A survey on the use of Telemedicine in Healthcare System among the students of Daffodil International University

A project presented for the partial fulfillment of the requirements for the degree of Bachelor of Pharmacy (B.Pharm)

Submitted To

Department of Pharmacy

Faculty of Allied Health Sciences

Daffodil International University

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APPROVAL

This Project, A survey on "**The use of Telemedicine in Healthcare System among the students of Daffodil International University**", submitted to the Department of Pharmacy, Faculty of Allied Health Sciences, Daffodil International University, has been accepted as satisfactory for the partial fulfilment of the requirements for the degree of Bachelor of Pharmacy (B. Pharm) and approved as to its style and contents.

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CERTIFICATE

This is to confirm that the research findings included in this project are new and have never been submitted in full for a degree from this university. The whole existing project, which has been submitted as a research project for the partial fulfillment of the Bachelor of Pharmacy degree, is based on the findings of the author's (ID: 191-29-232) personal research.

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DECLARATION

I hereby declare that, this project report is done by me under the supervision of **Mr. Shadhan Kumar Mondal**, Lecturer, Department of Pharmacy, Faculty of Allied Health Sciences, Daffodil International University, impartial fulfilment of the requirement for the degree of Bachelor of Pharmacy (B. Pharm). I am declaring that this project is my original work. I am also declaring that neither this project nor any part thereof has been submitted elsewhere for the award of Bachelor or any degree.

Md. Rafiqul Islam Rahat

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Md. Rafiqul Islam Rahat

Author

DEDICATION

I dedicate this work at first to almighty Allah then to my parents, to my respected teachers, my lovely friends and a special person……..

ABSTRACT

Background: Telemedicine is the use of technology to provide healthcare services remotely. This technology has been around for several decades but has gained significant attention and usage in recent years, especially with the COVID-19 pandemic. Telemedicine has provided a means for patients to receive medical care without having to visit a doctor in person, reducing the risk of infection transmission and making healthcare services more accessible.

Objective: To investigate the current state of telemedicine use, benefits and limitations, and to gain insights into the attitudes and experiences of healthcare professionals and patients towards telemedicine services, with the aim of identifying areas for improvement and potential opportunities for further adoption.

Method: An online survey was conducted on students at Daffodil International University in Dhaka, Bangladesh, utilizing a Google Form. The survey was shared through various means including email, Facebook, and other social media platforms. A questionnaire was designed, and data was collected. The results will be analyzed and compiled into a detailed report that will include tables and graphs, as well as recommendations for further research and improving telemedicine services.

Result: The survey involved 151 students, of which 92.7% reported having knowledge of telemedicine, and 7.3% reported having no knowledge of it. The majority of participants were male (73.5%) and female were (26.5%). 51.7% had used telemedicine services before, with the remaining 48.3% having not used them. The questionnaire was completed mostly by pharmacy department students (61.6%), with only 2.6% of students from the EEE department filling it out. Sources of information about telemedicine services included doctors, family members, friends, online searches, textbooks, and the internet. Those who have not used telemedicine services expressed concerns about preferring in-person consultations, quality doubts, distrust of technology, and data security concerns. A majority of individuals (63.8%) indicated they are likely to use telemedicine services in the future, while approximately 32.3% are considering it, and only 3.8% have no intention of using it.

Conclusion: In conclusion, the survey findings suggest that telemedicine has become an increasingly important aspect of healthcare delivery. It provides numerous benefits such as

increased access to healthcare services, improved patient outcomes, and reduced healthcare costs. Despite the advantages, the study also identified some limitations and challenges, including concerns about data security and privacy, lack of technological infrastructure, and inadequate reimbursement policies. It is recommended that healthcare systems and policymakers address these challenges to further promote the adoption of telemedicine services. Overall, the survey indicates that telemedicine has great potential to transform the healthcare system and enhance the delivery of patient-centered care.

Keywords: Telemedicine, healthcare, technology, patient, doctor, care, cost, Bangladesh.

LIST OF CONTENT

CHAPTER-1: INTRODUCTION

CHAPTER-2: OBJECTIVE OF THE STUDY

CHAPTER-3: METHODOLOGY

CHAPTER-4: RESULT & DISCUSSION

CHAPTER-5: CONCLUSION

CHAPTER-6: REFERENCES

LIST OF FIGURES

CHAPTER-1: INTRODUCTION

CHAPTER-4: RESULT & DISCUSSION

CHAPTER-1

INTRODUCTION

1.1. Introduction:

Telemedicine refers to the delivery of healthcare services to people who are geographically distant from their healthcare providers using information and communication technologies. It is not a single technology, but rather a part of a broader process of care, and is believed to enhance the quality and efficiency of healthcare. Telemedicine can also promote fairness and equality in healthcare by improving the accessibility of services, especially in remote areas. Although older methods such as telephone and fax are commonly used, telemedicine is now incorporating the latest advancements in computer and network technologies and other equipment.

Any new technology must demonstrate its superiority over existing approaches before it can be widely adopted. Telemedicine is no different and requires evaluation and data collection before it can be used routinely on a large scale. It is increasingly recognized that ongoing assessment is necessary for administrative purposes, as well as for informed decision-making and monitoring of telemedicine's use once implemented [1]. Telemedicine refers to the utilization of electronic communication and information technologies to offer or facilitate clinical care remotely [2]. Telehealth refers to the application of electronic information and telecommunications technologies to promote long-distance clinical healthcare, health education for patients and professionals, public health, and health administration [3].

1.2. Types of Telemedicine:

Telemedicine classified into three major categories-

1. Store-and-forward
2. Remote monitoring
3. Interactive services

1.2.1. Store-and-forward:

Telemedicine involves gathering medical information such as medical images and bio signals, and sending this information to a doctor or medical specialist for offline assessment at a convenient time, without requiring both parties to be present simultaneously. Asynchronous telemedicine is commonly used in specialties such as dermatology, radiology, and pathology. It is important to have a properly structured medical record, preferably in electronic form, as a component of this transfer. One key difference between traditional in-person patient meetings and telemedicine encounters is the lack of a physical examination and medical history during the latter. In the store-and-forward process of telemedicine, the clinician must rely on a report of medical history and audio or video information instead of a physical examination [4].

1.2.1.1. Telecardiology:

Electrocardiograms (ECGs) can be transmitted via telephone or wireless methods. Einthoven, who invented the ECG, conducted experiments transmitting ECGs over telephone lines because the hospital did not allow him to move patients from their rooms for testing. This led to the development of one of the earliest known telecardiology systems for transmitting ECGs. The system was also utilized to monitor patients with pacemakers in remote locations, with the central control unit at the ICU correctly interpreting arrhythmia. This technique facilitated the delivery of medical assistance to remote areas [5].

1.2.1.2. Teleradiology:

Teleradiology refers to the capability of transmitting radiographic images, such as X-rays, CT scans, MRIs, PET/CT scans, SPECT/CT scans, mammography, and ultrasound, from one location to another. To execute this process, three essential elements are required: an image sending station, a transmission network, and a receiving or image review station. The most common way to implement this is by connecting two computers via the internet. The computer at the receiving end must have a high-quality display screen that has been verified for clinical purposes, and sometimes

a printer is available for printing images for convenience. The process of teleradiology starts at the image sending station, which requires a radiographic image and a modem or other connections. The image is scanned and sent over the network connection to the receiving computer [6].

1.2.1.3. Telepsychiatry:

Telepsychiatry is a facet of telemedicine that utilizes video conferencing to provide psychiatric services to patients residing in underserved areas. It offers various services to both patients and providers, such as consultations between psychiatrists, educational clinical programs, diagnoses and assessments, and medication therapy management [7].

1.2.1.4. Tele-pharmacy:

Tele-pharmacy is a developing practice that allows patients in remote areas to receive pharmaceutical care without being in direct contact with a pharmacist. This includes services such as monitoring drug therapy, counseling patients, authorizing refills and prior authorizations, and ensuring compliance with formularies through the use of teleconferencing or videoconferencing. Videoconferencing is also commonly used in pharmacy for training, education, and various management tasks. [8].

1.2.2. Remote monitoring:

Remote monitoring, also referred to as self-testing or self-monitoring, is a technique that employs various technological devices to enable healthcare professionals to monitor a patient from a distance. It is mainly used for managing chronic diseases or specific conditions, like heart disease, diabetes mellitus, or asthma. These services have the potential to produce similar health outcomes to in-person patient visits, provide increased patient satisfaction, and may be a more cost-effective alternative [9].

1.2.3. Interactive service:

Interactive telemedicine services refer to the use of technology to enable real-time interactions between healthcare providers and patients. These services can take the form of phone conversations, online communication, or home visits. Many healthcare activities, including history review, physical examination, psychiatric evaluations, and ophthalmology assessments, can be performed using interactive telemedicine services in a manner comparable to traditional face-to-face visits. Furthermore, such services may be less expensive than in-person clinical visits. [10].

1.3. Infrastructure and system of Telemedicine:

Telemedicine is the delivery of healthcare services using telecommunication technologies such as video conferencing, remote monitoring, and mobile applications. The infrastructure of telemedicine includes several components that work together to facilitate the delivery of healthcare services remotely. These components include:

1. Hardware: The hardware used in telemedicine includes devices such as computers, tablets, smartphones, and medical devices such as blood pressure monitors, glucose meters, and thermometers. These devices are used by both patients and healthcare providers to communicate with each other remotely.
2. Software: Telemedicine software platforms are used to facilitate communication between patients and healthcare providers. These platforms include video conferencing software, electronic medical record systems, and remote monitoring software. The software used in telemedicine must be secure and comply with healthcare privacy regulations.
3. Connectivity: Telemedicine relies on reliable internet connectivity to facilitate communication between patients and healthcare providers. Patients must have access to high-speed internet to participate in telemedicine appointments. Healthcare providers must have reliable internet connectivity to ensure that they can deliver healthcare services remotely.
4. Telehealth Services: Telehealth services are the healthcare services delivered through telemedicine. These services include teleconsultations, remote monitoring, teletherapy, and

telepsychiatry. Telehealth services are delivered by licensed healthcare professionals who are trained in the delivery of care through telemedicine.

5. Regulations: Telemedicine is regulated at the state and federal level. Healthcare providers must comply with regulations related to telemedicine, including licensure, reimbursement, and privacy laws. These regulations can vary by state, making it important for healthcare providers to stay up-to-date with the laws in their jurisdiction.

Overall, the infrastructure of telemedicine requires reliable hardware and software, internet connectivity, telehealth services, and compliance with healthcare regulations. By utilizing these components, telemedicine can improve access to healthcare services for patients and increase efficiency for healthcare providers [11].

1.4. Factors facilitating the use of Telemedicine:

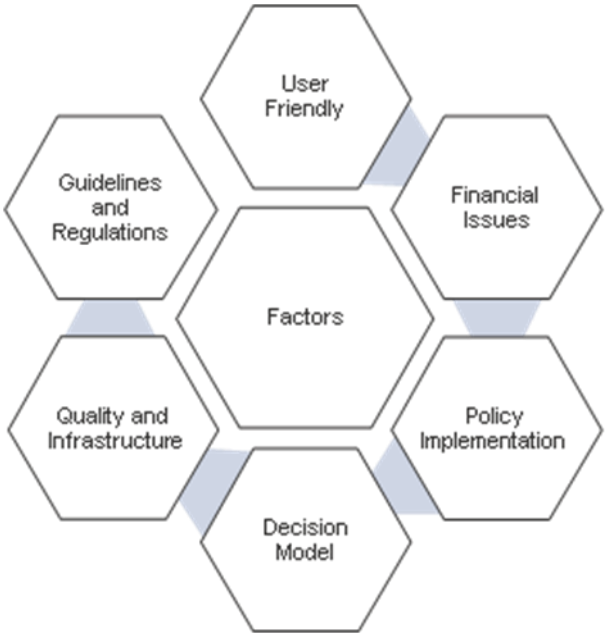

Figure 1.1: Factors facilitating the use of telemedicine.

Telemedicine may be more suitable for individuals who are comfortable using technology. To encourage the adoption of telemedicine, it is important to consider various factors, such as making it more user-friendly by providing training and awareness to all parties involved, including end-users. Financial constraints may also hinder adoption, but this can be addressed by providing initial

grants to start-up centers and utilizing existing infrastructure and administrative resources to reduce costs. However, proper digital infrastructure and organizational efforts are crucial in promoting the acceptance of health technology and avoiding potential barriers. The quality of healthcare providers also plays a significant role in telemedicine outcomes, and incentives can be provided based on their inputs and efforts to enhance their efficiency and foster healthy collaboration among physicians and specialists [12]. The acceptance of telemedicine is influenced by the performance of healthcare providers, service providers, and social influencers. Therefore, before designing a healthcare system, the efficiency of physicians should be taken into account. A major concern that needs to be addressed is the lack of clear guidelines and regulations, which requires flexibility and innovation to address legal, technical, and political issues and challenges. There is also a need for clear ethical guidelines for situations that may arise intentionally or unintentionally during telehealth services, either at the user or service provider end. If implemented properly, policies can facilitate access to patient support systems through assistive technology and can play an important role in promoting the adoption of telemedicine [13]. To avoid financial difficulties for users, it is important to address various issues by implementing appropriate decision and reimbursement models.

1.5. Patient counseling and monitoring:

Patient counseling and monitoring are important components of telemedicine. In telemedicine, patient counseling and monitoring are typically conducted remotely using video conferencing, telephone calls, or secure messaging applications. Here are some key considerations for patient counseling and monitoring in telemedicine:

1. Communication: Effective communication is key to telemedicine counseling and monitoring. Providers should ensure that patients understand how to use the technology and how to communicate with the provider. Providers should also establish clear guidelines for communication, including when and how to contact the provider.
2. Privacy and security: Providers must ensure that patient data is secure and protected during telemedicine sessions. This includes using secure video conferencing platforms and

encrypted messaging applications. Providers must also comply with HIPAA regulations to protect patient privacy.

3. Equipment: Patients must have access to the necessary equipment to participate in telemedicine counseling and monitoring sessions. This includes a computer, tablet, or smartphone with a reliable internet connection. Providers may also need to provide medical devices, such as blood pressure monitors or glucose meters, to enable remote monitoring.
4. Training: Patients may need training to use the technology and equipment required for telemedicine counseling and monitoring. Providers should provide patients with clear instructions and demonstrations to ensure that they can use the technology effectively.
5. Follow-up: Providers should establish clear guidelines for follow-up care and monitoring after telemedicine counseling sessions. Providers should also schedule regular follow-up appointments to ensure that patients are adhering to treatment plans and to monitor their progress.

In summary, patient counseling and monitoring are important components of telemedicine. Providers must ensure effective communication, privacy and security, equipment availability, training, and follow-up care to ensure the success of telemedicine counseling and monitoring [14].

1.6. Patient and healthcare provider relationship:

The patient-physician relationship is an important factor to consider when using telemedicine. Here are some key points to keep in mind:

1. Trust: Patients must trust their physicians to provide accurate diagnoses and treatment recommendations, even when communicating remotely.
2. Communication: Communication is key to building a strong patient-physician relationship. During telemedicine visits, it's important to establish clear lines of communication and to actively listen to patients' concerns.
3. Privacy: Patients need to feel comfortable discussing sensitive health information during telemedicine visits. Physicians should take steps to ensure that patient privacy is protected during virtual consultations.

4. Technology: Both patients and physicians must be comfortable with the technology used for telemedicine. Physicians should provide guidance on how to use the platform, and patients should have access to technical support if needed.
5. Follow-up: Follow-up care is important to maintain the patient-physician relationship. Physicians should schedule follow-up appointments and ensure that patients have access to any necessary resources or referrals.

Overall, a strong patient-physician relationship is essential for effective telemedicine. By establishing trust, maintaining open communication, protecting patient privacy, and providing appropriate follow-up care, physicians can help ensure that telemedicine is a successful tool for delivering high-quality healthcare [15].

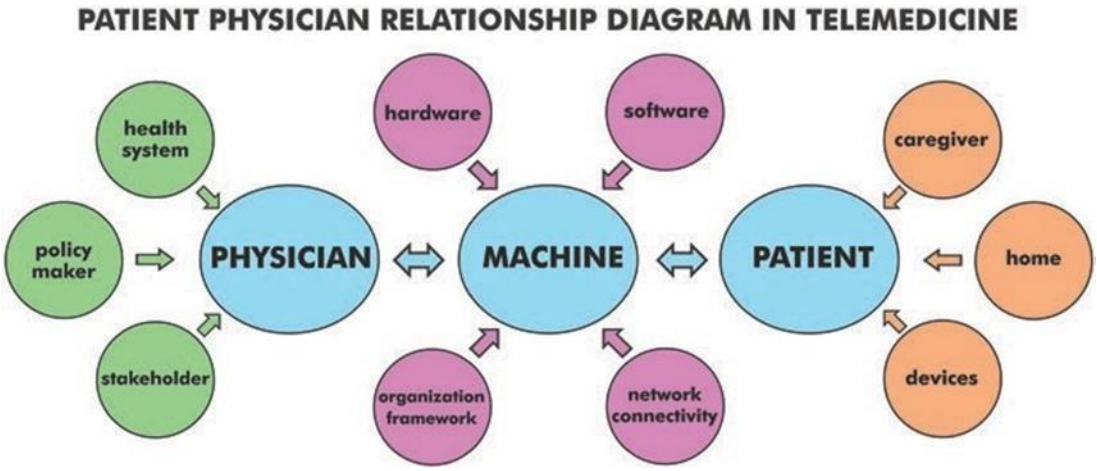

Figure 1.2: Patient physician relationship diagram in telemedicine.

1.7. Advantages of the use of Telemedicine:

Telemedicine, which involves the use of technology to provide medical care and consultation remotely, has become increasingly popular in recent years, particularly in light of the COVID-19 pandemic. Some advantages of telemedicine in healthcare systems include:

1. Increased access to care: Telemedicine can be particularly beneficial for patients who live in rural or remote areas where access to healthcare services may be limited. It can also help patients who have mobility issues or transportation challenges.

2. Improved efficiency: Telemedicine can help healthcare providers streamline their workflow and reduce the amount of time spent on administrative tasks. This can allow providers to spend more time on patient care and improve overall efficiency.
3. Cost savings: Telemedicine can help reduce the cost of healthcare services, particularly for patients who may need frequent follow-up appointments or monitoring. By reducing the need for in-person visits, telemedicine can also reduce the cost of transportation and related expenses.
4. Improved patient outcomes: Telemedicine can help patients receive more timely care, which can lead to better outcomes. For example, telemedicine can help patients with chronic conditions manage their symptoms more effectively and avoid hospitalization.
5. Flexibility: Telemedicine can provide patients with more flexibility in scheduling appointments and accessing care. This can be particularly helpful for patients who work long hours or have other commitments that make it difficult to attend in-person appointments.
6. Time-Saving: Telemedicine saves time for both patients and healthcare providers. Patients can receive care from the comfort of their homes or workplaces, while healthcare providers can use telemedicine to consult with patients remotely, saving time that would otherwise be spent on travel.
7. Increased Patient Engagement: Telemedicine can increase patient engagement by providing patients with greater access to healthcare information and resources. It can also enable patients to take a more active role in their own care, which can lead to better health outcomes.
8. Reduce the spread of Infections: Since the advent of the COVID-19 pandemic, clinics and hospitals have had to shut their doors to patients. Patients with infections often sit close to each other at doctors' clinics. Through telemedicine, patients can avoid spreading infections and keep themselves safe from exposure [16].

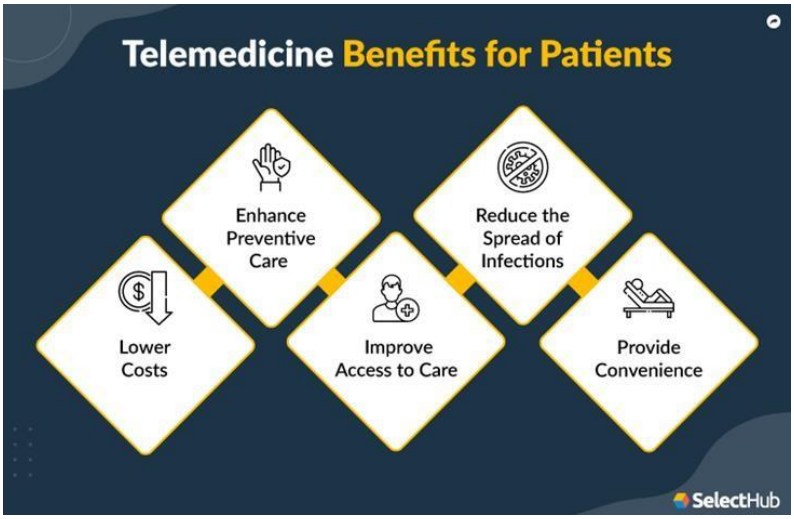

Figure 1.3: Benefits of Telemedicine

1.8. Disadvantages of the use of Telemedicine:

While telemedicine has several advantages, there are also some potential disadvantages to its use in healthcare systems. Here are some of the main disadvantages:

1. Technical issues: Telemedicine requires reliable and secure internet connections, as well as the right hardware and software. Technical problems such as poor connectivity or malfunctioning equipment can hinder the effectiveness of a telemedicine visit.
2. Limited physical examination: One of the biggest disadvantages of telemedicine is that it limits the ability of healthcare providers to conduct a physical examination of the patient. This can make it difficult to diagnose certain conditions or evaluate the severity of a patient's symptoms.
3. Lack of personal interaction: The lack of face-to-face interaction between the patient and healthcare provider can impact the relationship between them, potentially leading to a lack of trust or misunderstandings.
4. Patient confidentiality: Telemedicine platforms must comply with privacy laws and regulations, but there is still the potential for breaches of patient confidentiality, especially if the patient is using an unsecured network.

5. Access issues: Not all patients have access to the technology needed for telemedicine, such as a reliable internet connection or a smartphone, which can limit the reach of telemedicine services.
6. Cost: Telemedicine may not be covered by all insurance plans, and the cost of telemedicine visits may be higher than in-person visits for patients who do not have insurance coverage.
7. Reimbursement issues: The reimbursement policies for telemedicine services are not yet well-established, which can create financial challenges for healthcare providers and limit access to care for patients who cannot afford it.
8. Legal and regulatory issues: Telemedicine is subject to various legal and regulatory requirements that can vary by state or country. These requirements may limit the ability of healthcare providers to offer telemedicine services or make it difficult to provide telemedicine services across state or country borders.
9. Delayed care: Telemedicine can also pose unwanted delays in paths of care. In an emergency, access to telemedicine can be troublesome with low internet bandwidth, among other limitations.

It is important to note that while there are some disadvantages to telemedicine, many of these can be mitigated through careful planning and implementation. Telemedicine can still provide significant benefits to patients and healthcare providers, especially in situations where in-person visits are difficult or impossible [17].

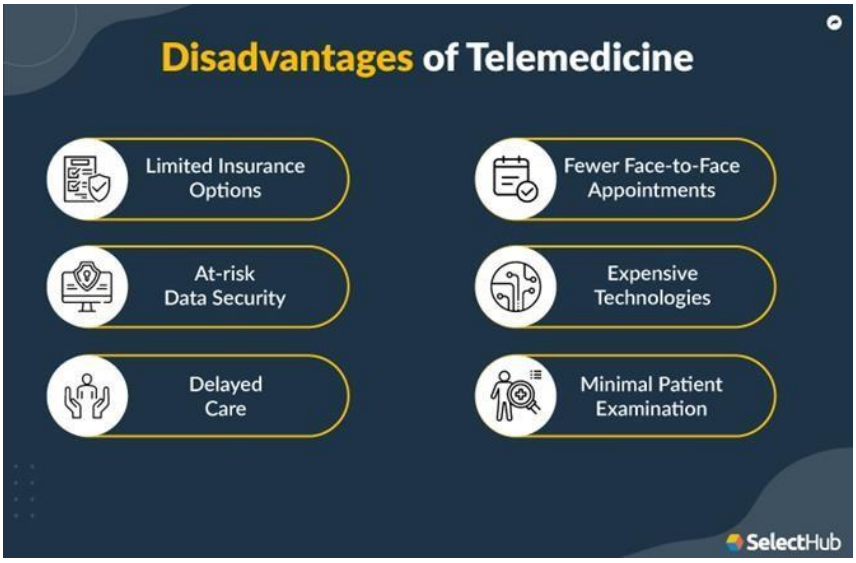

Figure 1.4: Disadvantages of Telemedicine.

1.9. Telemedicine service in Bangladesh:

Telemedicine is the use of telecommunication and information technologies to provide healthcare services from a distance. In Bangladesh, telemedicine has gained importance in recent years due to its potential to provide healthcare services to people in remote and underserved areas.

The history of telemedicine in Bangladesh can be traced back to 2002 when the country's first telemedicine project was initiated by the government in collaboration with the Apollo Hospitals Group. The project aimed to provide healthcare services to the people in rural areas using telecommunication technologies. The project was successful and led to the establishment of the Bangladesh Telemedicine Network (BTN) in 2004.

The BTN is a network of healthcare professionals and institutions that provides telemedicine services to people in remote and underserved areas of the country. The network uses video conferencing, email, and other communication technologies to connect patients with doctors and healthcare professionals in urban areas.

Since its inception, the BTN has expanded its services and has become an essential part of the healthcare system in Bangladesh. The network has collaborated with various organizations and government agencies to provide telemedicine services to people in need. In recent years, the COVID-19 pandemic has further accelerated the adoption of telemedicine in Bangladesh.

Today, telemedicine services are widely available in Bangladesh, and many private hospitals and clinics offer teleconsultation services to their patients. The government is also promoting telemedicine as a way to improve healthcare services in the country, and various initiatives have been launched to encourage its adoption.

Overall, the use of telemedicine in Bangladesh has helped to bridge the gap between urban and rural healthcare services and has improved access to healthcare for people in remote and underserved areas [18].

1.10. Future perspective of the use of Telemedicine in Bangladesh:

Telemedicine has the potential to revolutionize healthcare delivery in Bangladesh, especially in the rural areas where access to quality healthcare services is limited. With the increasing availability of internet and mobile devices, telemedicine has become more accessible and affordable, which has led to its rapid adoption in the country.

In the future, telemedicine is likely to become even more prevalent in Bangladesh, as the government and private healthcare providers continue to invest in digital healthcare technologies. This will make it easier for people in remote areas to access healthcare services from the comfort of their homes, without having to travel long distances to see a doctor.

Telemedicine can also help to address the shortage of healthcare professionals in the country, by enabling doctors to provide consultations and medical advice remotely. This can help to improve the efficiency of healthcare delivery, as doctors can see more patients in less time.

However, there are also challenges to the adoption of telemedicine in Bangladesh, such as the lack of digital infrastructure and low levels of digital literacy among the population. To fully realize the potential of telemedicine in the country, these challenges will need to be addressed through investments in digital infrastructure and efforts to improve digital literacy.

Overall, the future of telemedicine in Bangladesh looks promising, and it is likely to play an increasingly important role in improving healthcare delivery and access in the country.

CHAPTER-2

OBJECTIVE OF THE STUDY

2.1. General objective of this study:

The general objective of telemedicine in healthcare is to improve access to healthcare services, particularly in remote or underserved areas, and to provide more convenient and efficient healthcare delivery options for patients. Telemedicine has the potential to reduce healthcare costs, increase patient satisfaction, and improve health outcomes by providing timely access to medical care, consultations, and monitoring.

2.2. Specific objective of this study:

1. To assess the level of awareness among healthcare providers and patients regarding telemedicine services.

2. To understand the current usage of telemedicine in healthcare systems and its impact on patient care and outcomes.

3. To identify the factors that influence the adoption and implementation of telemedicine in healthcare.

4. To evaluate the effectiveness of telemedicine in improving access to healthcare services, reducing healthcare costs, and enhancing patient satisfaction.

5. To identify the barriers and challenges in the implementation of telemedicine in healthcare and suggest strategies to overcome them.

6. To evaluate the level of patient satisfaction with telemedicine services and their willingness to continue using them in the future.

7. To investigate the legal and regulatory framework governing the use of telemedicine in healthcare delivery.

8. To suggest recommendations for improving the adoption and utilization of telemedicine in the healthcare system based on the survey findings.

CHAPTER-3

METHODOLOGY

3.1. Methodology:

The study uses a survey approach with a descriptive research design. For this study, the researcher has employed both primary & secondary data. Secondary information was gathered from readily available books, research papers, articles, and websites.

3.2. Period and target population:

The target population for this study was comprised of many department students, and it was carried out at Daffodil International University. Between February and March 2023, this took place.

3.3. Study Design:

This was a cross-sectional online survey study conducted on the students of Daffodil International University which are located in Dhaka, Bangladesh. Data were collected via an online survey using a Google Form. The online link of the survey was shared via email, Facebook, and other social media. A questionnaire design was made, then data was collected, after that data analysis and then a comprehensive report will be generated summarizing the findings, including tables and graphs, and recommendations for future research and improvement of telemedicine services.

3.4. Inclusion criteria:

This survey was open to graduate and undergraduate pharmacy students at Daffodil International University.

3.5. Exclusion criteria:

The students who were not willing to participate were excluded from the study.

3.6. Questionnaire development, pretesting and validation:

A prototype questionnaire was created after a thorough literature and book study focusing on the use of telemedicine. To test the quality of the questions, this was checked with the questions of the various literature which were previously published from India, Japan, U.S and many countries. This question was evaluated by a lecturer from Daffodil International University before being assigned as the final question. The final question was divided into four sections: participant demographic profile, knowledge, attitude, and practice. A trial survey was conducted on 15 students prior to the final survey to ensure that the questionnaire was intelligible, effective, and contained reliable data.

3.7. Data Analysis:

Students return completed forms, which are then gathered and examined to determine the results. MS Excel was used for the statistics in order to achieve the results. Frequency and percentages were used to express the final data.

CHAPTER-4

RESULT & DISCUSSION

4.1. Demographic profile of participant:

4.1.1. In which department are you enrolled?

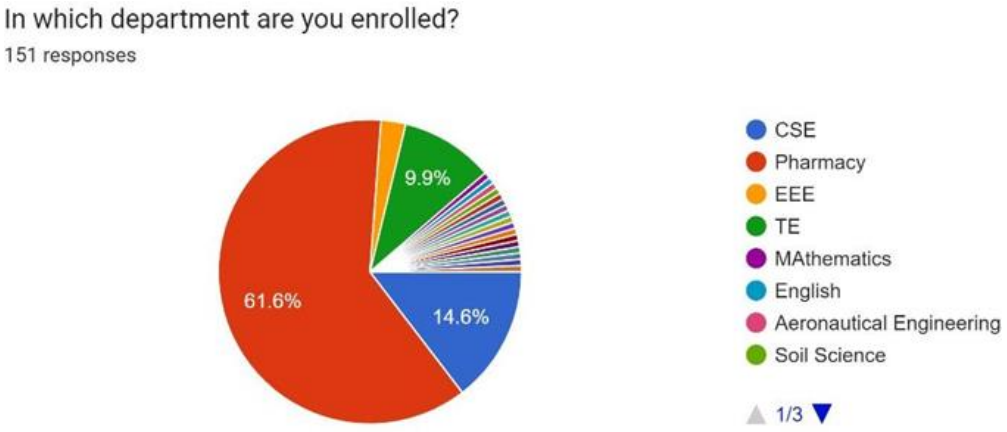

Figure 4.1: Chart of participant department.

Discussion: The survey form was completed by a majority of pharmacy students, which accounted for 61.6% of the participants. In contrast, only a small percentage of students from the EEE department, around 2.6%, took part in the survey. A total of 14.6% of CSE students participated in the survey, while 9.9% of TE students filled out the form. The remaining respondents were from various departments such as English, Law, SWE, CIS, BBA, and others.

4.1.2. Gender:

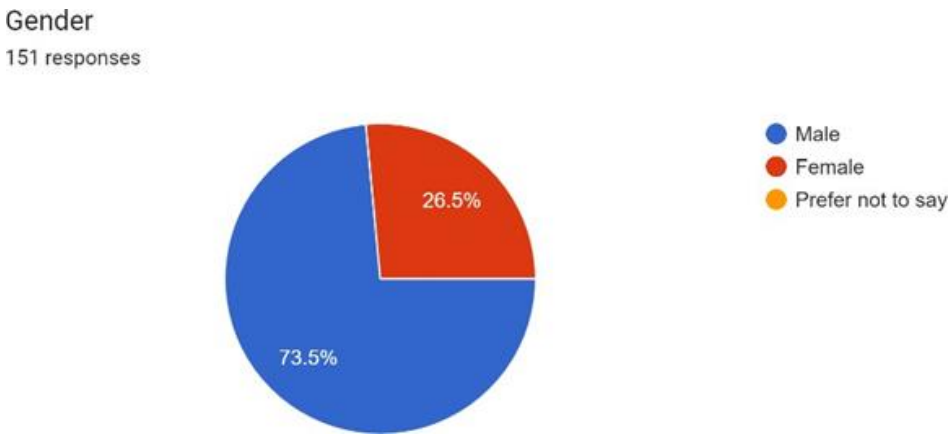

Figure 4.2: Chart of participant gender

Discussion: Of the participants in this survey, approximately 73.5% were male, while around 26.5% were female.

4.1.3. Age:

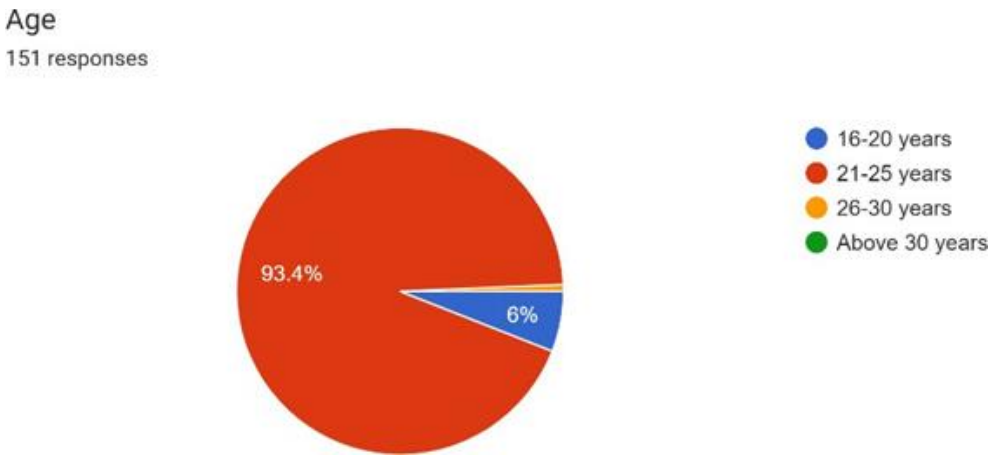

Figure 4.3: Chart of participant age

Discussion: The majority of participants, 93.4%, were between the ages of 21 and 25, with only 6% falling into the 16-20 age range. A very small percentage, just 0.6%, were between the ages of 26 and 30.

4.1.4. What is your current academic year?

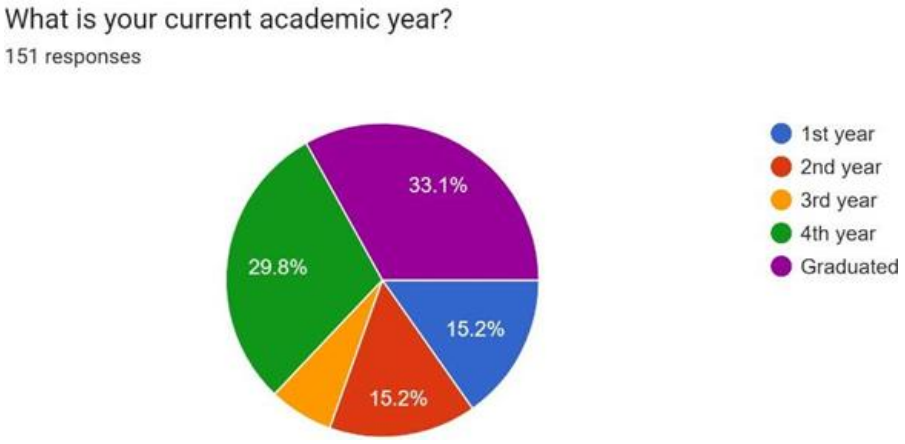

Figure 4.4: Chart of participant current academic year

Discussion: Out of all the participants, 33.1% were graduate students, while 29.8% were fourth-year students. Both first and second-year students accounted for 15.2% of participants, and only a small proportion, 6.6%, were third-year students.

4.1.5. Living Area

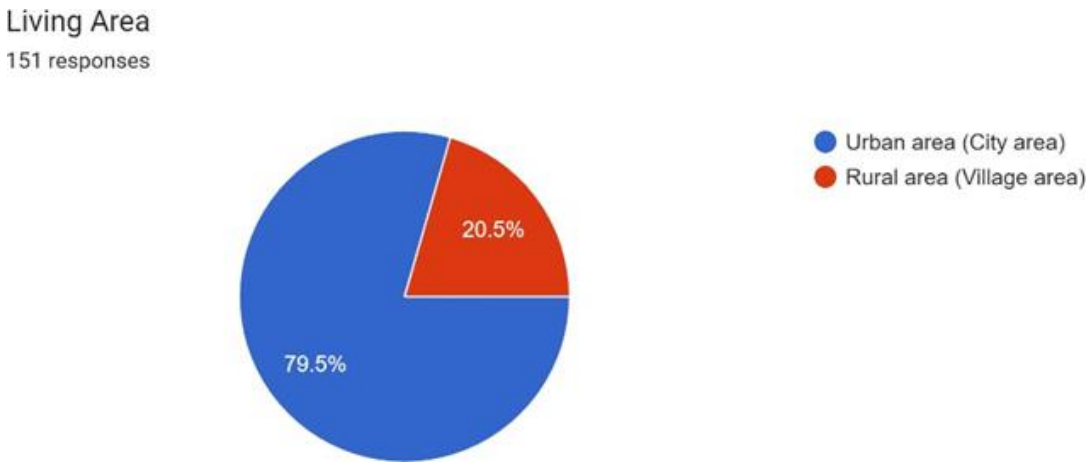

Figure 4.5: Chart of participant living area

Discussion: The majority of participants, approximately 79.5%, resided in urban areas, while only 20.5% lived in rural areas.

4.2. Knowledge about telemedicine among the participant

4.2.1. Do you know about telemedicine service?

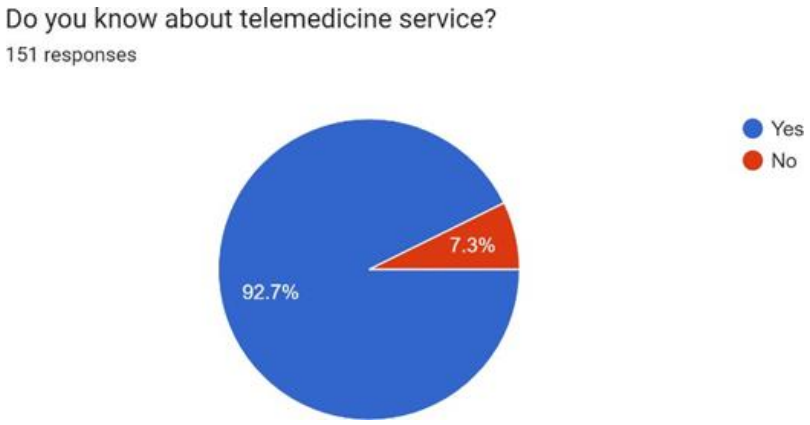

Figure 4.6: Chart of participant knowledge about Telemedicine

Discussion: Nearly 92.7% of the participants were familiar with telemedicine services, while only 7.3% had no knowledge of it.

4.2.2. Have you ever used telemedicine services before?

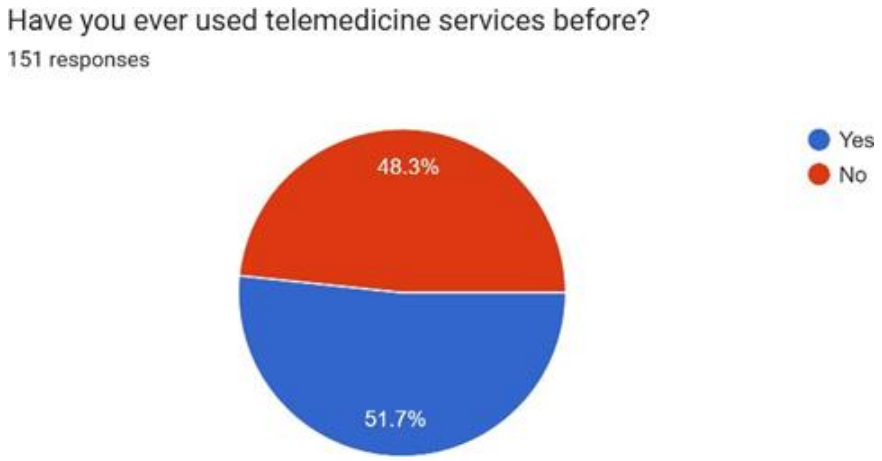

Figure 4.7: Chart of telemedicine service use/non-use participant

Discussion: About 51.7% of the participants utilized telemedicine services, while 48.3% did not make use of it.

4.2.3. How did you hear about the telemedicine service that you used?

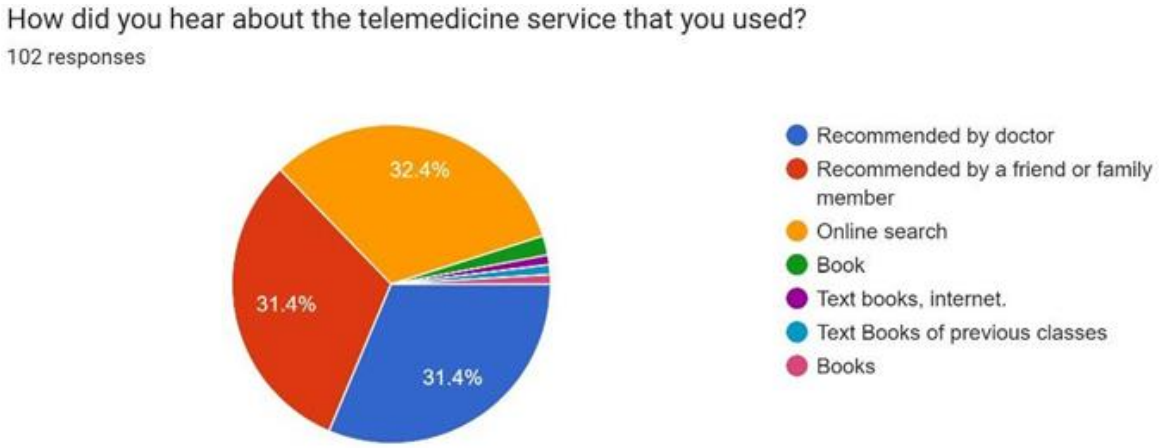

Figure 4.8: Chart of participant hearing platform about telemedicine.

Discussion: Approximately 32.4% of the participants learned about telemedicine through online searches, while 31.4% heard about it from recommendations by doctors, family, and friends. A smaller percentage, 5%, gained knowledge from books, and only 1% learned about it from the internet.

4.3. Practice of the participant

4.3.1. Which type of telemedicine service did you use?

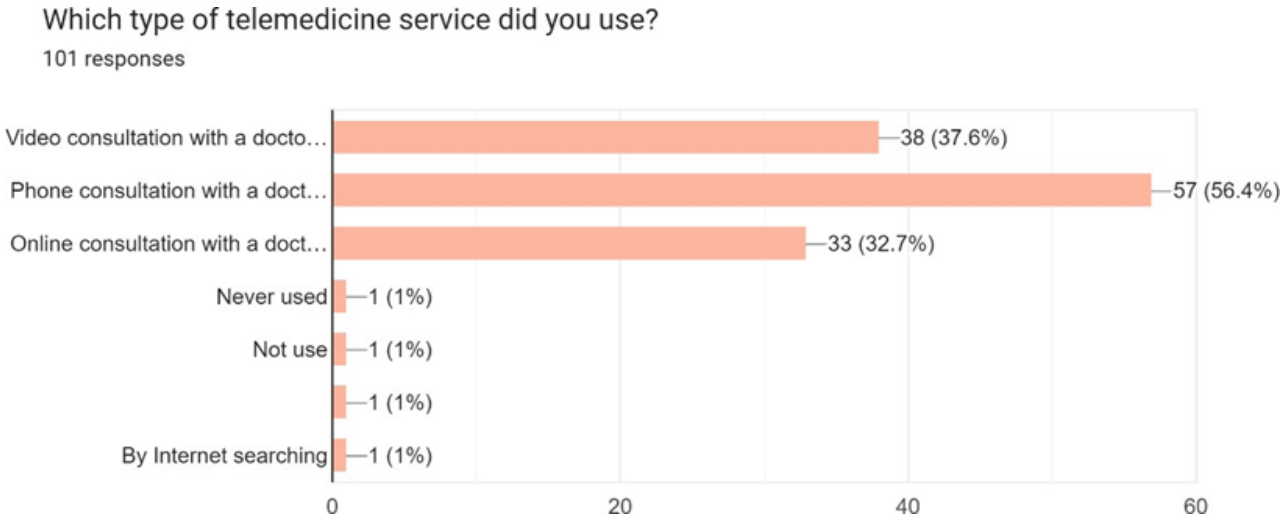

Figure 4.9: Graph of participant used type of Telemedicine

Discussion: In a study, it was found that 56.4% of participants utilized telemedicine services by having a phone consultation with either a doctor or pharmacist. 37.6% of participants used this service through video consultation with a doctor or pharmacist, while 32.7% used it through online consultation. Only 1% of participants utilized this service through internet searching, and 3% never used it at all.

4.3.2. What type of healthcare provider did you receive telemedicine services from?

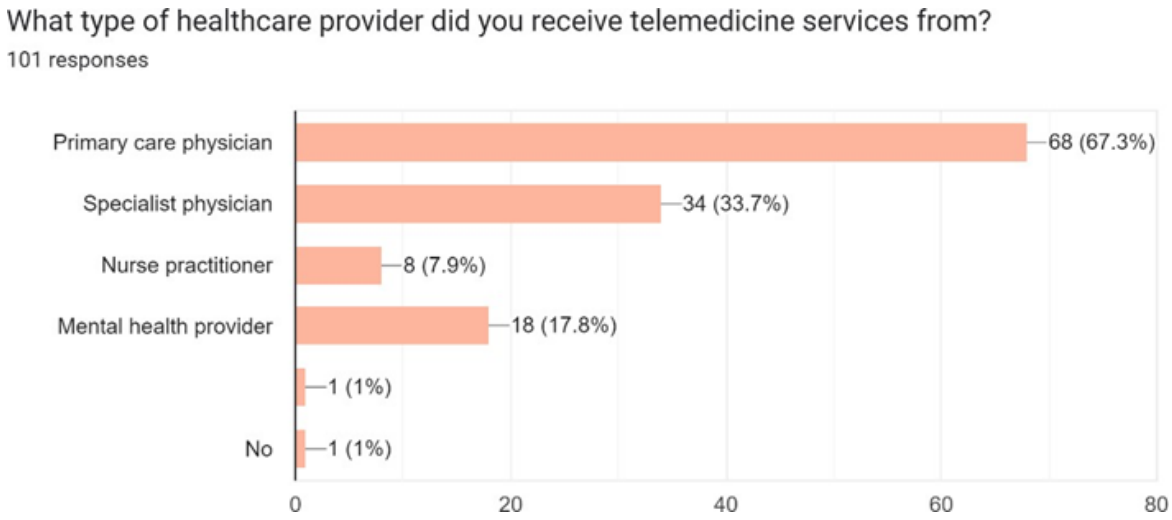

Figure 4.10: Graph of participant types of healthcare provider received from

Discussion: In this survey, it was found that 67.3% of participants received telemedicine services from their primary care physician. 33.7% received it from a specialist physician, while 17.8% received it from a mental health provider and 7.9% received it from a nurse practitioner. Only 1% of participants never received telemedicine services and another 1% received it from other healthcare providers.

4.3.3. How did you access the telemedicine service?

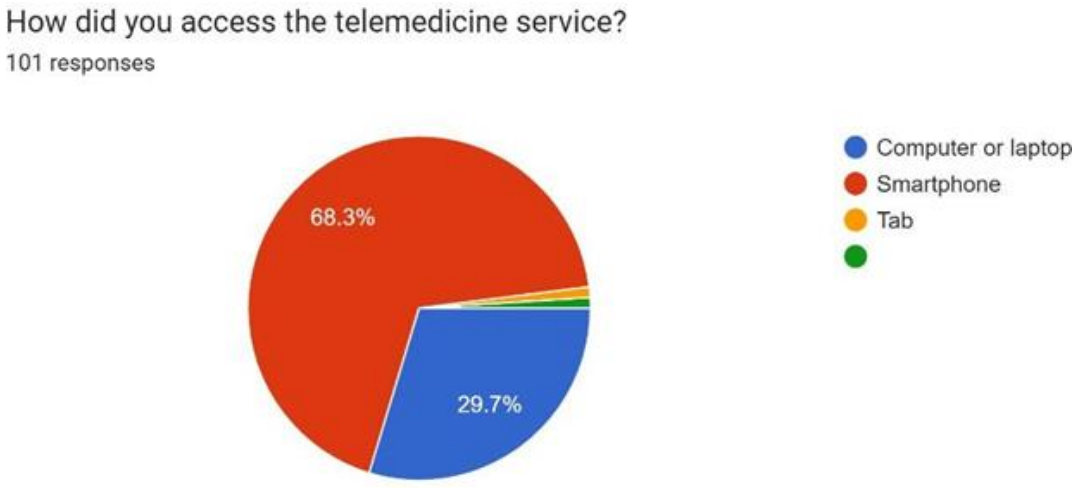

Figure 4.11: Chart of participant used device

Discussion: In a study, it was found that 68.3% of participants accessed telemedicine services via their smartphones, while 29.7% accessed it from a computer or laptop. Only 1% of participants accessed this service from a tablet, and another 1% accessed it from other devices.

4.3.4. How confident are you in your ability to use technology required for telemedicine services?

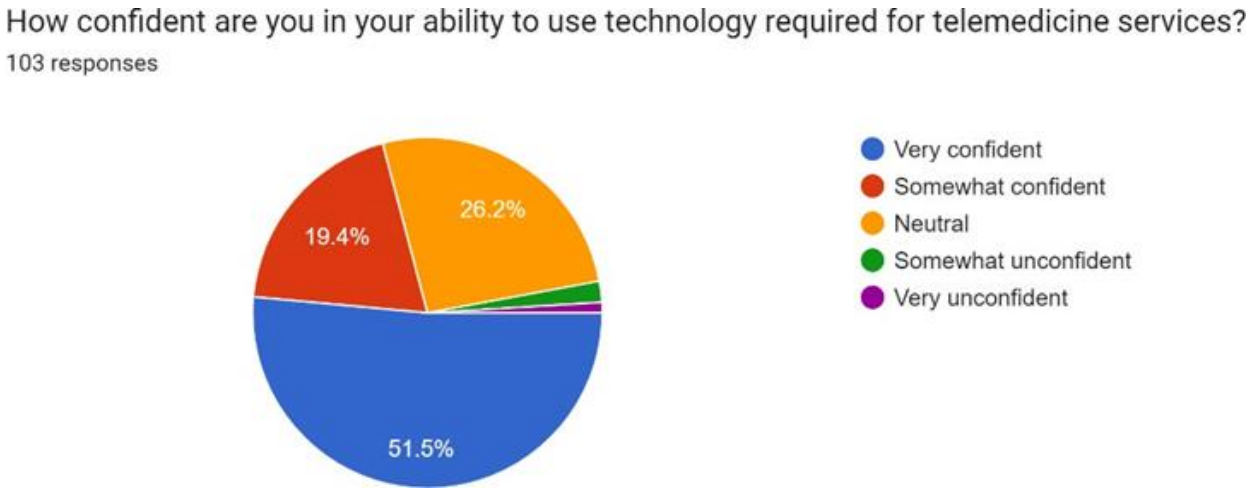

Figure 4.12: Chart of participant confident about use to technology for telemedicine service

Discussion: According to this survey, 51.5% of participants reported feeling very confident in using technology for telemedicine services. 26.2% of participants had a neutral stance towards this service, while 19.4% reported feeling somewhat confident. Only 1.9% of participants reported feeling somewhat unconfident, and another 1% reported feeling very unconfident about using technology for telemedicine services.

4.3.5. Did you experience any technical difficulties during the telemedicine consultation?

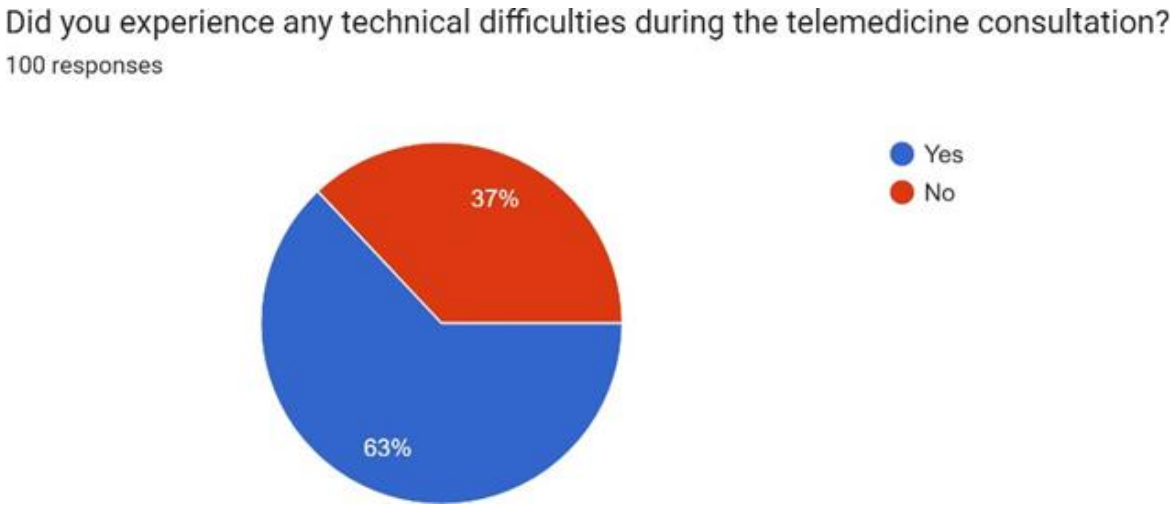

Figure 4.13: Chart of participant technical difficulties during consultation

Discussion: In this study, it was found that 63% of participants faced technical difficulties during their telemedicine consultations, while 37% of participants did not face any technical difficulties.

4.3.6. What was the nature of the technical difficulties you experienced?

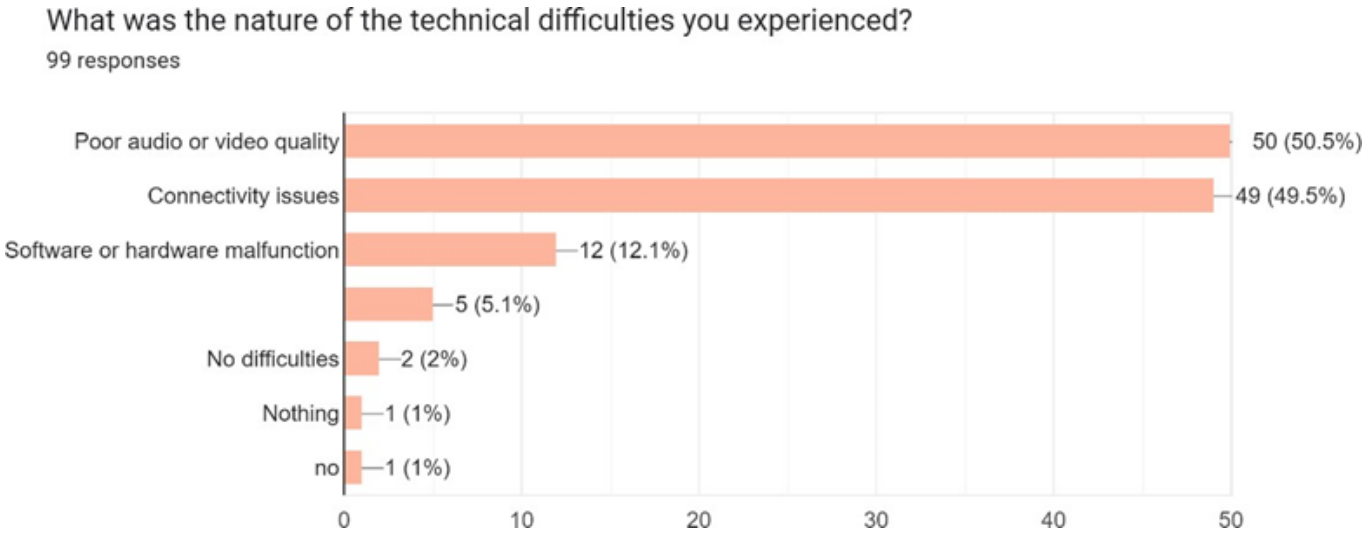

Figure 4.14: Graph of the nature of technical difficulties participant experienced

Discussion: According to this survey, 50.5% of participants experienced poor audio or video quality during their telemedicine consultations, while 49.5% faced connectivity issues. Of the participants, 12.1% reported facing software or hardware malfunctions, and 5.1% reported facing

other problems. Only 4% of participants reported having no difficulties during their telemedicine consultations.

4.3.7. Did you feel like the quality of care received through the telemedicine service was the same as an in-person visit?

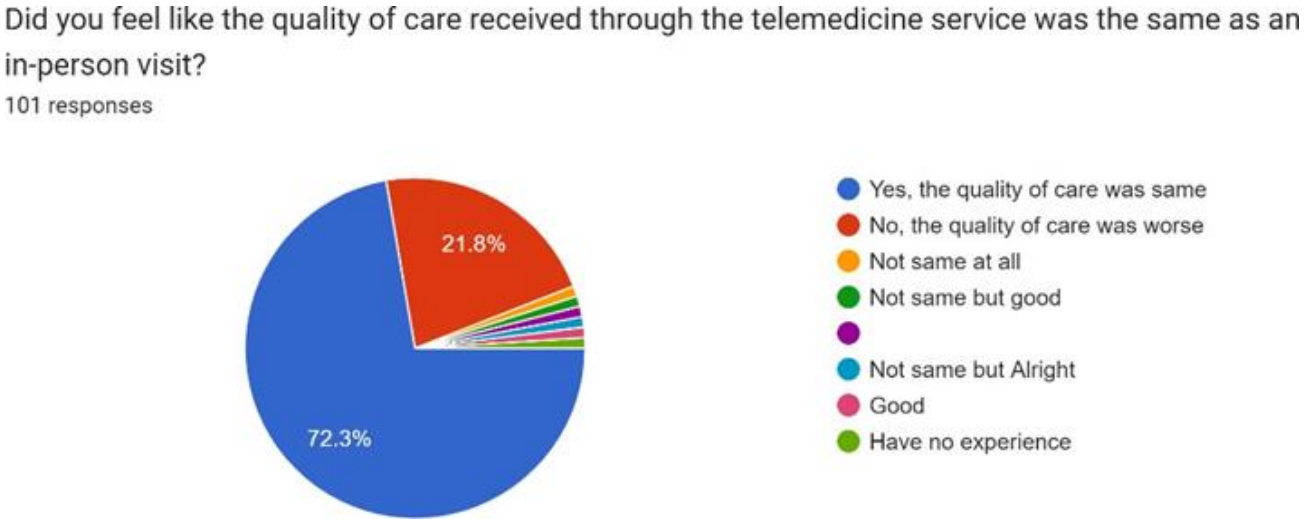

Figure 4.15: Chart of participant comparison between telemedicine service & in-person visit

Discussion: In this study, it was found that 72.3% of participants believed that the quality of care provided through telemedicine services was the same as an in-person visit. However, 21.8% of participants believed that the quality of care was worse. Only 1% of participants thought that the quality of care was not the same at all, while another 1% thought that it was not the same but still good. Similarly, 1% of participants thought that it was not the same but alright, and another 1% thought that the quality of care was good. Only 1% of participants did not have any experience with telemedicine services.

4.3.8. What was the main reason for using telemedicine services instead of in-person healthcare services?

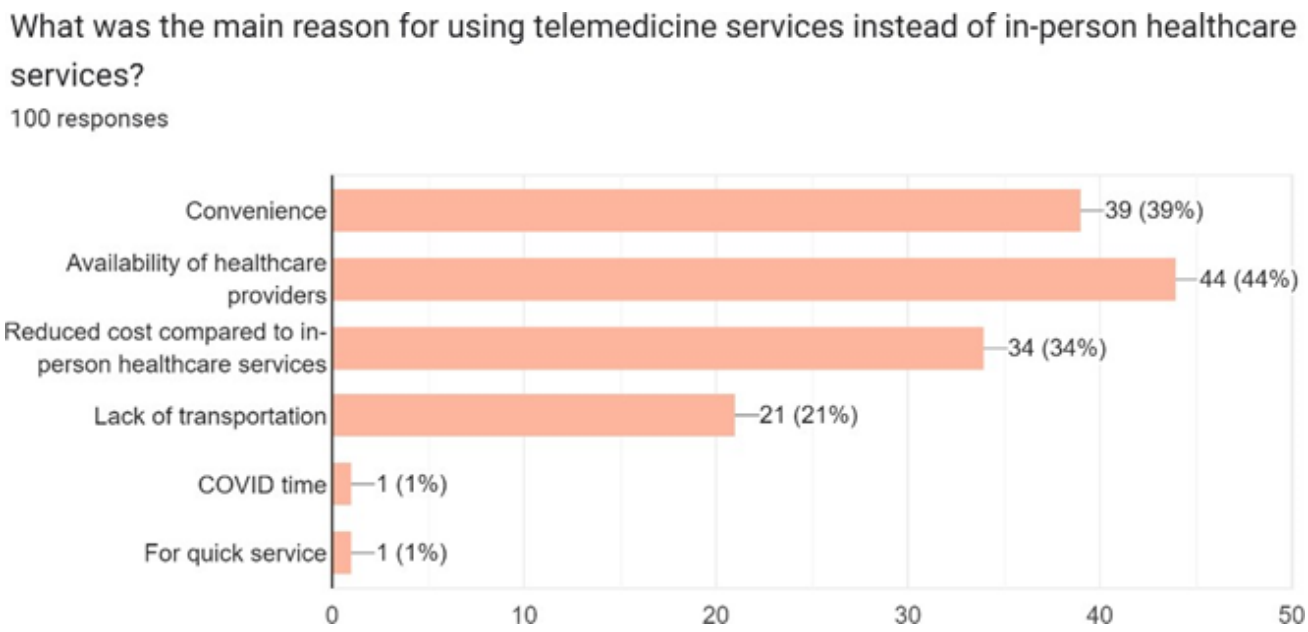

Figure 4.16: Graph of the main reason for using telemedicine service instead of in-person visit

Discussion: In this survey, it was found that 44% of participants used telemedicine services instead of in-person healthcare services due to the availability of healthcare providers. Similarly, 39% of participants used telemedicine services because it was convenient to use. Of the participants, 34% used telemedicine services to reduce costs compared to in-person healthcare services. Additionally, 21% of participants used telemedicine services due to a lack of transportation. Only 1% of participants used telemedicine services during the COVID-19 pandemic, and another 1% used it for quick service.

4.3.9. Did you feel that the telemedicine consultation was a suitable replacement for an in-person consultation?

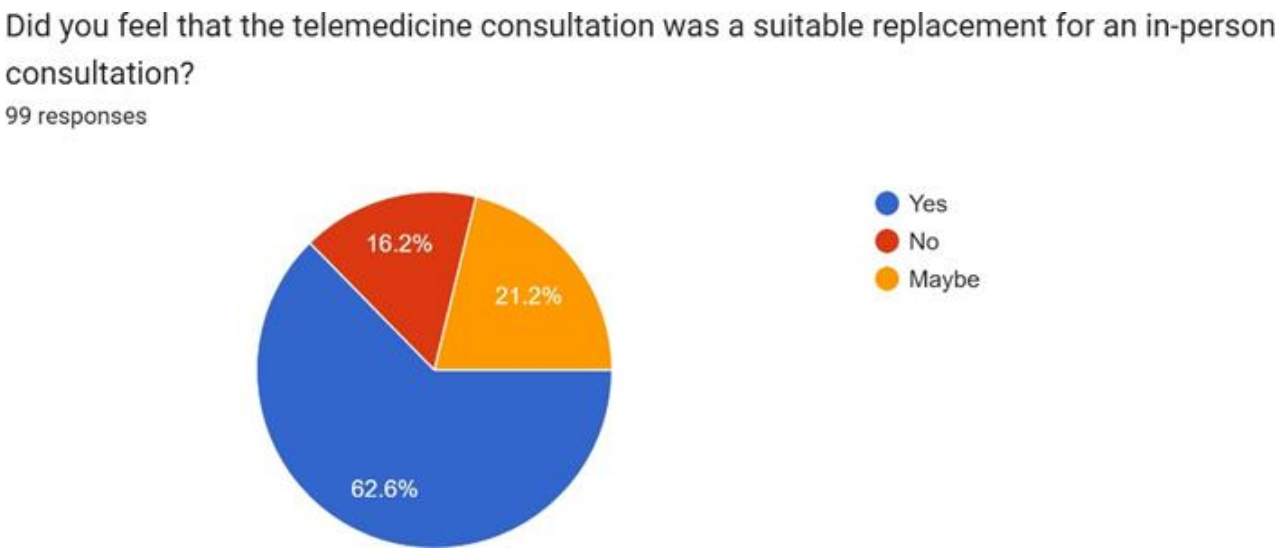

Figure 4.17: Chart of participant thought about is telemedicine suitable replacement of in-person consultation

Discussion: According to this survey, 62.6% of participants believed that telemedicine was a suitable replacement for in-person consultations. Similarly, 21.2% of participants thought that it may be a suitable replacement, while 16.2% of participants believed that telemedicine was not a suitable replacement for in-person consultations.

4.3.10. How did you pay for the telemedicine consultation?

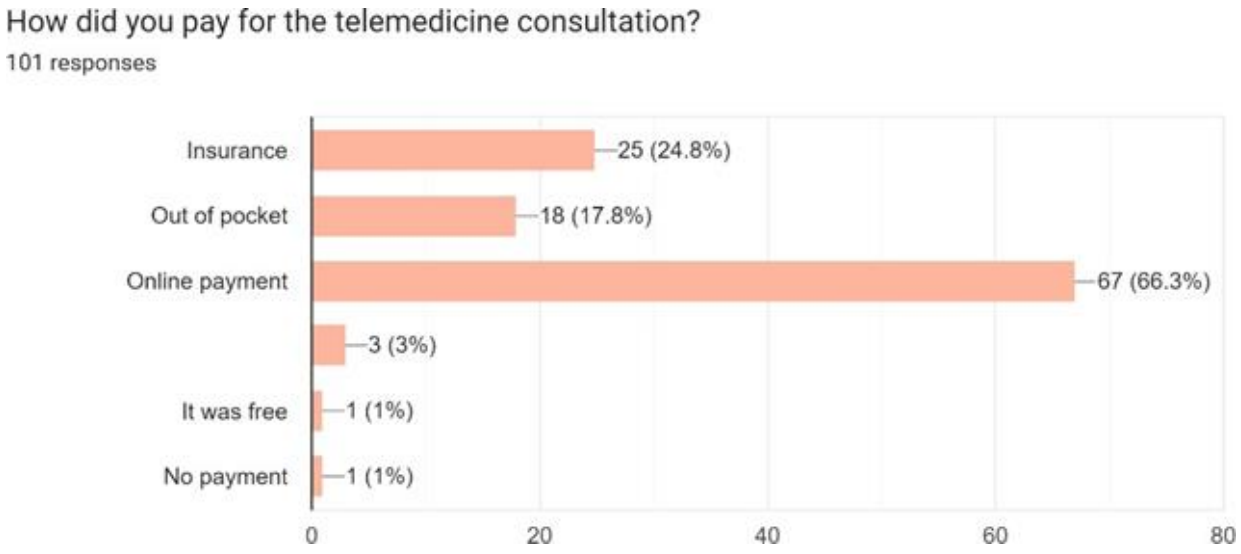

Figure 4.18: Graph of participant payment method for telemedicine consultation

Discussion: In this study, it was found that 66.3% of participants paid for their telemedicine consultations via online payment. Of the participants, 24.8% paid their consultation fees through insurance, while 17.8% paid out of pocket. Only 3% of participants paid through other methods. Similarly, 1% of participants used telemedicine services freely, and another 1% did not have to pay for the service.

4.3.11. How concerned are you about the security of your personal health information when using telemedicine services?

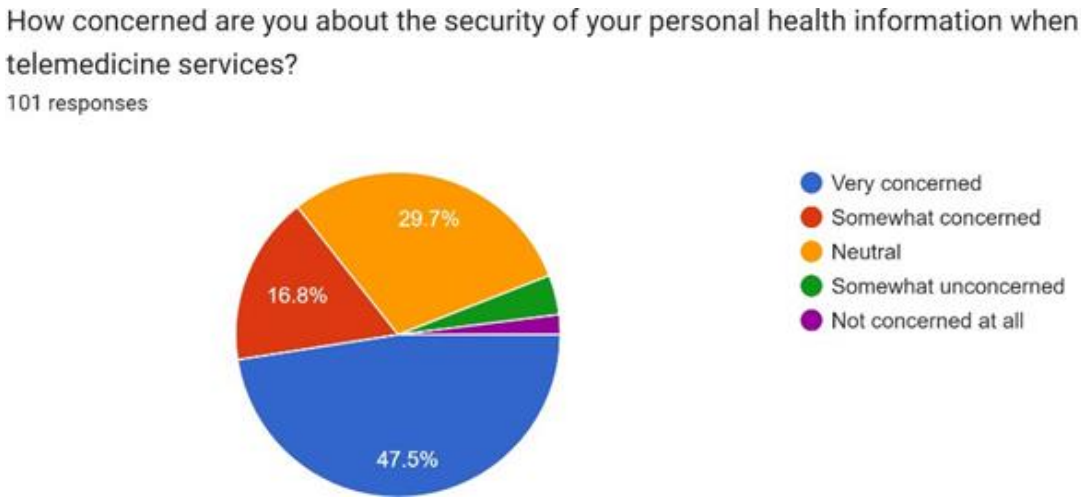

Figure 4.19: Chart of participant security about information during using telemedicine service

Discussion: According to this survey, 47.5% of participants were very concerned about the security of their information when using telemedicine services. Similarly, 29.7% of participants were neutral about it. Of the participants, 16.8% were somewhat concerned, while 4% were somewhat unconcerned. Only 2% of participants were not concerned at all about the security of their information when using telemedicine services.

4.3.12. Have you experienced any privacy or security concerns when using telemedicine services?

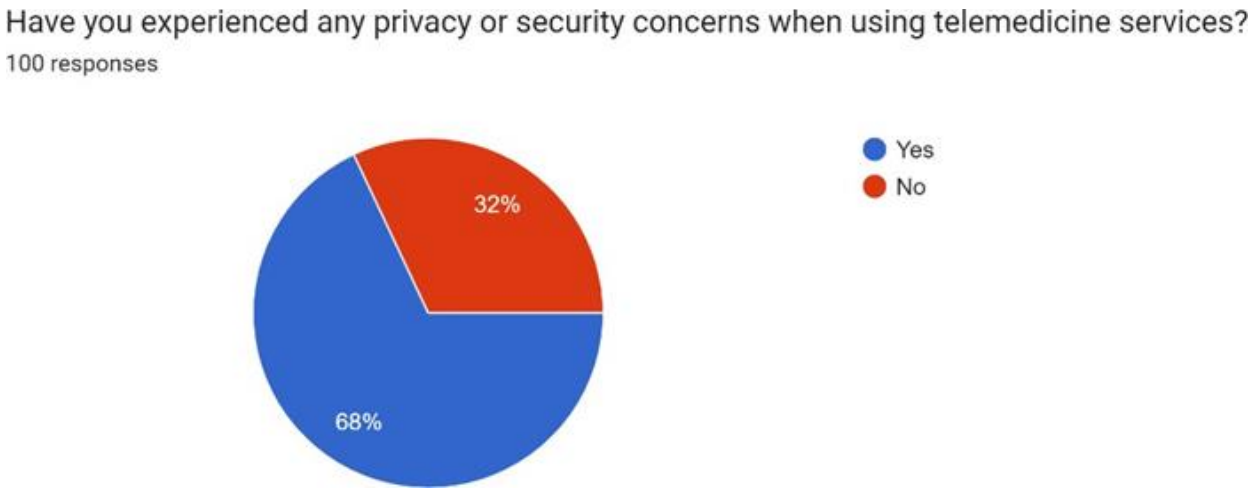

Figure 4.20: Chart of participant experience about privacy or security concern when using telemedicine service

Discussion: In this study, it was found that 68% of participants faced privacy or security concerns when using telemedicine services. Conversely, 32% of participants did not encounter any privacy or security problems when using telemedicine services.

4.3.13. How likely are you to continue using telemedicine services in the future?

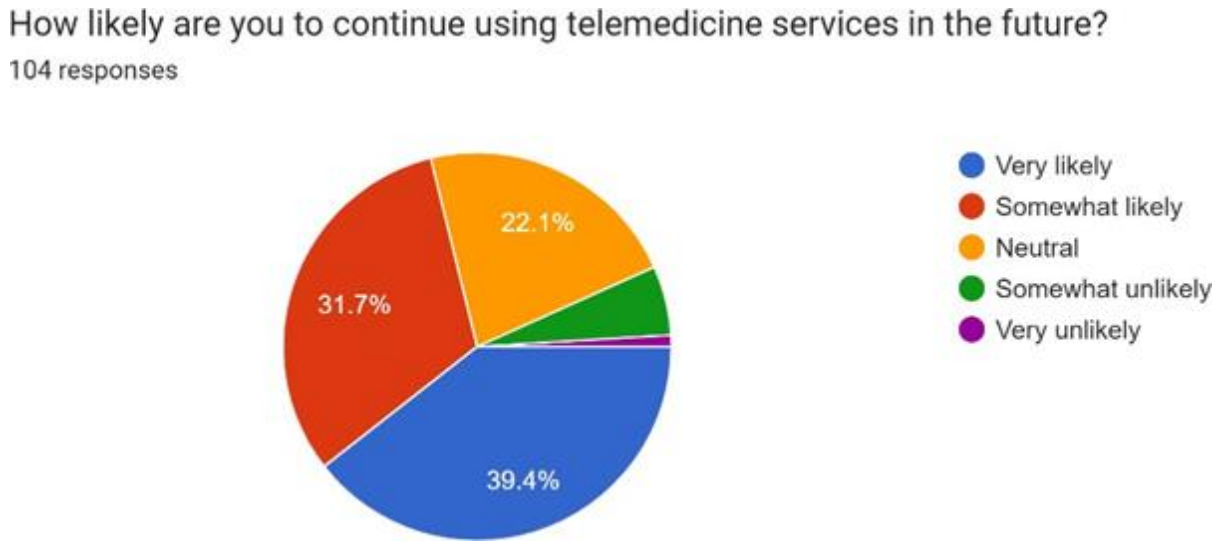

Figure 4.21: Chart of participant who used telemedicine and will be use in future

Discussion: As per the results of this survey, 39.4% of participants said that they would use telemedicine services in the future. Of the participants, 31.7% said they were somewhat likely to use it, while 22.1% were neutral about it. Similarly, 5.8% of participants said that they were somewhat unlikely to use telemedicine services in the future, and only 1% said that they were very unlikely to use it.

4.3.14. How likely are you to recommend telemedicine services to friends or family?

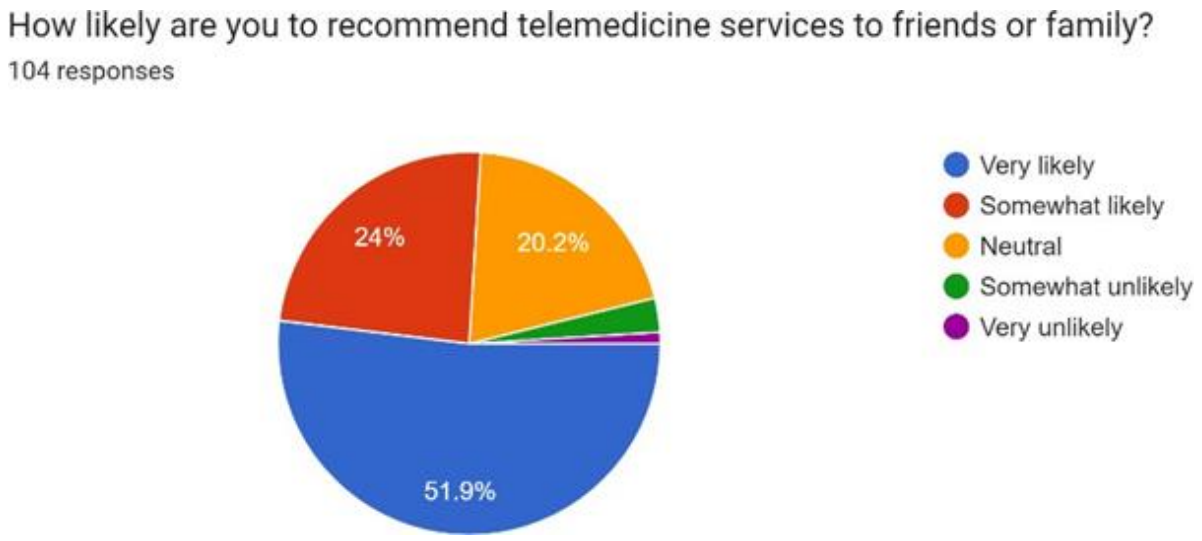

Figure 4.22: Chart of participant who recommend telemedicine service to friends and family

Discussion: According to the survey, 51.9% of participants said that they would recommend telemedicine services to their friends and family. Additionally, 24% of participants said that they were somewhat likely to recommend it, while 20.2% were neutral about it. Conversely, 2.9% of participants said that they were somewhat unlikely to recommend it, and only 1% said that they were very unlikely to recommend it.

4.4. Attitude and behavior of the participant who never used Telemedicine service

4.4.1. What are your primary reasons for not using telemedicine services?

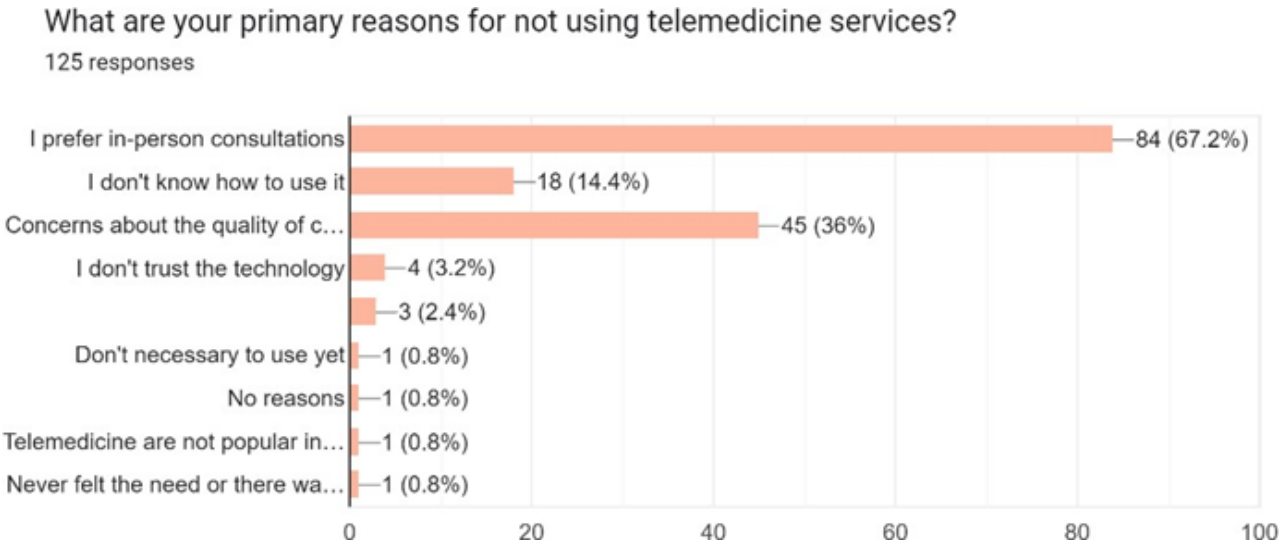

Figure 4.23: Graph of participant primary reason for not using telemedicine service

Discussion: A majority of 67.2% of individuals prefer face-to-face consultations instead of telemedicine services. About 36% of people have concerns about the quality of care provided through telemedicine, while 14.4% do not know how to use telemedicine services. Only 3.2% of people never trust technology, and 2.4% have other reasons for not using telemedicine. Another 0.8% of individuals do not believe that telemedicine is necessary for their use, while 0.8% have no specific reason for not using it. Additionally, 0.8% of people think that telemedicine is not popular in our country and is still in its early stages of growth. Lastly, 0.8% of individuals have never felt the need or had an emergency that required them to use telemedicine services.

4.4.2. Have you ever been recommended telemedicine services by a healthcare professional?

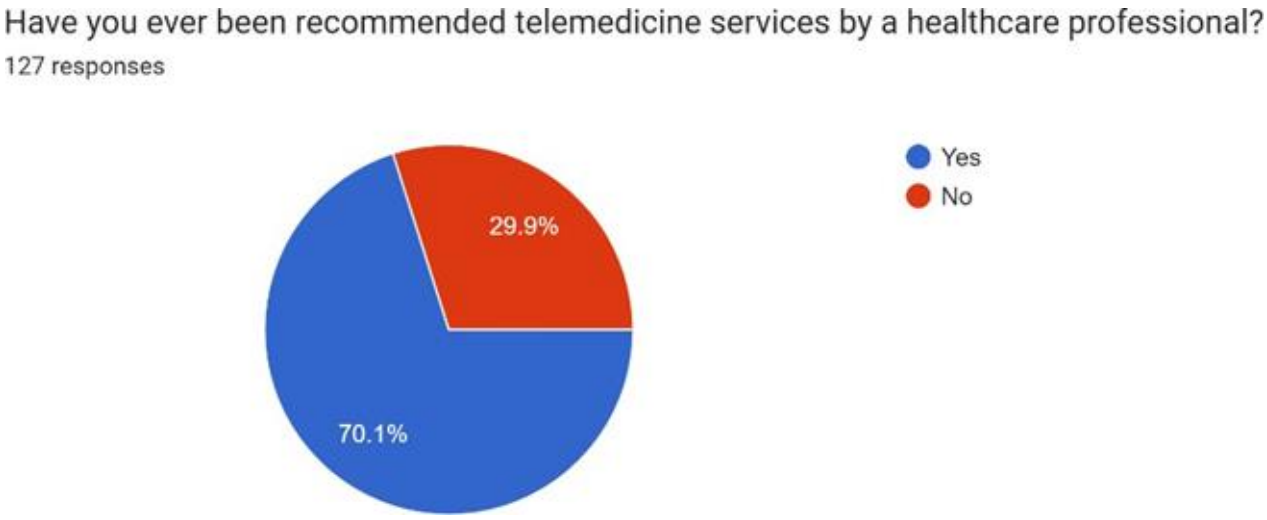

Figure 4.24: Chart of participant who recommended telemedicine service by a healthcare professional

Discussion: A total of 70.1% of participants were advised to use telemedicine services by a healthcare professional. On the other hand, 29.9% of participants have never received a recommendation from a healthcare professional to use telemedicine services.

4.4.3. If you were to use telemedicine services, which method of communication would you prefer?

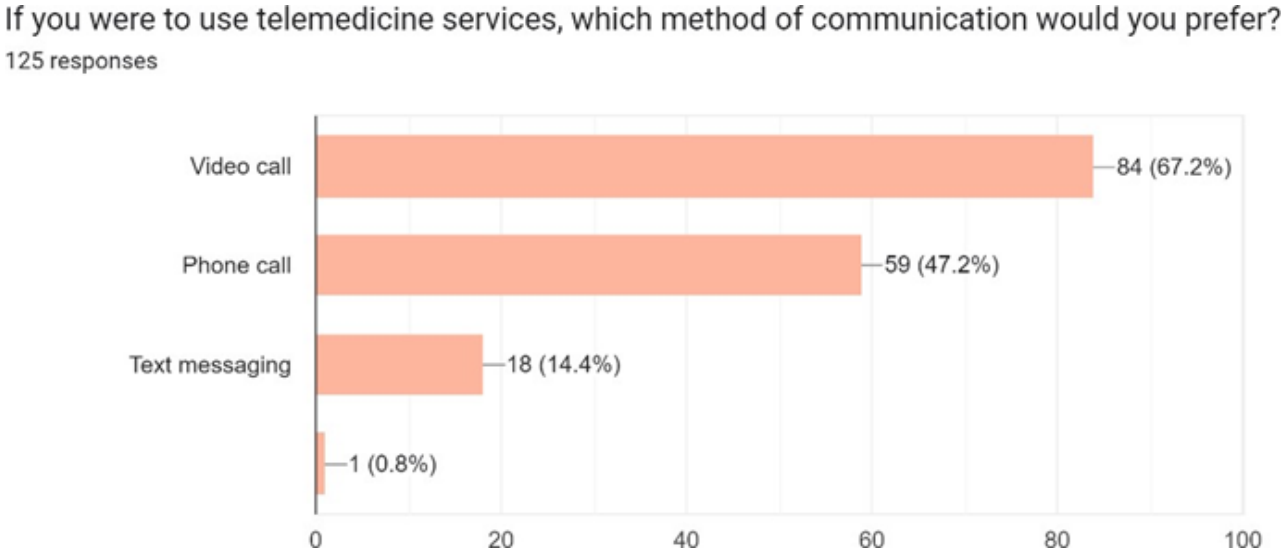

Figure 4.25: Graph of participant who never used telemedicine, which method would they prefer if they use it

Discussion: Out of the total participants, 67.2% prefer video calls as their preferred method of communication if they use telemedicine services. On the other hand, 47.2% of participants prefer phone calls, while 14.4% prefer text messaging. Only 0.8% of participants prefer a different method of communication for telemedicine services.

4.4.4. How important is the availability of telemedicine services to you when choosing a healthcare provider?

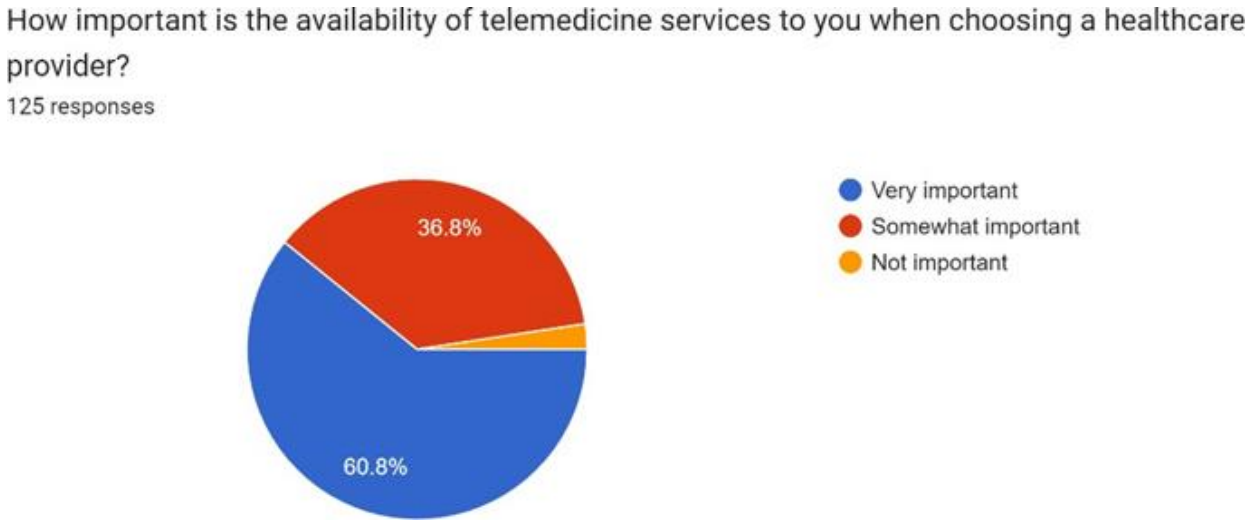

Figure 4.26: Chart of participant who never use telemedicine, how important is the availability of telemedicine service when choosing a healthcare provider

Discussion: A majority of 60.8% of participants believe that the availability of telemedicine services is a crucial factor when choosing a healthcare provider. Around 36.8% of participants believe that it is somewhat important, while only 2.4% of participants do not consider it an important factor.

4.4.5. What types of healthcare services do you think are best suited for telemedicine consultations?

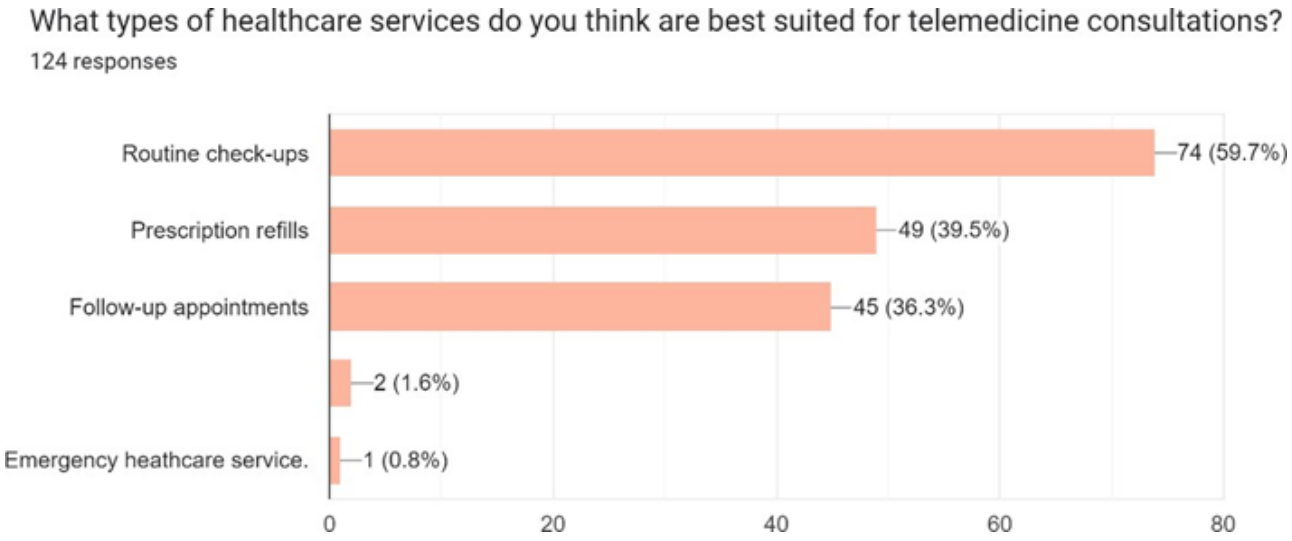

Figure 4.27: Graph of what type of healthcare service are best suited for telemedicine consultation

Discussion: A total of 59.7% of participants believe that routine check-ups are the most appropriate type of healthcare service for telemedicine consultations. On the other hand, 39.5% of participants think that prescription refills are best suited for telemedicine consultations. Approximately 36.3% of participants consider follow-up appointments as the most suitable type of healthcare service for telemedicine consultations. Only 1.6% of participants believe that other types of healthcare services are suitable for telemedicine consultations, while just 0.8% think that emergency healthcare services are best suited for telemedicine consultations.

4.4.6. What factors would encourage you to try telemedicine services?

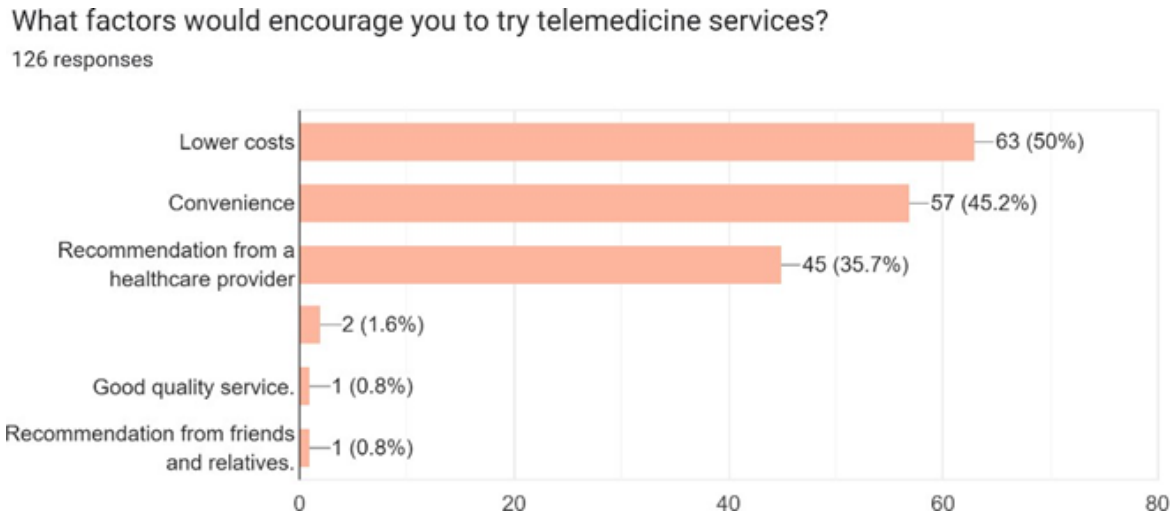

Figure 4.28: Graph of participants who never used telemedicine, factors that would encourage to try telemedicine service

Discussion: Around 50% of participants stated that lower costs would be a factor that would encourage them to try telemedicine services. Approximately 45.2% of participants believe that convenience is an important factor that would encourage them to try telemedicine services. Another 35.7% of participants stated that a recommendation from a healthcare provider would encourage them to use telemedicine services. Only 0.8% of participants believe that good quality services and recommendations from friends and relatives would be a factor that would encourage them to try telemedicine services.

4.4.7. Would you consider using telemedicine services in the future?

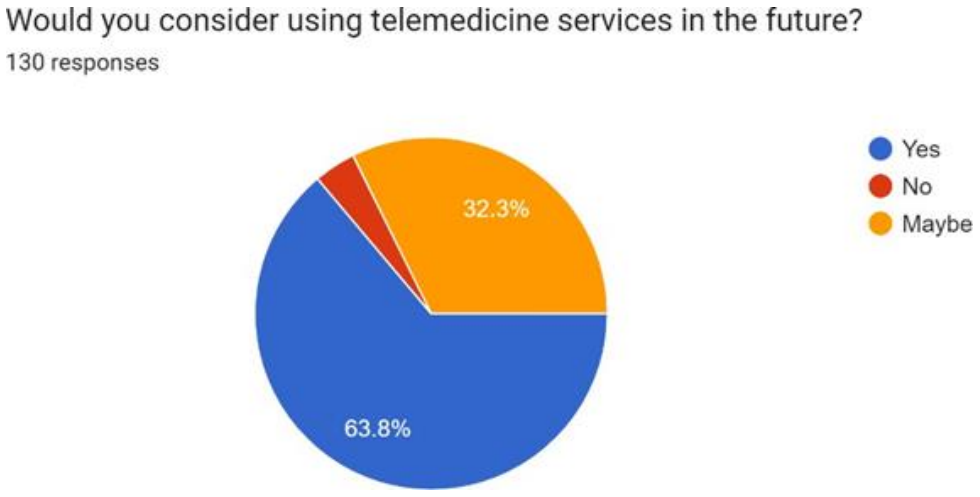

Figure 4.29: Chart of participant who never used telemedicine, would you consider using telemedicine service in the future

Discussion: A total of 63.8% of participants stated that they would be willing to consider using telemedicine services in the future. Around 32.3% of participants expressed that they may use telemedicine services in the future. Only 3.8% of participants indicated that they do not want to use telemedicine services in the future.

CHAPTER-5

CONCLUSION

5.1. Conclusion:

Based on the survey data, it can be concluded that the use of telemedicine in the healthcare system is becoming increasingly popular and has been beneficial in many ways. The majority of healthcare providers and patients have reported positive experiences with telemedicine.

Telemedicine has been particularly useful in improving access to healthcare for people who live in remote or underserved areas. Patients who live far from healthcare facilities or who have mobility issues can now access medical care from the comfort of their own homes.

The use of telemedicine has also been found to be cost-effective, as it can reduce the need for in-person visits and hospitalizations. Patients and providers have reported that telemedicine visits are often shorter and more efficient than traditional in-person visits.

However, the survey also highlighted some challenges that need to be addressed to ensure the continued success of telemedicine in healthcare. These challenges include technological issues, such as poor internet connectivity, and concerns around data privacy and security.

Overall, the survey results suggest that telemedicine is a valuable tool that can help to improve healthcare access and efficiency, but more work needs to be done to overcome the challenges associated with its implementation.

CHAPTER-6

REFERENCES

6.1. References:

1. D. Hailey and P. Jacobs, "Assessment of Telehealth Applications," Alberta Heritage Foundation for Medical Research, Edmonton, Alta., 1997.

2. "Telemedicine Report to Congress," U.S. Department of Commerce, 1997, pp. 1.

3. "Telemedicine Report to Congress," U.S. Department of Health and Human Services, 2000, pp. 13.

4. Mayo Foundation for Medical Education and Research, "Managing your health in the age of wi-fi," Mayo Clinic, Jun. 18, 2022. [Online]. Available: https://www.mayoclinic.org/healthy-lifestyle/consumer-health/in-depth/telehealth/art-20044878. [Accessed: April 6, 2023].

5. "Teletransmission of ECG Waveform: An Ingenious Low Priced Technique," Indian Heart Journal, vol. 34, pp. 6, 1982.

6. G. Kontaxakis et al., "Integrated Telemedicine Applications and Services for Oncological Positron Emission Tomography," Oncology Reports, vol. 15, pp. 1091-1100, 2006.

7. "Tele med.doc - Tele medicine INTRODUCTION Worldwide people living in a rural and remote area and struggle to access timely quality specialty medical | Course Hero," Course Hero. [Online]. Available: https://www.coursehero.com/file/28829361/Tele-meddoc/. [Accessed: April 6, 2023].

8. D. M. Angaran, "Telemedicine and Telepharmacy: current status and future implications," American Journal of Health System Pharmacy, vol. 56, pp. 1405-1426, 1999.

9. "Telemedicine," Telemedicine | Pyrgo Meda. [Online]. Available: http://pyrgomeda.com/en/dir/telemedicina. [Accessed: April 6, 2023].

10. “Telehealth,” Wikipedia, 30-Mar-2023. [Online]. Available: https://en.wikipedia.org/wiki/Telehealth. [Accessed: April 6, 2023].

11. 10. R. Dennis, "Telemedicine: The future of healthcare," Medical News Today, Oct. 28, 2021. [Online]. Available: https://www.medicalnewstoday.com/articles/telemedicine-the-future-of-healthcare. [Accessed: April 6, 2023].

12. N. Menachemi, D.E. Burke and D.J. Ayers, "Factors affecting the adoption of telemedicine—a multiple adopter perspective," J. Med. Syst., vol. 28, no. 6, pp. 617-632, 2004.

13. C. Nebeker, J. Torous, and R.J.B. Ellis, "Building the case for actionable ethics in digital health research supported by artificial intelligence," BMC Med., vol. 17, no. 1, p. 137, 2019.

14. American Medical Association, "Best practices for telemedicine during COVID-19 pandemic," 2020. [Online]. Available: https://www.ama-assn.org/delivering-care/public- health/best-practices-telemedicine-during-covid-19-pandemic. [Accessed: April 6, 2023].

15. American Medical Association, "Ethical practice in telemedicine," March 2020. [Online]. Available: https://www.ama-assn.org/system/files/2020-03/ethical-practice-telemedicine.pdf. [Accessed: April 6, 2023].

16. S. Sarkar, "Benefits of Telemedicine: 2023 Advantages & Disadvantages," in SelectHub Raquo, May 4, 2022. [Online]. Available: https://www.selecthub.com/telemedicine/telemedicine-benefits/. [Accessed: April 6, 2023].

17. S. Sarkar, "Benefits of Telemedicine: 2023 Advantages & Disadvantages," in SelectHub Raquo, May 4, 2022. [Online]. Available: https://www.selecthub.com/telemedicine/telemedicine-benefits/. [Accessed: April 6, 2023].

18. Nahar, N. and Azad, A.K., 2021. Telemedicine in Bangladesh: An Update on Current Status and Future Prospects. Healthcare, 9(5), p.591. doi: 10.3390/healthcare9050591.