the COVID-19 Pandemic in 2020, Arne Peine and other researchers in Germany worked on Telemedicine. Authors worked to contain the consequences of the coronavirus disease (COVID-19) pandemic by implementing telemedical solutions to address staffing, technical, and infrastructural challenges. A variety of telemedical technologies are already in use in Germany, and new techniques are being developed at a quick pace in response to the problem. However, the scope of current application in various health-care settings, as well as user acceptance and perception, as well as technological and legal roadblocks, are all unknown.

The authors' goal with this article was to analyze the current state of telemedical solutions' availability and everyday use, as well as user approval and subjectively felt burdens. Furthermore, the authors want to know how professional groups perceive the quality of public information and what communication channels they prefer.

A total of 2827 medical experts took part in the study, according to the authors. 65.6 percent (n=1855) of the professionals were doctors, 29.5 percent (n=833) were nurses, and 4.9 percent (n=139) were other professions such as therapeutic staff. A large majority the importance of telemedicine in the crisis was judged as high (1065/2730, 39%) or neutral (n=720, 26.4%) by participants.

However, substantial disparities existed between doctors and nurses ($P=.01$), as well as between the stationary and mobile sectors. ($P.001$) to the ambulatory sector For 19.6% (532/2711) of German health-care practitioners, telemedicine was already standard practice. 40.2 percent (n=1090) were in partial use. Private practices (239/594, 40.2 percent) and private clinics (23/59, 39.0 percent) participants in comparison to university hospitals, they faced fewer regulatory or technological challenges (586/1190, or 49.2%).

On COVID-19, the majority of doctors rated public information quality as good (942/1855, 50.8 percent) or very good (213/1855, 11.5 percent); nurses rated it substantially lower ($P.001$). The participants' age was negatively related to their judgment of the importance of telemedicine ($=-.023$; $P.001$). According to the authors, telemedicine is well-liked by German

doctors. Technical and regulatory hurdles must be solved before telemedical structures can be implemented in normal care [30].

During the COVID19 in 2021, G. Lakshin and other researchers in Germany worked on Telemedicine in Pediatric Surgery. According to the authors, the COVID-19 epidemic has resulted in an unparalleled global spread of telemedicine services. The authors wanted to learn more about telemedicine in pediatric surgery in Germany, as well as the impact of the pandemic on its development and the experiences of parents and surgeons with it.

The authors conducted a cross-sectional analysis utilizing three polls conducted between June 2020 and October 2020: (1) All German pediatric surgery departments were asked if they offer telemedicine services. (2) Members of the German Society of Pediatric Surgery and (3) families who had an outpatient appointment by phone or video with the University Hospital Frankfurt's Department of Pediatric Surgery and Pediatric Urology completed an anonymous survey about their telemedicine experience.

The authors received In Germany, telemedicine was used by 21% of pediatric surgery departments, with 57 percent of those starting because of the pandemic. Surgeons and parents appear to be constrained by a lack of physical inspection and face-to-face contact. Telemedicine is equal to or better than regular appointments, according to 48 percent of parents, while 33 percent believe it is worse. According to the authors' research, both families and doctors have had favorable experiences with telemedicine, and the majority will continue to use it after the pandemic [31].

In 2021, Stephanie Dramburg and her colleagues worked on Telemedicine in Germany allergology. The wide-ranging contact restriction efforts in the context of the severe acute respiratory syndrome coronavirus 2 (SARS-CoV2) pandemic have also resulted to a reduction in physician-patient contacts in the ambulatory care setting, according to the authors, since spring 2020.

Telemedicine applications will become more common as a means of efficiently delivering medical care while maintaining infection control. Telemedicine and digital tools in allergology can potentially make daily clinical practice easier. However, in order for this to happen, the technological and legal barriers to implementing digital initiatives must be addressed.

The authors' goal with this paper is to present an understandable overview of the factors to consider when implementing telemedicine consultations, as well as to highlight the current status of the framework as well as optimization options and perspectives in allergology. Digital and telemedical applications, especially in allergology, can improve patient care if they are used in an organized way. Many areas, including distant collecting, have the potential to be utilized [32].

2.2.12 Research of Telemedicine in France

During the COVID-19 pandemic in 2021, Carine Milcent and another researcher focused on the application of telehealth in French teleconsultation for women's healthcare. According to the authors, Teleconsultation was rarely utilized in France prior to the COVID-19 pandemic. The sanitary crisis has increased the demand for teleconsultation and other digital technology-based treatments. Authors investigate how French teleconsultation for obstetrics and gynecology treatment was used before and during the sanitary crisis.

Before the sanitary crisis, the authors provided the global image of the teleconsultation setting, and then during the first quarantine and lockdown measures. The authors define three characteristics of teleconsultation: 1-use of teleconsultation in terms of provider capability; 2-use of teleconsultation in terms of technical features; and 3-use of teleconsultation for which sort of healthcare. Second, the authors looked into the characteristics that influence teleconsultation use and provider satisfaction with the practice.

The authors demonstrated the importance of training, as well as the importance of some key digital technology benefits, such as improving public health, responding to patient requests, and facilitating healthcare access, as well as the importance of some key digital technology drawbacks, such as lack of convenience and veracity (truthfulness).

The authors' findings inform the regulator on the motivation and needs of suppliers for teleconsultation adoption. The authors emphasized the requirements for effective teleconsultation [33].

In 2018, Abrar A. Zulfiqar and other researchers in France worked on Telemedicine for the Elderly.

The authors said that telemedicine is currently popular, allowing computer and communication tools to be used in a variety of fields of medicine, including cardiology, dermatology, and international research. Older folks are becoming increasingly concerned about this novel technique as the population matures. This is a narrative assessment of telemedicine programs in the realm of geriatric themes in France, as well as the literature and the Internet. Several telemedicine initiatives and studies focusing on chronic heart failure in the elderly, as well as in the field of dermatology, have been created since the beginning of the 2000s. Second-generation telemedicine projects' potential benefit in terms of mortality, morbidity, and the number of hospitalizations prevented is now being investigated.

The impact of the authors on health economics is also being explored, given that the economic and social benefits provided by telemedicine solutions have already been confirmed by the first telemedicine programs [34].

2.2.13 Research of Telemedicine in Bangladesh

During COVID-19 in Bangladesh in 2021, Sheikh Elhum Uddin Quadery and other academics worked on the consumer side economic perception of telemedicine. Telemedicine is one of the few sectors in Bangladesh that has been able to thrive under the current COVID-19 period. However, in order to grow, the sector needs to understand the perspectives of both consumers (those who want to use the company's services) and non-consumers. This should be done in order to get the most out of the situation profits must be maximized and users' utility maximized in order for the industry to be long-term viable.

The authors' main goal in this article was to examine both telemedicine users and non-consumers' economic perceptions Bangladesh's economic situation and the steps that must be taken to improve it. The respondents' health identification, the respondents' use of telemedicine, the authors' analysis of the respondents' economic behaviors with regard to telemedicine, and the consumer opinion of the pros and demerits of telemedicine were all covered by the 18 questions devised by the authors. According to the findings of the authors' survey, nearly a third of those who were exposed to COVID-19 used some sort of telemedicine. Hospital-mandated telemedicine services were used by 48 percent of telemedicine users, while mobile telemedicine apps were used by 41 percent. According to the authors' poll, 75% of respondents were happy with their service. The average payment made by the respondents was 532 Taka, and 62% of them considered the price was justified. The survey's findings can be used to develop economically feasible telemedicine models that provide maximum benefit to their users and help foresee the industry's next stage for improved health outcomes [35].

During COVID-19 in 2021, Mohammad Monirujjaman Khan and other researchers worked on telemedicine in Bangladesh. During the COVID-19 outbreak in Bangladesh, the authors discuss the impact of telemedicine use among patients and healthcare providers. Many countries are adopting non-therapeutic preventative measures as the coronavirus outbreak spreads worldwide, according to the authors' findings. Telemedicine is defined as the electronic transmission of medical data from one location to another. The use of information and communication technologies to provide healthcare support is referred to as telemedicine. Unless it is an absolute emergency, it is safer not to visit a hospital for consultation during the pandemic. Telemedicine plays a significant role in improving the quality and accessibility of healthcare services during a pandemic in this scenario.

The authors demonstrated the need of adopting Telehealth to deliver healthcare in the current (COVID-19) context, particularly as a means of reducing the danger of cross-contamination induced by close contact Bangladesh, like every other country, has begun to use telemedicine to deliver digital healthcare services. As the outbreak worsens, the authors discover that several telemedicine service providers in Bangladesh have expanded their operations to better serve the general public. The authors see telemedicine as a bridge between providing safe healthcare advice and maintaining the recommended social distance during the COVID-19 pandemic. The present COVID-19 scenario in Bangladesh was also discussed. Despite various limitations, the use of telemedicine in Bangladesh is highly important during the pandemic, according to the authors [36].

During COVID-19 in 2021, Saanjaana Rahman and other academics researched on Gender imbalance in telehealth usage in Bangladesh. According to the authors, telehealth allows healthcare workers to treat patients remotely in regions that were previously inaccessible, saving money and time while also saving lives. The authors want to look into the gender gap in telehealth usage during the pandemic in 2020. The authors' study will take advantage of a timely national experiment to assess telehealth users across the Bangladeshi population. The authors were able to collect de-identified data for 200 patients from the Global Health Data Exchange, which tracked telehealth use in Bangladesh.

The authors discovered that male patients were more reliant on telemedicine than female patients. Only 14 percent of female patients chose telehealth appointments, with 57 percent of missed medication doses, compared to 20 percent of male patients preferring telehealth visits and 29 percent missing their medication doses. The authors discovered that the youngest age group, 16–25, had the most reliance on telehealth of any age group, while the oldest age group, 45 years and beyond, had the lowest. The authors found a robust link between telehealth use and gender difference, with a p value of 14 0.02 0.05. To learn more about gender discrepancies and their impact on telehealth utilization, longitudinal and geographic data are needed [37].

In 2022, Habibur Rahman and his colleagues worked on the usage of Telemedicine in Bangladesh.

The authors argue that improvements in digital health will help health and medical systems greatly. Mobile health is one area of digitalization that has received a lot of interest in Bangladesh in recent years (mHealth). The use of mobile health technologies in the health industry in developing countries like Bangladesh offers enormous potential to enhance the quality, accessibility, and affordability of healthcare. According to the authors, a large percentage of individuals in developing countries, particularly those living in rural or distant locations, still lack or only have access to basic services. Business, social, and non-governmental organizations have all committed to investing a significant amount of money

in the construction of mobile healthcare infrastructure across the United States, according to the authors, The use of information and communications technology (ICT) in healthcare, particularly mobile health is quickly increasing in Bangladesh, according to the authors. Authors inquired about the current state of health.

The study's goals were to describe the introduction of mobile health, identify unmet health requirements, outline motion wellbeing in Bangladesh, and analyze ethical problems and impediments in the expansion of mobile health. While e-health in Bangladesh remains a challenge, the authors' findings show that it is possible. Given the current situation and difficulties, more progress in numerous areas of mHealth is essential.

This study's findings will benefit a wide spectrum of stakeholders, according to the authors. enable Bangladesh's health sector to make educated decisions on e-services and capital growth [38].

The Growth in Telehealth Use in Bangladesh in 2022 was researched by Saanjaana Rahman and other scholars. The authors investigate the rise of telehealth use among non-elderly patients in Bangladesh during the COVID-19 pandemic.

Authors studied telehealth visits and all health care procedures from 2019 to 2021 utilizing patients aged 18 to 64 from both inside and outside Dhaka. The critical inflection point was March 2020, when the COVID-19 epidemic was formally designated a national emergency. Age, gender, and socioeconomic index were all taken into account in the authors' analysis. The authors employed the DiD method to track the rise of telehealth use and then used logistic regression to assess the relationship between any telehealth use and patient characteristics.

More than 3000 observations were analyzed by the authors, with more than 60% of them being female after the inflection point, the percentage of females did not decline. The commencement of the pandemic was linked to a rise in telehealth use in Dhaka compared to outside the city (DiD estimate 0.07; 95 percent CI, -0.77-0.62).

After March 2020, the average number of telehealth visits per person-year in Dhaka was 33% greater than outside the city. Dhaka's mean (SD) and outside Dhaka's mean (SD) were 1.69 (7.03) and 1.48 (7.62), respectively. Telehealth use was linked to the youngest age group of 18-34, residing in more metropolitan regions, and living in locations with greater socioeconomic level, according to the authors. The authors discovered a significant decline in in-person services and an increase in telehealth visits in this study [39].

In 2020, Md. Hafiz Iqbal worked on Telemedicine. According to the author, health care provision in distant villages is deteriorating due to a lack of comprehensive and convenient healthcare facilities and services, resulting in higher expenditures than in urban areas.

Telemedicine can help with this problem. The author's analysis gives empirical proof of the benefits package, which includes a hypothetical telemedicine service, and assesses the telemedicine service's economic benefit.

On a sample of 203 observations, the author's study examines marginal willingness-to-pay (MWTP) responses to policy change. In 7 distant villages in three coastal districts in Bangladesh's southwest coastal region, a randomized conjoint experiment was undertaken. Each respondent is given three choices: two hypothetical alternatives and the current telemedicine system. Payment for telemedicine service, sample collection from home, medicine delivery to home, capitation via online technology, service delivery frequency, and blood pressure and glucose measurement at home are all randomly assigned to the two options.

Coastal people, according to the author, would choose to pay more in option 4 and higher. The author's findings from MWTP show potential demand for telemedicine in coastal communities in Bangladesh, indicating that lower payment for telemedicine services does not necessarily imply poor demand for telemedicine [40].

During the COVID-19 Pandemic in 2020, Md. Sayeed Al-Zaman worked on the Healthcare Crisis in Bangladesh. The COVID-19 pandemic, according to the author, has wreaked havoc across the globe. Developed countries like the United States, the United Kingdom, Italy, and Spain saw their highly efficient medical system put to the test, with significant death rates. Bangladesh, a poor South Asian country, is also losing the war against poverty. Pandemic, but primarily due to the country's inept health-care system. The death toll is rising, as are public outcries. Unthinkable things are happening. In this context, the author presented a viewpoint paper about Bangladesh's healthcare problem. When the pandemic was in full swing the author pinpoints three factors that are to blame for the country's failing health-care situation: 1) Poor Inadequate healthcare infrastructure, 2) a lack of public health information, and 3) poor governance and increased corruption [41].

Md Kariul Islam and his colleagues worked on the COVID-19 Pandemic and Response Levels in Bangladesh in 2020. Bangladesh is a natural, beautiful, middle-income country in Southeast Asia, according to the authors. It has a rapidly growing economy. Every sector of life, including women's empowerment, has seen significant progress in the recent decade. The authors, on the other hand, demonstrated that the COVID-19 Pandemic has had a negative impact on every sector of Bangladesh. COVID-19 is a potentially severe acute respiratory infection caused by a novel emerging severe acute respiratory syndrome corona virus2 (SARSCoV-2). It was labeled a pandemic disease by the World Health Organization (WHO) on March 11th, 2020 [1]. In December 2019, the virus was discovered to be the source of an unidentified pneumonia outbreak in Wuhan, Hubei Province, China.

The clinical presentation is that of a respiratory infection, with symptoms ranging from a mild influenza-like illness to a severe viral pneumonia leading to potentially fatal acute respiratory distress syndrome, according to the authors. The epidemic is said to be active in 199 countries throughout the world, and the situation is fast changing, with worldwide case counts and deaths rising every day. The World Health Organization has a very high risk assessment for the virus, and community transmission is occurring in many countries, according to the authors, but it is unclear how easy the virus travels between people.

The authors made an observation. Bangladesh has also declared COVID-19 infection, which is being reported on a daily basis by the Directorate General of Health Service, with 48 confirmed cases and 5 deaths due to community transmission (as of March 28, 2020) [2]. COVID-19 community transmission and death tolls, on the other hand, are two of the world's most pressing challenges today. As a result, the authors conducted this research to have a better understanding of the COVID-19 status in Bangladesh as of May 14, 2020, based on a secondary literature review [42].

2.3 Summary on the research of Telemedicine

Various governments throughout the world are launching telemedicine projects to reach out to the world's unreached people. Developed countries have sophisticated telemedicine services and adhere to telemedicine standards. Developing nations are likewise attempting to improve their economies.

Through these services, you can break down barriers and join worldwide communities.

This chapter examines the technical aspects of 31 research papers. With relation to the study, we've proposed Standard telemedicine services are in high demand. Services, particularly for the poor, throughout the world as a result, our study's goal is to: bridge the gap between our country's current telemedicine offerings and international best practices service telemedicine.

The CRP initiated telemedicine operations for physically handicapped people in Bangladesh in 1999 [43]. Following it, corporate and government groups took various initiatives on a project basis. Sheikh Elhum Uddin Quadery and other academics focused on the economic perception of telemedicine from the consumer side in 2021. In 2021, Mohammad Monirujjaman Khan and other researchers in Bangladesh worked on telemedicine. Gender discrepancy in telehealth usage in Bangladesh in 2021 was investigated by Saanjaana Rahman and other scholars. Habibur Rahman and his colleagues worked on telemedicine in Bangladesh in 2022. Saanjaana Rahman and other academics studied the growth of telehealth use in Bangladesh in 2022. Md. Hafiz Iqbal worked on Telemedicine for remote persons in 2020. In the year 2020, Md. Sayeed Al-Zaman worked on the Healthcare Crisis in

Bangladesh. In Bangladesh in 2020, Md Kariul Islam and his colleagues worked on the COVID-19 Pandemic and Response Levels.

Chapter Three

System Design

3.1 Introduction

This chapter discusses the proposed design, which plays a very helpful role in the research work. The design aims to improve telemedicine healthcare during the covid-19 period in the remote areas of Bangladesh. Because the problems with their health care have been fully highlighted in the survey. This design is able to take telemedicine services to the forefront, which will serve as a far-reaching part of the modern context. Here patient. Pharmacy owners, village doctors, specialist doctors are intimately with this design. We designed the questionnaires to study the impact of telemedicine on the healthcare system in Bangladesh during the covid-19 period.

3.2 Proposed Telemedicine System Design

The proposed system is completed with the necessary modules to meet the design requirements. It is basically a data flow diagram of system design, the processes in the diagram divide the whole system into several modules. Below is the system design diagram.

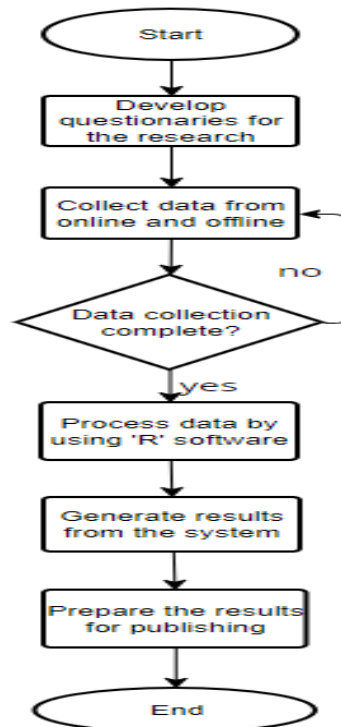


Figure 3.2.1: Data flow diagram of System Design

Data flow diagrams show many processes in system design, each an integral part of system design. Following this flow, the system design will be completed. Here all the processes have been brought inside some modules. Modules are very important for system design. Below is the module of system design.

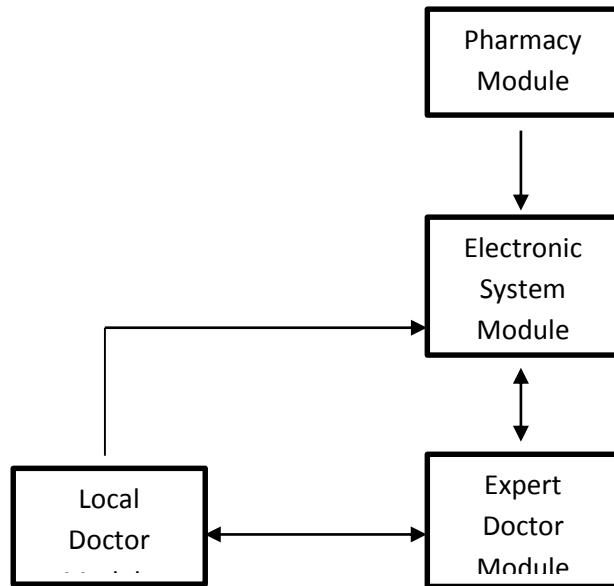


Figure 3.2.1: Modules of System Design of System Design

The data flow diagram contains four modules that are involved in system design. Pharmacy module, local doctor module, specialist doctor module and electronic system module.

According to the system design, pharmacy module will act as the remote telemedicine center for the rural patients with the necessary component. Local doctor is another component of the model. Patients go to the local doctor if they have any health problems. In this case local doctors play an important role in their services. The specialist doctor module is the fourth part that stays with the local doctor as a guide. The fifth module is the electronic system which is the main part of all modules. It is associated with all modules. There are three more modules related to the original module. These are payment, notification and security modules. All these modules considered as an element of the proposed model. This module is detailed the following sections are discussed.

3.3 Modules of Proposed Telemedicine System Design

The proposed telemedicine system design modules are presented chronologically. Modules are presented with the functions performed by these modules and their features. The module must meet certain requirements for development. Which will help activate the system.

3.3.1 Pharmacy Module

Low-cost client modules are required to connect pharmacy modules to electronic systems. To contact a local or specialist doctor, we have introduced the Pharmacy module. The local administrator at the pharmacy will run the module. We have designed the questionnaires for this module to find out the following parameters: how and which roles this module play during Covid-19, which types of patients get services from this module, what is the requirements for getting standard services from this module and so on.

3.3.2 Local Doctor Module

How local doctors were involved in the telemedicine services in Bangladesh during Covid-19 period are analyzed here. Which technology were used in the services, what were there observations and what should be included in the future telemedicine of Bangladesh is included with this module.

3.3.3 Expert Doctor Module

Specialist doctors are one of the integral parts of the proposed model. Local and specialist doctors communicate with each other through electronic health systems. They can also have an audio conversation through their mobile phone. Local doctor's patients will input information for testing and the local administrator at the pharmacy will give the patient history and initial information to the input system. Test data, based on patient records and in conversation, the specialist doctor will prepare a medication plan for the patient. The medication plan will then pass on to the patient through the health system. Expert doctor's requirements are included in the questionnaires to find out the requirements.

3.3.4 Electronic System Module

This module requires a server to run the electronic system. Patient's information will be stored here. The local doctor and the pharmacy administration will act as assistants in conveying the patient's information to the specialist doctor. Later they will be able to get telemedicine services from their received input.

3.4 Summary

In this chapter, we have discussed about the questionnaires on the different modules. Questionnaires were developed in consultation with the related persons. We have designed our questionnaires so that we can get the vital information on telemedicine services during Covid-19. Questionnaires were circulated and collected from the desired locations of Bangladesh. We have processed the collected data and finally concludes the research.

Chapter Four

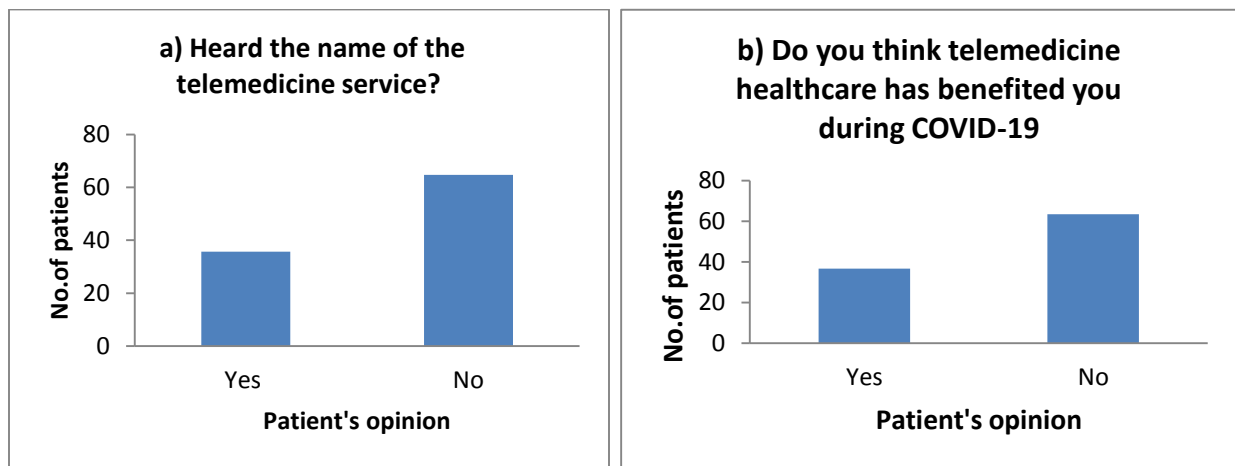
Results and Discussions

4.1 Survey Results

After processing the survey data, survey results are presented in this section. It shows the results of a survey of four different types of respondents on the impact of telemedicine on the healthcare system in Bangladesh during the Covid-19 period.

4.1.1 Patient's Section

To collect information from patients, we divided them into three districts namely Dhaka, Noakhali and Dinajpur. We have collected some data from Dhaka Medical College in Dhaka district. People from different districts come from outside Dhaka. Some information has been collected from them at Dhaka Medical Hospital. Data has been collected from about 240 people from remote villages of Noakhali and Dinajpur. More than 300 rural patients were surveyed. 18 different questions have been asked for them. Data of 300 patients has been collected in remote villages. Patients are a fundamental component of the telemedicine service. So, their thinking, expectation, and required services are analyzed properly for the effective introduction of telemedicine. The survey results on patients are sequentially shown in figures.



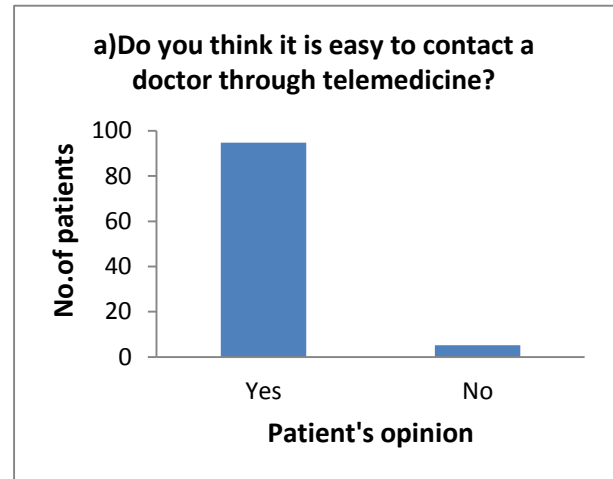
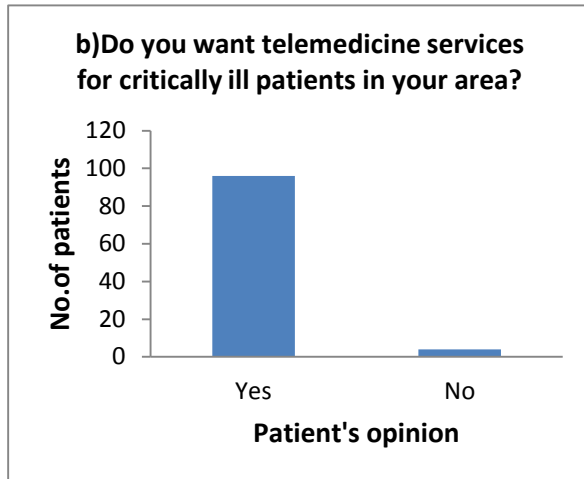
4.1(a) Telemedicine services status

4.1(b) Telemedicine healthcare services status

Fig 4.1: Telemedicine services status and Telemedicine healthcare services status.

Figure 4.1(a) we asked people in remote villages if they had heard of telemedicine services. 64.7% of rural people think they have not heard of telemedicine and 35.7% of people think they have heard of telemedicine services. Percentages are shown in the figure. Figure 4.1(b)

we asked people in remote villages, do you think telemedicine healthcare has benefited you during COVID-19? 63.4% of people think they did not benefit from covid-19, 36.6% of people think they have benefited from covid-19 telemedicine services.



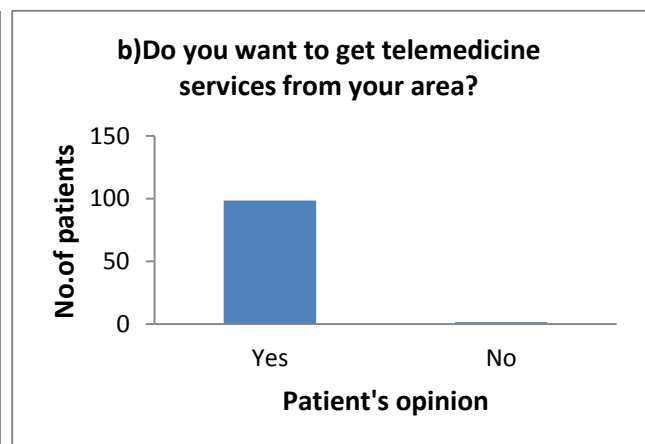
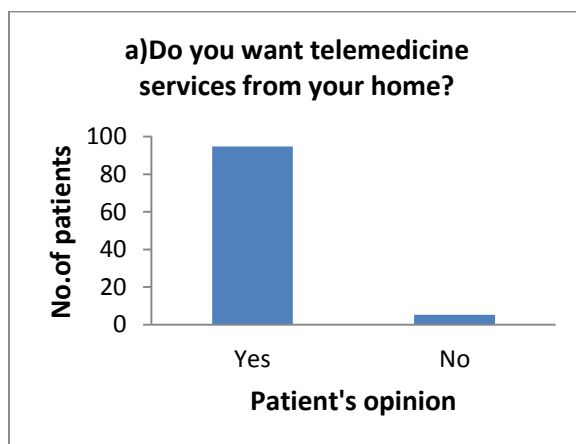
4.2(a) Easy contact status with doctor

4.2(b) Telemedicine services for ill patients

Fig 4.2: Easy contact status with doctor and Telemedicine services for ill patients.

Figure 4.2(a) People in remote villages think telemedicine services are very important 94.8% of people think telemedicine services make it very easy to contact doctors. 5.2% of people think yoga is a little difficult.

Figure 4.2(b) figure shows a survey of 300 patients, do you want telemedicine services for critically ill patients in your area? 96% of people think that telemedicine services are very important for them, 4% of people think they don't need telemedicine services.



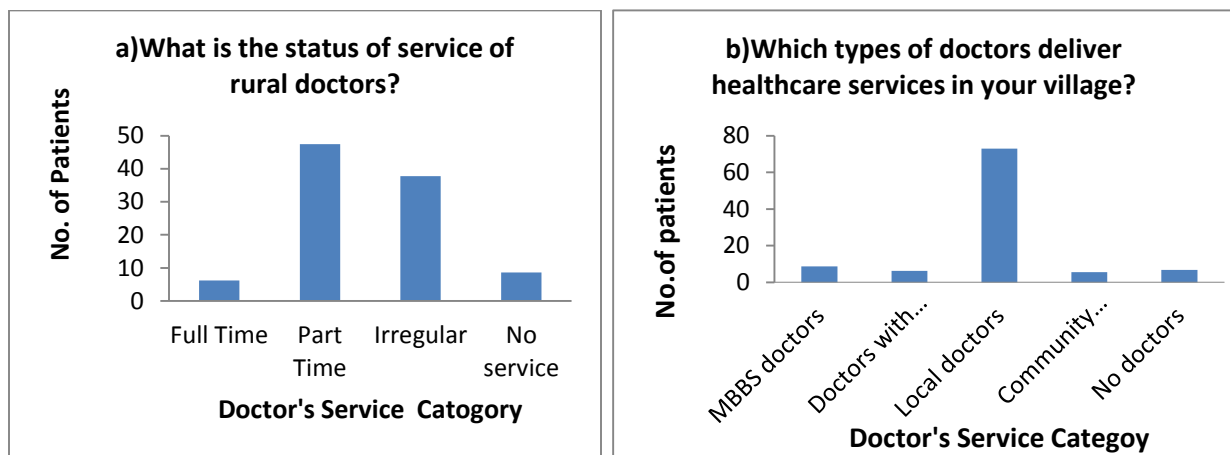
4.3(a) Telemedicine services at home

4.3(b) Telemedicine services area

Fig 4.3: Telemedicine services at home and wanting telemedicine services in the area.

Figure 4.3(a) shows the telemedicine services area. People in rural areas have been asked if they want telemedicine services from their homes 98.2% of people think they want telemedicine services from home and 1.8% of rural people do not want telemedicine services from home.

One more question has been asked to the people of the village. Do you want telemedicine services from your area? As Figure 4.3(b) shows, 98.5% of people think they need telemedicine services and they want to take telemedicine services from the area. 1.5% of people think they don't need telemedicine services from their area.



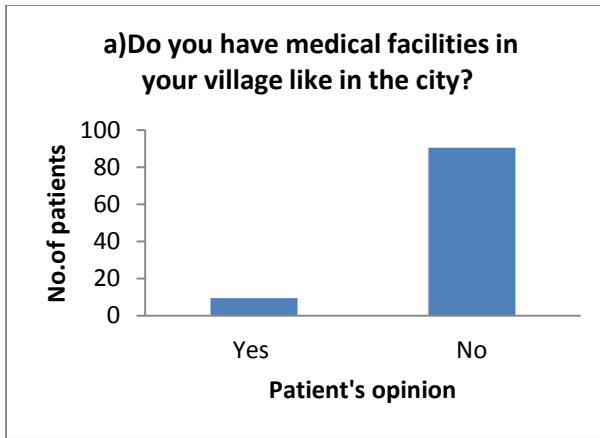
4.4(a) Status of service of rural doctors services

4. 4(b) Types of doctors for healthcare

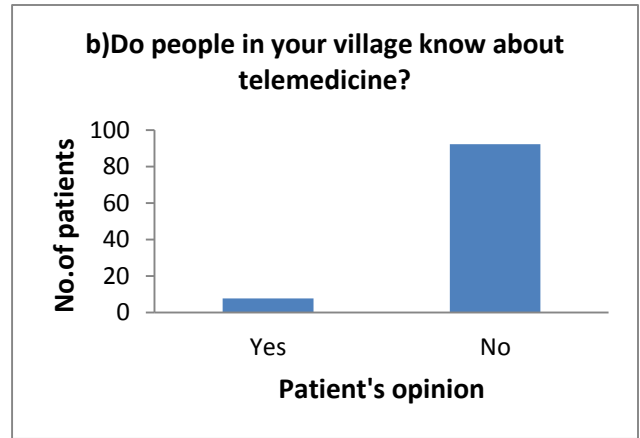
Fig 4.4: Status of service of rural doctors and Types of doctors for healthcare services.

Figure 4.4(a) The people of remote villages have been asked to know the status of services of village doctors. The survey found that full-time doctors service 6.2% of health care, part-time doctors service 47.8%, irregular doctors service 37.8% and no doctor's services do not service 8.6%.

Figure 4.4(b) figure shows that 8.6% of rural people get MBBS doctor's services, Diploma doctor gets health care 6.2%, the local doctor gets health care 72.5%, community doctor gets health care 5.5% and no doctor gets health care 6.8%. Local doctors get the most health care.



4.55(a) Medical facilities status in the village

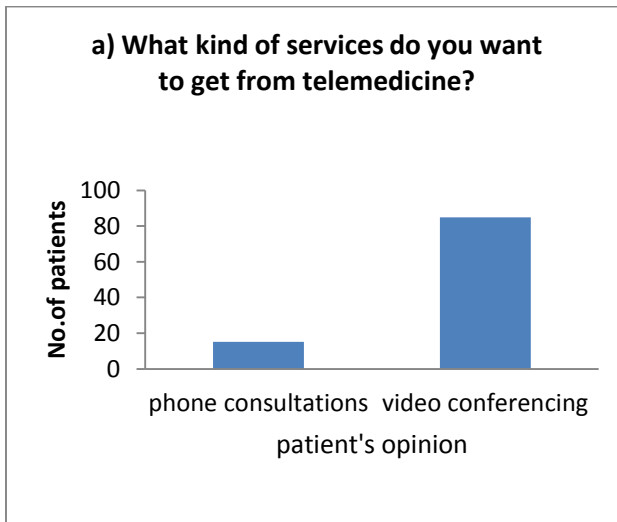


4.5(b) Village people's opinion status

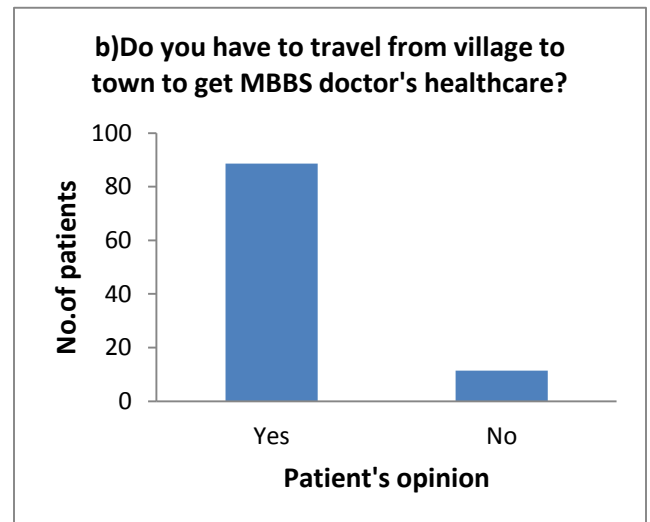
Fig 4.5: Medical facilities in the village and Village people's opinion status.

Figure 4.5(a) survey of people in rural areas showed that 9.5% of people get access to medical facilities in rural areas like urban areas. A large number of people in rural areas think that they do not get medical facilities in rural areas like 90.5% in urban areas.

Figure 4.5(b) survey shows that only 7.7% of villagers know about telemedicine. 92.3% of the rural population does not know about telemedicine.



4.6(a) Types of services from telemedicine services



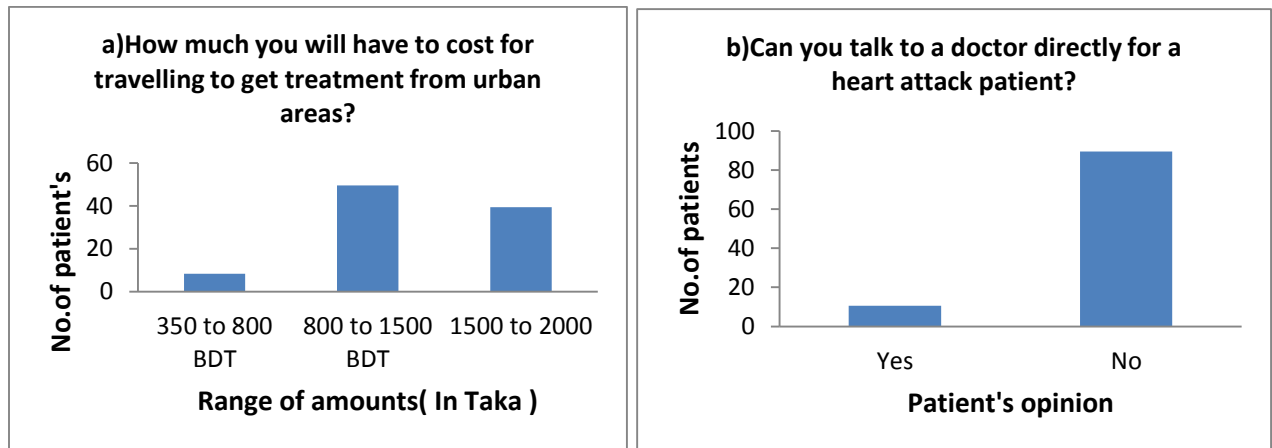
4.6(b) Travel status for healthcare

Fig 4.6: Types of services from telemedicine and Travel status for healthcare services.

As shown in the Figure 4.6(a), rural people are asked what kind of services you want to get from telemedicine. 15.1% of people think telemedicine services through phone consultation

are good for them and 84.9% of people think that telemedicine services are the best through video conferencing.

Figure 4.6(b) shows that 88.6% of rural people have to travel from village to town to get an MBBS doctor's health care and 11.4% of people think they don't have to go to town to get an MBBS doctor's health care.



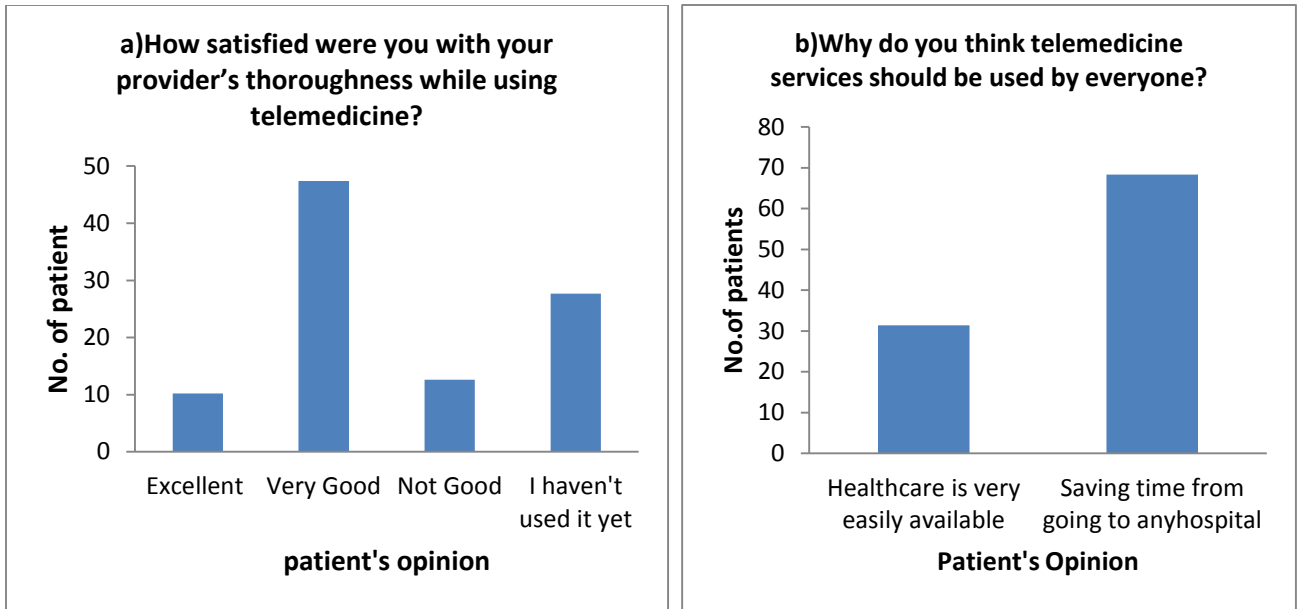
4.7(a) Cost of travel to get medical treatment directly

4.7(b) Opinions about talking to a doctor directly

Fig 4.7: Cost of travel to get medical treatment and Opinions about talking to a doctor directly.

Figure 4.7(a) shows how much patients have to spend to travel from urban areas for treatment. The study shows that about 39.4% of patients have to spend 1500- 2000 BDT, 49.5% of patients have to spend 800 to 1500 BDT, 8.3% of patients have to spend 350 to 800 BDT and 2.8% of patients do not have to spend any.

Figure 4.7(b) shows a survey for a heart attack patient to talk directly to a doctor. Survey about 89.5% patients doesn't talk directly to a doctor and 10.5% can so.

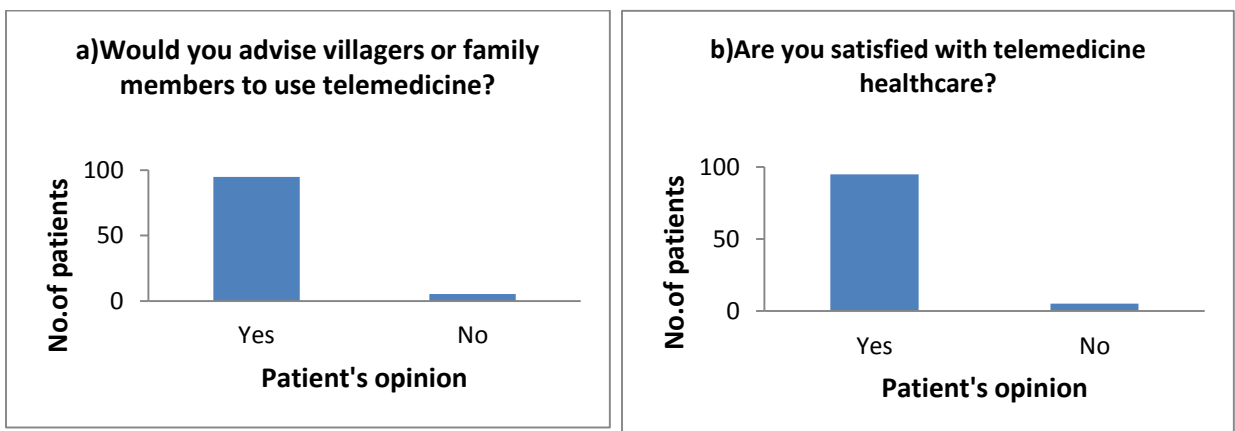


4.8(a) Patient feedback on telemedicine services 4.8(b) Opinions for telemedicine services

Fig 4.8: patient feedback on telemedicine services and Opinions for telemedicine services.

Figure 4.8(a) The survey shows that rural people were asked how satisfied they were with your provider when using telemedicine. 10.2% people think excellent, 47.4% people think very good, 12.6% people think not good and 27.7% people think I haven't used it yet.

Figure 4.8(a) shows for what reasons should everyone use telemedicine services? About 68.3% of patients think that saving me time from going to hospital and 31.4% of patients think that healthcare is very easy to get.



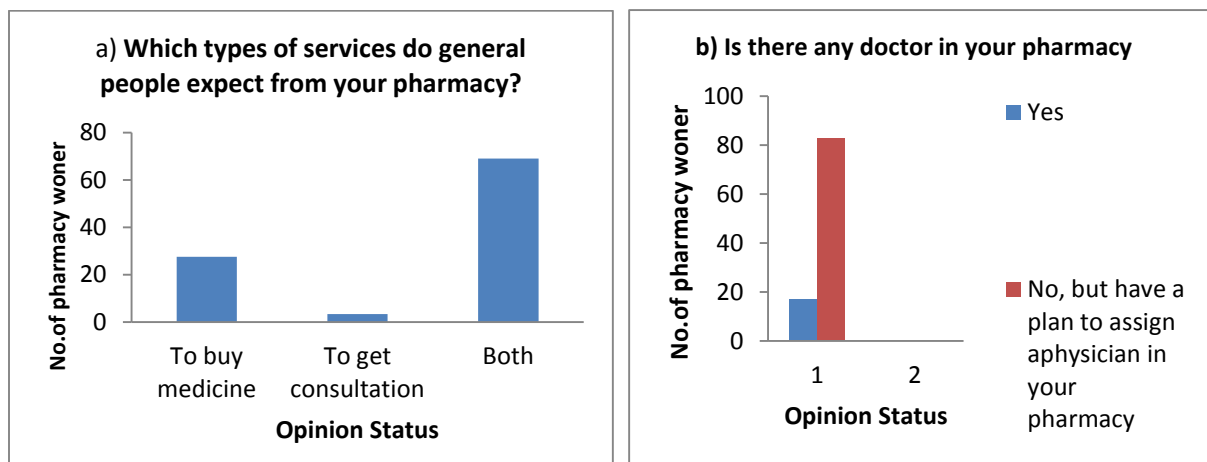
4.9(a) Telemedicine for villagers or families 4.9(b) Satisfaction about telemedicine service

Fig 4.9: Telemedicine for villagers or families and Satisfaction about telemedicine service.

Figure 4.9(a) shows whether patients can advise villagers or family members to use telemedicine. About 97.8% of patients said yes and 2.2% did not advise. Figure 4.9(b) shows whether patients are satisfied with telemedicine healthcare. Survey results show that 94.8% patients are satisfied and 5.2% patients are not satisfied with telemedicine healthcare.

4.1.2 Pharmacy Owner's Section

Pharmacy is the primary source of benefit for patients where patients can get adequate services. This data has been collected from both urban and rural areas. Each of the data was obtained from significantly different areas. In rural areas, doctors provide medical services to patients from pharmacies. The survey was conducted on the owners of rural pharmacies for telemedicine services. The results are shown in chronological order:

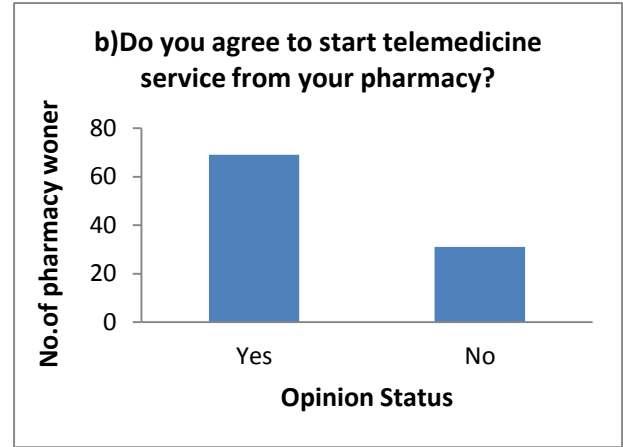
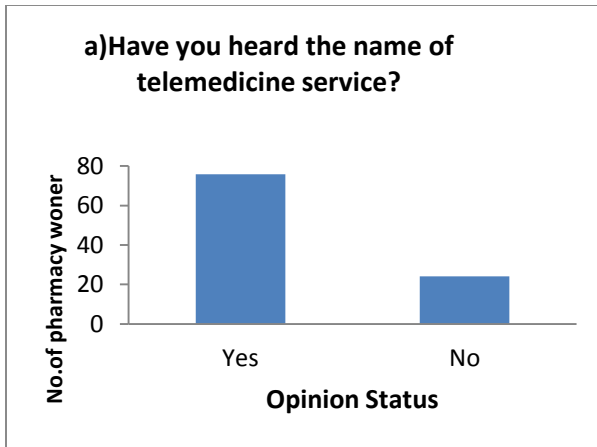


4.10(a) Expected services from the pharmacy 4.10(b) Opinions status of pharmacy owners

Fig 4.10: Expected services from the pharmacy and Opinions status of pharmacy owners

Figure 4.10(a) indicates about types of services general people expect from pharmacy, just about 69% people expect both to buy medicine and get consultation and 27.6% people expect for to get consultation from pharmacy.

Figure 4.10(b) appears about is there any doctor in pharmacy, 82.8% pharmacy owner says that there is no doctor but they have a plan to assign a physician in pharmacy and 17.2% owner says they have doctor for give services.

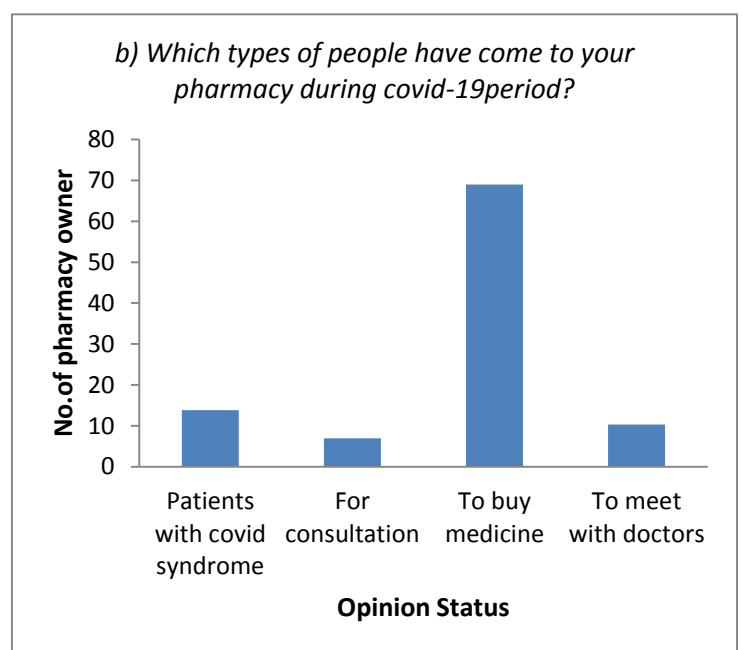
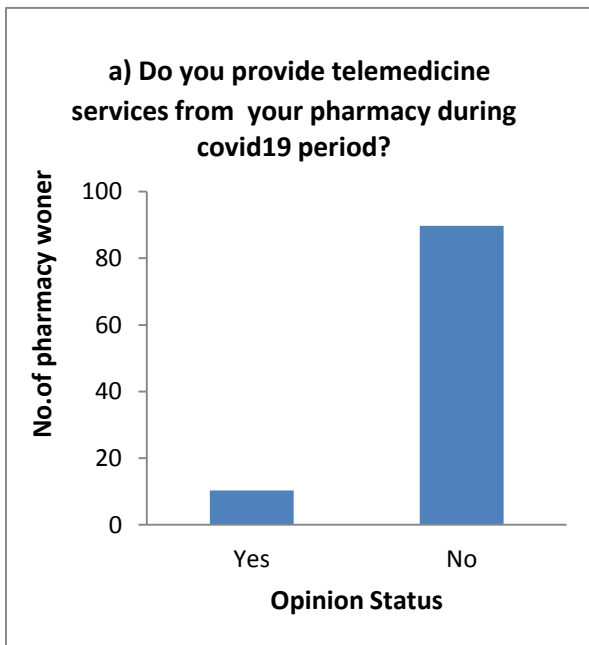


4.11(a) Pharmacy owner's opinion status

4.11(b) Telemedicine services from pharmacy

Fig 4.11: Pharmacy owner's opinion status and Telemedicine services from pharmacy.

Figure 4.11(a) shows that whether have the pharmacy owner heard the name of telemedicine service. Almost 75.9% owner have heard the name but 24.1% owner haven't heard the name of telemedicine service. Figure 4.11(b) Shows whether the owner agrees to start telemedicine service from the pharmacy .69% of owners agree but 31% refuse to start telemedicine services for some reason.



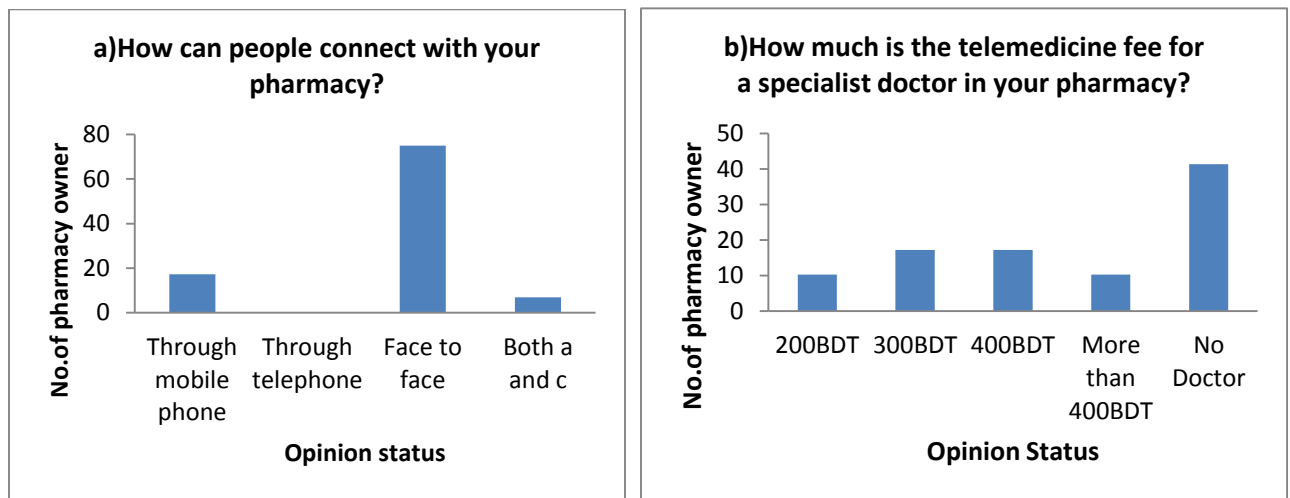
4.12(a) Telemedicine services status

4.12(b) People's types status in pharmacy

Fig 4.12: Telemedicine services status and People's types status in pharmacy.

Figure 4.12(a) shows about how telemedicine services from pharmacy during covid-19 period, almost 82.8% owner don't provide telemedicine services but 17.2% are provide telemedicine services during covid-19 period.

Figure 12.b: survey about types of people have come to pharmacy during covid-19 period, it shows that about 69% people have come to buy medicine, 13.8% have come to patients with covid syndrome and over 10.3% have come to meet with doctors.



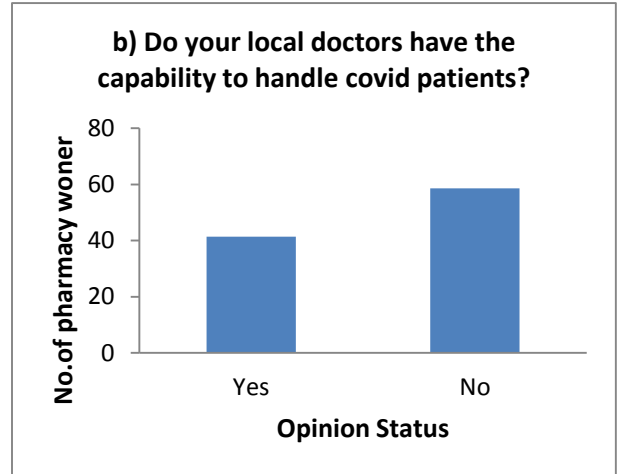
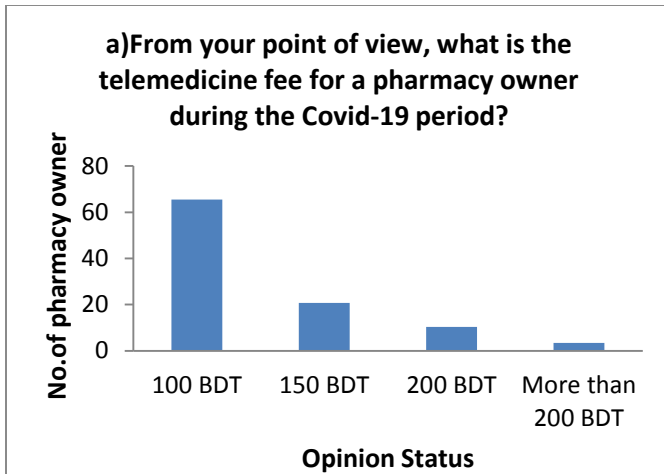
4.13(a) Connected status with the pharmacy status

4.13(b) Telemedicine fee recommendation

Fig 4.13: Connected status with the pharmacy and Telemedicine fee recommendation status.

Figure 4.13(a) represents the survey about how can people connect with pharmacy. survey shows that almost 75.9% people connect face to face, 17.2% connect through mobile phone and 6.9% people connect through face to face and mobile phone with pharmacy.

Figure 4.13(b) shows about how much is the telemedicine fee for an expert doctor. About 41.4% owner have no doctor, 10.3% owner indicate that the telemedicine fee will more than about 400 BDT, 17.2% owner indicate 400 BDT, 17.2% are 300 BDT and 10.3% owner indicate about 200 BDT.



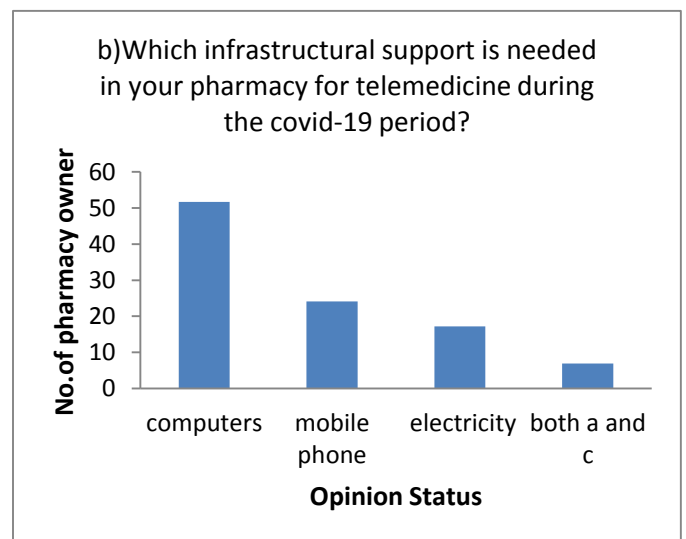
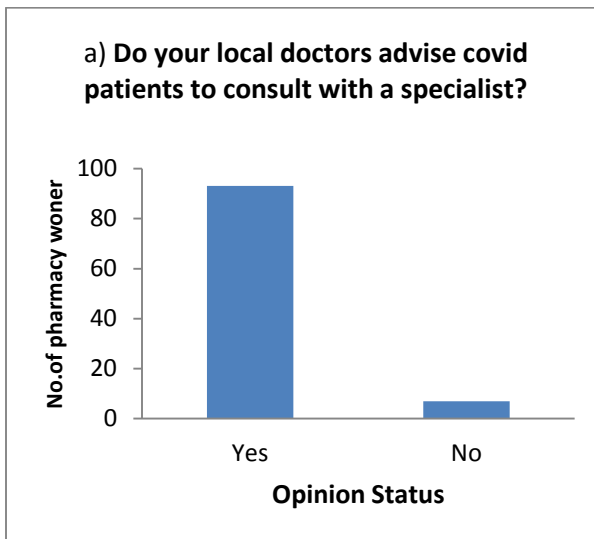
4.14(a) Proposed telemedicine fee for owners

4.14(b) Local doctor's capacity to handle

Fig 4.14: Proposed telemedicine fee for owners and Local doctor capacity to handle.

Figure 4.14(a) manifests about what is the telemedicine fee for an owner of pharmacy, the survey shows that about 65.5% owner state that 100 BDT and 20.7% owner opinion 150 BDT, 10.7% owner opinion 200BDT.

Figure 4.14(b) shows local doctors capability to handle covid patients. Survey shows that 58.6% owner thinking there have no ability to handle covid patients and 41.4% thinking there have the capability to handle covid patients.



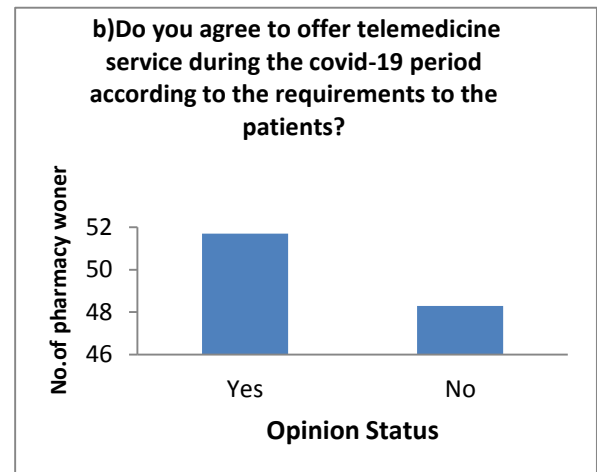
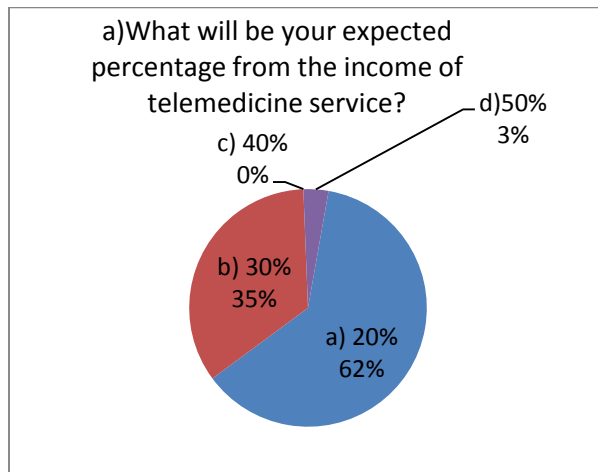
4.15(a) Opinions status of pharmacy owner's

4.15(b) Infrastructural support in pharmacy

Fig 4.15: Opinion status of pharmacy owner's and Infrastructural support in pharmacy.

Figure 4.15(a) shows whether do local doctors advise covid patients to consult a specialist. 93.1% local doctors advise to consult an expert and just 6.9% local doctors don't advise to consult a specialist.

Figure 4.15(b) declares that during the Covid-19 period, telemedicine required an infrastructure rate of 51.7% for computers, 24.1% for mobile phones, and 17.2% for electricity.



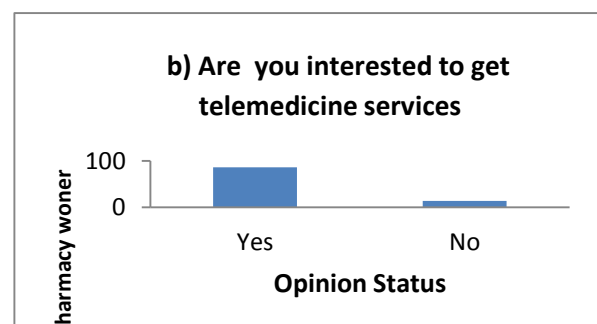
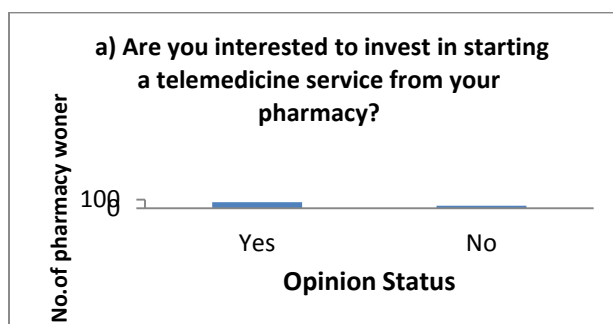
4.16(a) Status about expected percentage

4.16(b) Telemedicine services for patients

Fig 4.16: Status about expected percentage and Telemedicine services for patients.

Figure 4.16(a) tells that maximum 20% of income expects for the pharmacy owners then minimum 30% pharmacy owners expects from income and 50% for telemedicine services.

Figure 4.16(b) shows that 51.7% pharmacy owners want to offer telemedicine services during COVID-19 according to patients and 48.3% don't want to offer this service.



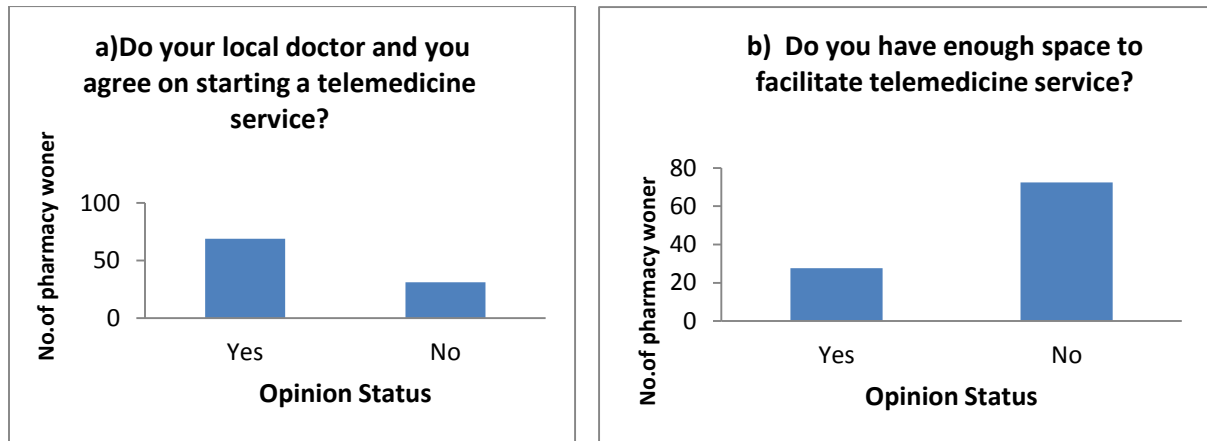
4.17(a) Invest status for telemedicine service

4.17(b) Intent to get telemedicine services

Fig 4.17: Opinions of invest to start telemedicine service and intent to get telemedicine services

Figure 4.17(a) presents the pharmacy owners willingness to invest starting a telemedicine service, the majority of them 69% gave their opinion to invest and 31% told their unwillingness.

Figure 4.17(b) shows that pharmacy owners willingness for telemedicine training and 86.2% told their positive feedback and 13.8% were disagree for training.



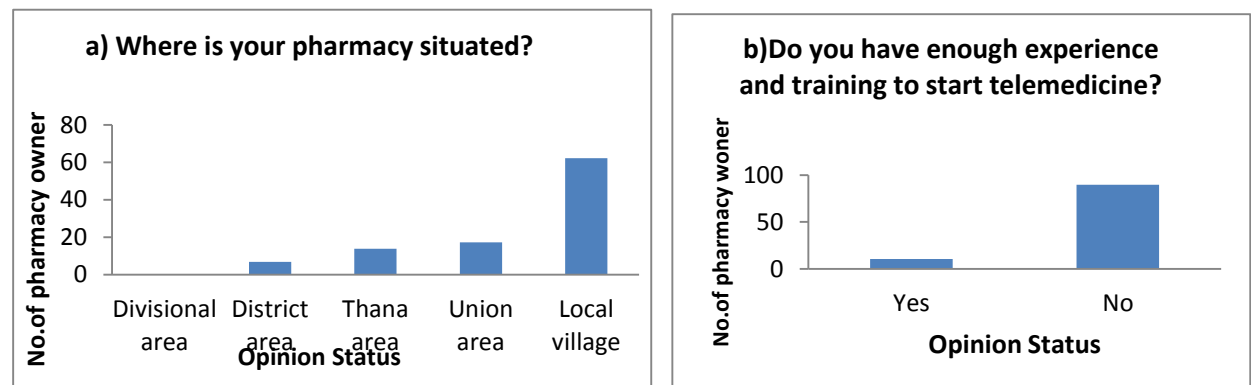
4.18(a) Launching telemedicine services

4.18(b) Adequate space for telemedicine services

Fig 4.18: Launching telemedicine services and Adequate space for telemedicine services.

Figure 4.18(a) is the result of several pharmacy owners. They want to initiate a work together with a local doctor or not. The reply was 69% for yes and 31% for no.

Figure 4.18(b) shows whether the pharmacy owner has enough space to facilitate telemedicine services. About 27.6% of the owners have enough space but 72.4% of the pharmacies do not have enough space to facilitate telemedicine services.



4.19(a) Pharmacy situated status

4.19(b) Opinions of pharmacy owners

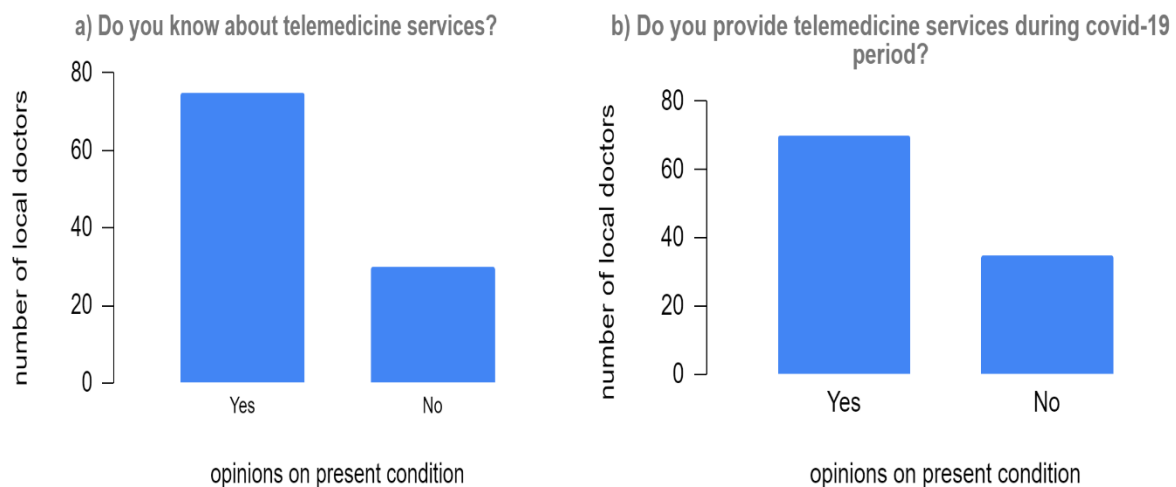
Fig 4.19: Pharmacy situated status and Opinions of pharmacy owners.

Figure 4.19(a) indicates that where have the pharmacy located, just about 62.1% pharmacy located on local village area, 17.2% are union area and 13.8% located on thana area.

Figure 4.19(b) represents whether the pharmacy owner have sufficient experience and training to start telemedicine services. Just 89.7% of the owners expressed that they have no experience and 10.3% of the owners have experience and training to start telemedicine services from pharmacy.

4.1.3 Local Doctor's Section

The data were collected for the local or village doctors from the remote villages of north region of Bangladesh. The results are shown through the various charts which can significantly answers the different questions. It will be helpful for the implementation of Impacts on the healthcare system of Telemedicine in Bangladesh during Covid-19 period for Bangladesh from the point of view of local or village doctor.



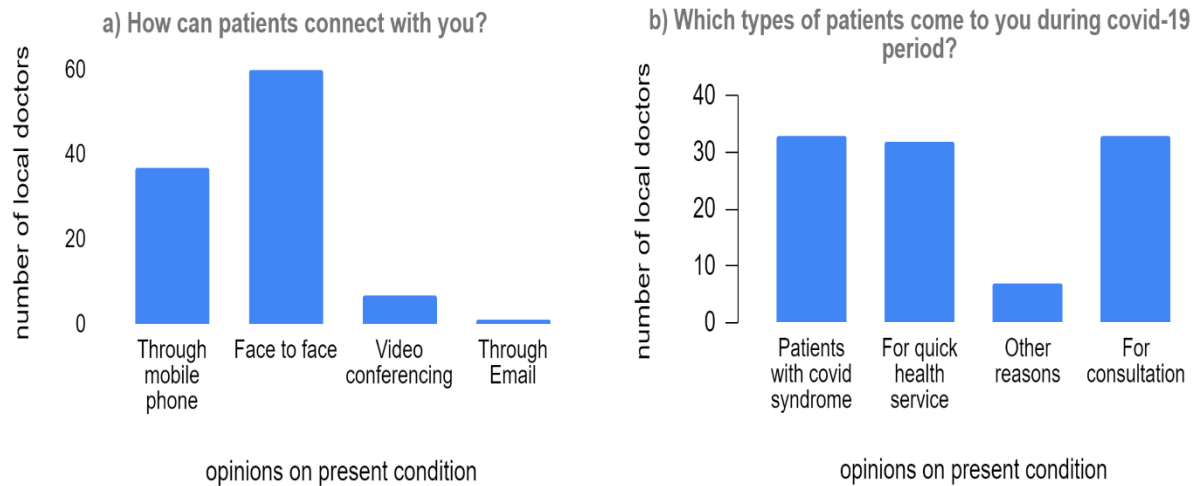
4.20(a) Opinions of local doctors

4.20(b) Providing status of telemedicine services

Fig 4.20: Opinions of local doctors and Providing status of telemedicine services.

Figure 4.20(a) shows the knowing about telemedicine services in the remote areas of north region local doctors. Survey shows that 71.4% local doctors knowing about telemedicine services and 28.6% local doctors don't know about telemedicine services.

Figure 4.20(b) shows the status of providing telemedicine services during covid-19 period of local doctors. Survey result shows that 66.7% of local doctors provide telemedicine services during covid-19 period. On the other side 33.3% local doctors don't provide telemedicine services during covid-19 period.



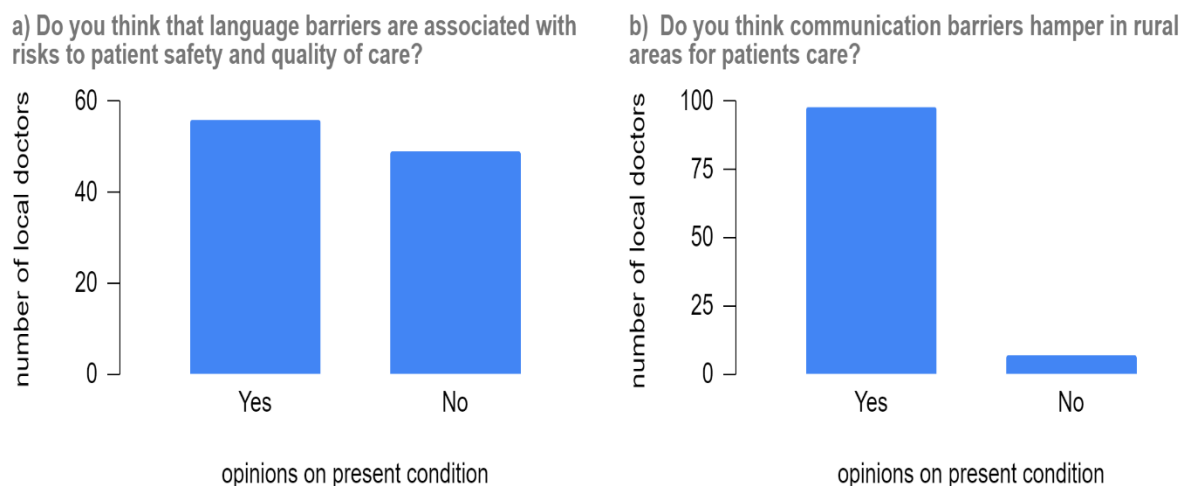
4.21(a) The attached condition of the patients

4.21(b) The type of patient to come

Fig 4.21: the attached condition of the patients and the type of patient to come.

Figure 4.21(a) lays out that how can patients connect with local doctors. About 57.1% patients are connect through face to face, 6.7% connect through video conferencing, 1% connect through email and 35.2% connect through mobile phone.

Figure 4.21(b) shows that which types of patients come to local doctors during covid-19 period. Survey result shows that 31.4% patients are come to local doctors for consultation, 30.5% patients are come for quick health services, 31.4% patients are come for with covid syndrome and 6.7% are come for other reasons.

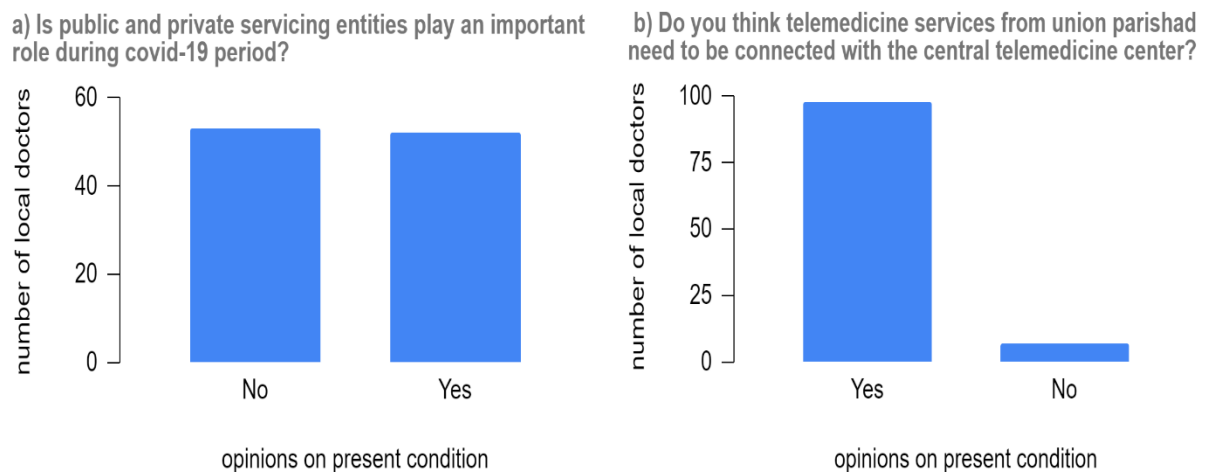


4.22(a) Opinions of patient safety and quality care

4.22(b) Opinions of local doctors for patient care

Fig 4.22: Opinions of patient safety and quality and Opinions of local doctors for patient care.

Figure 4.22(a) shows the opinions about that language barriers are associated with risks to patient safety and quality of care for patients. Survey shows that about 53.3% local doctors think that language barriers are associated with risks to patient safety and quality of care and 46.7% aren't think it. Figure 4.22(b) shows about that the communication barriers hamper in rural areas for patient care. About 93.3% opinions are yes, 6.7% are no.

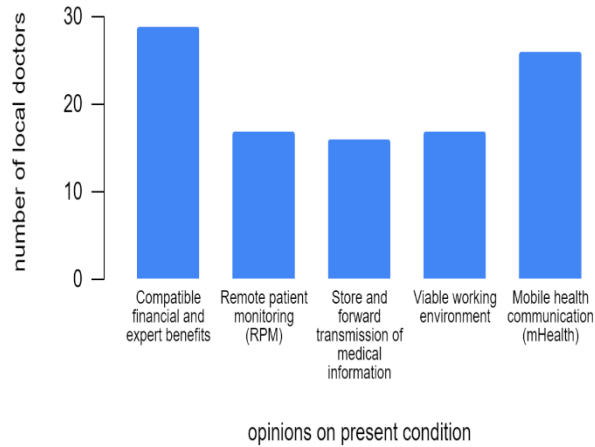


4.23(a) Public and private servicing entities 4.23(b) Opinions of the central telemedicine center

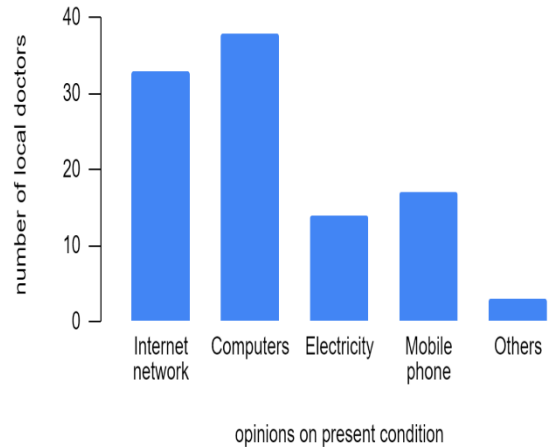
Fig 4.23: Public and private servicing entities and Opinions of the central telemedicine center.

Figure 4.23(a) displays a survey about the public and private servicing entities play an important role during covid-19 period. It shows that 49.5% local doctor opinions are yes and 50.5% opinion are no. Figure 4.23(b) shows a survey opinion of local doctors that telemedicine services from union parishad need to be connected with the central telemedicine center. The survey result shows that about 93.3% local doctors thinks it yes and 6.7% aren't think it.

a) In order to increase telemedicine services in rural areas which steps will need to included from your point of view?



b) Which infrastructural support are needed for telemedicine during covid-19 period?



4.24(a) Proposed steps status in rural areas

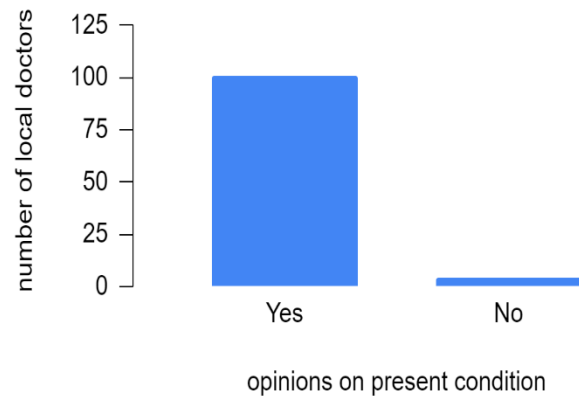
4.24(b) Opinions for infrastructural support

Fig 4.24: Proposed steps status in rural areas and Opinions for infrastructural support.

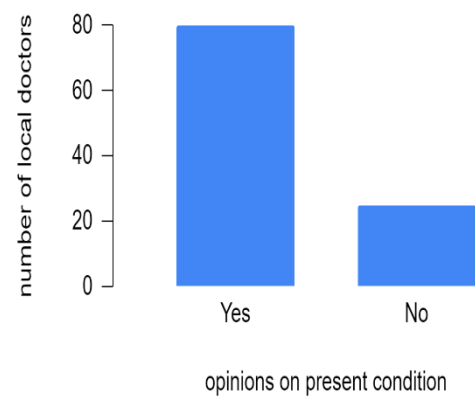
Figure 4.24(a) shows that about to increase telemedicine services in rural areas which steps will need to include from local doctor point of view. It shows 16.2% remote patients monitoring, 15.2% are store and forward transmission of medical information, 27.6% are compatible financial and expert benefits, 16.2% are viable working environment and 24.8% steps about are mobile health communication (mHealth) are needed.

Figure 4.24(b) is the survey about which infrastructural support are needed for telemedicine during covid-19 period. About 16.2% are mobile phone, 31.4% are internet network, 36.2% are computers, 13.3% are electricity and 2.9% are others infrastructural support are needed.

a) Do you think that local doctors need sufficient training on the new technology of medical sector?



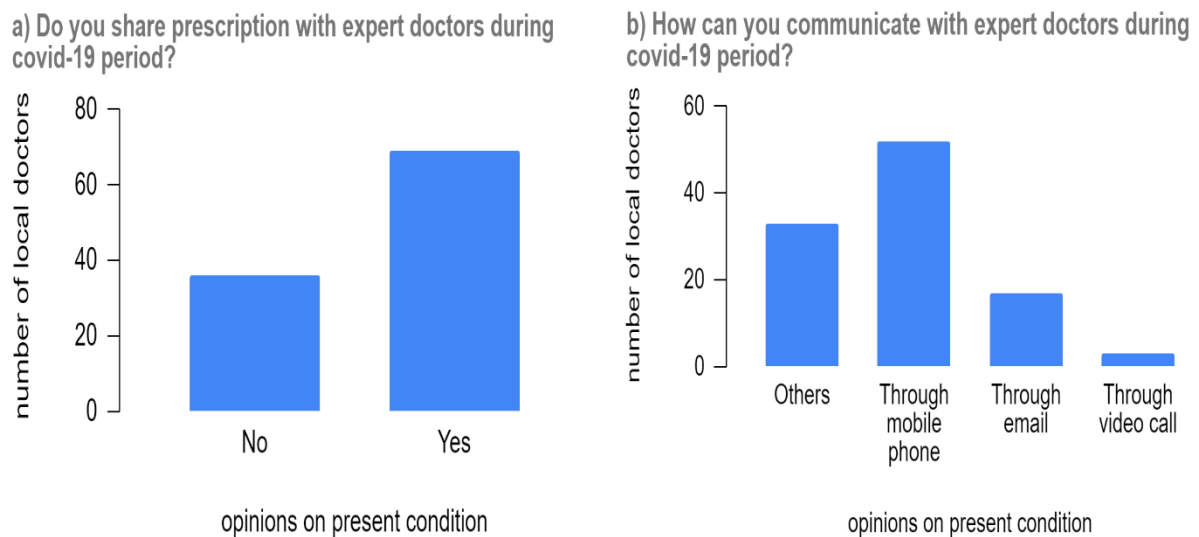
b) Do you have a specialist doctor's opinion for providing services to covid-19 patients?



4.25(a) Adequate training views on new technology 4.25(b) The services of a specialist doctor.

Fig 4.25: Adequate training views on new technology and the services of a specialist doctor.

Figure 4.25(a) depicts the survey about that local doctor need sufficient training on the new technology of medical sector. Survey result shows that 96.2% local doctors need sufficient training on the new technology and 3.8% aren't need. Figure 4.25(b) shows whether local doctors have the opinion of a specialist doctor to serve Covid-19 patients. About 76.2% local doctors have the opinion of a specialist doctor and 23.8% does not have the opinion.

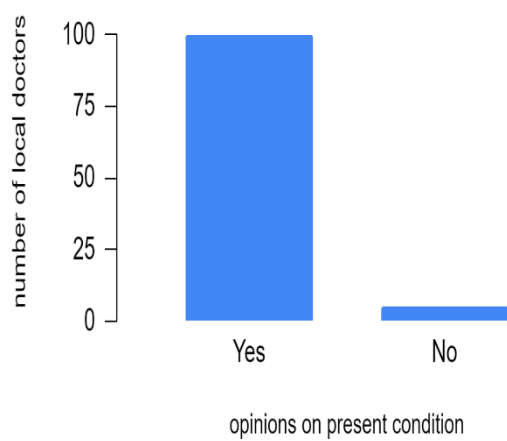


4.26(a) Opinions of local doctors 4.26(b) Communication status with expert doctors

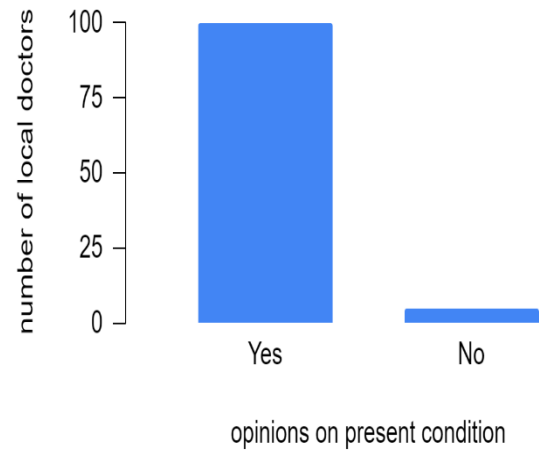
Fig 4.26: Opinions of local doctors and communication status with expert doctors.

Figure 4.26(a) displays whether local doctors share patient prescriptions with specialist doctors. Survey result shows that about 65.7% local doctors share prescriptions with specialist and 34.3% don't share prescriptions. Figure 4.26(b) shows that how can local doctor communicate with expert doctors during covid-19 period. About 49.5% local doctor are communicate through mobile phone, 2.9% through video call, 16.2% through email and 31.4% local doctor are communicating through other way.

a) Do you think it is needed to provide a good internet network in dispensary to communicate with national or international experts for telemedicine service during covid-19?



b) Do you agree a national telemedicine framework can be important part of telemedicine services for remote areas?



4.27(a) Status of a good internet network framework

4.27(b) Opinions about the telemedicine framework

Fig 4.27: Status of a good internet network and Opinions about the national telemedicine framework.

Figure 4.27(a) indicates the status about local doctor opinion to provide a good internet network in dispensary to communicate with national or international experts for telemedicine service during covid-19. Survey shows that about 95.2% local doctor is needed a good internet network in dispensary to communicate with global experts and 4.8% don't need it.

Figure 4.27(b) shows the survey of local doctor opinions that a national telemedicine framework can be needed for play important part of telemedicine services for remote areas. About 95.2% local doctor think that a national telemedicine framework can be an important part of telemedicine services for remote areas and 4.8% local doctors don't think that.

a) Do you agree that the public and private partnership program could play major role of telemedicine service during covid-19 period?

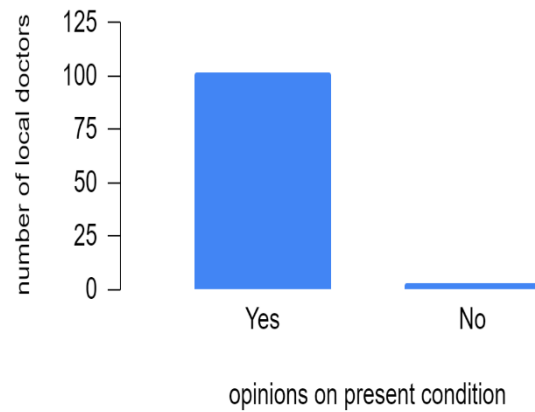
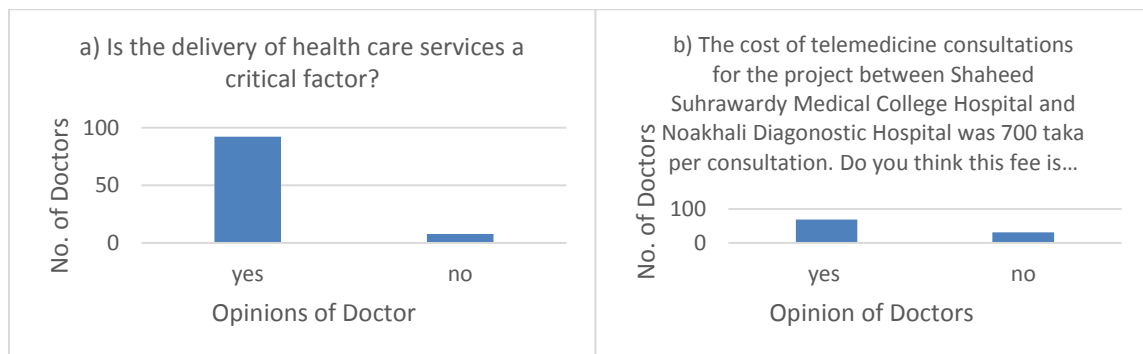


Fig 4.28: Opinions of public and private partnership program.

Figure 4.28(a) shows whether the public and private partnership program could play major role of telemedicine service during covid-19 period. Survey result concludes that about 97.1% local doctors think that this is yes i.e. partnership program can be very helpful to increase more telemedicine services through various way and 2.9% aren't think so.

4.1.4 Expert Doctor's Section

We chose medical colleges to collect expert doctor data since the majority of the doctors are faculty members who are always involved with research. The proposed telemedicine system relies heavily on expert doctors. As a result, their participation, advice, and talents are taken into account in this study. The survey findings for expert doctors are presented in figures in the following order:

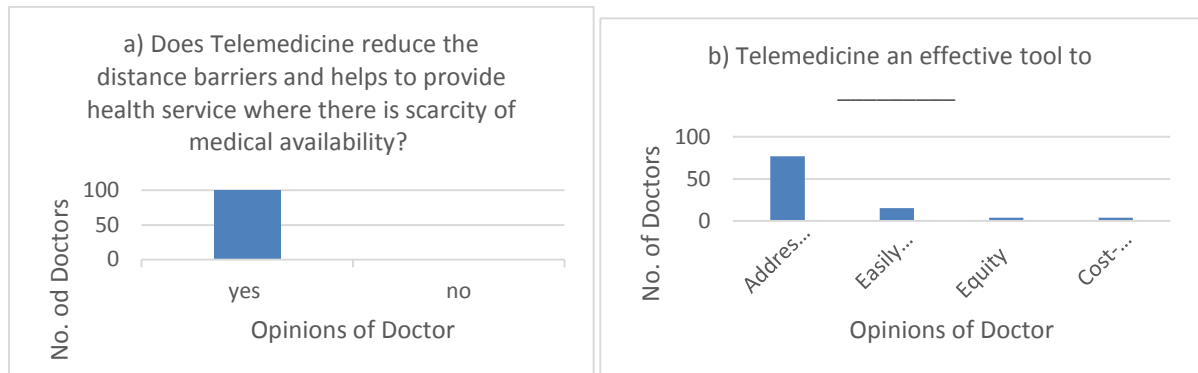


4.29(a) Opinions of health care services

4.29(b) Status of hospital telemedicine fees

Fig 4.29: Opinions of health care services and Status of hospital telemedicine fees.

Figure 4.29(a) shows the findings of expert doctors' opinions on the delivery of health care services a critical factor in Bangladesh. According to 92.3% of professional doctors said yes and 7.6 percent told it no. Figure 4.29(b) shows the cost of telemedicine consultations for the project between Shaheed Suhrawardy Medical College Hospital and Noakhali Diagnostics Hospital was 700 taka per consultation. Do you think this fee is adequate today, or should it be increased? are shown in Figure 4.29(b). Only 69.2 percent of expert doctors currently said that this amount is ok for telemedicine in some way and 30.8 percent of doctors do not think so.

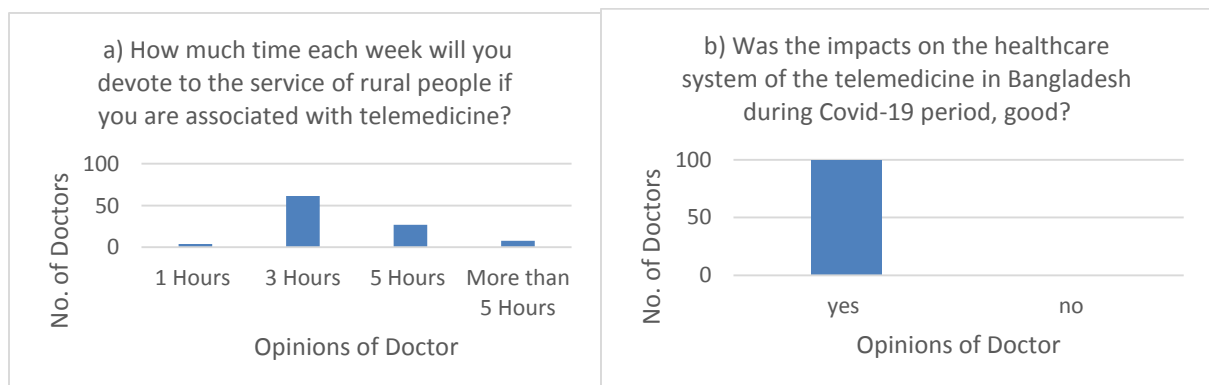


4.30(a) Distance barriers and help status

4. 30(b) Effective tool of telemedicine

Fig 4.30: Distance barriers and help status and Effective tool of telemedicine.

In figure 4.30(a) shows that 100 percent of expert doctors said that telemedicine reduces the distance barriers and helps to provide health service where there is scarcity of medical availability. In figure 4.30(b) presents the scenario about the effective tools of telemedicine. The Expert doctors chose 76.9 percent to address access, 15.3 percent to easily maintainability and 3.8 to equity and cost-effectiveness.



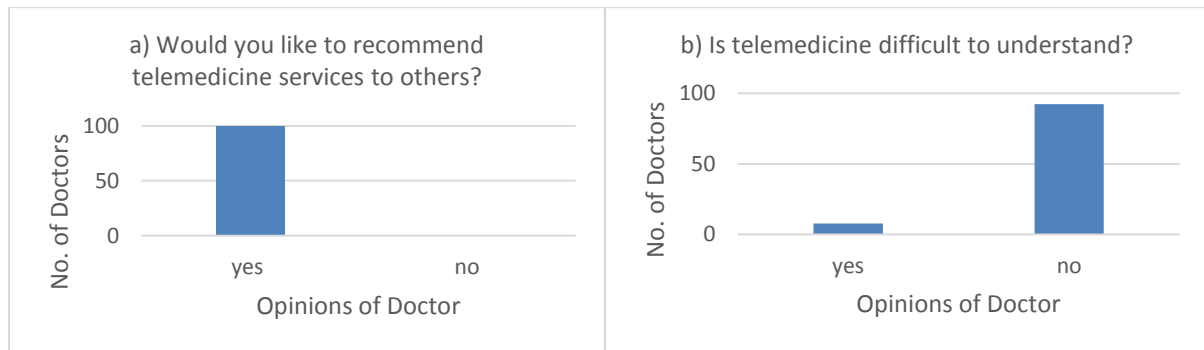
4.31(a) Service time for rural people

4.31(b) Opinions about the healthcare system

Fig 4.31: Service time for rural people and Opinions about the healthcare system.

Figure 4.31(a) shows how much time each week will you devote to the service of rural people if you are associated with telemedicine from the perspective of an expert doctor. The data shows that the majority of doctors prefer 3 hours (61.5 percent), 5 hours (26.9 percent), more than 5 hours (7.8 percent) and 1 hour (3.8 percent) for telemedicine service per week.

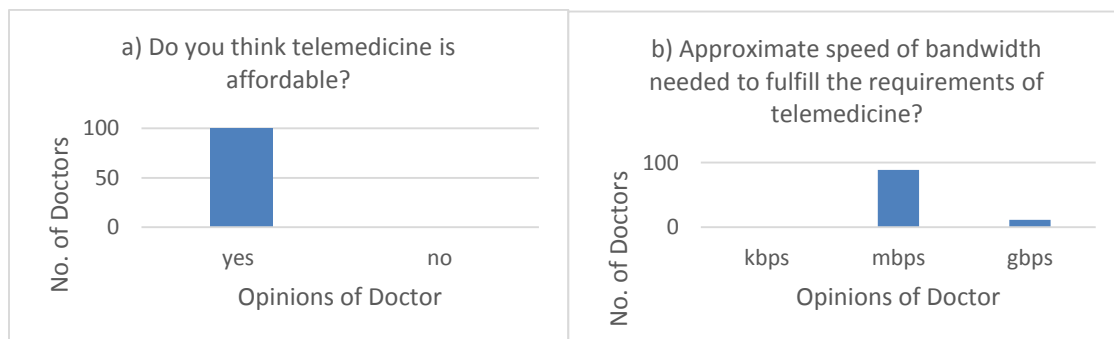
Figure 4.31(b) presents expert doctors' opinion on the impacts on the healthcare system of the telemedicine in Bangladesh during Covid-19 period. Most of the expert doctors gives feedback on yes i.e. 100 percent.



4.32(a) Telemedicine service recommendation 4.32(b) Understanding about telemedicine

Fig 4.32: Telemedicine service recommendation and understanding about telemedicine.

Figure 4.32(a) shows the status of recommendations to others for expert doctors on telemedicine services. We get 100 percent feedback on this question. We queried the doctors if they have any difficulty to understand telemedicine or not. Figure 4.32(b) presents that maximum result was no i.e. 92.3 percent and yes were 7.7 percent.



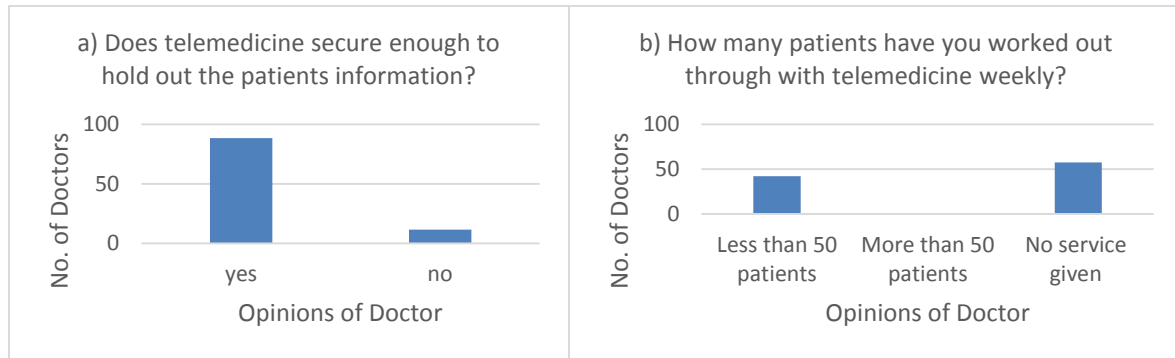
4.33(a) Telemedicine is affordable

4.33(b) Feedback on bandwidth speeds

Fig 4.33: Telemedicine is affordable and Feedback on bandwidth speeds.

Figure 4.33(a) presents the status of affordability of telemedicine. They answered 100 percent for yes. We questioned some expert doctors what approximate speed of bandwidth

they need to fulfill the requirements of telemedicine. Figure 4.33(b) shows that majority 88.5 percent replies that mbps, and next 11.5 percent declares their second opinion.

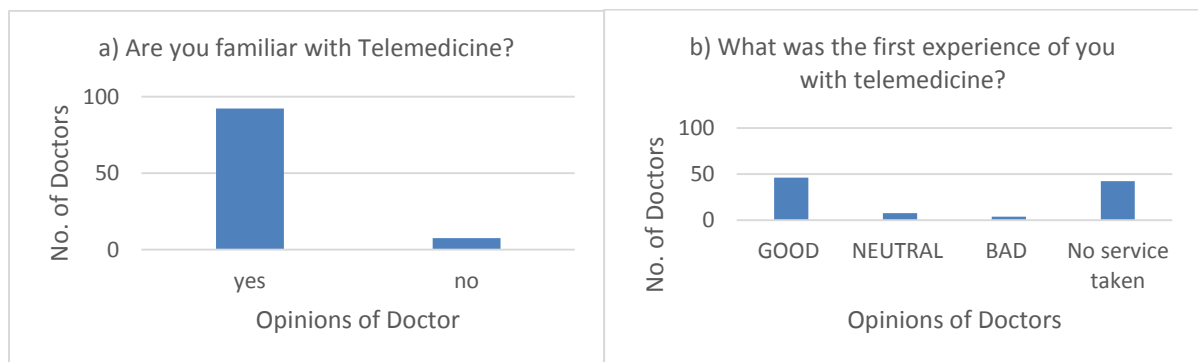


4.34(a) Opinions about patient information 4.34(b) Weekly patient for telemedicine

Fig 4.34: Opinions about patient information and Weekly patient for telemedicine.

Figure 4.34(a) is the answer of the question to get the result on “telemedicine is secure enough to hold out the patient’s information”. Most of the expert doctors answered yes i.e. 88.4 percent and no i.e.11.6 percent.

Figure 4.34(b) declares on how many patients were given services through telemedicine weekly by the expert doctors. Less than 50% were served through telemedicine and more than 50 % were not served.



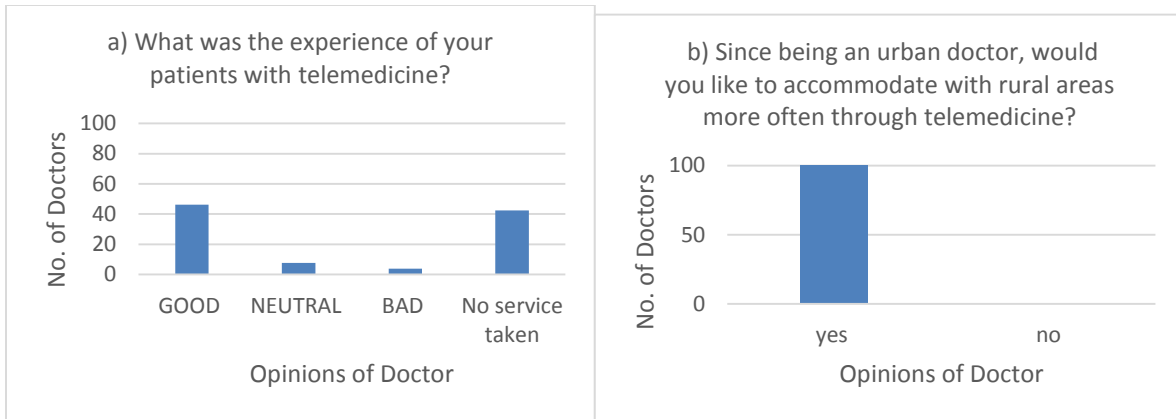
4.35(a) Familiarity with telemedicine

4.35(b) Opinions of first experience

Fig 4.35: familiarity with telemedicine and Opinions of first experience.

Figure 4.35(a) shows that 92.3% expert doctors are familiar with telemedicine services and only 7.6% are not familiar with this service.

Figure 4.35(b) presents the expert doctors experience with telemedicine. Good results were found 46.2 percent, no service taken for 42.3 percent, neutral service were given 7.7 percent and bad experience was recorded 3.8 percent.



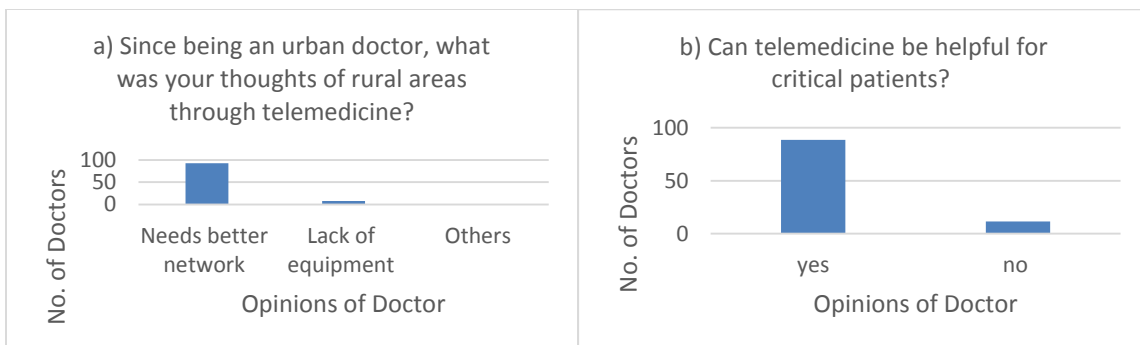
4.36(a) Opinions on previous experience people

4.36(b) Accommodation status for rural people

Fig 4.36: opinions on previous experience in telemedicine and accommodation status for rural people through telemedicine.

Figure 4.36(a) shows the experiences of doctors of using telemedicine. Doctors opinion is good 46.2 percent, no service taken through telemedicine is 42.3 percent, neutral opinion was given 7.7 percent and bad experience 3.8 percent.

Figure 4.36(b) displays the status of accommodation of more often through telemedicine, result was yes (100 percent).



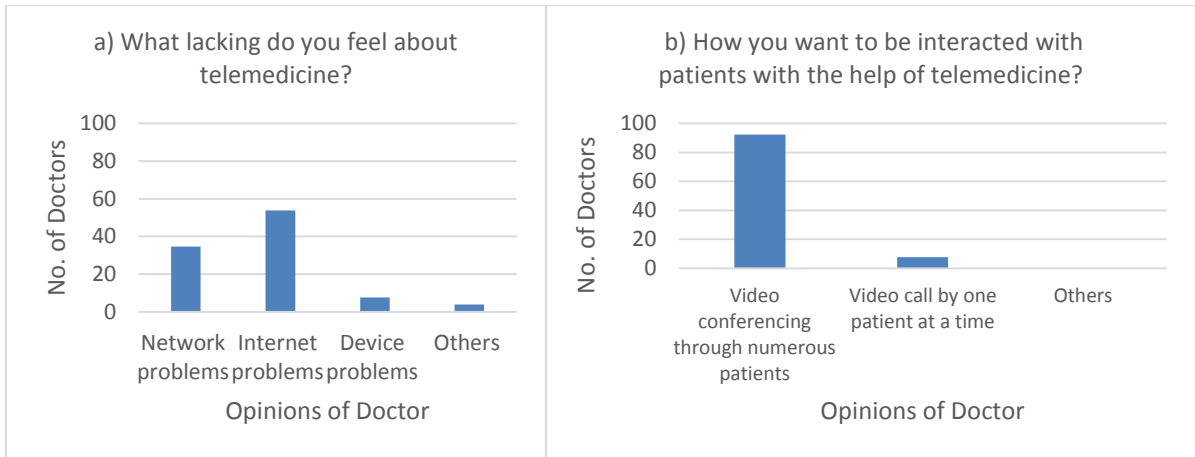
4.37(a) Opinions of urban doctors

4.37(b) Critical patient helpful status

Fig 4.37: Opinions of urban doctors and critical patient helpful status.

Figure 4.37(a) highlights the thoughts towards the rural areas through telemedicine. 92.3 percent gave their opinion about network betterment, 7.7 percent agreed that we need more equipment.

Figure 4.37(b) presents the usefulness status of telemedicine critical patients. Survey concludes that 88.5 percent gave their opinion on yes and 11.5 percent for no.



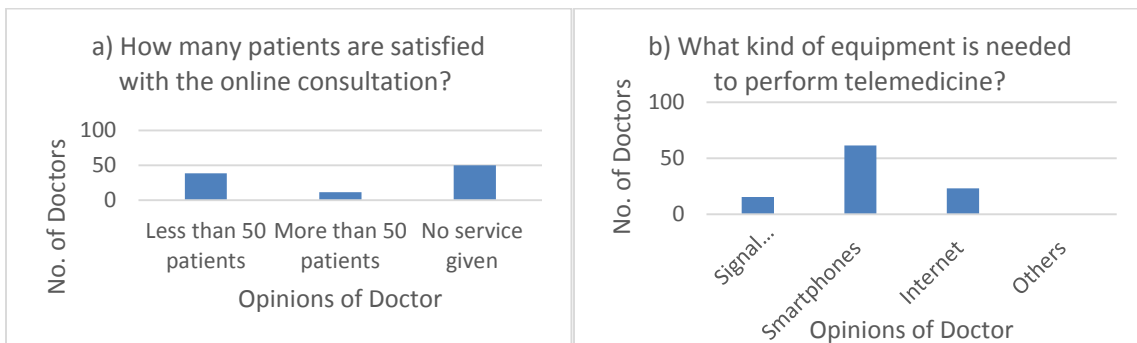
4.38(a) Opinions about telemedicine

4.38(b) Ways to communicate with patients

Fig 4.38: Opinions about the lack of telemedicine and ways to communicate with patients.

Figure 4.38(a) shows that network Problem is 34.6%, Internet Problem is 53.8%, Device Problem is 7.7% and Other Problems are 3.8% for offering telemedicine service for specialist doctors.

Figure 4.38(b) presents 92.3% of specialist doctors think video conferencing very good for the patients to get telemedicine services. 7.7% of specialist doctors think that telemedicine service will be provided with video call for once.



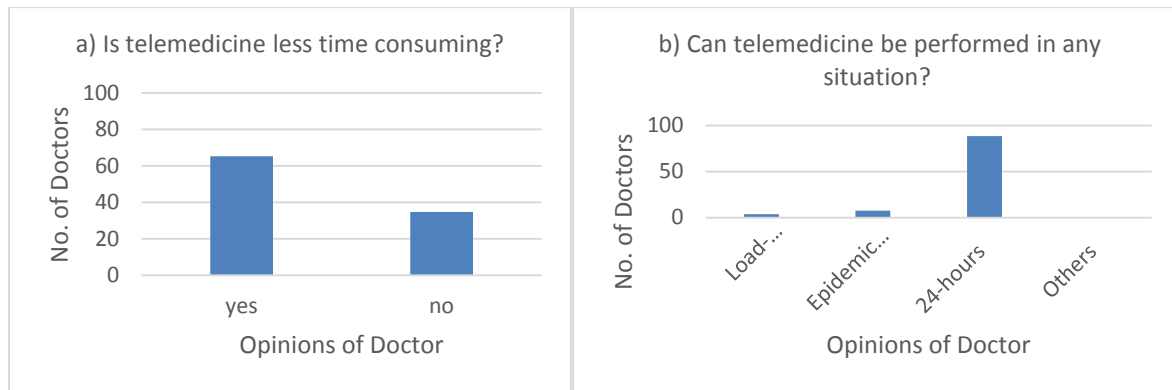
4.39(a) Patient satisfaction through online

4.39(b) Types of equipment for telemedicine

Fig 4.39: Patient satisfaction through online and Types of equipment for telemedicine services.

Figure 4.39(a) shows the patients satisfaction status. 50 percent of patient didn't receive any telemedicine service, 38.5 percent patients were satisfied among less than 50 patients and 11.5 percent patient were satisfied among more than 50 patients.

Figure 4.39(b) presents the equipment needed for telemedicine services. 15.4% need a signal transmitting device, 61.5% think a doctor needs a smartphone, 15.4% think a doctor needs the Internet connection.



4.40(a) Feedback about time spent

4.40(b) Performance situation about telemedicine

Fig 4.40: Feedback about time spent and Performance situation about telemedicine.

Figure 4.40(a) shows that 65.3% of specialist doctors think that telemedicine is less time consuming process and 34.7% of specialist doctors think it is very time consuming.

Figure 4.40(b) presents that 88.5% respondent tells that telemedicine service can be given in 24 hours, 7.7 percent tells that this service is effective for epidemic/pandemic, 3.8 percent tells that this service can be given at the time of load shading also.

4.2 Discussion

During Covid-19, patients have to face many problems with medical services. Some patients with serious problems were not able to communicate properly with specialist doctors. In this survey, we found several problems for patients. Patients in rural areas do not communicate properly with the specialist doctors during Covid-19. They faced power problems, poor internet service, lack of medical facilities, lack of transportation from one place to other and various other problems. Moreover, during the Covid-19 period patients did not receive proper medical care from their village. They are not satisfied with the medical facilities during the epidemic and many of them haven't heard the name of telemedicine services. Lots of valuable lives were lost due to Covid-19 period. Through this research, we came to know that telemedicine could solve the major health issues for the rural patients of Bangladesh.

Pharmacy owners play an important role during an epidemic. Although they faced various problems but they did not stop their service. Some pharmacies do not have specialist doctors. But they served the patients through local doctors and they want to introduce telemedicine services to meet the needs of patients. They realize that many patients died during the

epidemic due to lack of proper treatment. They also have some demands on telemedicine fees, specialist doctor fees and more. They do not have proper training about telemedicine. They want proper training to serve telemedicine through pharmacy. Once their proposed demand is met, they will be able to launch telemedicine services.

Local doctors are the backbone of medical services in rural areas. The study found that local doctors do not have adequate training in new medical technologies, but they are interested to get training. They also need to have good knowledge and good training in telemedicine. During the Covid-19 period, local physicians faced drug shortages, lack of infrastructural support, and other problems. Many patients went to them with various symptoms but they cannot give the best treatment to them for various reasons. They are unable to give proper treatment to Covid-19 patients and are unable to communicate with specialist doctors and others. Moreover, if there is a telemedicine center or dispensary near the village, they could easily provide telemedicine services. They proposed national telemedicine framework because it could be the best hub of the telemedicine.

Everyone needs to know about telemedicine to provide good medical services in rural disadvantaged areas. Specialist physicians will be the pioneers of telemedicine services. Every specialist doctor needs high quality training on telemedicine services and they should give proper guidance and knowledge about medical services to their local doctors. If they share their knowledge with patients, local doctors and pharmacy owners, they will become real heroes in the medical field to the rural people. This study shows that there are different opinions of specialist doctors about different perspectives in rural areas. Many people did not receive proper treatment during the epidemic but we had to share opinions through online consultation. They try to meet the needs of patients, pharmacy owners, local doctors. Patients in rural areas do not get proper treatment after various problems. They also point out some problems like speed of internet and lack of other necessary tools. They believe that telemedicine will become a role model for the medical sector for rural areas where treatment has not yet reached.

Chapter Five

Conclusion and Future Work

5.1 Introduction

This chapter discusses the findings of the study. The chapter presents a summary of the research and provides significant advances in telemedicine services for Third World countries. This section shows the originality and novelty of the research. Future works are also presented in the last section which provides guidance for further research conducted by researchers on the subject.

5.1.1 Conclusion

Firstly, the study began with a preliminary survey of telemedicine services in Bangladesh. The survey was conducted on patients, local doctors, specialist's doctors and pharmacy owners. The results of the survey were the basis for finding the current status of telemedicine during Covid-19 period.

Secondly, most recent literatures were reviewed to find out the telemedicine advancement around the world. All the existing telemedicine systems of Bangladesh were also analyzed through on-site observations. Published recent researches on the models of Bangladesh were reviewed technically in this research. Based on the results of the literature review and the primary survey results, the telemedicine systems should be designed to meet the demand of future.

Thirdly, rural areas of developing countries like Bangladesh where there is no electricity, telemedicine can be easily operated. Only mobile network is required to operate it. The electronic system need to be incorporated into the design phase in such a way that the health systems can interacts with other health systems easily. Health records can be easily shared and exchanged between health organizations. As a result, more efficient, convenient and quality care can be provided to patients.

Fourthly, we have started our survey to highlight the importance of telemedicine in rural areas. We interacted with patients, local doctors, specialist doctors and pharmacies to collect data through electronic devices such as softcopies of face-to-face questionnaires and smartphones. Their views on the survey were very important to start telemedicine services.

Finally, we can conclude that the telemedicine system will be improved and sustainable through this research. Through telemedicine services people can easily manage their health records and get improved healthcare even in pandemic situation. In this way, overall development of rural health and health services will be improved for Bangladesh.

5.2 Future work

We have successfully developed the questionnaires of the research in the Computer Science Engineering department of Bangladesh University. Results section shows briefly the findings of this research work. In order to develop the standard telemedicine system for Bangladesh, the results of this research can be a vital component for the decision makers of Bangladesh. We strongly believe that health sector of Bangladesh will enter into a new era of health sector through telemedicine.

Bibliography

1. Online. Link: borgenproject, <https://borgenproject.org/telemedicine-in-bangladesh/>.
2. WHO, A health telematics policy in support of WHO/s Health For All strategy for global health development: report of the WHO group consultation on health telematics, tech. rep., World Health Organization, 1998.
3. Research (IEDCR), Institute of Epidemiology, Disease Control and. করোনা ইনফো. corona.gov.bd (in Bengali). Archived from the original on 22 March 2020. Retrieved 3 May 2020.
4. J. Craig and V. Patterson, Introduction to the practice of telemedicine, Journal of Telemedicine and Telecare, vol. 11, no. 1, pp. 39, 2005.
5. B. Rao and A. Lombardi, Telemedicine: current status in developed and developing countries, Journal of Drugs in Dermatology, vol. 8, no. 4, pp. 371375, 2009.
6. R. Wootton, J. Menzies, and P. Ferguson, Follow-up data for patients managed by store and forward telemedicine in developing countries, Journal of Telemedicine and Telecare, vol. 15, no. 2, pp. 8388, 2009.
7. H. PJ, L. NE, and K. JC, Telemedicine in the future, Journal of Telemedicine and Telecare, vol. 11, 384-390 2005.
8. U. K. Prodhan, M. Z. Rahman, and I. Jahan, Ardunio based real time health monitoring system for telemedicine services of Bangladesh, Jahangirnagar University Journal of Science, vol. 40, no. 2, pp. 95108, 2017.
9. Telemedicine: Adventures in time and space KBIA Published December 14, 2011 at 11:30 AM CST.
10. <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3089841/>

11. The History of Telehealth and Telemedicine
https://3f9znz109u3oybcpa3vow591-wpengine.netdna-ssl.com/wp-content/uploads/2021/11/History_of_Telehealth.pdf.
12. The Doctor Will Skype You Now: Virtual Checkups Reach Bangladesh's Isolated Islands November 6, 2019 1:46 PM ET JENNIFER CHOWDHURY.
13. Early measures for prevention and containment of COVID-19 in the Maldives: A descriptive analysis by Mariyam SUZANA, Sheena MOOSA, Fathmath Nazla RAFEEG, Sofoora K. USMAN.
14. Impact of COVID-19 on the Education Sector in Nepal: Challenges and Coping Strategies by Saraswati Dawadi, Ram Ashish Giri and Padam Simkhada.
15. COVID-19 Pandemic and BPKIHS: our Situation, Endeavors and Future Direction by Dhana Ratna Shakya, Deebya Raj Mishra, Rajesh Gyawali, Surya Prasad Rimal, Sami Lama, Ajay Kumar Yadav, Suraj Nepal, Bishnu Pokharel, Nidesh Sapkota.
16. Application of Telemedicine Services Based on a Regional Telemedicine Platform in China From 2014 to 2020: Longitudinal Trend Analysis by Fangfang Cui, Xianying He, Yunkai Zhai, Minzhao Lyu, Jinming Shi, Dongxu Sun, Shuai Jiang, Chenchen, Jie Zhao.
17. Implementation and Application of Telemedicine in China: Cross-Sectional Study by Fangfang Cui, Qianqian Ma, Xianying He, Yunkai Zhai, Jie Zhao BaozhanChen, Dongxu Sun, Jinming Shi, Mingbo Cao, Zhenbo Wang.
18. The establishment of a telemedicine center during the COVID-19 pandemic at a tertiary care hospital in Pakistan by Fibhaa Syed, Muhammad Hassan, Aamir Shehzad, Salman Shafi Koul, Mohammad Ali Arif, Rebecca Susan Dewey, Tanwir Khaliq.
19. Healthcare strategies and initiatives about COVID19 in Pakistan: Telemedicine a way to look forward by Ayesha Humayunc, Syed Shahabuddine, Saira Afzal f, Ahmad Azam Malikg, Suleman Atiquei,, Usman Iqbal.

20. The promise of telemedicine in Pakistan: A systematic review by Syed Sarosh Mahdi, Raheel Allana, Gopi Battineni, Tamsal Khalid, Daniyal Agha, Mariam Khawaja, Francesco Amenta.
21. Patient and Physician Preferences for Therapy Characteristics for Psoriasis: A Discrete Choice Experiment in Japan by Timothy Bolt, Hisanori Kobayashi, Jörg Mahlich.
22. Telemedicine during COVID-19 in India—a new policy and its challenges by Sambit Dash, Ramasamy Aarthi, Viswanathan Mohan.
23. Model for the Adoption of Telemedicine in Sri Lanka by Dayani Jayasinghe, Richard M. Crowder, and Gary Wills.
24. A review of Telehealth practices in Sri Lanka in the context of the COVID-19 pandemic by Gumindu Garuka Kulatunga, Roshan Hewapathirana, Rohana Basil Marasinghe, Vajira H. W. Dissanayake.
25. Telehealth in the Context of COVID-19: Changing Perspectives in Australia, the United Kingdom, and the United States by Malcolm Fisk, Anne Livingstone, Sabrina Winona Pit.
26. Telemedicine, the current COVID-19 pandemic and the future: a narrative review and perspectives moving forward in the USA by Asim Kichloo, Michael Albosta, Kirk Dettloff, Farah Wani, Zain El-Amir, Jagmeet Singh, Michael Aljadah, Raja Chandra Chakinala, Ashok Kumar Kanugula, Shantanu Solanki, Savneek Chugh.
27. Medical Legal Aspects of Telemedicine in Italy: Application Fields, Professional Liability and Focus on Care Services During the COVID-19 Health Emergency by Ferorelli D.1, Nardelli L.1, Spagnolo L.1, Corradi S.1, Silvestre M.1, Misceo F.1, Marrone M.1, Zotti F.1, Mandarelli G.1, Solarino B.1, and Dell'Erba A.
28. Excellence in healthcare: Telemedicine project in an Italian region by Roberta Pinna, Pier Paolo Carrus, Marta Musso.

29. Market study on telemedicine Europe EUROPEAN COMMISSION Directorate-General for Health and Food Safety Directorate B — Health systems, medical products and innovation Unit B.3 — European Reference Networks and Digital Health.
30. Telemedicine in Germany During the COVID-19 Pandemic: Multi-Professional National Survey by Arne Peine, Pia Paffenholz, Lukas Martin, Sandra Dohmen, Gernot Marx, Sven H Loosen.
31. Telemedicine in the pediatric surgery in Germany during the COVID-19 Pandemic by G. Lakshin · S. Banek¹ · D. Keese¹ · U. Rolle¹ · A. Schmedding.
32. Telemedicine in allergology: practical aspects A position paper of the Association of German Allergists (AeDA) by Stephanie Dramburg · Uso Walter · Sven Becker · Ingrid Casper · Stefani Röseler · Astrid Schareina · Holger Wrede · Ludger Klimek.
33. Use of telehealth: evidence from French teleconsultation for women's healthcare, prior and during COVID-19 pandemic by Carine Milcent, Saad Zbiri.
34. Focus on the Different Projects of Telemedicine Centered on the Elderly in France by Abrar A. Zulfiqar, Amir Hajjam and Emmanuel Andrès.
35. Consumer side economic perception of telemedicine during COVID-19 era: A survey on Bangladesh's perspective by Sheikh Elhum Uddin Quadery, Mehedi Hasan, Mohammad Monirujjaman Khan.
36. The Use of Telemedicine in Bangladesh during COVID-19 Pandemic by Mohammad Monirujjaman Khan, S. M. Tahsinur Rahman, Sabik Tawsif AnjumIslam.
37. Gender disparity in telehealth usage in Bangladesh during COVID-19 by Saanjaana Rahman, Sajid Amit a, Abdulla - Al Kafy.
38. Use of Telemedicine in Bangladesh: Current Status and Future Prospects

By Habibur Rahman, Mojibul Hoque Rubel, Bushra Sadia, Naifa Enam Sarker, Md. Shahriar Kabir, Anika Jamal Sreya, Tahsin Monaem, Raisul Hasan, Sourav Nath Mitun, S.M. Tareq Rahman, Ratan Ali, Md. Al-Imran, Md. Al Hasan Ibneh Fahad, April 01,2022

39. Growth in Telehealth Use in Bangladesh from 2019-2021 – A Difference-in-Differences Approach by Saanjaana Rahman, Sajid Amit.

40. Telemedicine: An Innovative Twist to Primary Health Care in Rural Bangladesh by Md. Hafiz Iqbal.

41. Healthcare Crisis in Bangladesh during the COVID-19 Pandemic by Md. Sayeed Al-Zaman.

42. COVID -19 Pandemic and Level of Responses in Bangladesh by Md Kariul Islam, Md Shukur Ali, SAM Ziaur Rahman Akanda, Shahnaz Rahman, AHM Kamruzzaman, Sharif Abdul Kader Pavel, and Jannatul Baki.

43. An evaluation of the first years' experience with a low cost telemedicine link in bangladesh by D j vassallo, F Hoque, M Farquharson Roberts, V Patterson, P Swinfen and R Swinfen.

Appendix

Questionnaires for primary survey

TELEMEDICINE RELATED QUESTIONNAIRES FOR EXPERT DOCTORS

1. Is the delivery of health care services a critical factor?
a) Yes b) no
2. The cost of telemedicine consultations for the project between Barden Hospital and Faridpur Diagnostic Hospital was 600 taka per consultation. Do you think this fee is adequate today, or should it be increased?
a) Yes b) no
3. Does Telemedicine reduces the distance barriers and helps to provide health service where there is scarcity of medical availability?
a) Yes b) no
4. Is Telemedicine an effective tool to?
a) Address access b) Equity
c) Quality d) easily maintainability e) cost-effectiveness
5. How much time each week will you devote to the service of rural people if you are associated with telemedicine?
a) 1hours b) 3hours
c) 5hours d) More than 5hours
6. Was the impacts on the healthcare system of the telemedicine in Bangladesh during Covid19 period, good?
a) Yes b) no
7. Would you like to recommend telemedicine services to others?
a) Yes b) no
8. Is telemedicine difficult to understand?
a) Yes b) no
9. Do you think telemedicine is affordable?
a) Yes b) no
10. Approximate speed of bandwidth needed to fulfill the requirements of telemedicine?
a) Kbps b) Mbps c) Gbps
11. Does telemedicine secure enough to hold out the patient information?
a) Yes b) no
12. Was telemedicine a necessity during covid-19 period?
a) Yes b) no
13. how many patients have you work throughout with telemedicine weekly?
a) less than 50 patients b) more than 50 patients
14. Are you familiar with Telemedicine?
a) Yes b) no
15. What was the experience of you with telemedicine?
a) Good b) not bad c) bad
16. What was the experience of your patients with telemedicine?
a) Good b) not bad c) bad
17. Since being an urban doctor, would you like to accommodate with rural areas more often through telemedicine?
a) Yes b) no

18. Can telemedicine be helpful for critical patients?
a) Yes b) no
19. What lacking do you feel about telemedicine?
a) Network problems b) internet problems
c) Device problems d) others
20. How you want to be interacted with patients with the help of telemedicine?
a) Video conferencing through numerous patients b) video call by one patient at time
c) Other
21. How many patients are satisfied with the online consultation?
a) Less than 50 patients b) more than 50 patients
22. What kind of equipment is needed to perform telemedicine?
a) Smartphone b) computer
c) Internet d) others
23. Is telemedicine less time consuming?
a) Yes b) no
24. Can telemedicine be performed in any situation?
a) load-shedding b) epidemic/pandemic
c) 24-hours

APPENDIX A. QUESTIONNAIRES FOR PRIMAR SURVEY

TELEMEDICINE RELATED QUESTIONNAIRES FOR LOCAL DOCTORS

1. Do you know about telemedicine services?
 - a) Yes
 - b) No
2. Do you provide telemedicine services during covid-19 period?
 - a) Yes
 - b) No
3. How can patients connect with you?
 - a) Through mobile phone
 - b) Through telephone
 - c) Through Email
 - d) Video conferencing
 - e) Face to face
4. Which types of patients come to you during covid-19 period?
 - a) Patients with covid syndrome
 - b) For quick health service
 - c) For consultation
 - d) Other reasons
5. Do you think that language barriers are associated with risks to patient safety and quality of care?
 - a) Yes
 - b) No
6. Do you think communication barriers hamper in rural areas for patient's care?
 - a) Yes
 - b) No
7. Is public and private servicing entities play an important role during covid-19 period?
 - a) Yes
 - b) No
8. Do you think telemedicine services from union parishad need to be connected with the central telemedicine center?
 - a) Yes
 - b) No
9. In order to increase telemedicine services in rural areas which steps will need to include from your point of view?
 - a) Viable working environment
 - b) Compatible financial and expert benefits
 - c) Store and forward transmission of medical information
 - d) Remote patient monitoring (RPM)
 - e) Mobile health communication (mHealth)
 - f) Other steps
10. Which infrastructural support is needed for telemedicine during covid-19 period?
 - a) Computers
 - b) Internet network
 - c) Mobile phone
 - d) Electricity
 - e) Others
11. Do you think that local doctors need sufficient training on the new technology of medical sector?

- a) Yes
- b) No
- 12. Do you have a specialist doctor's opinion for providing services to covid-19 patients?
 - a) Yes
 - b) No
- 13. Do you share prescription with expert doctors during covid-19 period?
 - a) Yes
 - b) No
- 14. How can you communicate with expert doctors during covid-19 period?
 - a) Through email
 - b) Through video call
 - c) Through mobile phone
 - d) Others
- 15. Do you think it is needed to provide a good internet network in dispensary to communicate with national or international experts for telemedicine service during covid-19?
 - a) Yes
 - b) No
- 16. Do you agree a national telemedicine framework can be important part of telemedicine services for remote areas?
 - a) Yes
 - b) No
- 17. Do you agree that the public and private partnership program could play major role of telemedicine service during covid-19 period?
 - a) Yes
 - b) No

APPENDIX A. QUESTIONNAIRES FOR PRIMAR SURVEY

TELEMEDICINE RELATED QUESTIONNAIRES FOR PATIENT'S

- 1. Heard the name of the telemedicine service?
 - a) Yes
 - b) No

2. Do you think telemedicine healthcare has benefited you during COVID-19?
a) Yes b) No
3. Do you think it is easy to contact a doctor through telemedicine?
a) Yes b) No
4. Do you want telemedicine services for critically ill patients in your area?
a) Yes b) No
5. Do you want telemedicine services from your home?
a) Yes b) No
6. Do you want to get telemedicine services from your area?
a) Yes b) No
7. What is the status of service of rural doctors?
a) Full time b) Part time
c) Irregular d) No service
8. Which types of doctors deliver healthcare services in your village?
a) MBBS doctors b) Doctors with diploma degree
c) Local doctors d) Community clinic doctors
e) No doctors
9. Do you have medical facilities in your village like in the city?
a) Yes b) No
10. Do people in your village know about telemedicine?
a) Yes b) No
11. What kind of services do you want to get from telemedicine?
a) Phone consultations b) video conferencing
12. Do you have to travel from village to town to get MBBS doctor's healthcare?
a) Yes b) No
13. How much you will have to cost for travelling to get treatment from urban areas?
a) 350 to 800 BDT b) 800 to 1500 BDT
c) 1500-2000 BDT d) Others
14. Can you talk to a doctor directly for a heart attack patient?
a) Yes b) No
15. How satisfied were you with your provider's thoroughness while using Telemedicine ?
a) Excellent b) Very Good
c) Not good d) I haven't used it yet e) others
16. Why do you think telemedicine services should be used by everyone?
a) Healthcare is very easily available
b) Saving time from going to any hospital c) Others
17. Would you advise villagers or family members to use telemedicine?

- a) Yes b) No
18. Are you satisfied with telemedicine healthcare?
- a) Yes b) No

APPENDIX A. QUESTIONNAIRES FOR PRIMARY SURVEY

TELEMEDICINE RELATED QUESTIONNAIRES FOR PHARMACY OWNER

1. Which types of services, do general people expect from your pharmacy?
 - a) To buy medicine
 - b) To get consultation
 - c) Both
2. Is there any doctor in your pharmacy?

- a) Yes
b) No, but have a plan to assign a physician in your pharmacy
3. Have you heard the name of telemedicine service?
a) Yes b) No
4. Do you agree to start telemedicine service from your pharmacy?
a) Yes b) No c) Other
5. Do you provide telemedicine services in your pharmacy during covid-19?
Period?
a) Yes b) No
6. Which types of people have come to your pharmacy during covid-19?
Period?
a) Patients with covid-19 syndrome b) For consultation
c) To buy medicine d) to meet with doctors
7. How can people connect with your pharmacy?
a) Through mobile phone b) Through telephone
c) Face to face d) Other
8. How much is the telemedicine fee for a specialist doctor in your pharmacy?
a) 200 BDT b) 300 BDT
d) 400 BDT d) more than 400 BDT d) No Doctor
9. From your point of view, what is the telemedicine fee for a pharmacy owner?
During the Covid-19 period?
a) 100 BDT b) 150 BDT
c) 200 BDT d) More than 200 BDT e) Other
11. Do your local doctors advise covid-19 patients to consult a specialist?
a) Yes b) No
12. Which infrastructural support is needed in your pharmacy for telemedicine
during the covid-19 period?
a) Computers b) mobile phone
c) Electricity d) Other
13. What will be your expected percentage from the income of telemedicine?
service?
a) 20% b) 30%
c) 40% d) 50%
14. Do you agree to offer telemedicine service during the covid-19 period?
According to the requirements to the patients?
a) Yes b) No
15. Do you interested to invest in starting a telemedicine service from your
Pharmacy?
a) Yes b) No
16. Do you interested to get telemedicine services training?
a) Yes b) No
17. Do your local doctor and you agree on starting a telemedicine service?
a) Yes b) No
18. Do you have enough space to facilitate telemedicine service?
a) Yes b) No
19. Where is your pharmacy situated?
a) Divisional area b) District area

- c) Thana area d) Union area
- e) Local village

20. Do you have enough experience and training to start telemedicine?

- a) Yes b) No