SCHOOL OF PUBLIC HEALTH

COLLEGE OF HEALTH SCIENCES

UNIVERSITY OF GHANA, LEGON

FACTORS ASSOCIATED WITH THE WILLINGNESS TO USE OF TELEMEDICINE APPLICATIONS FOR HEALTHCARE DELIVERY AMONG HEALTH PROVIDERS AT THE KORLE BU TEACHING HOSPITAL

BY

RACHEAL KWAFOAH NYANSAH

(10220795)

THIS DISSERTATION IS SUBMITTED TO THE UNIVERSITY OF GHANA LEGON,IN PARTIAL FULFILLMENT OF THE REQUIREMENT FOR THE AWARD OF MASTER OF PUBLIC HEALTH (MPH) DEGREE

JUNE, 2022

DECLARATION

I, Racheal Kwafoah Nyansah, the author of this dissertation hereby declare that except for references to other researchers' works which have been duly acknowledged, this research for dissertation is my own initiative to be conducted under supervision and has not been presentedfor a degree in any other university.

Signature… Date: 4th October, 2022

Racheal Kwafoah Nyansah

(Student)

Signature Date: 4th October, 2022

Dr. Genevieve Cecilia Aryeetey

(Supervisor)

DEDICATION

I dedicate this work to my husband Mr. Wilson Bright Nyansah, my children Winston Baruchi Kobby Nyansah and Caris Emily Sika Nyansah and my entire family for their immense support, sacrifice and encouragement which words cannot describe.

Without them, this work wouldn't have been a success.

ACKNOWLEDGEMENT

I give thanks to God almighty who through his grace and mercy have brought me this far, to him be the glory.

I would like to appreciate the contribution of people who in diverse ways contributed towards the successful completion of this work: my supervisor Dr. Genevieve Cecilia Aryeetey, Dr. Benjamin Tetteh Mensah, my research assistants Ebenezer Larteh Tettey and George Johnson, the heads of child health and maternity department in Korle Bu Teaching Hospital as well as management of Korle Bu Teaching Hospital.

TABLE OF CONTENTS

LIST OF TABLE

LIST OF FIGURES

LIST OF ABBREVIATIONS

CHPS	Community based health planning and services
DTN	Delay tolerant networking
DHIS	District Health Information System
E-health	Electronic health
ECG	Electrocardiograph
E-HIS	Electronic Health Information and Surveillance System
GCN	Ghana consultation network
GMA	Ghana Medical Association
ICT	Information Communication Technology
IT	Information Technology
KBTH	Korle Bu Teaching Hospital
MOTECH	Mobile technology for community health
MMS	Multimedia Messaging Service
IMCI	Integrated Management of Childhood Illness
MVHS	Millennium Village Health System
MVP	Millennium Village Project
MDG	Millennium Development Goal
MVG NET	Millenium Village Global Network
ReACH	Remote asynchronous communication for healthcare
SMA	Short Message Service
WHO -	World Health Organization

DEFINITION OF TERMS

Telemedicine: the remote diagnosis and treatment of patients by means of telecommunication technology.

Electronic Health: the use of information and communication technology in support of health and health-related fields.

Health service delivery: the part of a health system where patients receive the treatment and supplies, they are entitled to.

Care giver: A person who regularly looks after a child or someone who is sick.

ABSTRACT

Background: Telemedicine is gradually becoming a valid value addition to health care delivery. It provides an assortment of applications in understanding patient care, public health, education, and research. Telemedicine have been explored extensible in the developed counties for some time now, but little is known of its application and use for remote health care provision in developing countries, particularly in Ghana

Aim: The study assessed providers' perception and willingness to use telemedicine for healthcare services at the Korle Bu Teaching hospital.

Method: The study employed a cross-sectional design using quantitative approach to gather and analyze the data. The study interviewed 392 doctors, midwives, nurses and laboratory personnel. using self- administered questionnaires between January and March 2022. Participants were recruited using simple random sampling technique. The data was collected and analysed using a statistical software, STATA version 16. Descriptive statistics was presented in tables and graphs. Chi square test and logistic regression analysis was applied to determine the association between the dependent and independent variables. A level of significance was accepted at $p>0.05$ at 95% confidence interval.

Results: The study involved 392 participants of which 189 were males and 198 were females, while 5 did not disclose their gender. Approximately, 338 health professionals including: 144 (42.60%) doctors, 69(20.41%) midwives and 104 (30.77%) nurses had access and use computer at workplace. About 141 (40.99%) doctors, 75 (21.80%) midwifes, and 110 (31.98%) nurses have personal computer (p-value=0.00). Most of the time, more than 80 (35%) medical doctors and about 40 (18.96%) midwifes, and 71 (33.65%) nurses search, upload or download health information online. About 115 (37%) doctors, 61 (19%) midwifes and 112 (36%) of nurses will want to use telemedicine tools at their facility. The study recorded that approximately 95% (371) of the study participants believe that telemedicine is a viable approach for health care delivery.

About 112 (33.04%) doctors, 76(22.42) midwifes, 126(37.17%) nurses agree telemedicine system can save efforts (p-value=0.000). Close to 79.1% of participants were willing and 20.1% were not willing to use telemedicine application. The participants were willing to communicate with fellow colleagues using any of the telemedicine tools such as email (56%), WhatsApp (85%), Facebook (15%) or face-to-face interaction (92%). Participants were willing to communicate with patients using at least one of the telemedicine tools, phone calls (87%) or WhatsApp messages (49%). Participants from maternity department had a lower odd of willingness to use telemedicine (0.485; p-value= 0.083) compared to child health department. Co-habiting participants had higher odds of willingness to use (2.573; p-value= 0.047) Muslim participants recorded an odds ratio= 1.912 and p-value= 0.092 indicating they are more likely to be willing to use telemedicine. Participants who were not concerned about legal issues recordeda higher odd (3.096; p-value<0.000).

Conclusion: The study concluded that health professionals; clinicians, midwives, nurses and laboratory personnel of the Korle Bu teaching hospital had positive perception (95%) regarding use of telemedicine. Approximately 79.1% of participants were willing to use telemedicine applications tools for health care delivery. Most of the professionals have access and use electronic devices such as computer and smartphones, be it at work or personally. Further, participants' department, marital status, religion and legal issues of concern were significantly associated with providers' willingness to use telemedicine.

CHAPTER ONE

INTRODUCTION

1.0 Background to the study

Technology in medicine has been a concept considered for several years and the recent pandemic the world faces has made it expedient for much attention to be focused in that aspect of medicine (Albarrak et al., 2021). Technology has made medical services like e-health and telemedicine that enables long distance health care services developed faster in the recent years. (Miller et al., 2003). Telemedicine and e-health refers to the use of advanced telecommunication technologies and electronic information to aid long distance health care, patient's health records, professional and patient's health related education, health administration and public health (Zayabalaradjane & Santosh., 2016). Telemedicine can be identified as one of the main cutting edge technology in health services,which is not only limited to the technological aspect of it but also from the social and cultural pointof view and improvement of the quality of medical care and organizational efficiency (Torrent-Sellens et al., 2016).

The World Health Organization (WHO) defines e-health and its other variants as the essential use of Information and Communication Technology (ICT) in a cost-effective way to support health services, education, knowledge, health surveillance and research (Ryu, 2012). According to WHO, it further explains telemedicine as an aspect of healthcare where the location of an individual at a particular time is an integral part which requires all healthcare professionals to be well equipped and knowledgeable in the use of information communication technology (ICT) among themselves and with patients as well (WHO, 2021). This will in turn help health professionals to obtain critical information for use in diagnosis, treatment and prevention of diseases. It will further improve research, monitoring and evaluation and for further training and equipping of healthcare providers with the aim of maintaining good and a high quality of life for individuals and the community at large. (El- khafif & Al-qahtani, 2012).

According to Daniel & Sulmasy, (2015), telemedicine can be grouped into four (4) types which include; synchronous method, where there is real time interactive technology such as a 2-way interactive video call between a physician and the patient; Asynchronous method, where there is no real time transmission and usage of patient's medical information; Remote patient monitoring method, where a patient's health information is gathered through a technological device and sent for monitoring and evaluation and kept for future reference; and the mobile healthcareservices, where there is the use of mobile applications, text messages and calls to manage and trackpeople's health conditions. The basis of telemedicine is not only easy accessibility to health care services in unlimited ways but also to reduce cost and improve efficiency in clinical services (Miller et al., 2003). To highlight the importance of telemedicine, a study conducted by Zapata et al., (2015) revealed that there were about 8,000 mobile health apps in the Google Play store and over 20,000 mobile health app in the Apple store.

The use of Telemedicine to aid in health provision have been tried and tested in different forms across the country. Notwithstanding, literature covering some of these telemedicine applicationsare scarce. It was shown that most of these telemedicine applications utilized the store-and-forward technology. This realization was associated with the averagely low and effortlessness of implementing the store-and-forward method (Tchao et al., 2019). According to the findings of Tchao et al, (2019) some implementations did not work out in Ghana because of the unavailability of funds and not much assistance from government. They further indicated that, with an increased government involvement in the implementation process, telemedicine will speed up to help mitigate most of the challenges facing telemedicine implementation projects.

This study seeks to assess the knowledge, perception and willingness of physicians, nurses and midwives on the use and application of telemedicine at the Korle Bu Teaching hospital.

1.1 Problem statement

Generally, health care delivery in Ghana is through the conventional face-to-face approach. This usual form of healthcare delivery is faced with numerous challenges. Health facilities do not have the required number of trained health professionals to attend to the several people who need care and attention. The Sub-Saharan Africa averages 1000 of its citizen to 1.15 health professional (Benjamin & Agyei-Baffour, 2019). According to the report by the Ghana Statistical Service, over 40% of the Ghanaian citizens dwells in the hinterlands. Sadly, this part of the population do not get the equal share of healthcare resources (Benjamin & Agyei-Baffour, 2019). If these issues are not carefully looked at and with the increase in population number, the nation would soon have an increased in average patients' number to health professional ratio. In addition, it would take a very long time for healthcare delivery to improve in rural areas considering the increasing number in average patient to health professional ratio.

Telemedicine in developing countries has expansive potential. It has the potential of solving logistical constraints and provides support to wear public health systems and connect global network. Initiatives in telemedicine has the potential to address challenges that has confronted developing countries including Ghana on providing quality cost-effective care services. Despite the enormous benefits telemedicine provides to the populace, there remains a challenge with the implementation of telemedicine interventions in Ghana. The level of knowledge on the use of telemedicine has become a major concern for stakeholders in the health sector. Osei-Frimpong et al., (2016) confirmed that most health workers in Ghana have limited knowledge on telemedicine. The limit in their knowledge affects their ability to facilitate the use of telemedicine. It is expected that since Korle-Bu Teaching Hospital is the prime/leading hospital in Ghana, health workers would have adequate knowledge to facilitate the implementation of telemedicine. This study therefore sought to assess the knowledge levels of health

workers on the use of telemedicine as well as ascertain how the knowledge levels had influenced the implementation of telemedicine program.

With the increasing development of information and communication technologies, telecommunication applications could expand to cover several areas that bring solution to many pertaining problems. Telecommunication have become important tools for elaboration in banking and other sectors, using smartphones, email, video conferencing and other tools. In Ghana, telemedicine is in the developing stages, however, it could be very useful in healthcare delivery (Tchao et al., 2019). The Government of Ghana through its digital application platform has introduced electronic system for telemedicine, however, it is not clear which facilities have started the implementation of these platforms for improved health care services. This study further sought to assess the available platforms for telemedicine and how these platforms have been utilised by Korle-Bu Hospital for healthcare administration. Beyond the availability of telemedicine platforms and the level of knowledge of health workers on telemedicine, other factors that may influence telemedicine implementation is not clearly known. This study also at assessing the socio-demographic and other factors that determine the use of telemedicine for healthcare services at the Korle-Bu Teaching hospital.

1.2 Justification of the study

Telemedicine technology has been explored extensible in the developed countries for some time now, but little is known of it in the developing countries. Telemedicine has been used to solve different forms of difficulties in the medical area or field. In Ghana, there are several advantages that the country can derive when telemedicine is executed or administered efficiently across the country. However, it is unclear which particular application is adopted and utilised effectively for providing cost-effective telemedicine. This study therefore sought to determine the platforms/applications that are used by health workers for

telemedicine in Korle-Bu. The result would provide some lessons for learning for other facilities and stakeholder within the health sector for adoption.

The availability of different platforms that facilitate or enhances the implementation of telemedicine may not be enough. It is important to equally know whether the available applications for telemedicine can easily be accessed by interested parties. For those in Korle-Bu, it was important to ascertain how health workers in the facility are able to access some of these applications to facilitate telemedicine activities for their clients. The outcome of the study is key for other stakeholders and end users of telemedicine to identify the best possible ways to utilization these services with limited cost.

Another significant objective of this study was to ascertain the level of knowledge among health workers on the use of telemedicine in the facility. It has been established that knowledge levels of health workers on telemedicine is essential in providing quality services to clients. Assessing the knowledge levels of health workers in Korle-Bu would help determine whether there is the need to develop training plans for health workers before the adoption of any application. Before the development of any training plan, there is the need to conduct any needs assessment and level of knowledge on the specific training content. This study is an important opportunity to identify the gaps in knowledge and help determine training content for health workers.

To improve upon the quality of healthcare delivery in rural areas, a system that employs reduced cost while providing patients with quality and satisfactory healthcare. Considering the advances in technology in the field of medicine, exploring telemedicine could serve as the solution to these challenges (Tchao et al., 2019).

1.3 Research objectives

The objective of the study was divided into general and specific objectives as stated below:

1.3.1 General objective

The general objective of the study was to assess the factors associated with the use of telemedicine applications for healthcare delivery among health providers at the Korle Bu Teaching hospital.

1.3.2 Specific objectives

The following specific objectives were set to address the general objective:

i. To determine the use of telemedicine application for healthcare delivery among health providers.

ii. To assess the level of availability access to telemedicine applications for healthcare delivery among health providers.

iii. To assess the association between socio-demographic characteristics and the use of telemedicine applications for healthcare delivery among health providers.

iv. To assess the knowledge of the use of telemedicine applications for healthcare delivery among health providers

v. To examine the perception of the use of telemedicine applications for healthcare delivery among health providers

vi. To evaluate the willingness to use telemedicine applications for healthcare delivery among health providers.

vii. To identify challenges to the use of telemedicine applications for healthcare delivery among health providers

1.3.3 Research questions

The following research questions helped to find answers to address the specific objectives:

i. What is the level of use of telemedicine applications for healthcare delivery among health providers?

ii. What is the level of availability and access telemedicine applications for healthcare delivery among

health workers?

iii. What is the association between socio-demographic characteristics and the use of telemedicine applications for healthcare delivery among health providers?

iv. What is the knowledge of the use of telemedicine applications for healthcare delivery among health providers?

v. What is the perception of the use of telemedicine applications for healthcare delivery among health providers?

vi. What is the willingness to use telemedicine applications for healthcare delivery among health providers?

vii. What are the challenges to the use of telemedicine applications for healthcare delivery among health providers?

1.4 Outline of the dissertation

This dissertation was presented in chapters one to six. Chapter one contains the background to the study, problem statement, justification, objectives and organization of the study. In chapter two, the literature review and conceptual framework of the study was presented. Chapter three contains the methods that were applied to collect data focusing on the study design, study setting, study population, inclusion and exclusion criteria, the sampling and sampling techniques, data collection and analysis procedures. In chapter four, the results of the study were presented. Chapter five contains the discussion of the findings of the study and how they relate to current literature. In chapter six, the summary, conclusions and recommendations was presented.

CHAPTER TWO

LITERATURE REVIEW

2.0 Introduction

This chapter presents the knowledge and understanding of telemedicine. It also contains other similar work done by other researchers as well as a conceptual framework to represent the objectives as well.

2.1 Origin and history of Telemedicine

Telemedicine is a word that was generated in the 1970s. The Greek word tele represents distance, and mederi is a known Latin word which means to heal. American Telemedicine Association (ATA) described telemedicine as the growth of healthcare in an automated world. Telehealth appeals to health workers due to the fact that, electronic information or gadget is used to communicate technologies which helps to alleviate the pain or distress a patient goes through over a distance, that is to say, the health worker and patient aren't in the same place. According to WHO, distance is an integral factor for the application of telemedicine in today's world where health services are provided by care givers using communication technology to help in exchange of information for diagnosis and treatment as well as for research and continuous professional studies. All this is aimed at improving the health of all individuals in a community. Telemedicine can be applied in several ways to help appreciate and gain further knowledge in patient management and public health practice.(Kanta Mohanty et al., n.d.) History has it on record that telemedicine can be dated as far back as mid and late nineteenth century where the first record was published when electrocardiograph (ECG) information was communicated over phone wires. The Radio News magazine which was issued in April 1924 enlightened telemedicine to the world as a new aspiration for public health in the future. The front page of the magazine displayed a patient with a TV and a receiver speaking with a doctor at the opposite end (Sageena et al., 2021).

2.1 Types of Telemedicine

According to a Victoria Ramos (2014), Telemedicine is usually categorized into three main groups: store-and-forward, monitoring remotely and interactive services. The categories are described as follows:

2.1.1 Store-and-forward telemedicine

This requires acquiring medical data in the likes of medical images, bio signals etc. for assessment whilst offline. The data is transmitted to a health care giver or a medical practitioner at an appropriate time for evaluation. Both people do not necessarily have to be together during that particular. Some specialties that are instrumental with the use of asynchronous telemedicine include dermatology, radiology, and pathology. An electronic form of the medical record should be an essential component of the transfer. The main distinction between the conventional method where patients come in physically and telemedicine has to do with the exclusion of real physical analysis and history. The store-and-forward type of telemedicine entails the clinician to depend on a history report which has an audio/video component as a substitute of a physical examination (Ramos, 2014).

2.1.2 Remote monitoring

This method allows healthcare givers to monitor and access patients remotely using different means of technology and can also be said to be self-monitoring or self-testing. This method works well and better for already diagnosed patients who have chronic and distinct conditions such as asthma, cardiac infarction, insulin dependent diabetes, sicklers etc. This primarily used for managing chronic diseases or specific conditions, such as heart disease, diabetes mellitus, or asthma. This method is really cost effective, and it helps the patient to be an integral part in

managing the condition with a greater satisfaction. The patient is not required to do a physical visit all the time (Ramos, 2014).

2.1.3 Interactive services

As the name suggests, interactive telemedicine services requires real-time encounters that occurs with the patient and health care giver. This may include phone calls, online communication and even sometimes being attended to in the comfort of the patient's home. Physical evaluation, psychiatric examinations and ophthalmology procedures can be done just as in the face-to-face visit. Clinician-interactive telemedicine services also seem to be more efficient and cheaper as compared to the traditional brick and mortar way of consulting (Ramos, 2014).

2.2 Telemedicine Applications

Applications of telemedicine can be categorized into two main types. This is in relation to the time at which the information was conveyed and the conversation between the people involved. It may be between two health professionals or a health professional and a patient (Craig &Patterson,2005). Store-and-forward or asynchronous forms of telemedicine requires a dialogue or discussion of data between two or more people happening at different times that has already been pre-recorded. A classical situation is where a health care giver who is referring the case or a patient sends a mail to a medical expert for him or her to express his or her view on a particular case. The expert will in turn later send his or her view with regards to what was sent in the mail andthe most appropriate way to manage it. The opposite is seen in real time or synchronous telemedicine. With this method, it is essential for the people involved to be physically available for quick dissemination of information as seen in videoconferencing (Rao & Lombardi,2009). In both synchronous and asynchronous form of telemedicine, vital details and knowledge may be sent in several media platforms which include text messages, audio, video, or motionless images.

These two main forms of telemedicine can be utilized in several ways of healthcare such as teledermatology, telepathology, and teleradiology. (WHO Report on the global survey on eHealth, 2009) Telemedicine services mainly focus on examination, treatment and management of the disease clinically. These are usually performed in United Kingdom of Great Britain and Northern Ireland, Scandinavia, North America, and Australia but it's not excluded to them. Also, patients with chronic conditions can be managed remotely mainly by using biometric measuring equipment which include heart rate monitoring device, blood pressure and blood glucose levels device. There are a group of people who are of the firm belief that telemedicine has the capacity and ability to change the delivery of healthcare services in the near future from traditional hospitals and clinics into homes considering the way technology and industrialization as advancing (Heizelmann *et al.*,2005).

Countries and regions with restricted infrastructure usually adopt telemedicine and its applications. They can connect with health-care givers and specialists from referral hospitals and tertiary centres.With all the numerous benefits associated with the use of telemedicine and its application such as low cost, sustainability, feasibility, and its usefulness, there are still many communities that struggle to adopt it due to several challenges (Wootton, 2008).

2.3 Challenges associated with telemedicine

There is a great potential in the use of telemedicine to minimize the flexibility of diagnosis as well as enhancing the management of diseases clinically and the prompt delivery of health care globally.This can be achieved by strengthening access, quality, efficiency, and cost-effectiveness (Craig & Patterson,2005). Since telemedicine has the potential to overcome time and distance barriers between healthcare givers and patients it will be appropriate in the provision of health care to rural and low middle income

countries since they are usually faced with very small number of health workers. Other benefits derived from telemedicine includes improved socioeconomic welfare or interest to the affected patients, families and the health practitioners and also it has amplified patient provider services and academic opportunities (WHO Report on the global survey on eHealth, 2009).(World Health Organization, 2010).

In spite of the promising nature of telemedicine, it has attained some success stories. Throughout industrialized and developing countries it still stands the chance of being used to deliver health services routinely. Some pilot projects that were deployed have been able to maintain the program even after the initial funding ended. Other regularly stated difficulties is as a result of lack of continuity in almost all telemedicine ventures and one of them is as a result of the complexity of human behaviour and cultural factors. With a thorough investigation, it can be acknowledged that both patients and health care workers may hold out against trying new service models that is different from indigenous practices, others too may not be abreast with the usage of ICT tools. One other challenge that pertains the most with barriers associated with telemedicine are verbal and cultural differences between patients especially in the rural areas and service providers (Currel *et al*.,2000).

Inadequate studies that report the various advantages we derive from telemedicine such as cost effectiveness of telemedicine is equally a challenge. One will have to display a well-grounded case by performing several research to impress and persuade the people who make the policy to welcome and invest in telemedicine. This has also been a major factor that has resulted in lack of infrastructure and underfunding of programmes related to telemedicine (Craig & Patterson, 2005). Legal and ethical deliberations are also factors that impede telemedicine usage. An international legal framework is needed to assist healthcare givers to provide services in several countries and other administrations. Unavailability of policies that are common and are centered around patient privacy and confidentiality

in respect to the exchange of data, storage and dissemination between health workers is also another challenge. The authentication of health professionals especially with e-mail and other social media networks and the risk of medical liability for the health care givers offering services with regards to telemedicine are all potential barriers to telemedicine application. Malfunction may occur since the system used is compounded which can be as a result of technological challenges. Related to legal considerations are technological challenges which could cause the software or hardware to fail. This can cause a rise in morbidity or mortality of patients (WHO Report on the global survey on eHealth, 2009).

A document accepted worldwide must be made available and known to all to help regulate the challenges faced with the use of telemedicine and it must provide strict guidelines for its usage. A legislation which governs secrecy, solitude, access, and responsibility needs to be instituted as a country as well. In the case where public and private sectors come together to collaborate and make an effort to be abreast with eHealth applications, health care givers must guarantee that telemedicine will be positioned strategically to increase health care services. Citizens should not be deprived of their basic access to healthcare regardless of where they find themselves. Everyone around the world is concerned about issues regarding privacy and confidentiality in the use of telemedicine since it employs the use if ICT. If telemedicine must be employed adopted for use in the near future, it is important to ensure its rolled out impartially and with the best ethical considerations and standard. This will help support and keep the dignity of everyone regardless of their social status and the differences in educational levels, linguistics, geographical area, physical and mental ability, age, and sex. This will also prevent stigmatization to the people who are receiving care (WHO Report on the global survey on eHealth, 2009).

2.4 Telemedicine applications in Ghana

Some disciplines of telemedicine that has been tried and tested in the country are described as follows.

2.4.1 Store and Forward Applications

Below are some projects that were done using store and forward application of telemedicine in the country

2.4.1.1 Asynchronous remote medical consultation

Currently, the referral infrastructure in Ghana is faced with a lot of problems. Remote Asynchronous Communication for Healthcare (ReACH) was instituted to help fix the challenges that are facing the system. With that introduced system, the doctors in the rural areas can input a patient they are dealing with and facing challenges into case information as text or images and send it to doctor in one of the referral or tertiary hospitals. This system is relatively inexpensive and convenient to use. It functions well even when sent in an email and doesn't require internet connection. It can work perfectly in a web-based portal. For computers without internet a (DTN) delay tolerant networking was introduced to ensure such computers can be updated using a USB key. It is of no doubt that there is generally a low number of medical specialists in the country. Thus, the system is opened up to other medical specialist around the globe who volunteers to also be of help to have access to the system. This usually occurs when the specialists in Accra or Kumasi are busy and are unable to access the system or they lack that particular expertise. A non-case specific issue is also allowed where doctors can talk among themselves. To guarantee fairness and impartiality, after the doctors assign cases to the specialist at the referral centres, the system also does a final assignment to a specialist. Also, already existing social networking are employed between the doctors and the medical specialist to make the specialist more responsive on the system since they already know each other. With high medical standards and good health practice, most specialist would like to follow through with cases they worked on or responded to and so the system

ensures that the doctors making the request onto the systems profile is publicly available. A unique code is assigned to each doctor on the system which makes them answerable on the system. Though it was mentioned earlier that foreign specialist also have access to the system in case they want to also provide help, the system ensures that all are seen by Ghanaian specialist before foreign specialist are engaged. Cases are passed on to foreign specialist only when there is work overload on the Ghanaian specialist. All the foreign specialist were people who already had knowledge about our Ghanaian system and the medical practice we do here. Thus they are already familiarwith peculiar issues that bother us as a country. In very few instances where the foreign specialist had little idea about our medical practice as a country, a training session is organized which included the resident doctors in Ghana and then finally sent to the specialist outside Ghana. (luk et al.,2008:)

2.4.1.2 Web-based tele-ophthalmology system

A web-based tele-ophthalmology system was instituted to permit ophthalmologist in Ghana to transmit images on cases they are dealing with online and to receive assistance from a specialist at Moorfields Eye Hospital located in London. Several referral facilities in Africa were enrolled on that program and our own Korle Bu Teaching hospital was part. An online SSL encryption method was used to secure the data privacy and for sharing information. All patients involved in the teleconsultation program provides a signed informed consent form as part of adherence to ethical considerations. A history of the patient must be made available by the requesting doctor who needs assistance on a case, and this must include what the condition is, how the doctor intends to manage the condition and if possible the research that is being done with regards to the condition. Training and professional development was conducted for the participating facilities as well as access to internet to make the transmission process smooth. Not more than four images are permitted to be uploaded on a file history and there was also the provision of digital cameras to help get the images. Once a care giver uploads an image or information on the

system, an electronic mail is sent to specialist at the other facility automatically to facilitate a quick response and once a response has been entered into the system an electronic mail is also sent to the practitioner who initiated the case. The only people that have access to the uploaded cases are the doctors attending to the case and the engineer of the site (Craig *et al.*,2006).

2.4.1.3 Sene PDA

Community based Health Planning and Services (CHPS) still remains one of the best ways communities are being attended to with regard to the provision of health services. The Sene PDA project was developed and was intended to help boost healthcare at the Community-based Health Planning and Services (CHPS) zones through utilization information communication technology. Itstarted in 2004 and was among the first mobile health apps to be developed in Ghana. This technology when it was introduced made life easier for the community-based health care givers. Reports were now more accurate and are easily accessible to help in the making of decisions by the district health manager. Also, mother and child visitation to the facilities increased and there was easy follow up since all the attendants are registered. The rate of drop out for immunization also reduced drastically. Time spent on acquiring monthly reports by the community health workers and managers now became relatively small. (Afarikumah., 2014).

2.4.1.4 Mobile technology for community health (MOTECH) in Ghana

The main function and aim of MOTECH was to enhance healthcare for women and their babies in the rural areas through the use of mobile phones. It was inaugurated to instigate the quantity and quality of prenatal and neonatal care in rural Ghana. It was made up of two main categories: Nurse Application and Mobile Midwife Application. The Nurse Application was adapted to aid community health care givers to keep an eye on patients and document the care and assistance delivered to newborns and their mothers

who are based in the communities. All the facilities were supplied with cost effective mobile phones which already had the nurse application on it. This system helped the health workers to document and have access to the MOTECH database, ask questions and also to retrieve information on patients as well as knowing which women are almost ready to deliver.

The Mobile Midwife application was designed to help pregnant women and their families know their situation as well as what is happening each week with their babies. This was done through SMS or voice notes. They are usually reminded to take their medications, report other challenges or unusual symptoms that come up as well as continuous reminders and education on pregnancy relatedissues to help maintain good health (Entsieh et al.,2015: LeFevre et al.,2017).

2.4.1.5 OneTouch Medicare line

The OneTouch Medicare Line program was specifically designed for registered physicians and surgeons in Ghana. Thus, it was particularly created for the GMA (Ghana Medical Association). It provided the physicians and surgeons the opportunity to communicate among themselves using free calls and SMS. This was adopted during the times when mobile phones were fairly new in the system which made them expensive. The aim for this program was to minimize economic difficulties that comes with using mobile phones but not limited to innovations in technology. The medics are given a sim card after registration with the system. The sim card provided should be used to place a call to other participants who have also registered for free. This helps to reduce the cost of airtime by the medics. The GMA was given a computer terminal to transmit information to the participants to prompt them on happenings with the system. Plans was also underway to add on new interventions. There is also another aspect where they intend to let participants communicate using free multimedia messaging survive (MMS) which will permit consultations to be done using photos or pictures and also to aid in the acquisition of medical data. Another aspect of the program was to gain partnership with mobile hardware companies to provide

mobile phones to the medics which already has medical reference materials installed on it for easy referencing (Luk et al.,2009).

2.4.1.6 mPEDIGREE technology

The pharmaceutical industry in Ghana has suffered several challenges and counterfeit drugs is one of them. mPedigree technology was enrolled to cut down negative effects of counterfeiting in the Ghana health industry. Fake drugs cost the economy loss of revenue, lives are lost, jobs are lost andunnecessary competition between the genuine drug dealers and the fake ones. The mPedigree system operates by a system where manufacturing companies collaborates with network providers and are given a unique and concealed 12-digit number which is special to every product produced by the manufacturers. The unique number is only identified after purchase by the consumer. The consumer reveals the 12 digit codes and sends it to a short code of the mobile network without paying for it. This helps to validate the authenticity of the drug. Once the drug is original, a specific detail will pop up hitherto, it will be labelled as counterfeit. This technology hasn't only been beneficial to pharmaceutical companies but also to other products to help ascertain if its veritable or forged (Afarikumah.,2014).

2.4.1.7 The Ghana consultation network (GCN)

GCN was inaugurated in the country to help doctors to communicate amongst themselves in Ghana as well as in other countries. They consult with each other and share ideas as to how best one can manage a situation. It provides a computer-based system where the doctors share information. A local server is situated at the various participating facilities where the clinicians log into the system through a web based interface This helps them to still communicate even in situations where internet connectivity is very bad. The system consists of two methods of communication which are a systematic method for specified patients which makes use of electronic history and an unstructured one which works like a forum.

Electronic messages and emails have been included to fasten the communication process. This program was signed on by people in Ghana, USA, South Africa and others. GCN started with identifying needs, piloting the tactics and deploying it. Initially the pilot study was done in the rural areas in the northern part of the country but currently it's also being used at the southern part due to its effectiveness with plans of taking it to other parts of the country (Luk et al.,2009).

2.4.1.8 SATELLIFE PDA project

A pilot study was done in 2001 SATELLIFE PDA together with the American Red Cross to ascertain how (PDA) are essential for field survey in relation to measles in Ghana. A number of people from the red cross society willingly joined and were educated for some few days and they faced no issues with regards to the use of PDAs considering the fact that some had no exposure to computers before that time. During the period if training, about 2,400 surveys was done whereas previously only about 200 could be done due to manual ways of working. The study lasted only for about a a week considering the smooth running of gathering the data. The study made a strong and firm case that PDAs together with technology is vital for reporting and gathering data. Healthnet was instituted at the school of medicine to aid in accessing medical information conferencing usingelectronic means (Osei Darkwa., 2000).

2.4.1.9 Vodafone Healthline project

This is a radio and television program aimed at educating Ghanaians on health-related issues. Vodafone Ghana started it and called it ‑Vodafone Healthline‖. The program tries to answer health related questions when people call into the show. Vodafone Ghana explains that the show is aimed at informing the ordinary Ghanaian and demystifying certain myths in the society and also help improve cultural practices that are stuck with the people and not helping in promoting health. Another avenue also called Healthline 255, provides precise medical advice to people who call in with their phones from the comfort of their

homes (Tchao et al., 2019).

2.4.1.10 Electronic health information and surveillance system (eHISS)

Viamo a Ghanaian company designed the Electronic Health Information and Surveillance System (eHISS). The system was instituted to evaluate the symptoms and manifestations displayed by children who are sick through the use of phones. Also, through the same means the care givers are assisted with health advice to help in the management of the children. A number of questionswhich are automated in a voice response and answered by the caregivers. The geographical location, clinical history and symptoms of the disease are also noted down. The clinical algorithm was mapped out and was dependent on the doctors' report and the Integrated Management of Childhood Illness Chart Booklet (IMCI). The algorithm was designed for more than two years with further consultations from researchers, biostatisticians, epidemiologists, public health specialists and clinicians. When a caregiver is linked to the software, instructions and short introduction is given to the caregiver on what to do. It usually takes the form of for A press "yes" or for B press "no" responses on their cell phones. The initial queries that the health care giver is asked is usually about the possibility of any risk signs" as shown in the IMCI guideline taking into account the age of the child. The subsequent questions that follow are purposely to determine the exact symptoms that is being displayed by the child. Further enquiries are made to access the seriousness of the child's situation. The caregiver who accessed the site must provide all this information to enable thesystem to capture all the symptoms so that an accurate response can be given by the system. (Mohammed *et al.*,2018, (Brinkel et al., 2017)

2.4.1.11 District health information system (DHIS 2)

The District Health Information System (DHIS 2) requires the use of a Microsoft excel tool for easy and quick input of data. The data is stored in individualistic reporting forms in a web-based health

information system to help bring out reports and use of data from the health service centres. The system is capable of analysing data from different health facilities and regions to create reports for health care managers in a centralized manner (Dehavieh *et al.*,2018).

2.4.2 Real-Time Interactive Applications

Some real-time interactive Telemedicine implementations that have been developed in the country are as follows:

2.4.2.1 Millennium village health system

The Millennium Village Health System (MVHS) is an integral part of the Millennium Villages Project (MVP) to attain the Millennium Development Goals (MDGs) in low-income rural Africa. The MVHS has its main objective as to attain universal health coverage of primary health services to achieve the MDGs in healthcare. These primary health services include minimizing child mortality rate as well as reduced maternal mortality rate with regards to a baseline. The technique used is to ensure easy and quick access to health for patients at the point of care without it being at an extra cost to the patient. The delivery of health service to the communities must be continuous without a break from the household, clinic and the referral center. The MVHS takes into account the compilation of health data feedback which should include all the necessary events and recordings to help improve and give better end results. Currently, the MVP is working with the Millennium Village Global Network (MVG-Net). The vision of this network is to ensure health workers in the community are able to continually have access to data, do a better form of reporting and help in the evaluation of whether the MVP"s are making progress and intensify the healthcare given at MVP community sites. The MVG-Net has an open-source electronic health delivery platform known as OpenMRS which stores data for managing patient care, program evaluation and monitoring, decision making, and management. It enables a facility-based data storage of individual-level data, community-based data capture of individual-level information, data storage of individual patient

health records, and an automated scheme for aggregating data and generating reports and feedback to health care providers and managers. Child Count, a program running under MVG-Net, is an SMS-based system that helps collect data for community health workers to monitor pregnant women and children under 5 years of age. As part of the test, the mClinic software was designed for midwives in Bonsaaso of the Ashanti Region of Ghana, to use to enable them have access to the MVG-Net. mClinic works on inexpensive android-based devices and allows midwives to obtain data (Velez *et al.*,2014).

2.4.2.2 Novartis

Novartis pilot project was intended to extend access to quality healthcare for people living in remote rural areas, to reduce time and cost of transportation and to eliminate unneeded referrals. It was developed to allow for centralization of healthcare expertise with digital technology. Later, the project was expanded in 2015 to cover the entire Amansie-West district in the Ashanti Region. Mobile technology is used to connect community health workers based in rural, remote areas to experienced healthcare professionals via 24-hour teleconsultation centers. This healthcare professionals guide and advise the community health workers in their patient care to improve the quality of healthcare patients receive. This helps to reduce unnecessary referrals and also allows for immediate support in the event of medical emergencies. The project was launched in cooperation with the Columbia University Earth Institute"s Millennium Promise, the Ministry of Health, National Health Insurance Authority and Ambulance Services of Ghana, and Ghana Health Services (Novartis telemedicine factsheet report, 2016).

2.4.2.3 Pan African eNetwork

The Pan African eNetwork was instituted over a 5-year period to assist over 10,000 students to equip them with quality and standardized education. Participants were mainly students, and they were enlightened on several training from other universities and reputable schools from India. Medical

specialist in India also provides medical consultation using online services to other health professionals in Africa as a continent (Tchao et al., 2019).

2.4.2.4 Sanford

Sanford Health Enterprise is a non-profit organization that targets mainly rural areas and its situated in the USA. Sandford started working in Ghana in 2012 to help with Ghana's healthsystem and works with over 300 health professionals. Sanford operates through at least 360 clinics in Ghana in collaboration with the Ghana Health Service and the Ministry of Health and offers a wide range of services which include education, specialty hospital care and primary health care. Sanford operates both real-time and store and forward telemedicine in Ghana. Sanford uses EMR (Electronic Medical Records) to create a paperless system with easy and effective access topatients" records. This system requires a stable internet connectivity, a camera, a stethoscope that is capable of transmitting software and an audio-video call system that works in a two-way interaction. The main challenges the program faced was language barriers, poor and unstable internet connectivity, unreliable power supply and the lack of health facilities. This situation is quiet typical and associated with most rural areas in Ghana. (Tchao et al., 2019).

2.4.2.5 Mahiri

Telmedx provided tablets which is an electronic device to healthcare workers in the rural areas in Ghana to help improve health services in conjunction with the Mahiri project. These tablets can be used to make video calls to connect doctors in Tamale and Nsawam to acquire medical information and assistance without travelling that long distance. The nurses available at the rural areas are trained to use the devise. They move with it around and as such are are able to get the patients without they coming to the health facility. The patients can be attended to remotely, at their homes, in schools and even during community activities such as festivals. The Mahiri project thus makes use of high-quality cameras to make videos and

take pictures which can be shared among doctors tohelp in decision making and patient management by making use of a web browser for real time consultation. Health care workers can thus retrieve already taken pictures from the backed-up browser remotely. The video and photos can be assessed side by side on a computer screen to help in diagnosis. The Telmedx mobile app affords a group of health care givers the opportunity to watch and view images and videos at the same time without interference. Doctors in Ghana applauded the initiative due to its efficiency and reliability since they are able to capture images foraccurate analysis and consultation (Tchao et al., 2019).

2.4.2.6 Family health hospital telemedicine

A medical facility in Ghana named Family Health Hospital started a telemedicine centre to enable patients have the opportunity to access health care givers and generally to boost health knowledge in Ghana. The hospital is equipped with video-conferencing systems and monitors to aid in the enhancement of the program. The first private medical school in Ghana, Family Health Medical and Nursing Schools are all part of the Family Health Group and they all received training on the use of the system. Airtel Ghana, the family health group, Apollo Hospital in India all came togetherto set up the centre. With this technology, all the patient had to do was to book an appointment to get access to specialist medical care. This takes away the trouble of travelling outside Ghana to seek for medical attention in the USA and India (Tchao et al., 2019).

2.5 Review Conclusion

Though there have been several works done in Ghana in relation to the use of information and communication technologies to advance telemedicine in Ghana there are still more room for improvement. Telemedicine in developing countries need to be critically reviewed to help in its advancement. The program needs to be extended to other areas to get more people to appreciate it and become familiar with it. Despite all the successes achieved, there are still some areas in telemedicine that

hasn't been implemented in Ghana. This can be attributed to poor planning, lack of health-related policies and frameworks, lack of funds, lack of health personnel etc.

2.7. Empirical Evidence of factors associated with telemedicine utilization among health workers

2.7.1 Demographic factors

Demographic factors related to use of the teleconsultation system may differ from one study to the other. However, Alkmim et al., (2015) explains that the socio-demographic factors that influences the use of telemedicine may vary with limited focus few factors such as age, sex, educational background, etc. Although these factors can be related to the telehealth centre, to the operational system, or to the remote sites, in this study the focus is limited to telemedicine in health facilities. The study noted that factors such as residence of the health worker and the type of health facility determines the level of utilization of telemedicine in healthcare delivery. Chen et al., (2022) in a study on socio-economic and demographic disparities in the use of telemedicine for ophthalmic care during the COVID-19 pandemic explained that the use of telemedicine may not be determined by only one factor or the level of infrastructure development in a giving country. However, the undescribed factors such socio-economic and demographic characteristics have the potential to derail the effort of any government in improving telemedicine in healthcare delivery. The study noted that people with older age, low level of education and are conversant with old system of healthcare delivery have difficulties in adopting new technology for health care delivery. It was therefore concluded that telemedicine can best be implemented when the health workers are willing and ready to change the status quo. Kaustav et al., (2022) also observed that socio-demographic factors such as age, educational level and race significantly influenced the use of telemedicine in a study in India. In this approach, video conferencing was the major telemedicine approach used for healthcare delivery.

2.7.2 Knowledge about telemedicine

Knowledge about health service is an essential component to healthcare delivery. It has been well established that knowledge generally improves the utilization of health services. While improved knowledge in health services among clients improved acceptance and utilization of healthcare delivery, improved knowledge among health workers increases the rate of health service delivery. Ayatollahi et al., (2015) in a study in Iran on clinicians' knowledge and perception of telemedicine technology observed that knowledge is key in advancing telemedicine in Iran. The study noted that knowledge about telemedicine among the health workers was relatively low especially dentist. Clinicians were limited in the use of different applications to delivery quality and cost-effective healthcare services. This, according to the study, affected the implementation of telemedicine in the country in the selected health facilities.

Ashfaq et al., (2020) also conducted a study in Pakistan to assess the knowledge and attitude of medical doctors regarding telemedicine in some selected facilities. The study observed that more than 80% of the medical doctors were aware of the concept of telemedicine for healthcare delivery. However, limited knowledge was observed for the use any application for telemedicine. Interestingly, only 28.1% of the doctors had firm believe that telemedicine is an effective means of providing faster and cost-effective medical services to patients. Majority did not believe in the effectiveness of telemedicine. For those who did not believe in the effectiveness of telemedicine, it was extremely difficult to facilitate the process of providing quality healthcare service through the means of telemedicine. Nearly half of the doctors did not believe in telemedicine because, for them, the approach defeats the face-to-face interaction between a doctor and a patient and therefore disrupts their relationship.

Ahmed et al., (2021) in a study in Saudi Arabia assessed the knowledge levels of physicians and its

relationship to the perception and willingness of telemedicine use in healthcare delivery. The study which sampled about 391 physicians observed that participants have average knowledge about telemedicine technology (46.1%). Nearly, 77% of the professionals believed that continuous training is necessary for the use of telemedicine. The highest level of perception was (90%) for telemedicine as a viable approach for providing medical care services to patients. More than 90% of specialties professional agreed that telemedicine can save time, money and further believed information and communication technology (ICT) has a potential role in healthcare. However, most of the clinicians noted that the implementation of telemedicine is a breach to patients' privacy.

Another study by Mohammed in Egypt noted that most of the clinicians (96.1 percent) had little knowledge about telemedicine. They perceived the advantages of telemedicine at a moderate level and its disadvantages at a low level. The knowledge of dentists about this technology was less than that of other groups, and as a result they were less positive about the advantages of telemedicine compared to nurses, general physicians, and specialists. The analysis of the various studies have shown that telemedicine can best thrive in the health sector when workers have adequate knowledge about the whole concept. Nonetheless, there remain reservation on the use of telemedicine especially with the breach of individual's privacy.

2.7.3 Availability of logistics and application for telemedicine delivery

Ranganathan & Balaji (2020) discussed in detail the technological factors that increases or facilitates the use of telemedicine among health workers. The study noted that clinics with paperless electronic health record (EHR) systems, health information exchange (HIE)-enablement, and better technological infrastructure had higher odds of telemedicine adoption compared to those with limited systems. Furthermore, clinics that had redesigned their workflows also exhibited higher odds of telemedicine

adoption. Clinics that faced high costs of telemedicine equipment, lack of demand had lower adoption levels. Clinics that faced high costs for hosting and staffing were more likely to adopt store-and-forward telemedicine and real-time patient monitoring rather than other high-end telemedicine services.

2.8. Conceptual Framework

The conceptual framework in figure 2.1 provides a clear description of some major factors that assesses health care providers on telemedicine application and use. The development of this framework was done after a comprehensive literature review to identify research relevant to providers perception and willingness to use telemedicine. The final work is based on researcher's own construct. The framework displayed the relationship that exist between the independent variables (demographics, general information on telemedicine, providers' knowledge, issues of telemedicine use and the availability of application for telemedicine) and the use of telemedicine for healthcare delivery (dependent variable). Under the demographic characteristics, variables such as age, gender, education, years of practice and the department of practice. The general information components included questions on access to computer, computer literacy, the use of information technology tools and availability of stable network (internet) connectivity. Providers' knowledge will look at the expertise, skills and training of healthcare professionals. The availability of telemedicine application is also essential in influencing the use of telemedicine by health workers for the delivery of health care services.

Conceptual framework

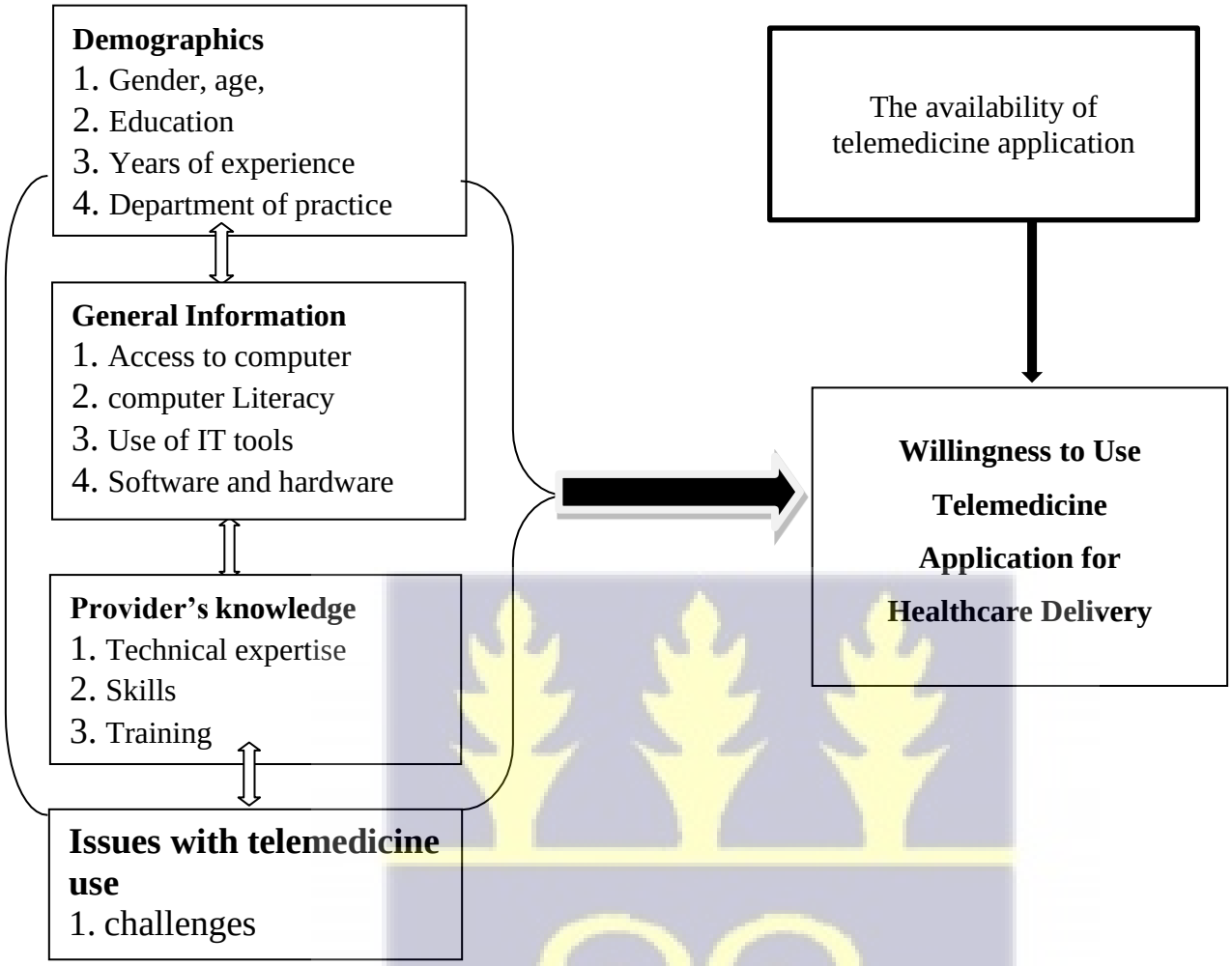

Figure 2.1: Conceptual framework for health provider's view on Telemedicine.

Source: Researcher's own construct (2022).

CHAPTER THREE

METHODS

3.0 INTRODUCTION

This chapter presents the methods to be applied to collect data for analysis in order to address the objectives of the study.

3.1 Philosophical assumption

The researcher's philosophical perspective is that of a positivist. Being a positivist mean one is confident and sure of something. (Wikipedia). Researchers make clear that, positivism include the philosophical stance of a natural scientist who is working with observable reality within society leading to production of generalizations(Alharahsheh & Pius, 2020). This means that positivism relates to the importance of what is given in general, with more strict focus on pure data as well as facts without being affected by interpretation of bias of human interaction (Scotland, 2012; Saunders et al., 2012; Alharahsheh, & Pius, 2020). Alharahsheh and Pius (2020) again indicated that the positivist paradigm would enable researchers to have more statistical reliance and generalization leading to development of universal laws and findings.

As against the positivist perspective is interpretivism, which is more concerned with in-depth variables and factors related to a context and considers humans as different from physical phenomena as they create further depth in meanings with the assumption that human beings cannot be explored in a similar way to physical phenomena (Alharahsheh, & Pius, 2020).

3.2 Study design

A cross-sectional study design using quantitative methods was used to collect data for analysis in this study. A cross-sectional study design is a type of research study in which either the entire population or a

subset is selected. It could also mean that data was collected from individuals to help gain more knowledge and understanding about research questions which are of interest (Olsen, & St George, 2004). The cross-sectional study design was applied because it is relatively quick and easy (MacDonald, Greig, & Baracos, 2011). MacDonald et al. (2011) noted however, that it does not permit distinction between cause and effect.

A quantitative research method is related to measuring quantity with application to a specific phenomenon, and this is expressed in terms of quantity, which is used often to test existing theories (Creswell, 2002; Biggam, 2008; Alharahsheh, & Pius, 2020). The quantitative method was applied because it places emphasis on numbers and figures in the collection and analysis of data, which makes generalisation possible (Bryman, 2001, Eyisi, 2016). The cross-sectional design and quantitative research method was thus used to select participants.

3.3 Study area

The study was conducted at the Korle Bu Teaching Hospital at the Ablekuma South Sub Metropolitan district in the Greater Accra region (–History of Medical School‖, 2018, History of Korle-Bu Teaching hospital., 2021). Out of the 17 departments at Korle Bu teaching hospital, child Health and maternity departments were selected for the study. This is because of the interest I have in advancing healthcare services for mothers and children. They seem to be more vulnerable and are faced with more health issues in addition to the fact that funds or resources may not be readily available to them for treatment. Also considering the duration for my program, it was going to be tedious to sample all the 17 departments in the hospital.

Geography

The Ablekuma South sub metropolitan district in the Greater Accra region is one of the 254 metropolitan districts in Ghana. It covers an area of about 15.1 square kilometers. It is also one of the three sub

metropolitan district council of the Accra Metropolitan Assembly (AMA). The sub metro is the largest in the metropolis and shares boundaries with Ablekuma Central, Ablekuma North and Ashiedu Keteke sub metropolitan district council.

Demography

The 2010 population and housing census (PHC) revealed that the sub metro has an estimated population of about 257,543. This includes 22,751 houses and 69,401 households. Using the Greater Accra growth rate of 3.1% in 2018, it is projected that the population of Ablekuma South is about 315,051. The census revealed that there are more females in the district as compared to males and also with a high dependency ratio with reference to the work force.

Economic Status

Though there are several other businesses which helps in contributing to the economic development of the area, the dominant economic activity within the sub metro is fishing and fish mongering since its located along the coastal area. Most of the inhabitants are petty traders. Tuesday market at Korle Gono and Dansoman market are the main markets in the area. And with the establishment of the Korle Bu Teaching hospital in the locality, it has attracted more investors and other businesses to the area.

Healthcare provision (including staff strength)

Korle Bu is one of the major hospitals in west Africa and a referral facility. Also, there are other health facilities in the district such as Mamprobi polyclinic, Kaneshie polyclinic, Dansoman polyclinic among many others which also help in taking care of the community's' health needs. As such, cases that are sent to Korle Bu are the critical ones which the other local hospitals can't handle and require the services of a specialist.

Korle Bu Teaching Hospital

Korle Bu Teaching Hospital is the premiere hospital in Ghana, with approximately 2000 bed capacity and the third biggest referral centre in Africa. Averagely, KBTH records about 1,500 outpatient visits and almost 250 inpatient admissions.

The teaching hospital was established in 1923 and gained teaching hospital status in 1962. The hospital has 17 clinical and diagnostic departments/ units. Some of the units include therapeutics and Internal Medicine, Surgery, Child Health, Obstetrics and Gynaecology, Radiology, Anaesthesia, Psychiatry, Accident & Emergency, Orthopaedics, Family Medicine/Polyclinic, Laboratory, Pharmacy, Pathology, and Reconstructive Plastic Surgery & Burns Centre. These departments also serve as a clinical and research training grounds for medical students throughout the span of their medical education. Generally, health care delivery in Korle Bu Teaching hospital is through the conventional face-to- face approach. Health professionals have to attend to the several people who come to the facility that require care and attention. Generally, there are about 5000 workers at the Korle bu Teaching hospital which includes clinical and non-clinical staff.

3.4 Study population

A study population is the collection or aggregation of the individuals or other elements about which inferences are to be made (Lavrakas, 2008). Lavrakas (2008) argues that in statistical usage, a population is any finite or infinite collection of individual elements.

The study involved doctors, midwives, nurses and laboratory staff at the child health and maternity department of Korle-Bu Teaching hospital. This was because these groups of professionals play an important role in healthcare delivery and also have direct contact with patients. They also offer treatment and counselling during patient management.

3.4.1 Inclusion criteria

This study considered all consenting doctors, midwives, nurses and laboratory staff who are permanent

workers of maternity and child health departments of Korle-Bu Teaching Hospital regardless of their age and employment duration.

3.4.2 Exclusion criteria

All doctors, midwives, nurses and laboratory professionals of maternity and child health departments of Korle-Bu Teaching Hospital who declined to be part of the research and those that work at other departments. Also interns and workers who work part time were not considered for the study.

3.5 Sampling Strategies

This study applied appropriate sampling methods to determine the sample size as well as selected the study participants as explained below.

3.5.1 Sample size Determination

The total sample size for the study was estimated to be four hundred and twenty-five (425). The study recruited one hundred and forty-two (142) doctors, midwives and nurses.

The sample size was calculated using Z-scores. A Z score can be used to determine a reliable sample size for an unknown population. The Z scores can be used to determine the sample size using the Magnan formula:(Magnani, 2020).

$$N = \frac{Z^2 \times P(1-P)}{C^2}$$

Where;

N= required sample size

Z=standard normal deviation set at 95% confidence level (standard value of 1.96)P= percentage picking a choice or response (50%=0.5)

We did not have much information on telemedicine application in Korle-Bu Teaching hospital, so we

assumed that half of them had information on Telemedicine: this gave us maximum variability, hence, the decision to go with 50%.

C = confidence interval (0.05 = +/-5)N= $\frac{(1.96)^2 \times 0.5 (1-0.05)}{(0.05)^2}$

N = 384

10% of 384 was added for non-response hence a total sample size of 425 was expected for the study within the study period of two (2) months.

3.5.2 Sampling method

The study applied the needed sampling method to select the research participants into this study. A sampling occurs when researchers examine a portion or sample of a larger group of potential participants and use the results to make statements that apply to this broader group or population (Salkind, 2010). A simple random sampling, which is a probability method of selecting a subset, or sample, from a larger population in such a manner that every element has a chance of being selected (Frey, 2018).

Participants were briefed on the study and they signed informed consent form before proceeding to answer a structured self-administered questionnaire through face-to-face interviews. One of the informed consent form was handed over to participants after it has been endorsed to keep.

3.6 Study Variables

Researchers show the view that a variable is something that varies in value, as opposed to a constant, which always has the same value (Lavrakas, 2008b). Lavrakas (2008b) explained that these are observable features of something that can take on several different values or can be put into several discrete categories. The variables measured in this study were grouped into both dependent and independent as shown below.

3.6.1 Dependent variable

The dependent variable for the study was use of telemedicine applications for health services

3.6.2 Independent variables

The independent variables are as follows

- Level of use of telemedicine applications for healthcare delivery
- Level of availability of telemedicine applications for healthcare delivery
- Level of access to telemedicine applications for health delivery
- Individual (socio-demographic characteristics) factors: age, marital status, ethnicity, educational status, profession
- Knowledge of the use of telemedicine applications for healthcare delivery
- Perception of the use of telemedicine applications for healthcare delivery
- Willingness to use telemedicine applications for healthcare delivery
- Challenges to the use of telemedicine application for healthcare delivery

3.7 Data collection: Questionnaire design and administration

The study questionnaire was adopted from Albarrak et al., (2021) and modified to suit the study objectives. Participants were briefed on the study and signed an informed consent form before proceeding to answer a structured self-administered questionnaire through face-to-face interviews. The questionnaire consisted of mainly eight sections: Section A collected data on demographic characteristics (eight items) which include age, gender, department, years of practice, marital status, religion, highest level of education and occupation.; Section B collected data on the general information about access to computers and its literacy with twenty-one items; Section C accessed provider's knowledge regarding telemedicine which had seven items; Section D accessed providers perceptions of use of telemedicine with eighteen

items; Section E had data on willingness to use telemedicine technology with fellow health workers with five items; Section F collected data on willingness to use telemedicine technology-for patients with five items; Section G collected data on challenges with the use of telemedicine and finally section H collected data on Issues affecting use of telemedicine with eight items.

The demographic characteristics and general information about access to computer and its literacy addressed the general factors of the study. The knowledge section looked at the skills, training and technical expertise of study participants. The perception section addressed the benefits,disadvantages and viability of telemedicine use. The willingness about telemedicine assessed provider's will to use some information technology tools to communicate with colleagues or patients and finally the challenges dealt with possible issues that can come up with the use of telemedicine.

Some questions such as general information about access to literacy and use of telemedicine tools used simple yes or no as answers and others such as providers knowledge regarding telemedicine used a likert scale where low = 0, average = 1and high = 2.

The questionnaire was administered by two research assistants who have some background in research methods. Both the self-administered and interviewer-administered strategies were used depending on the level of understanding of the participant. The research assistants went to the various departments and talked to the professionals either at the consulting rooms, their desk or offices or where it was convenient for the participants. The researcher supervised and monitored the research assistants to ensure that they administered the questionnaires correctly. The researcher also participated in the data collection to ensure that the reliability of the questionnaire was achieved. Data was collected from every respondent and a series of checks was conducted daily after field work. This was to ensure that the questionnaires was completed appropriately and accurately. Each questionnaire administered took between 10 and 15 minutes.

3.7.1 Quality assurance

The necessary procedures were applied to ensure that the data collected met the required standards. It is explained that quality control or assurance refers to the efforts and procedures that survey researchers put in place to ensure the quality and accuracy of data being collected using the methodologies chosen for a particular study (Lavrakas, 2008c). To ensure reliability and validity of the data, a well-designed questionnaire containing all the details necessary to achieve the set objectives was administered to assist in obtaining the right information from the patients.

Pretesting

The proposed questionnaire was pretested at the Korle Bu polyclinic and modifications were made depending on the responses. About 30 health professionals who fit into the inclusion criteria were recruited to respond to the questions. The pre-testing of the questionnaire helped to revise wrongly worded words/phrases. It also gave the opportunity for the research assistants to be familiar with the objectives and the questions as well as the duration for administering each questionnaire.

Validity and reliability

Some researchers explain that reliability is the extent to which research produces the same results when replicated (Bloor, & Wood, 2006). Bloor and Wood (2006) indicated that validity is the extent to which the research produces an accurate version of the world.

3.8 Data management and analysis

Data management and analysis helps in organizing, storing and maintaining data collected. It helps to reduce potential errors by instituting processes.

3.8.1 Data entry and processing

The returned questionnaire was cleaned to ensure that there was no double answering to any of the questions. That is, raw data was entered into Microsoft Excel spreadsheet and preliminary frequencies was done to identify entry errors. The inaccuracies in the data entry process was corrected before the calculations was performed. The data was imported into Stata statistical software version 16 for analysis

3.8.2 Data analysis

The knowledge of the respondents was assessed by using an item rated on a seven-point Likertscale that ranged from ‒0= low; 1= average and 2= high‖. Then scores of Likert scale statement was dichotomized into two. A participant can score a minimum of 0 and a maximum of 2 in this section. Similarly, perception was assessed as either positive or negative in telemedicine use. The perception of the respondents was assessed by a two-point likert scale that was answered as 1‒agree‖ or ‒disagree‖. The scale ranged from ‒1= disagree and 0= agree‖. A score of ‒1‖ was labelled as "negative" and a score of ‒0‖ was labelled as a "positive". A participant can score a minimum of 0 and a maximum of 18 in this section. In addition, respondents' level of willingness was assessed by using five items to be answered in either "Yes" or "No". They were asked about their willingness to use five distinct information technologies with fellow health workers and for patients remotely. This would allow them to better communicate among themselves and manage/support their patients. The technologies would include voice calls, text messages, e-mail, social media, and video conferencing. A "yes" response will be taken to mean that the care provider will be willing, while the "No" response will be regarded as unwilling. The result was computed by adding their response to each technology. A score of "0" will be given for "Yes" and "1" for "No." One can score a minimum of 0 and a maximum of 5 in this section.

After the data collection, the data will be checked, cleaned, edited, and analysed by using STATA statistical software version 16 for analysis. Descriptive statistics (mean and percentage) will be used to

describe demographic characteristics, knowledge, perception and willingness. The binary logistic regression method was used to identify variables associated with respondents' willingness to use of telemedicine. The results of logistic regression analysis will be expressed as odd ratios (OR), accompanied by 95% CI (confidence interval), and a p-value < 0.05 will be calculated to evaluate statistical significance.

3.9 Ethical considerations

The needed ethical issues relating to studies involving human subjects was applied as explained below.

Ethical clearance

Approval for the study was sought from Legon and Korle Bu Teaching Hospital Institution Review Boards. Ethical clearance for the conduct of the research was permitted by the Korle Bu Teaching Hospital Scientific and Technical Committee (KBTH-STC) with protocol identification number KBTH-STC 00036/2022.

Permission from the study site

An introductory letter from the School of Public Health college of Health Sciences University of Ghana Legon was sent to the Child Health and maternity department of Korle Bu Teaching Hospital to guarantee that the research was for academic purposes only.

Participants consent

Consent forms was made available in plain English without difficult terminologies. The consent form was read and explained to participants. They were given some minutes to also read the form for themselves too before they proceeded to answer the study questions.

Risks and benefits

The study did not pose any harm to the participants. However, the results of the study would help

strengthen public health education and improve policy planning in Ghana's health sector. The respondents' involvement in this study only responded to the questionnaires. Hence, it did not expose them to any form of risks.

Confidentiality and anonymity

The study ensured that no identifying details of the participants were revealed. Codes were used to identify them using the questionnaires. Since the report was a composite one per the analysis, it ensured that their identities were protected.

Voluntary withdrawal

Individuals participating in the study had the right to opt out of the study at any given time without any negative implications to the participants.

Compensation

There were neither financial benefits nor other materialistic benefits to participants. However, a word of appreciation was extended to each one of them for their time spent in responding to the questionnaire.

Covid 19 Protocols

Covid 19 protocols was strictly adhered to during the conduct of the study. The principal researcher and the assistants were all in nose mask and social distancing was maintained. Where necessary, hand sanitizers was used as well as handwashing since veronica bucket and liquid soap had already been provided by the hospital at the study site.

Data storage and usage

All data obtained with the hard copy of the questionnaire would be destroyed by incineration after a period of one year. A soft copy of the data that was generated was stored onto a computer protected with a password whilst hard copies were saved in a file cabinet under lock and key. Only the researcher and

the supervisor have access to the stored data. After a period of five years, the soft copies would also be deleted with no traces on the personal computer and external drive of the researcher.

Results dissemination

The outcome and findings of this study was provided to University of Ghana School of Public Health College of Health Sciences for academic purposes. Copies of the dissertation were also submitted to Korle Bu Teaching Hospital to help them in future decision making and implementation of health policies with regards to telemedicine. Also, manuscripts were made available for publications in renowned journals.

Conflict of interest

Even though the researcher is a staff of the proposed study site, this did not in any way create a situation for conflict of interest or whatsoever related to the study. The study was solely for academic work and responses to the questionnaires were used for the intended mentioned goals only.

Funding

The study was self-financed. The researcher footed all the expenses related to the conduct of the study without support from any third party.

3.10 Summary of the chapter

This chapter presented the methods that were applied to collect data for analysis and to address the objectives of the study. The chapter argued that the choice of the cross-sectional design using the quantitative research method was based on the philosophical assumption of the researcher as a positivist. The next chapter presents the results analysed from the data that has been collected.

CHAPTER FOUR

RESULTS

4.0 Introduction

This section presents results of the analysis of the data that was collected and analysed using STATA version 16.0. The results are presented in sections related to the specific objectives of the study. These are section one presents socio-demographic characteristics of respondents. Section two presents level of patients' satisfaction. Section three presents chi square analysis of the association between patient related factors and satisfaction. Section four presents association between health provider factors and patient satisfaction. The chapter ends with summary of the main ideas and an indication of what is contained in the subsequent chapter.

4.1 Socio-demographic characteristics of respondents

The results of the analysis of the socio-demographic characteristics if study participants is presented in Table 4.1. The mean age of the study participants was 37.9 year $\pm$ 6.8 years. More than half (n = 199; 51.3%) of the study participants were females. Majority (n = 210; 53.6%) of the study participants were single with less than a third (n = 126; 32.1%) of them been married. Predominantly, the study participants were sampled from child health (43.0%) and maternity (49.2%) departments of the hospital. More than two-fifth (n = 162; 41.5%) of the study participants had obtained bachelor's degree with only 5.6% (22) of them having attained the specialist position. Most of the study participants were medical doctors (n = 147; 37.5%) and nurses (n = 136; 34.7%). Majority (n = 294; 75.0%) of the participants were Christians.

Table 4.1: Socio-demographic characteristics of study participants

Variable	Frequency	Percentage (%)
Age (mean)	37.9 ± 6.8	Min: 20 max 57
Sex		
Male	189	48.71
Female	199	51.29
Marital status		
Single	210	53.57
Married	126	32.14
Co-habiting	45	11.48
Widowed	11	2.81
Department		
Child health	167	43.04
Maternity	191	49.23
Other	30	7.73
Highest level of Education		
Diploma	57	14.62
Bachelors	162	41.54
Masters	56	14.36
MBCHB	93	23.85
Specialist	22	5.64
Profession		
Medical doctor	147	37.50
Midwife	83	21.17
Nurse	136	34.69
Lab scientist	26	6.63
Religion		
Christian	294	75
Moslem	98	25

4.2 Use of telemedicine application for healthcare delivery

The results of the analysis of the use of telemedicine application for healthcare delivery is presented in Table 4.2. The results present comparative assessment of the various staff categories on their use of telemedicine. For each of the staff, analysis was done to determine the proportion of the staff who used telemedicine. The staff were asked whether they have received any training for the use of telemedicine tools, the feedback showed that only lab technicians who had more than half (n = 17; 65.4%) of the staff reporting ever receiving training on telemedicine. Nearly half (n = 70; 47.6%) of the doctors reported that

they had ever received training. The use of telemedicine application for healthcare delivery was basically determined using two key variables, telemedicine for communication and telemedicine for diagnosis. For communication, it was observed that a little over half (n = 69; 50.7%) of the nurses had used telemedicine application for communication while only 7 (28.0%) of lab technicians had used telemedicine for communication. On diagnosis, it was observed that over 80% of the staff across all the categories with the exception of lab technicians had used telemedicine application for diagnosis. While telemedicine application used for diagnosis among doctors was 88.4%, the midwives had 81.9% utilization rate with nurses reporting utilization rate of 85.3%. However, majority of the health workers across all profession had concerns on legality of the use of telemedicine for healthcare delivery. These concerns were largely related to the privacy of the worker.

In general, the utilization rate of telemedicine application healthcare delivery was 83.4%. The utilization rate was statistically significant with a p-value < 0.001. Similarly, the observed difference in the use of telemedicine application for communication (p-value = 0.012) and diagnosis (p-value = 0.001) were statistically significant.

The use of telemedicine application/platforms was further assessed based on the means of communication. The result of the analysis is presented in Table 4.3. Communication among staff was first analysed. It was observed that the use of email as a means of communication among staff was relatively higher among nurses (64.7%) followed by midwifes (62.6%) Only 30.7% of lab technicians used Emails as a means of communication among staff within the facility. The use of WhatsApp was also predominantly used by midwives (89.1%) for communication with other staff followed by doctors (85.7%) and nurses (84.5%). The use of Facebook was comparatively low among all staff with only 6.0% of midwives who reported ever using Facebook to communicate with a colleague health worker. The

health workers did not virtually communicate through Twitter. Nurses were even the highest with only 3.7% using Twitter for communication. There was no lab technician who ever used Twitter or Instagram for communication with other health workers. Generally, the health workers communicated among themselves through face-to-face interactions.

The medium of communication with patients by health workers was assessed using three major medium, email, WhatsApp and phone calls. The use of email for communication with patients was limited. The use of emails for communication with patients was relatively higher among doctors with a little over a quarter (n = 38; 25.8%) who ever used email to communicate with their client. More than half of midwives (n = 44; 53.0%) and nurses (n = 70; 51.5%) used WhatsApp as medium for communicating with their clients/patients. The use of phone calls was the common method used by all the health workers to communicate with their patients.

Table 4.2: Use of Telemedicine application for healthcare delivery within the health facility

Description	**Doctor n (%) col**	**Midwife n (%) col**	**Nurse n (%) col**	**Lab n (%) col**	**p-value**
Extra training in use of telemedicine tools	70 (47.6)	26 (31.3)	44 (32.3)	17 (65.4)	0.001
Use of telemedicine for communication at the facility	72 (49.0)	27 (32.5)	69 (50.7)	7 (28.0)	0.012
Use of telemedicine for diagnosis at facility	130 (88.4)	68 (81.9)	116 (85.3)	13 (52.0)	0.001
Concerns about legal issues	111 (75.5)	56 (67.5)	105 (77.2)	20 (76.9)	0.417
Overall ever used of telemedicine	83.4% (Diagnosis and Communication combined)				

Table 4.3: Medium of communication between health workers and patients

Medium	Doctor N (%)	Midwife N (%)	Nurse N (%)	Lab N (%)	p-value
Communication with fellow health workers					
Email	75 (51.0)	52(62.6)	88(64.7)	8(30.7)	0.003
WhatsApp	126 (85.7)	74(89.1)	115(84.5)	17(65.3)	0.094
Face book	26(17.7)	5(6.0)	24(17.6)	6(23.1)	0.050
Twitter	5(3.4)	1(1.2)	5(3.7)	0(0.00)	0.552
Instagram	19(12.9)	4(4.8)	17(12.5)	0(0.00)	0.056
Face to face	134(91.1)	78(94.0)	129(94.8)	20(76.9)	0.017
Communication with patients					
Email	38(25.8)	13(15.7)	22(16.2)	0(0.00)	0.007
WhatsApp	70(47.6)	44(53.0)	70(51.5)	8(30.8)	0.218
Phone calls	130(88.4)	74(89.1)	117(86.0)	21(80.8)	0.655

4.3 Availability and access of telemedicine application for healthcare delivery

Analysis of the results of availability to telemedicine application has been presented in Table 4.4. All the doctors indicated that they use at least one device either for their work or personally. Similarly, almost all the other staff from different professions confirmed using at least one device for their work or personal activities. Almost all doctors (141; 95.9%), midwives (n = 90.4%) and nurses (n = 110; 80.9%) indicated that they possessed personal computer. On internet connectivity, only less than a tenth of doctors (5.5%) and midwives (9.6%) did not have access to network connectivity to their computers. However, for lab technicians, more than a third (34.6%) did not have access to internet connectivity on their computers. The use of computer for work was relatively high among doctors (n = 144; 97.9%) followed by midwives (n = 69; 83.1%). With the exception of only one (1) doctor who did not have smart phone at the time of study, all the other study participants possessed smart phones. All midwives and nurses indicated that they have internet connectivity on their smart phones while one

(1) doctor as well as one (1) lab technician did not have internet connectivity on their smart phone. Having access to the devices was relatively higher than those who actually used the devices to guide their work. For doctors, majority (n = 103; 70.0%) often used their computers to provide services to clients. Only a little over a third (n = 33; 39.7%) of midwives often used their computers for their work-related activities. Lab technicians (n = 17; 65.4%) often searched online for health information compared to doctors (n = 87; 59.2%) and midwives (n = 56; 67.5%). Similarly, majority (n = 19; 73.1%) of lab technicians often download or upload information online to guide their work. However, for doctors and nurses, a little over half (n = 81; 55.1%) and (n = 71; 52.2%) respectively often download or upload information online as part of their work.

Table 4.4: Availability of telemedicine logistics and application for healthcare delivery

Questions	Doctor N (%)	Midwife N (%)	Nurse N (%)	Lab N (%)	P-value
ıf electronicdevice	147 (100.0)	82 (98.8)	135 (99.3)	25 (96.1)	0.204
sess personalcomputer	141 (95.9)	75 (90.4)	110 (80.9)	18 (69.2)	0.000
ɛrnet connectionon computer	139 (94.5)	75 (90.4)	111 (81.6)	17 (65.4)	0.000
Jse of computer for work	144 (97.9)	69 (83.1)	104 (76.5)	21 (80.7)	0.000
Smart phone	146 (99.3)	83 (100.0)	136 (100.0)	26 (100.0)	0.643
ternet connectionon smart phone	145 (99.3)	83 (100.0)	136 (100.0)	25 (96.1)	0.343
Use computer for work most often	103 (70.0)	33(39.7)	67(49.3)	12 (46.1)	0.000
Often search online for health information	87 (59.2)	56 (67.5)	83 (61.0)	17 (65.4)	0.630
Often download / upload information online	81 (55.1)	40 (48.2)	71 (52.2)	19 (73.1)	0.159

4.4 Providers Perception of Telemedicine

Analysis of providers' perception on telemedicine is presented in Table 4.5. Almost all health workers acknowledged that telemedicine is a viable approach for medical care. There were however a few of the health workers across all the professions who did not belief in the viability of the telemedicine for medical care. Similarly, all midwives and almost all other health workers acknowledged the role of telemedicine as a potential tool for healthcare delivery. More than 90% of all the health workers across all professions mentioned that they perceived telemedicine as a potential tool for saving time and money in healthcare delivery. While almost all midwives, nurses and lab technicians perceived telemedicine as a system that can save efforts of health workers in service delivery, nearly a quarter of doctors did not perceive that. While almost all (n = 25; 96.1%) lab technicians perceived telemedicine as a means of avoiding overcrowding at various clinics, more than a quarter (26.6%) of the medical doctors did not perceived that. However, almost all health workers belief that telemedicine can easily be integrated into the existing health information system.

Participants were further asked to indicate whether they perceive telemedicine as comfortable approach for consultation. It was observed that a little over half (n = 83; 56.5%) of the medical doctors who mostly lead consultation in the hospital perceived that telemedicine consultation may be comfortable. However, for midwives, nurses and lab technicians, more than 80% of them perceived telemedicine consultation as comfortable. Less than half (n = 12; 46.1%) of the lab technicians perceived telemedicine as a means of providing enough time for diagnosis. More than two-thirds of nurses and midwives also perceived telemedicine to provide enough time for diagnosis. Telemedicine was perceived as more efficient tool for healthcare delivery by all health workers, however, doctors' perception was relatively lower (58.5%) compared to midwives (80.7%) and nurses (84.5%).

Table 4.5: Providers' perception of telemedicine

Questions	Doctors N(%)	Midwife N(%)	Nurse N (%)	Lab N (%)	p-value
Telemedicine as a viable approach for medical care	146 (99.3)	75 (90.4)	125 (91.9)	25 (96.1)	0.009
Potential role for ICT in health care	145 (98.6)	83(100.0)	132 (97.0)	25 (96.1)	0.322
Telemedicine can save time and money	144 (97.9)	76 (91.6)	125 (91.9)	25 (96.1)	0.089
Telemedicine system can save efforts	112 (76.2)	76 (91.6)	126 (92.6)	25 (96.1)	0.000
Telemedicine avoids overcrowded clinics	108 (73.4)	75 (90.4)	112 (82.3)	25 (96.1)	0.000
Telemedicine system can beintegrated intothe existing System	144 (97.9)	79 (95.2)	124 (91.2)	26 (100.0)	0.037
Telemedicine consultation is more comfortable	83 (56.5)	70 (84.3)	113 (83.1)	21 (80.8)	0.000
Telemedicineprovides enough timefor diagnosis	96 (65.3)	58 (69.9)	98 (72.0)	12 (46.1)	0.066
Telemedicineis more efficient than office visit	86 (58.5)	67 (80.7)	115 (84.5)	19 (73.1)	0.000

4.5 Providers' willingness to use telemedicine technology

At the end of the research, data analysis revealed that 79.10% of participants were willing to use telemedicine application tools. The result of the analysis is displayed in figure 4.5. The willingness to use telemedicine was analysed based on two main variables: telemedicine for diagnosis and communication. The willingness to use telemedicine was based on the feedback from the health workers and was related to ever use of telemedicine. Despite the challenges mentioned by some of the health workers (as discussed below), about 79% of the health workers were willing to use telemedicine for either diagnosis or for communication.

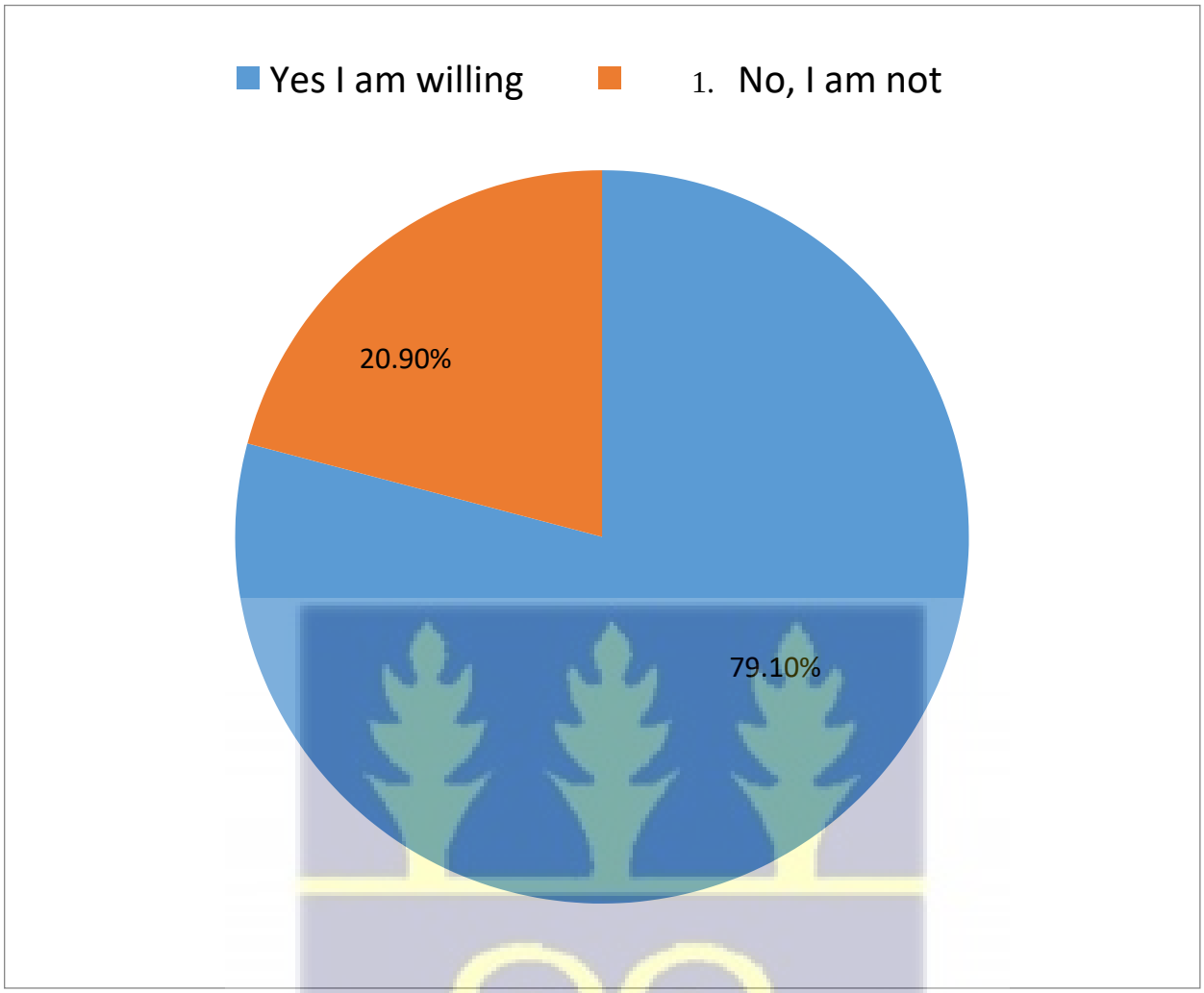

Figure 4.1: Participants willingness to use telemedicine application

4.6 Knowledge about the use of telemedicine

The results of the analysis of knowledge levels of health workers on telemedicine is presented in Table 4.6. Majority (n = 288; 73.7%) of the health workers had average knowledge or were averagely familiar with telemedicine technology. Nearly a quarter (n = 92; 23.5%) of the health workers were not familiar with the medical applications of telemedicine technology. More a third (n = 145; 37.1%) of the health workers have limited knowledge about the use of telemedicine during conferences, speeches or meetings

that have been held in their offices. Only 24 (6.1%) and 16 (4.1%) of the health workers had high knowledge about or were more familiar with telemedicine tools and telemedicine guidelines respectively. Similarly, only 27 (6.9%) of the health workers were more familiar or had high knowledge about the use of telemedicine in other countries. Almost half (n = 185; 47.3%) of the health workers were with high belief that continuous training in the use of telemedicine was necessary for health professionals to adapt telemedicine. An assessment of the overall knowledge levels or familiarity with telemedicine was assessed. The results showed that majority (n = 274; 70.1%) of the health workers had an average knowledge and were averagely familiar with telemedicine use.

Table 4.6: Knowledge levels of health workers on telemedicine use

Variable	Low N (%)	Medium N (%)	High N (%)
Familiar with telemedicine technology	83 (21.2)	288 (73.7)	20 (5.1)
Familiar with the medical applications of telemedicine technology	92 (23.5)	273 (69.8)	26 (6.7)
Conferences, speeches or meetings held in your workplace regarding telemedicine technology	145 (37.1)	220 (56.3)	26 (6.6)
Familiar with telemedicine tools	93 (23.8)	274 (70.1)	24 (6.1)
Familiar with telemedicine guidelines	167 (42.7)	208 (53.2)	16 (4.1)
Familiar with the use of telemedicine in other countries	168 (43.0)	196 (50.1)	27 (6.9)
Continuous training in the use of telemedicine necessary for health professionals?	56 (14.3)	150 (38.4)	185 (47.3)
Overall knowledge level	99 (25.3)	274 (70.1)	18 (4.6)

4.7 Challenges to the use of telemedicine application for healthcare delivery

Assessment of the challenges with the use of telemedicine application for healthcare delivery was done. This unearthed the barriers that hinder smooth utilization of telemedicine application. The results of the analysis of the challenges affecting telemedicine application use is present in Table 4.7 It was observed

that collaboration between information technology experts and clinicians was lacking, and this was supported by almost all the health workers except 91 (23.3%) who disagreed that collaboration was a challenge. Only 36 (9.2%) of the health workers did not perceive increase workload as a major problem. More than half of the health workers agreed that increased workload was a major problem for using telemedicine for healthcare delivery. More than a third (n = 135; 34.5%) of the health workers agreed that lack of suitable training in equipment use was a major barrier to telemedicine utilization while 176 (45.0%) were neutral in their decision as to whether lack of suitable training in equipment use was a challenge. More than half ((n = 222; 56.8%) of the health workers agreed that lack of user-friendly software was a challenge to telemedicine application use. Only 19 (4.9%) disagreed that lack of user-friendly software was a major problem to telemedicine utilization.

Similarly, more than half (n = 219; 56.0%) of the health workers agreed that negative attitude of staff is a major problem for adopting telemedicine application for healthcare delivery. High cost of equipment was also mentioned as another challenge to telemedicine application utilization and this was agreed by about half (n = 198; 50.6%) of the health workers. Only 29 (7.4%) of the health workers did not agree that high cost of equipment was a barrier to telemedicine application utilization. Finally, about 51% (201) of the health workers agreed that invading patients' privacy and confidentiality affects the use of telemedicine for healthcare delivery.

Table 4.7: Challenges to the use of telemedicine application for healthcare delivery

Statements	Agree	Neutral	Disagree
No collaboration between information technology experts and clinicians	141 (36.1)	159 (40.7)	91 (23.3)
eived increaseworkload	206 (52.7)	149 (38.1)	36 (9.2)
Lack of suitable training in equipmentuse	135 (34.5)	176 (45.0)	80 (20.5)
of user-friendlysoftware	222 (56.8)	150 (38.4)	19 (4.9)
e attitude ofstaff	219 (56.0)	152 (38.9)	20 (5.1)
High cost ofequipment	198 (50.6)	164 (41.9)	29 (7.4)
Concerns about patient privacy and confidentiality	201 (51.4)	142 (36.3)	48 (12.3)

4.8 Bivariate analysis of socio-demographic factors associated with willingness to use telemedicine

The study assessed the factors associated with providers willingness to use telemedicine application. The result of the analysis of association between socio-demographic factors and willingness to use telemedicine is presented in Table 4..8 The maternity department had a lower odds ratio (0.485) with a p-value of 0.083 compared to child health department indicating that they are less likely to use telemedicine. The relationship between department and providers' willingness to use telemedicine was not statistically significant. Marital status of the health workers had significant association with willingness to use telemedicine. Health workers who were co-habiting had higher odds (2.573) of the willingness to use telemedicine compared to health workers who were single and the relationship between the two was statistically significant (COR = 2.573; p-value = 0.047; 95% CI: 1.014 – 6.529). The willingness to use telemedicine was significantly higher among providers who were not concerned about legal issues relating to telemedicine application use. The odds of willingness to use telemedicine was 13 times higher among participants who were not concern about legal issues compared to participants who were more concerned about legal issues around telemedicine use (COR = 13.096; p-value = 0.00; 95% CI: 6.719 – 25.527). The rest of the factors were not significantly associated with willingness to use telemedicine.

Table 4.8: Association between demographic characteristics and provider's willingness to use telemedicine.

Parameter	95% confidence interval	Odds ratio	p-value
Age	0.926 – 1.067	0.994	0.869
Sex			
Male	Ref		
Female	0.56 – 2.225	1.117	0.754
Department			
Child health	Ref		
Maternity	0.215 – 1.098	0.485	0.083
Other	0.747 – 5.007	0.611	0.647
Marital status			
Single	Ref		
Married	0.427 – 2.028	0.931	0.857
Co-habiting	1.014 – 6.529	2.573	0.047
widowed	0.212 – 10.854	1.497	0.686
Religion			
Christian	Ref		
Muslim	0.899 – 4.064	1.912	0.092
Level of education			
Diploma	Ref		
Bachelors	0.502 – 5.964	1.731	0.385
masters	0.785 – 13.789	3.289	0.103
MBCHB	0.726 – 9.639	2.645	0.140
Specialist	0.335 – 9.234	1.759	0.504
Profession			
Medical doctor	Ref		
Midwife	0.554 – 4.454	1.571	0.395
Nurse	0.254 – 1.415	0.599	0.243
Lab scientist	0.107 – 10.773	1.075	0.951
Facility using telemedicine tool to diagnose and treat patients			
Yes	Ref		
No	0.588 – 2.526	1.219	0.594
Legal issues concern			
Yes	Ref		
No	6.719 – 25.527	13.096	0.000

4.9 Summary of the chapter

The chapter presents key results of the study. The demographic characteristics of the study participants (health workers at Korle Bu Teaching Hospital) has been presented. The chapter has further outlined the key results of the use of telemedicine as well as the availability and access of telemedicine application and tools to the health workers. Similarly, the perception of health workers regarding telemedicine use has also been presented. The chapter has further outlined the outcome of the willingness of the health workers to use telemedicine and its related factors.

CHAPTER FIVE

DISCUSSION OF FINDINGS

5.0 Introduction

Generally, information technology use in any organization like healthcare faces many challenging factors. To manage this challenge, it is necessary to consider good strategies to facilitate the best use of the information technology tools. These strategies can be effectively implemented when the root causes of the challenges are known. Some of these root causes of information technology challenges could be human related. The human-related factors include; knowledge, perception, and willingness to use information technology. First-hand information on these factors may help with work with information technology effectively. Telemedicine application have shown to be helpful in rural areas where access to healthcare is limited (Levy & Strachan., 2013).

This present study assessed characteristics of study participants, availability, access and use of telemedicine, healthcare providers' perception and willingness to use telemedicine. This chapter compared the present study findings with current literature. The discussion, based on study objectives, was organized into sections.

5.1 Characteristics of study participants

The study recruited a total of 392 participants, out of the 392 participants, 189 were males and 198 were females while 5 did not disclose their gender. The minimum age range for participants was 20years while the maximum was 57 years. The marital status of study participants was recorded as 210 (53%) for single participants, 126 (32%) married, 45 (11%) cohabiting and 11 (2%) widowed participants. At the end of the study, maternity department the highest level of participants with 191 (49%), followed by child health 167 (43%). The highest level of education for study participants were recorded. The highest number of participants had bachelors 162 (41%), followed by MBCHB with 93 (23%), diploma 57

(14%), master's degree 56 (14) and specialist 22 (5.6%). The present study recorded more Christian participants 294 (75%) than Moslems 98 (25%). The predominant profession observed was medical doctors 147 (37%) followed by nurses 136 (34%) and midwife 83 (21%). These statistics showed some differences and similarities with studies reported earlier (Ayatollahi et al.,2015).

5.2 General information on availability, access and use of telemedicine tools by providers

This part of the discussion focuses generally on availability, access and use of telemedicine tools by health care workers. The study revealed that most of the professionals have access and use electronic devices such as computer and smartphones, be it at work or personally. Approximately, 338 health professionals that including: 144 (42.60%) doctors, 69(20.41%) midwives and 104 (30.77%) have access and use work computer. Also, the analysis revealed more than 80 (35%) medical doctors most of the time search, upload or download health information online. Meanwhile about 40 (18.96%) midwifes and 71 (33.65%) nurses do most of the time search, upload or download health information via online. The findings are similar to the results reported by Albarrak et al., (2015) who recorded 47.3% of healthcare professionals using several electronic devices. Comparing to a previous study that 87% and 91% of healthcare providers use tablet or smartphone at work. Previous study indicated that approximately (54%) of doctors had personal portable computers for patient's clinical care (Koehler., 2013; Chase., 2013). However, a previous noted that 49% of study participants had no computers or laptops at home, therefore they did not have access to advanced features for computing various information technology applications (Ayatollahiet al., 2015).

However, about 115 (37%) doctors, 61 (19%) midwifes and 112 (36%) of nurses indicated their willingness to use telemedicine tools at their facility. This is in agreement with a study that

recorded that 72% of professionals interacted with patients directly via social media and that enhanced patient care (Houseah., 2013; Chretien., 2013).

5.3 Provider's perception to use telemedicine provide healthcare services

This part of the study discussion focused on the perception of healthcare professionals on the use of telemedicine technology for medical care. The study recorded that approximately 95% (371) of the study participants believe that telemedicine is a viable approach for health care delivery. Out of this proportion, the study recorded 146 (39.35%) medical doctors, 75 (20.22%) midwifes, and 125 (33.69%) nurses. The study result is in line with a study that reported 90% positive perception for physicians who saw telemedicine as a viable method for healthcare delivery (Albarak et al., 2019). However, another study showed a moderate perception level among healthcare professionals (Ayatollahi et al., 2015). Furthermore, about 94% of participants believed that telemedicine use in healthcare delivery can save time and money for healthcare professionals and patients respectively. This is consistent with a previous study that reported similar results that telemedicine implementation might help patients save money while professionals efforts and time (Ayatollahi et al.,2015).

The study revealed that the adoption of telemedicine might help avoid overcrowding at the clinics. About 108 (32.73%) medical doctors, 75 (22.73%) midwifes and 122 (36.97%) nurses agreed on this perception. To buttress this perception, about 39 % of study participants agreed that office visits reduce stress. In addition, the study showed that about 287 (73%) of professionals indicated that telemedicine consultation is more comfortable. Out of these professionals, the study recorded 83 (28.92%) medical doctors, 70 (24.39%) midwifes, and 113 (39.37%) nurses. These same proportions of professionals believe telemedicine application is more efficient than office visits. However, approximately 82% (320) of study participants rather agree that office visit provides the healthcare provider the chance to make a full and comprehensive assessment of patients. The present study is

consistent with previous study that reported that telemedicine is useful in providinghealthcare services to distance patients (Akbulut.,2003).

5.4 Provider's willingness to use telemedicine tools for healthcare services.

The present study revealed that approximately (310) 79.1% of healthcare professionals were willing to use telemedicine applications tools for health care delivery. The participants were willingto communicate with fellow colleagues using any of the telemedicine tools such as email, social media or face-to-face interaction. The analysis revealed that about 56% of participants were willing to communicate with colleagues via email. The most widely used social media used were Whatsapp (85%) and Facebook (15%). However, quite a number of participants also preferred face to face interaction (92%) with colleagues. The proportion of participants willing to use telemedicine in their facility includes about 115 (37%) doctors, 61 (19%) midwifes and 112 (36%) of nurses indicated their willingness to use telemedicine tools at their facility. The study findings are similar to that observed by Albarak et al., (2019) who revealed that 95% colleagues ofphysicians were willing to use telemedicine in their hospitals. Similar results were discovered by Akbulut (2003) who recorded 99% in their study (Akbulut.,2003. These findings were recorded because physicians use telemedicine to consult experts in specialized fields. They believed the practice impacts positively on time management and referral pattern **(**Wootton., 2001**).**

In addition, most participants were willing to communicate with patients using at least one of the telemedicine tools. Phone calls (87%) were the most dominant means of communicating with patients followed by WhatsApp messages (49%). Similar results was reported by Househ.,(2013) and Chretien., (2013) who observed physicians directly communicating with patients using social media tools for enhanced medical care (Househ.,2013 & Chretien., 2013). Social media can help healthcare professionals develop networks with patients, offer better healthcare services and create awareness for

new discoveries in communities (George et al., 2013). Meanwhile establishing relationship between clinicians and patients through social media is ethically offensive (Chretien., 2013; Bovi.,2003). The present study observed similar results of possible legal challenges with clinicians interacting with patients online (Chretien., 2013; Bovi., 2003).

5.5 Factors associated with provider's willingness to use telemedicine for health servicedelivery

This part discusses the factors associated with providers' willingness to use telemedicine for health service delivery. The present study analysed several factors and observed that significant association with p-value <0.05 in factors such as department, marital status, religion, and issues of legal issues concern. On department level, comparison was made among maternity, child health and others. The child health department was used as the reference department. There was significant association in maternity department with a lower odds ratio (0.485) and p-value 0.083. This meant that the people at the maternity department are less likely to use telemedicine application. Considering the marital status, single status was used as a reference to comparemarried, cohabiting and widowed statuses. The analysis observed that co-habiting participants had significantly associated with higher odds ratio (2.573) and a p-value 0.047. This result indicates that participants who are co-habiting are more likely to willingly use telemedicine application for health service delivery compared to single participants. Muslim religion was assessed with Christian religion as the reference.

The analysis observed that Muslim participants were significantly associated to factors associated with willingness to use telemedicine. The study recorded a higher odds ratio 1.912 and p-value 0.092. This finding indicates that Muslim healthcare professionals are more likely to be willing to use telemedicine application. Finally, the participants were given the option to indicate: ‖ yes‖ or ‖no‖ on concerns of legal issues regarding telemedicine.

Participants who were not concerned about legal issues were significantly associated with willingness to use telemedicine. They recorded a higher odds ratio (13.096) with a p-value 0.00. This shows that they are likely to be willing to use telemedicine application for health service delivery. The rest of the factors were not significantly associated with willingness to use telemedicine. These challenges are inconsistent with that observed by several researchers (Alaboudi et al.,2016; Ayatollahi et al.,2015; Akbulut.,2003). It is evident that telemedicine application faces various challenges before it can be implemented successfully (Zanaboni & Wootton 2012). In addition, the study observed that study participants indicated issues affecting providers' willingness of telemedicine use. More than 100 male and female participants agree that there is lack of suitable training in equipment use. Same proportion agreed on lack of user-friendly software and concerns about patient privacy and confidentiality.

5.6 Summary of the Chapter

This chapter discussed how the present study findings relate to available literature. The results showed that a significant number (95%) of health professionals; clinicians, midwives and nurses, have positive perception of telemedicine and believe that telemedicine is a viable approach for health care delivery. Approximately 79.1% of healthcare professionals were willing to use telemedicine applications tools for health care delivery. Most of the professionals use electronic devices such as computer and smartphones, be it at work or personally. Mostly doctors 144 (42%), followed by nurses 104 (30%) and midwife 69 (20%) had access and use work computer.

The study revealed that participants' department, marital status, religion and legal issues of concern were significantly associated to providers willingness to use telemedicine. Further, more than 100 male and female participants agree that there is lack of suitable training in equipment use. Same proportion agreed on lack of user-friendly software and concerns about patient privacy and confidentiality.

CHAPTER SIX

SUMMARY, CONCLUSION, AND RECOMMENDATION

6.0 Introduction

This chapter focuses on summary, conclusion and recommendations of the present study. They are organized into overview of study, conclusion, contribution to knowledge, study recommendations, limitation, and future study.

6.1 Study Summary

The present study had a general objective of assessing the perception and willingness of providers on use of telemedicine for healthcare services at the Korle Bu Teaching hospital. The aim of the study was achieved with a cross-sectional design using quantitative approach to gather and analyze the data. The study randomly recruited 392 participants, mainly; doctors, midwives and nurses using self-administered questionnaires. Providers' perceptions and willingness to use telemedicine was estimated using a 2-points likert scale with specific questions related to the two concepts and all other parameters were expressed in frequencies and percentage. The study concluded that health professionals of the Korle Bu teaching hospital have positive perception (95%) regarding telemedicine technology and its application. The specific objectives were specifically concluded below. The conclusion based on the specific objectives are indicated.

6.2 Study Conclusion

The study conclusion was drawn based on the specific objectives, which included availability, access and use of telemedicine, providers' perception, willingness to use telemedicine technology and factors associated with providers' willingness to use telemedicine for healthcare delivery

6.2.1 General information on availability, access, and use of telemedicine tools by providers The study had the objective of assessing the availability, access and use of telemedicine tools bymedical doctors, midwifes and nurses. The study recorded that most of the professionals haveaccess and use electronic devices such as computer and smartphones, be it at work or personally.The healthcare professionals most of the time use work computer to search, upload, or downloadhealth information via online.

6.2.2 Providers' perception on telemedicine application

One of the study objectives was to assess healthcare providers on their perception of telemedicine technology and application at the Korle Bu teaching hospital. The overall perception shows that doctors, midwives and nurses at the Korle Bu teaching hospital have positive perception about telemedicine technology and its application in the hospital. According to the analysis, about 95% (371) of participants have a positive perception of telemedicine. These participants agreed that telemedicine is a viable approach for health care delivery. Also, telemedicine is an efficient, cost- effective tool for healthcare delivery can be integrated into current healthcare system.

6.2.3 Providers willingness to use telemedicine technology

The present study had other goals to assess providers' willingness to use telemedicine technology and its application at the Korle Bu teaching hospital. The results suggested that significant number (79.1%) of healthcare professionals were willing to use telemedicine technology. The participants were willing to communicate with fellow colleagues using any of the telemedicine tools such as email, social media or face-to-face interaction. In addition, most participants were willing to communicate with patients using at least one of the telemedicine tools; phone or voice calls, or social media.

6.2.4 Factors associated with provider's willingness to use telemedicine for health service delivery

Also, the present study looked at factors associated with providers willingness to use telemedicine technology for health service delivery. There was significant association in maternity department where participants are less likely to use telemedicine application. In addition, co-habiting participants, Muslim participants, and participants who were not concerned about legal issues had significant association where they are more likely to be willing to use telemedicine application. . Further, more than 100 male and female participants agree that there is lack of suitable training in equipment use. Same proportion agreed on lack of user-friendly software and concerns about patient privacy and confidentiality.

6.3 Recommendation

This division highlights recommendation or suggestions for targeted stakeholders

6.3.1 Ghana Health Service/Ghana health service

The present research shows that Ministry of Health, Ghana Health Service and all other stakeholders responsible for policy development and implementation should consider the study findings and challenges. Considering the challenges in this study could help policy maker on sustainable implementation of telemedicine. The stakeholders should create avenues for telemedicine application for all healthcare professionals. Stakeholders should increase implementation and telemedicine use in healthcare delivery across the country. They can create telemedicine awareness and support healthcare professionals to use informational technology tools for medical services (Seboka et al., 2021). This might encourage all cadre of health professionals toconcentrate on telemedicine technology.

6.3.2 Management of Korle Bu Teaching Hospital

The management of Korle Bu Teaching Hospital would be informed on about the findings of the study. It is expected that the management of the hospital will consider the findings and provide avenues for staff to be educated on telemedicine technology. The management could provide trainings to all facets of professionals of the facility. Considering the findings, more research is needed to ascertain why significant number of healthcare providers did not want to communicate with their colleagues via telemedicine also examine cultural issues associated with telemedicine. Further studies is required for different processes for telemedicine application in healthcare facilities. With this recommendation, it is important for management to provide and enabling environment and support for researchers to work. This will help management provide satisfaction to patients and develop its vision and mission. In a long run, there will be improvement overall patient care.

Health providers or staff of Korle Bu Teaching Hospital

If telemedicine will achieve its goal, the enthusiasm of health workers to utilize it and recommend it to patients plays a critical role. It is unfortunate that some people resort to get medical help the condition has reached a critical stage. This makes it almost impossible to even start or recommend telemedicine as a tool to seek healthcare (Ganle, Parker, Fitzpatrick, & Otupiri, 2014). The study recommends that health workers must be knowledgeable, willing and display positive attitude towards the use of telemedicine. Continuous education should be held for them on regular basis. The facility must also make it a point to provide them with all the basic accessories to make telemedicine work.

6.4 Limitations to the study

The present study assessed the factors associated with the use of telemedicine applications for healthcare delivery among health providers at the Korle Bu Teaching hospital. In spite of all efforts by researchers,

the number of participants by specialists was limited. Specialist might not be interested because of study subject and time constraints. Another limitation has to do with non-application of qualitative research methods. Generalizing results for the whole study was based solely on quantitative research methods. Since there was no way to explain answers from respondents that should have come with qualitative methods, all explanation was provided with quantitative results. Due to time constraint for data collection, the study was not extended to other departments since this could have increased the sample size. Also, since there was no external funding, it limited the study in some way.

6.5 Future research

This section contains submissions related to the limitations to this study for consideration by future researchers in the field telemedicine. Future researchers should seek to increase the sample size to be used for their studies. All the various departments at the Korle bu teaching hospital can be included in the study to improve on the sample size. Also, with external financial support for the researcher or other researchers, the study could be extended to other health facilities in the region and the entire country. Thus, with sponsorship and financial support after the study has been extended to other departments and other health facilities in the Greater Accra region, the sample size will increase, and better grounds will be provided for analysis and comparison. Also, future studies should seek to apply the qualitative research methodology. With the application of qualitative research method, it will give better meaning to why and how respondents provide answers to the questions. Equally, the mixed methods approach (qualitative method and quantitative method) can be adopted in future studies (Leech, Dellinger, Brannagan, & Tanaka, 2010). This will inspire methodological triangulation of the results that will be obtained as well as seeking to solve the challenges of each method. (Bekhet, & Zauszniewski, 2012).

REFERENCES

Afarikumah E. Electronic health in ghana: current status and future prospects. Online Journal of Public Health Informatics. Vol. 5 no. 3. 230. 2014. DOI: 10.5210/ojphi.v5i3.4943

Alaboudi A, Atkins A, Sharp B, Balkhair A, Alzahrani M, Sunbul T. Barriersand challenges in adopting Saudi telemedicine network: the perceptions ofdecision makers of healthcare facilities in Saudi Arabia. J Infect Public Health2016;9(November–December (6)):725–33.

Albarrak, A. I., Mohammed, R., Almarshoud, N., Almujalli, L., Aljaeed, R., Altuwaijiri, S., & Albohairy, T. (2021). Assessment of physician's knowledge, perception and willingness of telemedicine in Riyadh region, Saudi Arabia. *Journal of infection and public health*, 14(1), 97-102.

Akbulut AY. An investigation of the factors that influence electronic informa-tion sharing between state and local agencies [Ph.D. thesis]. Baton Rouge, La,USA: Louisiana State University; 2003,.

Alkmim, Maria & Marcolino, Milena & Figueira, Renato & Sousa, Lidiane & Nunes, Mariana & Cardoso, Clareci & Ribeiro, Antonio Luiz. (2015). Factors Associated with the Use of a Teleconsultation System in Brazilian Primary Care. Telemedicine journal and e-health : the official journal of the American Telemedicine Association. 21. 10.1089/tmj.2014.0112.

Angela Afua Entsieh, Maria Emmelin,Karen Odberg Pettersson. Learning the ABCs of pregnancy and newborn care through mobile technology. Global Health Action. Vol. 8: 29340. 2015. DOI: 10.3402/gha.v8.29340

Ashfaq, A., Memon, S. F., Zehra, A., Barry, S., Jawed, H., Akhtar, M., Kirmani, W., Malik, F., Khawaja, A. W., Barry, H., Saiyid, H., Farooqui, N., Khalid, S., Abbasi, K., & Siddiqi, R. (2020). Knowledge and Attitude Regarding Telemedicine Among Doctors in Karachi. *Cureus*, *12*(2), e6927.

Ayatollahi H, Sabari SFZP, Langarizadeh M. Clinicians' knowledge and perception of telemedicine technology. Perspect Health Inf Manag 2015;12:1.

Benjamin, O., & Agyei-Baffour, P. (2019). Cost-effectiveness analysis of Telemedicine for primary healthcare delivery in the Amansie-West District, Ghana. *June*.

https://doi.org/10.35202/AJHE.2016.5101

Bovi AM, CE JA. Ethical guidelines for use of electronic mail between patients and physicians. AmJ Bioeth 2003;3: W 43–7.

Chau, P. Y., & Hu, P. J. H. (2002). Investigating healthcare professionals' decisions to accept telemedicine technology: an empirical test of competing theories. *Information & management*, *39*(4), 297-311.

Chretien KC, Kind T. Social media and clinical care: ethical, professional, and social implications. Circulation 2013;127(13):1413–21.

Chen, E. M., Andoh, J. E., & Nwanyanwu, K. (2022). Socioeconomic and Demographic Disparities in the Use of Telemedicine for Ophthalmic Care during the COVID-19 Pandemic. *Ophthalmology*, *129*(1), 15–25.

Currell R et al. Telemedicine versus face to face patient care: effects on professional practice and health care outcomes. *Cochrane Database of Systematic Reviews*, 2000, Issue 2. Art. No.: CD002098.

Craig J, Patterson V. Introduction to the practice of telemedicine. *Journal of Telemedicine and Telecare,* 2005, 11(1):3–9.

Craig Kennedy, Richard Bowman, Nor Fariza, Edith Ackuaku, Christine Ntim-Amponsah, Ian Murdoch. Audit of web-based telemedicine in ophthalmology. Journal of Telemedicine and Telecare. Vol. 12. Pp. 88-91. 2006. DOI: 10.1258/135763306776084356

Daniel, H., & Sulmasy, L. S. (2015). Policy recommendations to guide the use of telemedicine in primary care settings: an American College of Physicians position paper. *Annals of internal medicine*, *163*(10), 787-789.

Dash, M., Das, J. R., & Mohanty, A. K. (2016). Physician's Acceptance of Teledermatology Services: An Empirical Study. *International Journal of Engineering Management and Economics*, *5*, 25-29.

Demartines N, Freiermuth O, Mutter D, Heberer M, Harder F. Knowledge and acceptance oftelemedicine in surgery: a survey. J Telemed Telecare2003;6(3):125–31.

El-khafif, S., & Al-qahtani, M. F. (2012). *Successes and Challenges in the Implementation and Application*

of Telemedicine in the Eastern Province of Saudi Arabia. January 2014.

Elsaie, M. L., Shehata, H. A., Hanafi, N. S., Ibrahim, S. M., Ibrahim, H. S., & Abdelmaksoud, A. (2020). Egyptian dermatologists' attitude toward telemedicine amidst the COVID19pandemic: a cross-sectional study. *Journal of Dermatological Treatment*, 1-7.

George DR, Rovniak LS, Kraschnewski JL. Dangers and opportunities for socialmedia in medicine. Clin Obstet Gynecol 2013;56(3):453–62.

Grigsby W. J. (2002). Telehealth: an assessment of growth and distribution. *The Journal of rural health: official journal of the American Rural Health Association and the National Rural Health Care Association*, *18*(2), 348–358.

HayaviHaghighi, M. H., Alipour, J., Mastaneh, Z., & Mouseli, L. (2011). Feasibility study of telemedicine implementation in Hormozgan university of medical sciences. *Hormozgan Medical Journal*, *15*(2), 128-137.

Heinzelmann PJ, Lugn NE, Kvedar JC. Telemedicine in the future. *Journal of Telemedicine and Telecare*, 2005, 11(8):384–390. History of Korle bu. Retrieved from *https://kbth.gov.gh/brief-history/*. Accessed 29th April, 2021. History of the Medical School. Retrieved from *https://smd.ug.edu.gh/about/history-medical-school*.Accessed 15th April, 2021.

Househ M. The use of social media in healthcare: organizational, clinical, and patient perspectives. Stud Health Technol Inform 2013;183:244–8.

Ibrahim, M. I. M., Phing, C. W., & Palaian, S. (2010). Evaluation of knowledge and perception of Malaysian health professionals about telemedicine. *J Clin Diagn Res*, *4*, 2052-7.

Judi, H.M., Razak, A., Shaari, N., & Mohamed, H. (2009). Feasibility and Critical Success Factors in Implementing Telemedicine. *Information Technology Journal*, *8*, 326-332.

J. Brinkel et al. Mobile phone-based interactive voice response as a tool for improving access to healthcare in remote areas in Ghana–an evaluation of user experiences. *Tropical Medicine and International Health*.

volume 22 no 5 pp 622–630. 2017. DOI: 10.1111/tmi.12864

Kaustav P Shah, BS, Austin J Triana, BS, Roman E Gusdorf, BS, Allison B McCoy, PhD, MS, Baldeep Pabla, MD, Elizabeth Scoville, MD, Robin Dalal, MD, Dawn B Beaulieu, MD, David A Schwartz, MD, Michelle L Griffith, MD, Sara N Horst, MD, MPH, Demographic Factors Associated With Successful Telehealth Visits in Inflammatory Bowel Disease Patients, *Inflammatory Bowel Diseases*, Volume 28, Issue 3, March 2022, Pages 358–363

King, W. R., & He, J. (2006). A meta-analysis of the technology acceptance model. *Information & management*, *43*(6), 740-755.

LeFevre et al. Mobile Technology for Community Health in Ghana: what happens when technical functionality threatens the effectiveness of digital health programs? BMC Medical Informatics and Decision Making. Vol. 17 no.27. 2017. DOI 10.1186/s12911-017-0421-9

Levy, S., and Strachan, N. (2013). Child and Adolescent Mental Health Service Providers' Perceptions of Using Telehealth. *Mental Health Practice* 17, (1), 28–32.

Levy, S., and N. Strachan (2013). Child and Adolescent Mental Health Service Providers' Perceptions of Using Telehealth. Mental Health Practice, 17(1), 28-32. Doi: http://dx.doi.org/10.7748/mhp2013.09.17.1.28.e810

Luk Rowena, Ho Melissa, M. Aoki Paul. A framework for designing teleconsultation systems inafrica. Int'l Conf. on Health Informatics in Africa. 2008. arXiv:0801.1925

Luk Rowena, Ho Melissa, M. Aoki Paul. Asynchronous remote medical consultation for ghana. In: Proceedings of the SIGCHI Conference on Human Factors in Computing Systems (CHI „08); 05-10 April 2008; ACM New York, NY, USA ©2008; Pages 743-752. DOI: 10.1145/1357054.1357173

MacNeill, V., C. Sanders, R. Fitzpatrick, J. Hendy, J. Barlow, M. Knapp, M. Rogers, M. Bardsley, and S. P. Newman (2014). Experiences of Front-line Health Professionals in the Delivery of Telehealth: A Qualitative Study. *British Journal of General Practice*, 64(624), 401–407.

Miller, T. W., Miller, J. M., Burton, D., Sprang, R., & Adams, J. (2003). Telehealth: A model for clinical supervision in allied health. *Internet Journal of Allied Health Sciences and Practice*, *1*(2), 6.

Mohammed Aliyu et al. Feasibility of electronic health information and surveillance system (eHISS) for disease symptom monitoring: A case of rural Ghana. PloS one. vol. 13. 2018. DOI: 10.1371 journal. pone. 0197756

Myjoyonline.com. mPedigree a Ghanaian solution to global counterfeiting; the story of GTP[Internet]. 2015. Available from: https://www.myjoyonline.com/business/2015/October- 27th/mpedigree-a-ghanaian-solution-to-global-counterfeiting-the-story-of-gtp.php [Last Accessed: 2019-02-08]

Novartis Foundation. Novartis telemedicine factsheet (Report). 2016

Osei Darkwa. An exploratory survey of the applications of telemedicine in Ghana. Journal of Telemedicine and Telecare. 2000. Vol. 6 no. pp 177-183.

Osei Frimpong, Kojo ; Asare, Samuel ; Nomah, Daniel Kwakye ; Antwi-Asante, Dorothy. (2016). Knowledge and perception of telemedicine among health professionals at the Koforidua Regional Hospital, Ghana. 4. 96-103.

Olivia Vélez, Portia Boakye Okyere, Andrew S. Kanter, Suzanne Bakken. A usability study of a mobile health application for rural Ghanaian midwives. Journal of Midwifery & Women's Health. Vol 59. Pp. 184-191. 2014. doi:10.1111/jmwh.12071.

Profile, S. E. E. (2016). Awareness, Knowledge, Attitude and Skills of Telemedicine among Health Professional Faculty Working in Teaching Hospitals. March, 8–12. https://doi.org/10.7860/JCDR/2016/19080.7431

Ramos, V. (2014). Contributions to the history of Telemedicine of the TICs Contributions to the History of Telemedicine of the TICs. *November 2010*. https://doi.org/10.1109/HISTELCON.2010.5735269

Rao B, Lombardi A II. Telemedicine: current status in developed and developing countries.

Journal of Drugs in Dermatology, 2009, 8(4):371–375.

Ranganathan C, Balaji S. Key Factors Affecting the Adoption of Telemedicine by Ambulatory Clinics: Insights from a Statewide Survey. Telemed J E Health. 2020 Feb;26(2):218-225. doi: 10.1089/tmj.2018.0114. Epub 2019 Mar 15. PMID: 30874484

Reza Dehnavieh et al. The District Health Information System (DHIS2): A literature review and meta-synthesis of its strengths and operational challenges based on the experiences of 11 countries. Health Information Management Journal 1–14. 2018. DOI: 10.1177/1833358318777713

Roig, F., & Saigí, F. (2011). Barreras para la normalización de la telemedicina en un sistema de salud basado en la concertación de servicios (Barriers to the normalization of telemedicine in a healthcare system model based on purchasing of healthcare services using providers' contracts). *Gaceta sanitaria*, *25*(5), 397–402.

Ryu, S. (2012). Telemedicine: opportunities and developments in member states: report on the second global survey on eHealth 2009 (global observatory for eHealth series, volume 2). *Healthcare informatics research*, *18*(2), 153.

R. Luk, M. Zaharia, M. Ho, B. Levine and P. M. Aoki. ICTD for healthcare in Ghana: Two parallel case studies. 2009 International Conference on Information and Communication Technologies and Development (ICTD), Doha, 2009, pp. 118-128. DOI: 10.1109/ICTD.2009.5426714)

Sageena, G., Sharma, M., & Kapur, A. (2021). Evolution of Smart Healthcare: Telemedicine During COVID-19 Pandemic. *Journal of The Institution of Engineers (India): Series B*. https://doi.org/10.1007/s40031-021-00568-8

Schepers, J., & Wetzels, M. (2007). A meta-analysis of the technology acceptance model: Investigating subjective norm and moderation effects. *Information & management*, *44*(1), 90- 103.

Schwamm L. H. (2014). Telehealth: seven strategies to successfully implement disruptive technology and transform health care. *Health affairs (Project Hope)*, *33*(2), 200–206.

Shahpori, R., Hebert, M., Kushniruk, A., & Zuege, D. (2011). Telemedicine in the Intensive Care Unit

Environment: A Survey of the Attitudes and Perspectives of Critical Care Clinicians. *Journal of Critical Care*, 26(3), 328.e9–328.e15.9.

Shahpori R, Hebert M, Kushniruk A, et al. Telemedicine in the intensive careunit environment—a survey of the attitudes and perspectives of critical careclinicians. J Crit Care 2011;26, 328.e9– 328.e15.

Sheikhtaheri, A., Sarbaz, M., Kimiafar, K., Ghayour, M., & Rahmani, S. (2016). Awareness, Attitude and Readiness of Clinical Staff Towards Telemedicine: A Study in Mashhad, Iran. *Studies in health technology and informatics*, 228, 142–146.

Shittu, L., Adesanya, O., Izegbu, M., Oyewopo, A., Ade, A., & Ashiru, O. A. (2007). Knowledge and perception of health workers towards tele-medicine application in a new teaching hospital in Lagos. *Scientific Research and Essay*, *2*(1), 016-019.

Suh, B., & Han, I. (2003). The impact of customer trust and perception of security control on the acceptance of electronic commerce. *International Journal of electronic commerce*, *7*(3), 135- 161.

Tracy, J., Rheuban, K., Waters, R. J., DeVany, M., & Whitten, P. (2008). Critical steps to scaling telehealth for national reform. *Telemedicine journal and e-health: the official journal of the American Telemedicine Association*, *14*(9), 990–994.

Tchao, E. T., Acquah, I., Kotey, S. D., Aggor, C. S., & Kponyo, J. J. (2019). *On Telemedicine Implementations in Ghana*. *10*(3), 193–201.

World Health Organization. (2010). Telemedicine: opportunities and developments in memberstates. Report on the second global survey on eHealth. World Health Organization.

World Health Organization (2021). Telemedicine update, purpose, importance and its implication for health care delivery. *Geneva, Switzerland.*

Wootton R. Recent advances in telemedicine. *British Medical Journal*. 2001; 323:557–60.

Wootton R. Telemedicine support for the developing world. *Journal of Telemedicine and Telecare,* 2008, 14(3):109–114.

Wootton R. Telemedicine and developing countries—successful implementation will require a shared

approach. J Telemed Telecare 2001;7(Suppl. 1):1–6.

Yarbrough, A. K., & Smith, T. B. (2007). Technology acceptance among physicians: a new take on TAM. *Medical Care Research and Review*, *64*(6), 650-672.

Zailani, S., Gilani, M. S., Nikbin, D., & Iranmanesh, M. (2014). Determinants of telemedicine acceptance in selected public hospitals in Malaysia: clinical perspective. *Journal of medical systems*, *38*(9), 1-12.

Zanaboni P, Wootton R. Adoption of telemedicine: from pilot stage to routinedelivery. BMC Med Inform Decis Mak 2012;12(1):1–9.

Zapata, B. C., Fernández-Alemán, J. L., Idri, A., & Toval, A. (2015). Empirical studies on usability of mHealth apps: a systematic literature review. *Journal of medical systems*, *39*(2), 1.

Zayapragassarazan, Z., & Kumar, S. (2016). Awareness, knowledge, attitude and skills of telemedicine among health professional faculty working in teaching hospitals. *Journal of clinical and diagnostic research: JCDR*, *10*(3), JC01.

APPENDIX I: INFORMED CONSENT FORM

ASSESSMENT OF PROVIDER'S PERCEPTIONS AND WILLINGNESS OF USE OF TELEMEDICINE FOR HEALTHCARE SERVICES AT KORLE-BU TEACHING HOSPITAL

Principal Investigator

Racheal Kwafoah Nyansah Department: Child Health Laboratory

Address: Korle-Bu Teaching HospitalAccra
Phone: +233242685909
Email: akuaaoff2@gmail.com

Purpose of study

You are being asked to take part in a research study. Before you decide to participate in the study, it is important that you understand why the research is being done and what it will involve. Please read the following information carefully. Please ask the researcher if there is anything that is not clear or if you need more information. The purpose of this study is to assess provider's perceptions and willingness of use of telemedicine for healthcare services at Korle-Bu teaching hospital.

Study procedures

The sampling technique will be random sampling in which all eligible participants who are accessible during the data collection period will be included. Participants would be briefed on the study and sign informed consent before proceeding to answer a structured self-administered questionnaire through face-to-face interviews.

Benefits

The study has no direct benefits to the study participants. The findings of the research will informin long term decision making in the hospital.

Confidentiality

Your responses to this study will be anonymous. Every effort will be made to preserve your confidentiality by assigning code numbers for participants that will be used on all research notes and documents. Participant data will be kept confidential except in cases where the researcher is legally obligated to report specific incidents. These incidents include, but may notbe limited to, incidents of abuse and suicide risk.

Voluntary participation

Your participation in this study is voluntary. It is up to you to decide whether or not to take partin this study. If you decide to take part in this study, you will be asked to sign the consent section. After you sign the

consent form, you are still free to withdraw at any time and without giving a reason. Withdrawing from this study will not affect the relationship you have, if any, with the researcher. If you withdraw from the study before data collection is completed, your data will be returned to you or destroyed.

Consent

I have read and I understand the provided information and have had the opportunity to ask questions. I understand that my participation is voluntary and that I am free to withdraw at any time, without giving a reason and without cost. I understand that I will be given a copy of this consent form. I voluntarily agree to take part in this study.

Participant's signature……. Date…….

Investigator's signature..... Date…….

Appendix II: Questionnaire

Table 1: Demographic characteristics of study participants

Srl No.	Question	Responses	Skip
	Background information		
1	How old are you?		
2	What is your gender?	Male Female Other	
3	What is your profession?	Clinician Midwife Nurse	
4	Which department do you work?	Child health Maternity	
5	How many years have you been practicing current occupation?	……..	
6	What is your marital status?	Single Married Widowed/widower Co-habiting	
7	What is your religion?	Christian Muslim Traditionalist Other (state your religion)	
8	Wha;''t is your highest level of education	Diploma Bachelor Masters MBCHB (Medical doctor) Specialist	

Table 2: General information about access, literacy and use of telemedicine tools

SN	QUESTION	RESPONSE
1,	Are you able to use any electronic device for communication (eg laptop, tablet, computer etc)	Yes No
2.	Do you have a personal computer? *(this could be desktop, laptop, tablet/Ipad)*	Yes No
3.	Do you have an internet connection on your computer?	Yes No

4.	Do you have access and use of computer at work?	Yes No
5.	Does the computer at work have internet access?	Yes No
6.	How often do you use a computer at work?	Most of the time Some of the time Never
7.	Do you have a smart phone?	Yes No
8.	Do you have internet connection on your smartphone	Yes No
9.	How often do you search for health-related information online?	Most of the time Some of the time Never
10.	How often do you download/upload information online?	Most of the time Some of the time Never
11.	What means do you communicate with fellow health workers? (Select as many that applies)	Email Whatsapp Facebook Twitter Instagram Face-to-face (physical communication)
12.	How often to you use email to communicate with your fellow healthcare providers?	Most of the time Some of the times Never
13.	Do you interact (communicate) with patients using any form of technology?	Yes No
14.	What medium of technology to you use in your interaction with patients (select as many that apply)	Whatsapp Email Phone calls
15	Do you think you will need extra training on use of technological devices such as computers, ipads etc for communicating with fellow health workers and patients?	Yes No
16	Is the facility using any telemedicine software (tool) to communicate with patients?	1. Yes No
17	If yes, can you mention or list?	…… …… ……
18	Is the facility using any telemedicine software (tool) to diagnose and treat patients?	
19	If yes, can you mention or list?	…… ……

		……
20	Are you concerned of possible legal issues around interacting with patient online?	Yes No
21	Are you willing to use telemedicine to interact (communicate) with patients?	Yes No

Table 3: Providers knowledge regarding telemedicine

Srl	QUESTIONS	Low	Average	High
1	To what extent are you familiar with telemedicine technology?			
2	To what extent are you familiar with the medical applications of telemedicine technology?			
3	How often does conferences, speeches or meetings held in your workplace regarding telemedicine technology?			
4	To what extent are you familiar with telemedicine tools?			
5	To what extent are you familiar with telemedicine guidelines			
6	To what extent are you familiar with the use of telemedicine in other countries?			
7	To what extent is continuous training in the use of telemedicine necessary for health professionals?			

Table 4: Providers Perception of use of telemedicine

Please indicate whether you agree or disagree with the following statement about use oftelemedicine to provide services to patients

Srl	QUESTIONS	Agree	Disagree
1	Telemedicine is a viable approach for providing medical care services to patients		
2	There is a potential role for ICT in the health care		
3	Using of telemedicine system can save time and money		
4	Telemedicine system can save efforts		
5	Telemedicine system can be integrated within the existing system		
6	Telemedicine avoids overcrowded clinics		

7	Telemedicine consultation is more comfortable		
8	Telemedicine provides ease of discussion with the patient		
9	Telemedicine provides enough time to diagnose patient complaints		
10	Telemedicine uses time more efficiently than office visits		
11	Telemedicine avoids direct contact with patients in times of infectious disease outbreaks such as COVID-19		

Please indicate whether you agree or disagree with the following statement about face-to-faceoffice visit to provide services to patients

Srl	QUESTIONS	Agree	Disagree
1	Ease of discussion with patients		
2	Office visits more comfortable compared to telemedicine consultation		
3	Office visit do not require any form of technology compared to telemedicine consultation		
4	Office visit allows the provider to make full and comprehensive physical examination		
5	Office visits reduce stress		
6	Office visits provides enough time for patient diagnosis		
7	Office visits uses time more efficiently than telemedicine consultation		

Table 5: Willingness to use telemedicine technology-with fellow health workers

I would like you to indicate your willingness to use any of the following information technology tools to communicate with fellow health workers. Yes=1 and No=0		
Tool	**Yes, I am willing**	**No, I am not willing**
SMS		
Voice call		

Email		
Social media		
Video conference		

Table 6: Willingness to use telemedicine technology-for patients

I would like you to indicate your willingness to use any of the following information technology tools to communicate with patients. Yes=1 and No=0		
Tool	**Yes, I am willing**	**No, I am not willing**
SMS		
Voice call		
Email		
Social media		
Video conference		

Challenges with the use of telemedicine

Can you identify some challenges associated with the use of telemedicine for provision of healthcare in this facility?

1. ……..
2. ……..
3. ……..
4. ……
5. ……

Please indicate whether you agree or disagree with the following statements on the use of telemedicine for service delivery

Table 7: Issues affecting use of telemedicine

	STATEMENT	AGREE	NEUTRAL	DISAGREE
1	Lack of perceived clinical usefulness			
2	Lack of consultation between information technology experts and clinicians			
3	Perceived increase in workload			
4	Lack of suitable training in the use of equipment			
5	Lack of user-friendly software			
6	Negative attitude of staff involved			
7	High cost of equipment			
8	Concerns about patient privacy/confidentiality			

Appendix III: APPROVAL LETTER FROM KORLE-BU TEAHCHING HOSPITAL

In case of reply the number
And the date of this
Letter should be quoted

My Ref. No. KBTH/IRB/00036/2022

Your Ref. No......

KORLE BU TEACHING HOSPITAL
P. O. BOX KB 77,
KORLE BU, ACCRA.

Tel: +233 302 667759/673034-6
Fax: +233 302 667759
Email: Info@kbth.gov.gh
pr@kbth.gov.gh
Website: www.kbth.gov.gh

18th May 2022

RACHEAL KWAFOAH NYANSAH
SCHOOL OF PUBLIC HEALTH
COLLEGE OF HEALTH SCIENCES
UNIVERSITY OF GHANA
LEGON

INSTITUTIONAL APPROVAL: KORLE BU TEACHING HOSPITAL-SCIENTIFIC AND TECHNICAL COMMITTEE/INSTITUTIONAL REVIEW BOARD (KBTH-STC/IRB/00036/2022

Following approval of your study entitled "Assessment of provider's perceptions and willingness of use of telemedicine for healthcare services at Korle Bu Teaching Hospital" by the Korle Bu Teaching Hospital-Scientific and Technical Committee/Institutional Review Board.

I am pleased to inform you that institutional approval has been granted for the conduct of your study in Korle Bu Teaching Hospital.

Please contact the Head of Department to discuss the commencement date of the study.

Please note that, this institutional approval is rendered invalid if the terms of the Institutional Reviewed Board/Scientific and Technical Committee approval are violated.

Sincere regards,

Dr. Ali Samba
Director of Medical Affairs
For: Chief Executive

MEDICAL DIRECTORATE
KORLE BU TEACHING HOSPITAL

18th May, 2022

LETTER OF INTRODUCTION – RACHEAL KWAFOAH NYANSAH
"ASSESSMENT OF PROVIDER'S PERCEPTIONS AND WILLINGNESS OF USE OF TELEMEDICINE FOR HEALTHCARE SERVICES AT KORLE BU TEACHING HOSPITAL"

I have the pleasure to introduce to you the above named Investigator from School of Public Health, Legon. Racheal Kwafoah Nyansah sought and has been granted approval to conduct a study entitled "Assessment of provider's perceptions and willingness of use of telemedicine for healthcare services at Korle Bu Teaching Hospital" in your Department.

She is to contact you to discuss the commencement date of the study.

Please verify her identity with a Government issued National ID card and accord her the needed assistance.

Attached is the Scientific and Technical Committee and Institutional Review Board approval, which specifies the terms.

Sincere regards,

Dr. Ali Samba
Director of Medical Affairs
For: Chief Executive

DISTRIBUTION

THE HEAD, DEPARTMENT OF CHILD HEALTH, KBTH

THE HEAD, DEPARTMENT. OF OBST & GYNAE, KBTH