UNIVERSITY OF NAIROBI

SCHOOL OF JOURNALISM AND MASS COMMUNICATION

Determinants Influencing the Adoption of Telemedicine by Health Care Practitioners: A Case Study of Kenyatta National Hospital

A research Project submitted in Partial fulfillment of the Requirement for the Award of Masters of Art in Communication Studies.

2022

DECLARATION

I declare that this research project is my original work and to the best of my knowledge, it has never been submitted for the award of degree or diploma in any other institution of higher learning.

Catherine W. Gatetua

Reg. No. K50/81010/2015

Signature ..... Date 14TH NOVEMBER 2022

This research project has been submitted for examination with my approval as the University supervisor.

Dr. George Gathigi

Signature ..... Date 14/11/2022

DEDICATION

I dedicate this research project to the healthcare providers of the Kenyatta National Hospital that took part in this study.

ACKNOWLEDGMENT

I would like to acknowledge with sincerity the support and effort provided to me by my supervisor, Dr. George Gathigi who helped greatly helped and guided me till I completed this project. I also applaud the staff and management of the University of Nairobi for the support they accorded me throughout my study time. Further, my lecturers stand recognized and appreciated for the guidance and the lectures they offered me during this very important stage in my life.

Further my classmates and colleagues played a very critical role in my life thus I thank them for the support you offered me and the moments we shared together.

Special thanks go to my family members for the moral, financial and social support. Most specifically, I sincerely thank my parents, Mr. Gatetua and Mrs. Esther Mungai and my siblings Wairegi Gatetua, Melissa Ng'ania and Macharia Gatetua who enriched my academic life and for their understanding and support and for instilling the sense of pursuing education in my life whose value has been immeasurable to me. May God be with you all.

Finally, I give special thanks to God almighty for taking care of me, giving me good health and providing for me and my family and for enabling me to successfully finish this course.

LIST OF TABLES

Table 1: Showing distribution of healthcare personnel and administrative officers at KNH 19
Table 2: Distribution of doctors, nurses and administrators to be sampled and interviewed 23
Table 3: Age distribution by profession 27
Table 4: Gender Distribution 28
Table 5: Education level distribution by Profession 29
Table 6: Professional Experience 31
Table 7: Telemedicine Usage 32
Table 8: Telemedicine Frequency of Use 33
Table 9: Telemedicine Technology Used 34
Table 10: Computer literacy 34
Table 11: Invitation to telemedicine training 35
Table 12: Reasons for not using telemedicine 36
Table 13: User-specific factors of telemedicine adoption 38
Table 14: Correlation between adoption of telemedicine and perceived usefulness 39
Table 15: Correlation between adoption of telemedicine and perceived ease of use 40
Table 16: Correlation between adoption of telemedicine and user attitude and personality 41
Table 17: Use of ICT in provision of healthcare 43
Table 18: Use of telehealth technologies in provision of healthcare. 44
Table 19: Determinants influencing decision to accept and adopt telemedicine technology**.** 44
Table 20: Challenges of using telemedicine in patient care. 45
Table 21: Sustainability of telemedicine systems for patient care 45
Table 22: Recommendations 46

LIST OF FIGURES

Figure 1: Age distribution histogram 28
Figure 2: Gender Pie Chart 29
Figure 3: Bar plot showing respondents education level by profession 30
Figure 4: Line Graph 30

ABSTRACT

The purpose of this study was to determine factors that influence adoption of telemedicine by healthcare practitioners at Kenyatta National Hospital. Despite various studies arriving at several factors that influence adoption of telemedicine, it was important to look at user-specific factors which have scarcely been investigated. Therefore, this study focused on the investigation of user-specific factors through the specific objectives of determining whether perceived ease of use of telemedicine, perceived usefulness of telemedicine and whether individual user attitude and personality influence adoption of telemedicine by healthcare practitioners at KNH. This study's background was drawn from the existing literature on the status of telemedicine adoption internationally, continentally, and nationally. The problem statement was founded on the realization that despite presence of adequate literature and overwhelming evidence on the benefits, applicability, viability, sustainability, clinical usefulness and scalability of telemedicine in provision of healthcare in Kenya, still, major referral hospitals in the country are have a low adoption rate of telemedicine in healthcare delivery. The study employed the Technology Acceptance Model (TAM) which assumes that beliefs about usefulness and ease of use are always the primary determinants of information technologies adoption in organizations or by individuals. Literature review indicated that the use of telemedicine is largely adopted in scenarios where the physicians' satisfaction and recall levels are increased due to perception in ease of use/ access and perceived usefulness of ICT. The study adopted a mixed methods approach where both qualitative and quantitative research techniques were used in data collection and analysis. The targeted research population included 1,260 clinicians (doctors and nurses) and administrators working at KNH. To reach a feasible sample size, the study used the Cochran's method of sample size determination. An estimate of 196 respondents was drawn from the population. Stratified sampling method was then used in selection of the 196 respondents from the accessible population. To verify the reliability or trustworthiness of the data collected, the study employed the triangulation of data sources through usage of different respondents. Additionally, a pre-test of the interview schedule was done for four key informants who were purposively selected from the accessible population, enabling the researcher to review and adjust the interview questions/schedule before the interviews were conducted with the selected sample group. All ethical considerations of informed consent, assent, voluntary participation, confidentiality and anonymity, were ensured while conducting the study. The data collected was analyzed by use of excel and R software. The results from the analyses were summarized and presented by use of frequency tables and graphs. The study findings showed that the respondents' age ranged from 20 to 59 years with majority of the respondents being between ages 30 to 49 years. Furthermore, female represented a bigger percentage of the respondents accounting for 59.24%. Investigation into the respondents' level of education revealed 88 (48%) of the respondents attended colleges while 92 (52%) attended universities revealing the high education levels. The respondents were estimated to have adequate professional experience as they averagely had 12 years of professional experience. From the findings of the analysis, the three factors of perceived ease of use, usefulness and user attitude and personality were found to have a correlation with adoption of telemedicine. The major factors influencing the low adoption levels included the personal beliefs; attitudes towards ICT mediated healthcare, and the perception of increased workload especially for the older medical practitioners, despite the perceived usefulness of telemedicine.

Table of Contents

DECLARATION II
DEDICATION III
ACKNOWLEDGMENT IV
LIST OF TABLES V
LIST OF FIGURES VI
ABSTRACT VII
ACRONYMS XI
CHAPTER ONE: INTRODUCTION 1
1.0 Overview 1
1.1 Background Information 1
1.2 Statement of the Problem 3
1.3 Objectives of the Study 4
1.3.1 General Objective 4
1.3.2 Specific Objectives 4
1.4 Research Questions 4
1.5 Justification for the Study 5
1.6 Scope and Limitation 6
1.7 Definitions of Key Terms 6
CHAPTER TWO: LITERATURE REVIEW AND THEORETICAL FRAMEWORK 8
2.1 Overview 8
2.2 Literature Review 9
2.2.1 History of Telemedicine 9
2.2.2 Telemedicine as a key factor in achieving Universal Health Coverage in Kenya 9
2.3 Theoretical Foundation of the study 10
2.3.1 Technology Acceptance Model (TAM) 11
2.3.2 Effectiveness of Telemedicine 12
2.3.3 Benefits of Telemedicine in Healthcare Delivery 14
2.4 Research gap 15
CHAPTER THREE: RESEARCH METHODOLOGY 16
3.1 Overview 16
3.2 Research Design 16
3.3 Study Site 16

3.4 Research Approach 17
3.5 Data needs, type and sources 17
3.6 Data Collection 17
3.7 Target Population 18
3.7.1 Inclusion Criteria 18
3.7.2 Exclusion criteria 19
3. 8 Sampling Procedure 19
3.9 Data Collection Tools 23
3.9.1 Data Collection Instruments 23
3.10 Validity and Reliability of Research Instruments 24
3.11 Data Analysis and Presentation 24
3.12 Ethical considerations 25
CHAPTER FOUR: DATA ANALYSIS, PRESENTATION AND 26
INTERPRETATION 26
4.1 Overview 26
4.2 General Information 26
4.3 Demographic details 27
4.3.1. Age distribution 27
4.3.2 Respondents Gender 28
4.3.3 Education level of the respondents 29
4.4 Adoption of Telemedicine 31
4.4.1 Status of telemedicine use at Kenyatta National Hospital 32
4.4.2 Ability to Use Telemedicine Technologies 33
4.4.3 Computer literacy 34
4.4.4 Telemedicine training 35
4.4.5 Reasons for not utilizing telemedicine technologies 35
4.5 User-specific factors influencing adoption of telemedicine (Perceived ease of use, usefulness, attitude and personality) 37
4.5.1 Correlation analysis 38
4.6 Key Informants Interview Analysis 42
4.6.1 General Information 42
4.6.2 Analysis and Findings 42
CHAPTER FIVE: SUMMARY OF FINDINGS, CONCLUSION AND 47
RECOMMENDATIONS 47
5. 1 Overview 47

5. 2 Summary of Findings 47
5.2.1 Adoption of telemedicine 47
5.2.2 Perception of ease of use 48
5.2.3 Perception of usefulness 49
5.2.4 User attitude and personality 49
5.3 Conclusions 50
5.4 Recommendations 50
5.5 Suggestions for Further Studies 50
REFERENCES 52
APPENDICES 57
Appendix I: Consent form/ Letter of Introduction 57
Appendix II: Survey Questionnaire 62
Appendix III: Interview schedule 65
Appendix IV: Plan of Activities 68
Appendix V: Budget 69

ACRONYMS

ANOVA	-	Analysis of Variance
ICT	-	Information and Communication Technology
KNH	-	Kenyatta National Hospital
MedPAC	-	Medicare Payment Advisory Commission
SDG	-	Sustainable Development Goals
TAM	-	Technology Acceptance Model
UHC	-	Universal Health Coverage
UNICEF	-	United Nations International Children's Emergency Fund
USAID	-	United States Agency for International Development
WHO	-	World Health Organization

CHAPTER ONE: INTRODUCTION

1.0 Overview

Globally, many countries especially those under-developed or developing, continue to face a lot of challenges pertaining to quality, access, cost-effectiveness and equity in the present -day health problems. However, the rapid evolution in the ICT sector, presents possible remedies to most of the challenges facing many countries in different sectors. In the medical sector, this has been witnessed by use of electronic communication and information technologies in delivery of healthcare to patients through telemedicine. Therefore, this chapter seeks to give the general definitions of telemedicine, highlight its uses and advantages, and give its general context both globally and in Kenya. This chapter will further outline the study objectives, research questions, justification for the research, and significance of the study.

1.1 Background Information

In recognition to the fact that telemedicine has no definition that is definite, the World Health Organization (WHO), defines telemedicine as the process by which health practitioners deliver healthcare to patients in situations where distance is considered as a key factor by use of Information and Communication Technologies (ICT) for purposes of exchange of valid health information, continued delivery of healthcare education to health providers all with the intent of improving the health of individual patients together with their communities (WHO, 2010) Furthermore, Doarn (2004), defines telemedicine as the process of utilizing computing and communications technologies in-order to give support to the medical and other related fields such as dentistry, medicine, nursing and pharmacy. Joseph (2011), opines that telemedicine doesn't refer to a specific developed technology but a method or means through which patients can receive healthcare services from healthcare personnel from a distance.

According to Kaddu et al., (2009), telemedicine has been spurred by two megatrends that converge; evolution in technology especially in electronic communication and telecommunications and the constantly rising demand for access to healthcare of high-quality regardless of geographical limitations. Originally, the first traces of telemedicine are back in the mid-19th Century with the first telemedicine account published in the early 20th Century. This was observed when telephone wires were used in transmission of electrocardiograph data. This innovation gradually developed over the years leading to observation of the first modern form of telemedicine in the 1960s which was greatly driven by those in the space technology and military sectors.

Generally, there are two basic ways of telemedicine application; synchronous and asynchronous telemedicine. Both are dependent on the timing of transmission of information and the interaction taking place between the involved parties. This may be; healthcare personnel – patient or healthcare personnel – healthcare personnel. Synchronous telemedicine, refer to when the involved parties are simultaneously present and involved in the immediate information exchange. E.g. Videoconferencing. On the other hand, asynchronous telemedicine involves the process of exchanging data that is pre-recorded amongst individuals at different time periods. This may be through, sharing of medical cases/ diagnosis and prescriptions via email between doctor-patient or doctor-specialist all with the intent of optimal management of patient cases (Baker & Stanley, 2018).

Since its inception in the medical field especially in the developed countries, telemedicine has proven to be of great benefit to both the patients and healthcare providers. To the patients, telemedicine has; reduced costs as patient visits to hospitals are reduced, enhanced access to healthcare, reduced spread of infectious diseases as it reduces physical meet ups in hospitals, offered convenience as it allows patients to access care at the comfort of their homes. Healthcare providers enjoy benefits such as; increased revenue stream as they can reach more patients, increased patient satisfaction, reduced overhead costs and also reduced exposure to infectious diseases (Hjelm, 2005).

Most of the telemedicine services which are aimed at diagnosis and management of clinical cases are adopted/ offered in the regions that are more industrialized. Countries with limited infrastructure, continue to face a lot of challenges in fully adopting telemedicine technology. To a greater extent, in developing countries such as Kenya, telemedicine is basically used to connect healthcare personnel with specialists, tertiary healthcare centers, and referral hospitals. Despite that low-cost application of telemedicine has been proven to be viable, sustainable, clinically useful and scalable, still these applications have not been significantly adopted. According to Chinn (2002), telemedicine has the capability of transforming healthcare delivery globally and particularly in Kenya as it enables delivery of better and well-coordinated health services to populations and communities that can’t be reached with the current healthcare delivery system.

Such great benefits however, come with a lot of challenges to the successful deployment of telemedicine initiatives which must be addressed by those organizations spearheading adoption of telemedicine technologies. A crucial measure of how successful a technology has been implemented is by its acceptability/ adoption (Broens & Veld, 2007). Globally, based on the undertaken studies on telemedicine , in developed countries telemedicine implementation has been affected by factors such as; government policies, support

from top management, infrastructure, availability of finances, capabilities of external suppliers and the understanding of the requirements of the user adoption and corporate culture by those in the project teams. Furthermore, here in Kenya studies show that three main obstacles facing telemedicine implementation projects are; government policies, infrastructure, and availability of finances.

However, according to Y.K. Chan & J.P. Hu (2002), the adoption of technological innovation is influenced by various factors. They opine that the probability of acceptance of a technology by professional users such as a medical doctor is different from that of a common user of Information and Technology (IT). This is influenced by the fact that the environment that physicians work in is different and have higher requirements for their ethical behavior, qualifications, professionalism, professional responsibilities and autonomous practice. All these collectively influence their adoption readiness and technological acceptance decision making process. For this reason, it's important that a study is undertaken to understand the main determinants that influence the acceptance of telemedicine especially by the healthcare practitioners as there is a scarcity of such studies. This study therefore seeks to unravel the underlying factors that influence the adoption/ acceptance of telemedicine technology by healthcare practitioners.

1.2 Statement of the Problem

Globally, since the inception of telemedicine technology, a lot of research has been conducted in regards to the benefits that come with the adoption of this technology. Many studies have reported the vast benefits that follow use of telemedicine to both the patient and health provider. Such benefits include; reduced medical costs, improved access to healthcare, reduced spread of infections, convenience, increased revenue stream to health providers, increased patient satisfaction and reduced overhead costs. Furthermore, there is adequate literature on the applicability, viability, sustainability, clinical usefulness and scalability of telemedicine in the provision of healthcare in Kenya.

However, even with such evidence, major referral hospitals here in Kenya, are still grappling with adoption of telemedicine technology for delivery of healthcare to patients. Moreover, there is scarcity of literature that investigate user-specific factors that influence the acceptability and adoption of telemedicine technology by healthcare practitioners in Kenya. Majority of the studies undertaken to investigate factors that influence acceptance and implementation of telemedicine, only looked at administrative factors such as government policies, availability of financing and infrastructure, especially here in Kenya.

According to Maurice (2010), major factors influencing adoption of telemedicine in Africa include; lack of adequate workforce, poverty levels, high cost of connectivity, inadequate infrastructure, and issues related to legislations. Furthermore, in Uganda, implementation of telemedicine is impeded by inadequate telemedicine policies, lack of knowledge and technical know-how and lack of will to adopt to change. Davenport & Glaser, (2002) opine that difficulty in adopting to changes brought about by technology in work processes, present the biggest challenge for adoption of a new technology. Users attitude and personality traits, have always been considered to be influential factors to adapting. Moreover, according to several studies, user-specific factors are capable of influencing the users' mentalities towards utilizing a specific technological innovation. Therefore, it's important to investigate the influence of intrinsic and user-specific factors such as; user's attitude towards a technology, user perception on usefulness of a technology and user perception on ease of use, on adoption of telemedicine by healthcare practitioners in Kenya.

1.3 Objectives of the Study

This research is guided by the following objectives as enumerated below:

1.3.1 General Objective

This study's main objective is to determine the various factors that influence adoption of telemedicine by healthcare practitioners at KNH.

1.3.2 Specific Objectives

1. To determine by end of this study whether perceived usefulness of telemedicine influence its adoption by healthcare practitioners at KNH.
2. To determine by end of this study whether perceived ease of use of telemedicine influence its adoption by healthcare practitioners at KNH.
3. To determine by end of this study whether individual attitudes and personality influence adoption of telemedicine by healthcare practitioners at KNH.

1.4 Research Questions

This research majorly aims at identifying the main determinants influencing the adoption of telemedicine at the Kenyatta National Hospital.

The main research questions for this study are:

1. Does healthcare practitioners' perception on usefulness of telemedicine influence its adoption at KNH?

2. Does healthcare practitioners' perception on ease of use of telemedicine influence its adoption at KNH?
3. Does the healthcare practitioners' attitudes and personality influence adoption of telemedicine at KNH?

1.5 Justification for the Study

Understanding the user-specific factors that influence the adoption of telemedicine by healthcare practitioners in Kenya, will be a great step towards incorporation of telemedicine in the Kenyan healthcare system. This study will help solve the puzzle surrounding the low rate of telemedicine adoption in Kenya despite the existing evidence of its benefits. Furthermore, increased access to healthcare services being one of the main advantages of telemedicine, its incorporation into the Kenyan mainstream healthcare system, will assist the government in achieving the goal of Universal Health Coverage.

Moreover, conducting this research will be of utmost importance to different development partners and policy formulators as it will help them in coming up with strategic ways of effectively creating awareness about telemedicine and its uses in service delivery and also in infrastructural positioning for quality and affordable healthcare services in the country. There is need to understand factors associated with ensuring effectiveness of telemedicine in provision of cost-effective service delivery. Furthermore, the society is bound to benefit by being more knowledgeable about telemedicine and its application. As a result, a more comprehensive application identified as resulting from the use of telemedicine can be used across the country thus helping in achieving one of the vision 2030 goal of having a healthy nation leading to economic growth.

Also, the study has relevance to different Non-Governmental Organizations, organizations concerned with humanitarian activities and other institutions that are associated with health issues such as; USAID, UNICEF and WHO. Since, adoption of telemedicine in healthcare service delivery would help in improving the mortality and morbidity rates in Kenya and other developing countries. The mentioned organizations would aim to assist towards the optimal achievement of telemedicine application through establishing programs that sensitize the society on the effectiveness of implementing telemedicine in the healthcare and in aiding the government in implementation of its uses. The study will also be of interest to Kenyatta National Hospital since it will provide important insights that will assist in decision making processes on matters relating to telemedicine initiatives in the facility.

1.6 Scope and Limitation

The researcher carried out the study strictly at the Kenyatta National Hospital and used healthcare providers encompassed in the provision of healthcare especially in areas of monitoring, diagnosis and therapy for oncology patients. Some of the limitations experienced in the research included time constraints. Due to the nature of their nature of work, some of the respondents had restrictive schedules such as the doctors and nurses who work not only at hospital but also in other departments at the hospital. The researcher had to schedule multiple interviews and also use multiple data collection tools to ensure proper data collection thus safeguarding the validity and reliability of the research. Additionally, financial constraint was another limitation that the researcher may have encountered while conducting the research. Due to the nature and location of the research, the researcher used purposive and stratified sampling methods to ensure inclusivity of all respondents working with three strata of healthcare providers in the hospital. Additionally, the research used face to face and telephone interviews to deal with the issues of time limitations. The study was carried out at the Kenyatta National Hospital since it is a national and referral hospital with different service provisions including oncology care.

1.7 Definitions of Key Terms

For a better understanding of the study, the following terms are defined in the context of this research.

Acceptance. The process of being received as adequate, valid or suitable. Attitude. A settled way of thinking or feeling about something.

Administrator. A person mandated to control the operations of an organization.

Adoption. The action of choosing to take up, follow or use something.

Complex. Consisting of a nature that is not easily understood.

Determinant. An element that determines the nature of something or that which conditions an outcome.

Doctor. A person who is qualified to treat sick people especially in a hospital.

Ease of use. How easily a user can use a particular product.

Frustrating. Causing annoyance or upset because of inability to achieve something.

Improve. Make or become better.

Incentive. A payment made to stimulate greater output.

Intrinsic. Originating from within.

Know-how. Practical knowledge or expertise.

Nurse. A person who is trained to care for sick people especially in a hospital.

Personality. Combination of characteristics or qualities of a person.

Profession. A paid occupation especially one that involves a formal qualification.

Sufficient. Being adequate or enough.

Technology. The application of scientific knowledge/ concept to the practical aims of human life.

Usefulness. Quality of being competent in a particular area.

User- specific. A setting which apply only for a particular user.

CHAPTER TWO: LITERATURE REVIEW AND THEORETICAL FRAMEWORK

2.1 Overview

Generally, in both medical research and scholarly work, telehealth and telemedicine are areas that are fast growing. This has been brought about by the advances made in the field of telecommunication technology thus allowing the development of new and improved approaches of delivery of medical services. Telehealth and telemedicine are terms used synonymously across literature without consistent definition. Majority of researchers and providers of health care services, interchangeably use telehealth and telemedicine to broadly refer to utilization of electronic communication and information technologies in provision of healthcare services from a distance (Volkert, 2000). According to Sood et al. (2007) most scholars and researchers deem telemedicine as health care procedures and services that use technology with narrower definitions advanced from his past study conducted in 2007 that pointed out 104 different definitions of telemedicine that were peer-reviewed.

According to Wotton (2008) telemedicine or telehealth is sometimes referred to as healthcare beyond geographical boundaries hence may represent health care practiced in real time and involving direct interaction or that which unfolds over time like sending scanned images to other practitioners for examination. This type of healthcare delivery may be seen as seamless and may cover diagnosis, management, communication and administrative aspects. Scholars like Kay, Santos and Takane (2010) opined that telemedicine and telehealth are terms that are synonymously used with telehealth being associated with delivery of health care services with time and space continuum considered as fluid due to the help of technology supporting information exchange thus improving health care delivery (WHO, 2010). Even though telemedicine definitions are said to be expansive, the most common application is its use for simple patient to healthcare provider or consultations between general practitioners and specialist communications commonly referred to as e-consultation and may be used for diagnosis, care provision and rehabilitation of patients (Kay, et. al, 2010).

Telemedicine has the capability to enhance health care services to patients living in marginalized areas especially in developing countries. Many scholars and researchers deem telemedicine as an effective approach of improving and enhancing health care service thus improving access both within and globally (George, Hamilton and Baker, 2009). This is evidenced through the exceptional growth witnessed since 1990s in application of telemedicine with one survey conducted in 2003 establishing that over 85,000 e-

consultations between providers of healthcare and patients occurred in the US with the average number having multiplied nearly three times since the year 2000 (Grigsby et al., 2005).

2.2 Literature Review

2.2.1 History of Telemedicine

Accessibility of telephones by the public, brought about basic telemedicine applications. The institute of medicine (2012) in their publication highlights that in 1879 The Lancet, had an article discussing how telephone was used by doctors in consultations between doctors and specialists and in another instance in the year 1925, through the Science and Invention magazine, an article was published which suggested that radio was used as sensitization instrument for provision and promotion of healthcare education on diseases and injury. From the technologies which were developed during the 1960s period primarily to be used in space programs and by the military, more modernized and refined uses of telemedicine evolved (Craig and Patterson 2005; Currell et al., 2000). According to the Institute of Medicine (2012), in the Mercury Space Program, NASA used technology to monitor from a distance the key astronauts signs. Additionally, scholars like Kay et al., (2010) and Benschoter et al, (1965) note that videoconferencing technologies were first used at a psychiatric institute to link staff who were not specialized at a mental facility and specialists at the institute.

According to Institute of Medicine (2012), telemedicine currently has a wide range of applications. They include; remotely conducting videoconferences between doctors and patients, remotely monitoring key signs, electronic sharing of medical records and in special cases such as tele-rehabilitation or remote surgery.

According to the Medicare Payment Advisory Commission (MEDPAC), it is estimated that in 2009, the most common application of telemedicine was in provision of mental health services. This included; management of pharmacological procedures which made up to 62 percent of services of telemedicine that was provided to beneficiaries of Medicare. Outpatient visits and administrative services was estimated to be 31 percent of telehealth services while renal end-stage diseases contributed to only 5 percent (MEDPAC 2012).

2.2.2 Telemedicine as a key factor in achieving Universal Health Coverage in Kenya

After assuming the Presidency in 2013, His Excellency President Uhuru Kenyatta declared and prioritized Universal Health Coverage as one of his major development goals amongst those in his big four manifesto agendas. Furthermore, the Kenyan constitution dictates that every Kenyan is entitled to the highest standards

of healthcare services which is in-line with the WHO constitution. In 2005, during the 58th World Health Assembly, a directive was issued in pursuance of the right to health for all humans urging the WHO member states to provide healthcare that is universally accessible to its entire population based on the principles of solidarity and equity (MOH, 2019).

The UHC initiative is driven by the need to ensure that all persons in the Kenyan population and communities have equal access to services without suffering monetary hardships that result from seeking medication. This commitment is evidenced by the adoption of UHC as Target 3.8 under the Sustainable Development Goals (SDG). Since the inception of this initiative by the Government, the Kenyan Healthcare sector has seen improvements including addition of more than 200 localized community health units, recruitment of over 7700 volunteers to community health initiatives and recruitment of more than 700 health workers. This has caused an increase of more than 1.6 million hospital visits which has been recorded in healthcare facilities. Despite such positive results, still 6 out of 10 Kenyans don't have equitable access to key healthcare services and 4 out of 10 Kenyans are still at risk of at least experiencing financial difficulties when seeking medical attention (Barasa et al., 2018).

Furthermore, Kenya still faces a great challenge of healthcare workforce as the current doctor to patient ratio is at 1 doctor to 7200 patients which is way below the WHO recommendation of 1 doctor to 1000 patients. Also, the country still experiences intense regional differences in terms of distribution and access to quality care. This is evidenced by the existence of most the best medical facilities in Nairobi and under-developed healthcare facilities only in the marginalized areas of North-Eastern and some areas of the Kenyan coastal region. Such drawbacks continue to present a serious challenge to achieving equitable access to high quality healthcare by all Kenyan citizens. However, adoption of telemedicine technology by healthcare practitioners, will see the country rip a lot of benefits especially in achieving Universal Health Coverage. The ability of delivering healthcare services to patients from a distance through telemedicine serves to assist the government to achieve improved equitable access to health services by all Kenyans at a generally reduced cost which is UHC's goal (WHO, 2019).

2.3 Theoretical Foundation of the study

The rapid growth of information technology has revolutionarily proliferated effectiveness and efficiency in most industries. Technology is being increasingly integrated in medical settings to enhance healthcare service delivery. From medical record keeping software to simulation and analysis systems especially in tele-rehabilitation and course work, most medical related institutions are deliberately investing in new

technologies that are intended to provide effective and efficient healthcare services to its citizens. Nevertheless, achievement of newly introduced technologies succeeding can't be attained if physicians, healthcare doctors and patients do not accept and use the technology (Chen, 2011). Several theoretical models have been suggested to ease the process of understanding factors that significantly have an impact in information technologies acceptance (Davis, 1989; Chau, 1996; Venkatesh & Davis, 2000). The Technology Acceptance Model is one of the influential and robust models used in explaining the behaviour of patterns of adoption of IT. This model provides the basis for which impacts of external variables on internal attitudes, beliefs and intentions are discovered. Therefore, this study will be conducted on the basis of this model.

2.3.1 Technology Acceptance Model (TAM)

This model assumes that, for an information technology to be adopted and used, users consider primarily how easy the technology is to use and its usefulness as the determinants. The determinants influence or impact the users' mentalities towards utilizing a specific system, the intention to utilize and the exact use alongside the behavioural patterns. A technology's usefulness is perceived as the degree to which the user accepts that utilizing the technology would improve their performance or aid in accomplishment of their goals. Then again, ease of use is the ease with which a user is able to utilize a particular system (Davis, 1989).

Deemed usefulness depends on the perception that users gravitate towards a system or application based on its ability to enhance their performance and achievement of results or goals (Davis, 1989, p. 320). It straightforwardly impacts the demeanour towards utilization of the system and indirectly impacts usage intention behaviour. Regardless of whether an application is seen as helpful, it might be utilized only when it is seen as simple to use, that is, advantages of utilization offset the effort of utilizing the system in this way prompting a client's behavioural intentions (BI) to use. System usage is directly influenced by behavioural intentions.

Moreover Davis (1989) thought that there is a connection between users' alleged convenience of technology and the attitude and the aimed goals for utilizing the technology. In any case, perceived handiness shows more grounded and more reliable connection with use than other factors reported in the writing. Furthermore, an individual might embrace a technological innovation in the event that they consider it as helpful, valuable and socially attractive despite the fact that they despise utilizing the innovation (Saga and Zmud, 1994). Hence, there is plausibility of an immediate connection between intentions and convictions.

2.3.2 Effectiveness of Telemedicine

Ekeland, Bowes, and Flottorp (2012) and Wotton (2012) state that examination of telemedicine and telehealth by most medical journals, they are for the most part worried about effectiveness of particular treatment as they concentrate on one specific procedure and contrast it by use of telemedicine with the actually done procedure and measure whether they had comparative results. The reason for these examinations is to assess the clinical adequacy of telemedicine and legitimize its current continuous use. For instance, in a research study done on 47 patients diagnosed with cancer by Gordon, Hoeber, and Schneider (2012), it was discovered that 27,000 miles of movement was saved through use of tele-pharmacy to fill their pharmaceutical needs and tele-consultation to get the correct diagnosis. In another analysis conducted by Cole et al (2012) of tele-pharmacy at countryside clinics, found out that around one-fifth of the patients had blunders in their medical prescriptions which were identified by sending the prescriptions to drug specialists in other different areas. Furthermore, examinations into tele-pathology suggested that about 74% of the cases were more accurately analyzed by a distant expert than an on-location pathologist (Leung et al., 2009). Besides, a program to contact cardiovascular breakdown patients' day by day by telephone prompted $3 million saved funds, accounting for 54% less in-patient visits, and 13 % out-patient visits (Institute of medication 2012).

Hersh et al. (2006) concentrated on papers on the utilization of telemedicine amongst beneficiaries of medical care which suggested that telemedicine was best with services that essentially utilized verbal correspondence, for example, mental and emotional wellness services or treatment, and not really as compelling for services that regularly require actual contact. On the other hand, Wotton (2012) checked on the 141 trials that were controlled and randomized in which 148 telemedicine methods were drilled on 37,695 patients who had five normal sicknesses: diabetes, malignant growths, asthma, severe obstructive aspiratory illness, cardiovascular breakdown and hypertension. Albeit by far most of these examinations, 108 in specific, revealed positive outcomes and just two guaranteed adverse consequences, Wotton (2012) reprimanded many investigations for zeroing in on too-short a time span and utilizing conflicting methodologies. Wotton inferred that the proof found on the viability of telemedicine in management of persistent infections is uncertain and there should be more exploration on the subject matter (Wotton, 2012; 219).

Notwithstanding worries about the medical exploration behind telemedicine, researchers have distinguished other potential reasonable downsides which incorporate potential regulatory or infrastructural troubles for planning care across numerous sites, and a possible breakdown in relationship between doctors and patients, or between providers of medical care and their associates (Hjelm, 2005). Through multiple researches, it was

established that a few medical practitioners believe that telemedicine is encouraging for certain spaces of medication and doctor-patient interview in spite of certain constraints (Perna, 2013). The absence of an in-person consultation is believed to be perceived as a challenge especially for some procedures and the attitudes of the users (Perna 2014). Critical difficulties still remain for clinical researchers in normalizing their exploration and giving the supporting settings to which telemedicine intercessions are the best. However, these impediments for clinical researchers ought not stall the progression of telemedicine. The majority of the research on telemedicine, notwithstanding having contrasts in technique or approach, concludes that technology abetted medical services isn't just doable, however, at times, can be equivalent to or better than face-to-face care (Krupinski and Bernard 2014).

A few structures have been progressed for assessing telemedicine throughout the past years (Bashshur, Shannon and Sapci 2005). Bashshur et al. (2005) opine that the frameworks present an assortment of research strategies going from quasi-experimental designs, analysis of secondary data, experiments that are randomized and qualitative examinations that are in-depth. They additionally propose thorough comparison of advantages against cost, or impacts against cost, remembering telemedicine's effect on quality and access and its effect on the healthcare provider-patient relationship (Bashshur, Shannon and Sapci 2005). Telemedicine is seen to be a major method of promoting doctor-patient communication in places where distance may be an issue through e-consultation. Bodenheimer and Grumbach (2003) state that e-consultation may affect behavior during the consultation thus affecting trust which eases patient divulgence and collaboration. It might likewise impact the degree of specialist and patient participation by either leading towards patient-oriented mannerism or reinforcing traditional patriarchal patterns (Bodenheimer and Grumbach 2003). Whitten, et al., (2005) further believe that understanding the effect of telemedicine is likewise significant on the grounds that it might assist with defeating winning refusal to adoption of the technology, in this way advancing further use where suitable.

Telemedicine enables the transmission and storage of medical information (Kaushal, et al., 2005). Literature on telemedicine has recently expanded with the number of articles and researches registering an increase from just a few in the years before 1990 to a few more hundreds in the years after 1998 (Moser et al., 2004). Nonetheless, while the current writing upholds the practicability of telemedicine application on psychiatry, pathology, radiology, cardiology and home monitoring, there exists insufficient research data highlighting its impact on various outcomes (Jennett, et al. 2003). Bashshur, Shannon and Sapci (2005) argue that in relation to traditional medical care, telemedicine has the potential of improving access and ensuring equal or enhanced quality to the masses.

Telemedicine facilitates patient divulgence and participation, while diminishing the chance of objections or controversies between the specialist and patient (Mechanic et al., 1998). It might likewise impact the degree of patient and doctor involvement during clinical experiences (Szasz and Hollender 1956), either easing development towards patient-focused and consumerist designs (Haug and Lavin, 1983), or building up conventional paternalistic designs (Waitzkin,1991). However, telemedicine can lead to "doctor-centered" behavior focused on proficiently assembling adequate patient data and side effects aimed to make a clinical determination and consider choices of treatment at a relatively small amount of time possible (Roter and Hall 1991). Doctor practices that motivate patient involvement include posing more enquiries that are open-ended, guaranteeing and affirming patient perceptions, offering expressions of concern, endorsement and understanding (Roter and Hall 1992).

Telemedicine might affect consultation results by impacting the way medical services providers and patients connect with each other. These results involve the cycle results during the clinical experience itself, transient results following the completion of a clinical procedure, intermediate results inside several few weeks and or months and long-haul results recorded throughout a broader timeframe (Beckman, Kaplan and Frankel 1989).

2.3.3 Benefits of Telemedicine in Healthcare Delivery

Remote consultation via telemedicine may be cost effective and time saving for patients who would have been necessitated to travel significant distances for their medical appointments (Agha, et al. 2009). As Cukor, et al. (1998) observed with reference to psychiatric consultations, the additional worth of the video or voice channel is the making of a social local area that helps negotiations for the members in the common virtual space thus making them feel comfortable discussing complex issues within their created public sphere. Special parts of telemedicine may empower members and improve their control over the clinical experience by allowing greater patient participation in tasks that are able to be carried out by the physician in in-person consultations (Tachakra and Rajani, 2002). Telemedicine may likewise develop the anticipated scope of verbal and non-verbal correspondence prospects by giving health service providers and patients power over parts of the video feed (Kavanagh and Yellowlees, 1995).

Although enthusiasm with new technologies surely dissolves due to the different stages of adoption on both the part of the physicians and patients with time, continued use yields familiarity and a greater level of acceptance as this new practice becomes the new norm (Allen and Doolittle 1997). This general absence of privacy related to telemedicine may obstruct patient correspondence during certain instances hence

antagonistically influencing the patient's trust, fulfillment, recall, and adherence levels (Elford et al. 2000). Telemedicine permits residents in the rural areas to talk with far off experts in urban areas without leaving their rural homes and communities (Suzuki, et al. 2006). The outcome is improved interaction through e-consultations, improvement of the rapport and socializing skills of the patients (Roter and Hall, 1992). Furthermore, use of telemedicine serves to improve the matching between the healthcare provider and the patient through its ability to diminish the social distance between them which wouldn't be otherwise conceivable (Mucic, 2008).

2.4 Research gap

Despite the availability of literature evidence on the applicability, viability, sustainability, clinical usefulness and scalability of telemedicine in healthcare provisions, it still remains a puzzle as to why its adoption rate/ level of acceptance still remains low here in Kenya. Several studies have been conducted both in the developed and developing countries such as Kenya seeking to pin-point factors that influence the adoption/ acceptance of telemedicine technologies. However, only administrative factors such as; government policies, infrastructure, and availability of finances have been identified. User-specific factors which are considered to be intrinsic still remain unexplored, yet according to several studies, user-specific factors such as; perceived usefulness, perceived ease of use and user attitudes towards a technology are capable of influencing the users' mentalities towards utilizing a specific technological innovation. It is therefore imperative that further study is conducted on these factors to establish the extent to which they influence adoption of telemedicine especially by healthcare practitioners. Furthermore, despite the vast work pertaining to acceptance of information technologies that has been done, there is still reasonable proof that new models for accepting the information technologies or modification of the current models to fit their needs is required (Hu, et al., 1999).

CHAPTER THREE: RESEARCH METHODOLOGY

3.1 Overview

This chapter focused on the procedures that the researcher used to carry out the study. The chapter highlights the research design, study sites, research approach, data requirements, the target population, sample and sampling techniques, data collection method and instruments along with data analysis and methods of data presentation that were used in the study so as to answer the research questions and objectives.

3.2 Research Design

This research employed a descriptive research design. The design seeks to give a description that is accurate and systematic about a research phenomenon, a population or situation. It generally has the ability to answer the how, where, when and what questions. However, the method doesn't answer the why questions hence isn't able to establish the cause and effects relationships. Furthermore, it only measures and observes the variables and doesn't control nor manipulate them (Falana and Mary, n.d). Saunders et al., (2016) observed that this method is best for collecting original data as it gives a certain degree of accuracy. Furthermore, Kothari et al., (2009) opines that a descriptive research design is defined as a study that is designed to depict the participants in an accurate way. A descriptive research contextualizes the characteristics of the respondent taking part in the study and provides a depiction of a situation as it naturally happens (Parahoo, 2001). Therefore, this design was best suited for this study as it enabled accurate contextualization of the factors that influence adoption of telemedicine at Kenyatta National Hospital.

3.3 Study Site

This study was conducted at Kenyatta National Hospital general facility and was limited to the following departments; Cancer Treatment Center (CTC), Surgery department and Medicine department. The hospital is considered to be the largest public referral hospital in Kenya with an extensive treatment facility. The facility is estimated to have a 2000 bed capacity and is reported to attend to approximately 600,000 out-patients and 70,000 in-patients annually (KNH, 2017). Being a referral hospital, the facility gives a broad range of specialized health care services to patients who come from different regions in Africa. Furthermore, Kenyatta National Hospital is reported to be one of the longest serving treatment facilities in the country. These statistics formed the basis of selection of Kenyatta National Hospital as the study site.

3.4 Research Approach

This study used a mixed methods approach. According to Wisdom et.al., (2013), mixed methods approach refers a methodical technique that seeks to promote the systematic combination of both qualitative and quantitative data within the same research investigation. This method is most appropriate especially when seeking to have an in-depth understanding of the contradictions arising in a study. Also, the method enables collection of data that is comprehensive and guarantees research findings that are grounded on the experiences of the participants. Also, it enables the researcher to capitalize on the potential strengths of both quantitative and qualitative techniques as it allows for exploration of the various perspectives and underlying relationships within the complex layers of our composite research questions (Shorten and Smith, 2017). Furthermore, according to Abowitz et al., (2010), mixed methods approach generally improves the reliability and validity of the data collected and thus strengthens causal inferences.

3.5 Data needs, type and sources

Data is referred to as any information that is generated, collected or observed so as to validate the findings of a research. This study used primary data which was obtained through survey and key informant interviews at KNH. To enable the researcher to answer all the research questions and meet the set study objectives, text, continuous and categorical data was required.

3.6 Data Collection

To improve on the validity of the research instrument, a pilot-test of the various identified measures in the interview schedule was conducted with a section of the population before the actual collection of data. This comprised of 3 doctors, 3 nurses and 3 administrators who were randomly selected. This permitted the researcher to identify if the questionnaires were clear, reasonable and equipped to address the exploration questions and deciding as to whether the questionnaires required adjustments. The formulated interview schedules and survey questionnaires were approved by the Ethics & Research Committee of the University of Nairobi. The commencement of the data collection process depended on the approval of the data collection instruments and their appropriateness in achieving the objectives of this research.

Training was done on research assistants to ensure their proper understanding of all the sections and subsections of the questionnaire, the significance of the study, the standard interviewing protocols and sensitization on ethical issues such as confidentiality. The study participants were randomly selected using

simple random sampling technique from the workforce list obtained from the human resource as per the study's sample size distribution. In liaison with the various departments of the selected participants, the researcher used drop-off/ pick up method to administer the questionnaires to the selected participants upon getting their consent for participation through a consent form that was provided to them. The participants were given a period of 1 week to respond to the questionnaire after which there were follow-up visits to their respective departments for collection of the duly filled questionnaires and/or to offer clarification and guidance to those who needed.

Quantitative data collection was done through administration of structured questionnaires to the selected study participants in different sub-groups. Qualitative data collection involved either face-to-face or virtual zoom interviews with the selected key informants. Key informants are defined as those people who have an extensive, detailed and specialist knowledge about a research phenomenon being studied and thus are key sources of information to the researcher. In conducting the interviews, semi-structured questionnaire was used. In this study, two high ranking representatives were purposively selected from the three strata to be interviewed as key informants. The representatives were selected from the following professions; Chief medical specialist/ Senior Medical Specialist, Senior medical officer, deputy chief clinical officer/assistant chief clinical officer, deputy chief nurse/ assistant chief nurse and office administrator. Therefore, six participants were selected for qualitative data collection. Upon getting their consent, through their departments, the researcher booked appointments for interviews. The entire interviewing sessions were to be recorded and notes taken.

3.7 Target Population

The target population for this study was general healthcare practitioners and administrators working at Kenyatta National Hospital regardless of the department they work in. Saunders et al., (2016) define population as all individuals or elements that have common characteristics from which a sample is selected and which the researcher wants to generalize findings from. The total population for this study was 1,260 different levels of personnel consisting of 300 doctors (Medical Specialists, Medical Officers and Clinical Officers), 900 nurses and 60 administrative officers as per the KNH human resource data. The table below shows the distribution of the population of different personnel in different professional levels.

3.7.1 Inclusion Criteria

According to Burns & Grove (2001), inclusion criteria refers to the characteristics that a particular respondent must have so as to be considered for inclusion in a study. In this study, all the respondents that fell in either the doctors' nurses' or administrators' category and agreed to be interviewed, was included in the study.

3.7.2 Exclusion criteria

Exclusion criteria refer to the characteristics that a particular respondent doesn't possess in order not to be included in a study. In this study, any healthcare practitioner who wasn't a doctor, nurse or administrator and those who belonged to the three categories but were not willing to be interviewed were excluded from this study (Burns & Grove, 2001).

Table 1: showing distribution of healthcare personnel and administrative officers at KNH

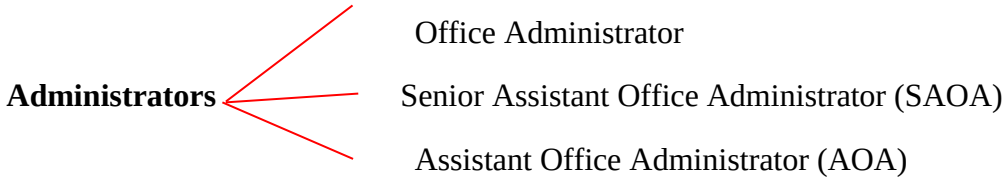
Profession	Category	Number
Doctor	Chief Medical Specialists	3
	Senior Medical Specialists	44
	Medical Specialists	26
	Senior Medical Officers	5
	Medical Officers	50
	Deputy Chief Clinical Officers	4
	Assistant Chief Clinical Officers	9
	Senior Registered Clinical Officers	25
	Registered Clinical Officers	34
	Clinical Officers	100
		300
Nurses	Deputy Chief Nurses	4
	Assistant Chief Nurses	8
	Senior Nursing Officers	444
	Nursing Officers	442
	Senior Enrolled Nurse	2
		900
Administrators	Office Administrators	21
	Senior Assistant Office Administrators	18
	Assistant Office Administrators	21
		60
Total		**1260**

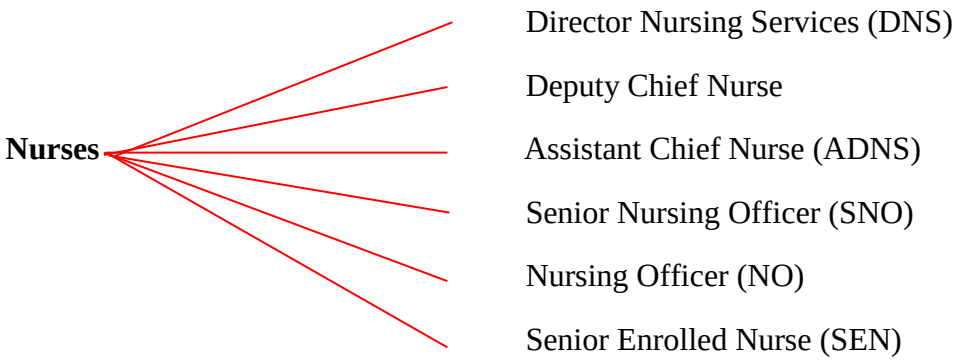
Source: (KNH, 2021)

3. 8 Sampling Procedure

3.8.1 Sampling Frame

According to Creswell (2013), a sampling frame is a list of elements in the population from which the sample is actually drawn. The study was undertaken at KNH with the sampling frame being drawn from the population of 1,260 healthcare providers that utilized telemedicine in healthcare service provision to cancer patients in the hospital. This sampling frame generally comprised of: doctors, nurses and administrators from the total population so as to ensure inclusivity and effective data collection. The different levels of the aforementioned personnel included in the sample frame is illustrated below:





3.8.2 Sample size determination

Determination of the sample size refers to the technique used in selecting an optimum number of participants to be included in a study from the target population. Time, cost and statistical power sufficiency are the main considerations used in determination of a sample size. It has been sufficiently illustrated in the past studies

that a sample size that is large and adequate ensures that the data obtained from the sample is reliable in making statistical inference, giving recommendations and supporting decisions that arise from the research findings. Also, adequate sample size has the ability to remove bias. However, it poses a great financial challenge to study a sample size that is too large, hence, determining a sample size that is neither too large nor too small is imperative for reliability of research findings.

In this study, the Cochran's method of sample size determination was used. This choice was informed by the ability of the formula to yield a sample that is representative for proportions of a sample that is large and heterogenous. Furthermore, the formula was ideal as it gave the researcher the flexibility to arrive at an optimal sample size at a desired confidence level, precision level and an estimated proportion of the characteristic of research phenomenon present in the population (Cochran, 1963).

This study targeted a population of 1,260 health care practitioners and administrators at KNH. The following Cochran's standard sample size formula was used in determining an optimal sample size:

$$\mathbf{n} = \frac{Z_{\frac{\alpha}{2}}^{2} * \mathrm{p} * (1-\mathrm{p})}{e^2}$$

Where, n was the sample size,

Z, was the degree of the required confidence

P, was the proportion estimated to have a specified population attribute

e, allowed margin of error.

In this study, the sample size was determined at 95% confidence level which is common in many medical researches (Attia, 2005). According to Sathian et al., (2014), in medical research, a margin of error of between 4% and 8% is permissible. Therefore, in this study a 7% margin of error was allowed. Since the variability in the proportion of the population that use telemedicine in health care delivery for cancer patients is not known, the researcher assumed a proportion of 50% which has in the past been suggested to have maximum variability (Singh et al., 2014). Therefore:

$$n = \frac{\mathbf{1.96^2} * 0.5 * (1 - 0.5)}{0.07^2} = 196$$

$$n = 196$$

An optimal sample size of 196 was drawn from the target population of 1,260 healthcare practitioners and administrators.

3.8.3 Sampling Technique

Stratified sampling technique was employed in the selection of respondents included in the sample for this study. Singh (2015) noted that stratified sampling technique is best suited if the population is heterogenous. Additionally, Taherdoost (2016) opines that this sampling technique guarantees proportionate representation of all the subgroups within a population. According to Sudman and Seymour (1976), a good sampling method should be efficient thus should have a small size of sampling error. Stratified sampling is considered to be the most efficient sampling technique when compared to other probabilistic methods. This method of sampling enabled the researcher to obtain responses from all the different kinds of healthcare practitioners and administrators at KNH as defined in the sample frame.

The sample in this study was sub-grouped into the following categories; doctors, nurses and administrators thus forming three strata. Stratum 1, 2, and 3 are doctors, nurses and administrators respectively. The sample size to be selected in each stratum was calculated using the following expression: $\mathbf{N_i} = \frac{\mathbf{N_1} * n}{N}$

Where:

$\mathbf{N_i}$= The sample size of the i^{th} Stratum (healthcare practitioner category).

$\mathbf{N_1}$= The population size of the i^{th} Stratum.

N= The size of the entire target population representing the total population of doctors, nurses and administrators.

n= The size of the entire sample needed for the study.

Sample size for the doctors' stratum was calculated as: $\mathbf{n_1} = \frac{300*196}{1260} = 47$

Sample size for the nurses' stratum was calculated as: $\mathbf{n_2} = \frac{900*196}{1260} = 140$

Sample size for the administrators' stratum was calculated as: $\mathbf{n_3} = \frac{60*196}{1260} = 9$

Therefore, 47 doctors, 140 nurses and 9 administrators were included in the study through random selection.

Table 2: Distribution of doctors, nurses and administrators to be sampled and interviewed

Profession	**Population**	**Sample**
Doctors	300	47
Nurses	900	140
Administrators	60	9

3.9 Data Collection Tools

3.9.1 Data Collection Instruments

Some scholars like Wellington (2000) opine that research should employ data collection instruments and methods that provide high level of data precision, generalisability of the findings and explanatory power with minimum management demands. Researchers like Denzin and Lincoln (2011) believe that qualitative examination strategy includes information assortment of individual encounters, thoughtfulness, anecdotes about existence, interviews, perceptions, and visual texts which are important to individuals' life. Whereas, quantitative research involves collection of quantifiable numerical data that can used to find patterns, make predictions and test causal relationships.

In this study, qualitative data was collected through key informant interviews while survey questionnaires were used for collection of quantitative data from the general population. In both scenarios, a semi-structured interview schedule and a structured questionnaire was used respectively. The researcher was guided by the study objectives when constructing the instruments. The interviews conducted on the key informants was utilized to investigate the perspectives, encounters, convictions and inspirations of individual respondents. Structured questions were used for development of quantitative questionnaires while Semi-structured interview questions were used for qualitative interview schedules. According to Britten (1999)

interviews that are semi structured in nature comprise of a few key inquiries that assist in identifying areas to be investigated, yet additionally permits the questioner or interviewee to veer off the scope of the question so as seek after a thought or response in a more detailed way. This kind of interviewing format provided participants with some guidance in accordance with the interview schedule.

3.10 Validity and Reliability of Research Instruments

According to Heale and Twycross (2015), a research instrument that accurately and consistently measures the research phenomenon under study, is considered to be valid and reliable. In this study, to ensure validity, the researcher ensured that the data collection instrument covered all the aspects of the phenomenon being studied and that all the questions formulated in the instrument exhaustively measured the intended research construct. Also, the concepts of homogeneity, stability and equivalence of the data collection instruments were put into consideration to ensure reliability.

3.11 Data Analysis and Presentation

Some scholars like Marshall and Rossman (2016) opine that data analysis is the process of bringing order, structure and meaning to the mass of collected data. They further opine that qualitative data analysis is a search for general statements about relationships among categories of data. This study used both quantitative and qualitative data analysis. Data collected through the key informant interviews was analysed using content analysis tools of categorization and theme-based analysis. This process begun by selection of pertinent text samples from the transcribed data. Each of the selected texts were categorized into different segments which were treated as different analysis units. The unitized text segments were then coded on the basis of the various themes surrounding adoption of telemedicine by use of a coding scheme. The data which had been coded was then analysed to establish the most common themes, their contexts and the underlying relationship amongst the themes.

The quantitative data collected through questionnaires, were first entered in excel and the data further cleaned, organized and analysed using R software. Descriptive analysis was used to analyse the demographic details of the respondents and other characteristics in the data. This involved use of frequencies and measures of central tendency. Polychoric correlation coefficient was used to test for the strength of relationship between adoption of telemedicine and the various measures of factors of perceived ease of use, perceived usefulness and user attitude and personality. Furthermore, the researcher used chi-square test of

independence to determine whether there was independence amongst the variables. Analysis findings were presented by use of tables and graphical representations such us bar charts, line graphs and histograms.

3.12 Ethical considerations

Resnik, (2007) defines ethics as norms for conduct that distinguish an acceptable and unacceptable behavior. Shamoo and Resnik, (2009) opined that ethics is a method, procedure or perspective for deciding how to act and for analyzing problems and issues. Ethical issues considered in this study included confidentiality professionalism, respect and non-discrimination of the respondents. Official permission was sought from the hospital, and the respondents. The principle of voluntary participation was strictly adhered to and the respondents were not coerced into participating in the research.

Borrowing from Peersman (2014) the researcher ensured that through the principle of informed consent, the respondents would be void of hang-ups that come with lack of clear understanding of the purpose of the research and the respondents,' expectation in the research. As Peersman (2014) points out, “some respondents may be impressed by the status of the researcher, or even by the word research as used and may agree to participate without having a good idea of what the research is all about”.

Protection of the research participants was assured. The researcher ensured the respondents’ confidentiality by ensuring the respondents remained anonymous throughout the study. According to Peersman (2014) ‘Anonymity is important for the success of surveys under certain conditions. Anonymity can help to protect privacy so that respondents can reveal information that cannot be identified to them. When the survey poses exceptional risks for participants, anonymity may improve cooperation’’. The researcher ensured polite and courteous mannerism and treated the participants with the dignity and respect they deserve during and after the research.

Furthermore, all the Ministry of Health stipulated measures of Covid-19 prevention were adhered to. This included; always wearing a face mask during interaction with study participants and incase the respondent didn’t have one, the researcher provided, the researcher maintained a social distance of at least 1 meter when interacting with respondents, the researcher always ensured to clean and sanitize hands before and after administration of questionnaires. Furthermore, the researcher ensured that interactions with the respondents took place in open, well-ventilated areas. In the event that the respondent showed Covid-19 like symptoms, the researcher was to end the interaction and allow the respondent seek further medical test.

CHAPTER FOUR: DATA ANALYSIS, PRESENTATION AND INTERPRETATION

4.1 Overview

In this chapter, the analysis of the data collected is described in details and is then followed by a thorough discussion of the findings of this research. The findings are discussed and presented as per the research objectives and questions defined in chapter two of this study. The data was analyzed with the aim of exploring and describing the underlying relationship between adoption of telemedicine and the various user-specific factors that influence its adoption at Kenyatta National Hospital and thus recommend measures that can enhance its adoption. Totally, 184 respondents out of the expected 196 respondents responded to the questionnaires thus 184 questionnaires received from the 196 administered. This formed 93.87% of the total sample where 9 (4.89%), 45 (24.46%) and 130 (70.65%) were administrators, doctors and nurses respectively. Even though neither the characteristics nor the reasons for refusal to participate in the study by the non-respondents are known, typically the unresponsiveness could be partially attributed to lack of will.

The questionnaire was composed of questions that were sub-divided into three parts and thus the data gathered will be presented as follows; the first part will give a general description of the respondents demographics such as age, profession, gender, education level and years of experience in the profession; the second part will present the response results to questions that were measuring and testing the status and extent of adoption of telemedicine; the last part will present results to questions that were testing influence of various factors such as perceived usefulness, ease of use, user attitudes and personality to adoption of telemedicine. This chapter will finalize by giving a summarized discussion of this research's findings.

4.2 General Information

Descriptive analysis was used to give a description of the responses by use of frequencies and percentages and the data further presented by use of tables and plots. The percentages given were as per the total number of questionnaires received of 184 and not the original sample size of 196. The association, correlation and statistical significance of the underlying relationships within the various variables in this study will further be determined by inferential non-parametric methods of chi-square test and Pearson's correlation coefficient which were all set at 5% level of significance thus a p-value of 0.05 indicated statistical significance.

4.3 Demographic details

4.3.1. Age distribution

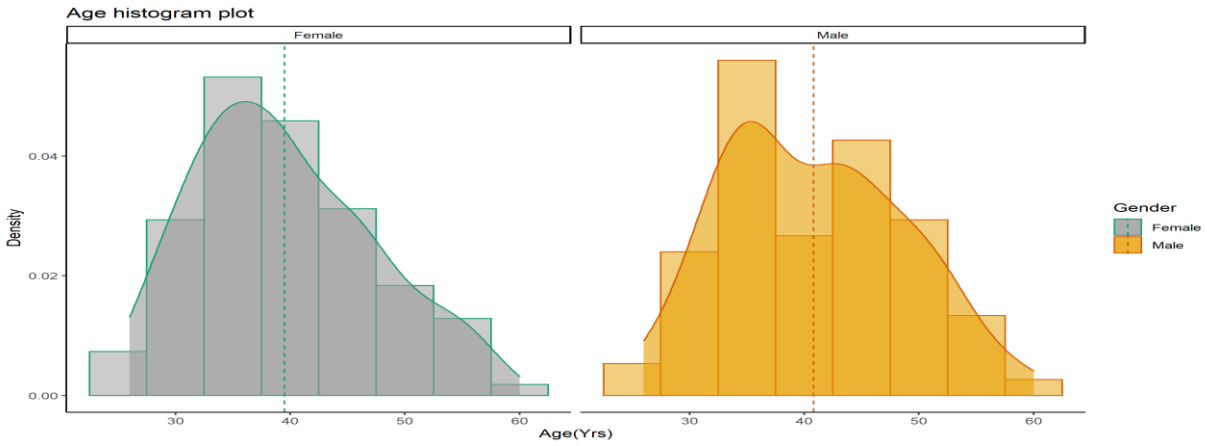
In this study, respondents of different ages ranging from 20 to 59 years were represented. Majority of the respondents were within the age brackets of 30-39 and 40-49 which accounted for 86(47%) and 58(32%) of all the respondents respectively. The youngest group of health practitioners falling within the age bracket of 20-29 years accounted for 18(9.8%) of the respondents while the oldest group falling within the age brackets of 50-59 years accounted for 22(12%) as shown in the cross tabulation below.

Table 3: Age distribution by profession

		Profession		
Variable (Years)	Overall, N = 184[1]	Administrator, N = 9[1]	Doctor, N = 45[1]	Nurse, N = 130[1]
Age Group				
20-29	18 (9.8%)	0 (0%)	5 (11%)	13 (10%)
30-39	86 (47%)	4 (44%)	29 (64%)	53 (41%)
40-49	58 (32%)	4 (44%)	9 (20%)	45 (35%)
50-59	22 (12%)	1 (11%)	2 (4.4%)	19 (15%)
60+	0 (0%)	0 (0%)	0 (0%)	0 (0%)

Further investigation into the distribution of the age amongst the respondents was conducted by use skew estimates and histograms. It was found that the age distribution of both the male and female respondents were slightly positively skewed as the skew estimates were calculated to be 0.406495 and 0.387589 for female and male respondents respectively. This is further evidenced by the age histogram plot below which show longer right tails thus indicating that majority of the distribution lies within the middle and older ages. Due to the skewness of the distribution, median was computed as a way of measuring the average age of the respondents which was estimated to be 39 years.

Figure 1 **Age distribution histogram**



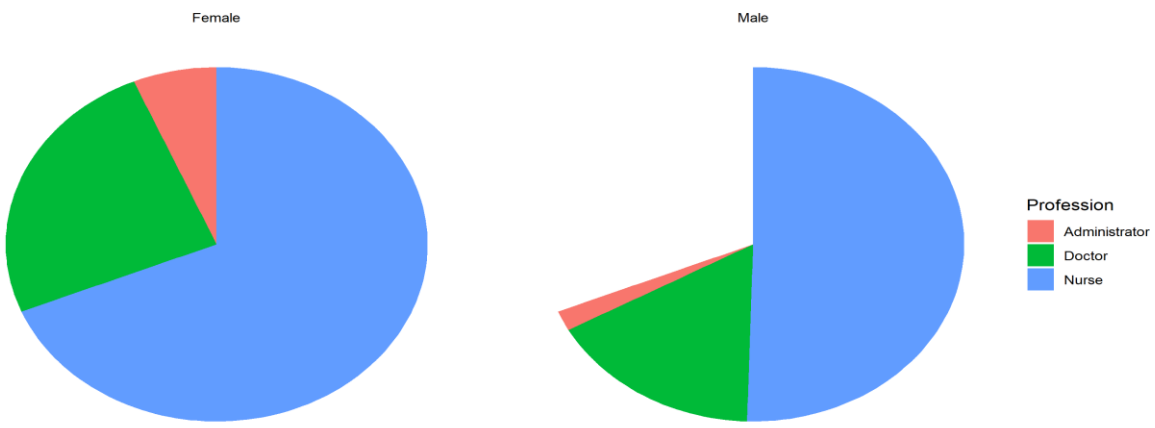
4.3.2 Respondents Gender

The respondents were asked to indicate their sex by selection of their most applicable options which were provided on a two Likert scale of male and female. From the analysis as illustrated on Table 4 below, out of 184 (100%) respondents, 109 (59.24%) were female while 75 (40.76%) were male. Out of the 109 female respondents, 7 (6.4%) were administrators, 27(25%) were doctors and 75 (69%) were nurses. Also, out of the 75 male respondents, 2 (2.7%) were administrators, 18 (24%) were doctors and 55 (73%) were nurses. Generally, women were the majority respondents with the largest number being nurses. According to Benner and Wrubel (1989), women have historically dominated the nursing profession. However, based on the current trends, males are fast joining this profession.

Table 4 **Gender Distribution**

		Gender	
Variable	Overall, N = 184[1]	Female, N = 109[1]	Male, N = 75[1]
Profession			
Administrator	9 (4.9%)	7 (6.4%)	2 (2.7%)
Doctor	45 (24%)	27 (25%)	18 (24%)
Nurse	130 (71%)	75 (69%)	55 (73%)

Figure 2 **Gender Pie Chart**



4.3.3 Education level of the respondents

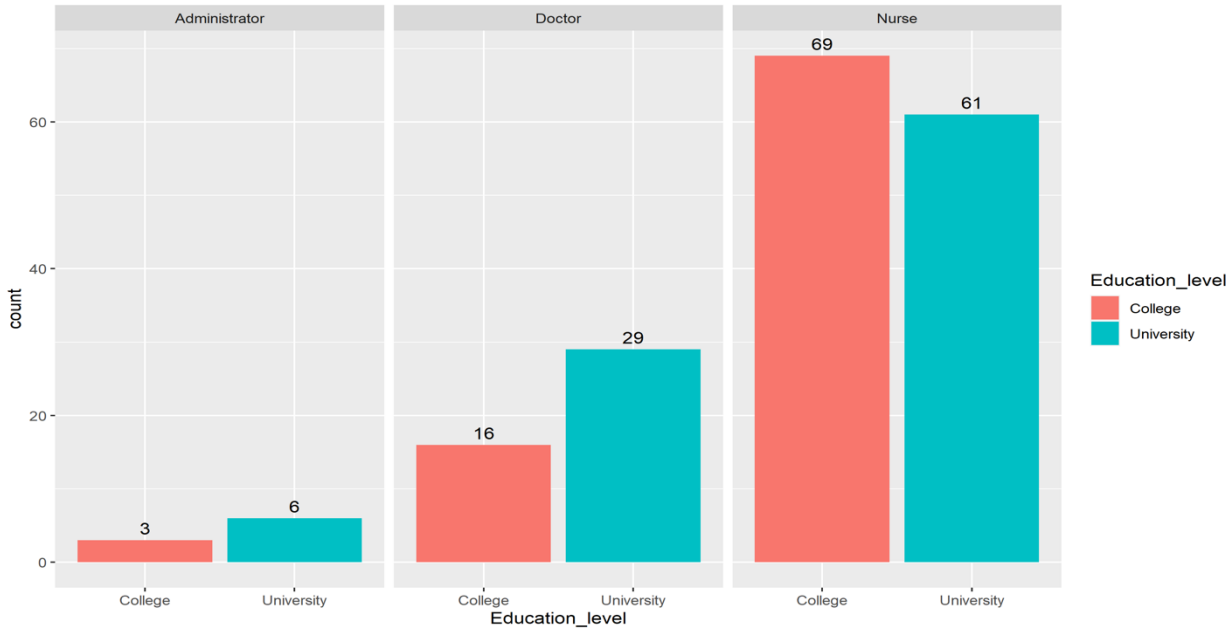
To be able to understand how well educated the respondents are, it was necessary to give a description of their education level. The respondents were asked to indicate their level of education from three options provided which included primary, secondary, college and university. Results of this analysis that all the respondents were well educated beyond primary and secondary level of education and thus were either of college or university level. From the 184 respondents, 88 (48%) indicated to have reached the college level where 3 (33%) were administrators, 16 (36%) were doctors, and 69 (53%) were nurses. Also, 96 (52%) of the respondents indicated to have completed university education where 6 (67%) were administrators, 29 (64%) were doctors and 61 (47%) were nurses.

Table 5 **Education level distribution by Profession**

		Profession		
Variable	Overall, N = 184[1]	Administrator, N = 9[1]	Doctor, N = 45[1]	Nurse, N = 130[1]
Education level				
College	88 (48%)	3 (33%)	16 (36%)	69 (53%)
University	96 (52%)	6 (67%)	29 (64%)	61 (47%)

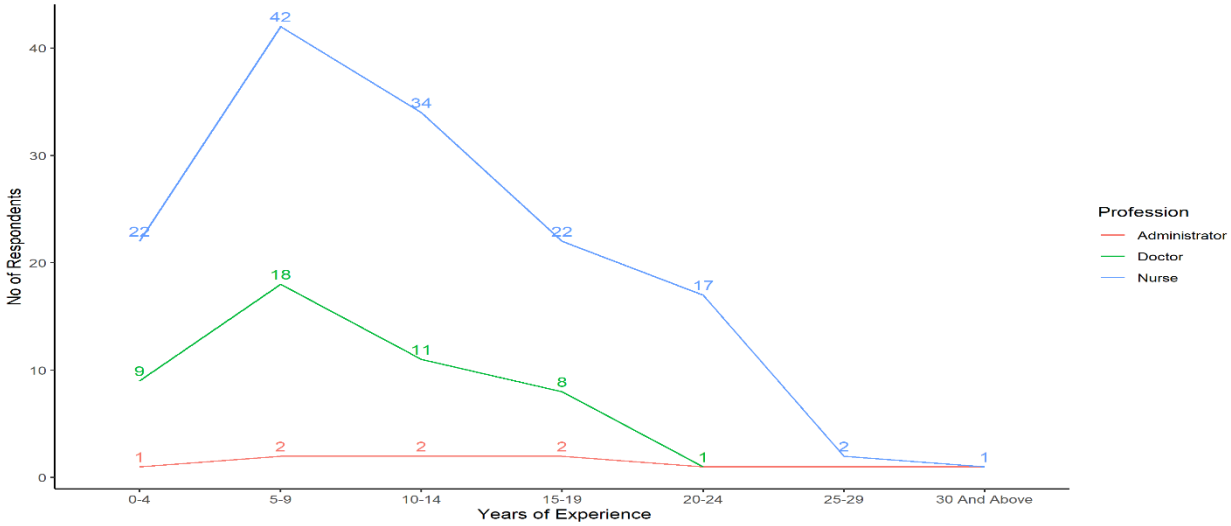
Generally, as shown in the bar plot below, majority of the respondents have reached university level in the administrator and doctor profession whereas majority of the nurses have reached college level of education.

Figure 3 **Bar plot showing respondents education level by profession**



4.3.4 Professional Experience

Figure 4 **Line Graph**



The number of years of professional experience of the respondents in the different professional categories was analyzed, summarized and presented by use of Figure 4 above and cross tabulation as presented in table 6 below**.** From the analysis, majority of the respondents indicated to be having 5-9 and 10-14 years of professional experience in their respective fields which accounted for 30 % and 24% of the total response

respectively. Averagely, administrators were estimated to have the highest number of years of professional experience with a mean of 15 years followed by nurses with a mean of 12 years and lastly the doctors with a mean of 10 years. This therefore, indicated that majority of the respondents had adequate experience in their fields and thus could be relied on to give well informed responses as guided by the structured questionnaires.

Table 6 **Professional Experience**

		Profession		
Variable (Years)	Overall, N = 184[1]	Administrator, N = 9[1]	Doctor, N = 45[1]	Nurse, N = 130[1]
Professional experience				
0-4	31 (17%)	1 (11%)	9 (20%)	21 (16%)
5-9	55 (30%)	2 (22%)	16 (36%)	37 (28%)
10-14	44 (24%)	2 (22%)	11 (24%)	31 (24%)
15-19	31 (17%)	2 (22%)	8 (18%)	21 (16%)
20-24	19 (10%)	1 (11%)	1 (2.2%)	17 (13%)
25-29	2 (1.1%)	0 (0%)	0 (0%)	2 (1.5%)
30 And Above	2 (1.1%)	1 (11%)	0 (0%)	1 (0.8%)

4.4 Adoption of Telemedicine

In this study, as outlined in the earlier chapters, adoption of telemedicine formed the response variable. Adoption is generally defined as the sole decision that a user of a product makes to use the product. In the context of this study, adoption has been used to refer to the acceptance and consistent use of telemedicine technologies by healthcare practitioners. In this section, findings will be presented in regards to the various measures that were used to determine adoption of telemedicine technologies by healthcare practitioners. These measures included; Usage of telemedicine technologies, frequency of use of telemedicine technologies, computer literacy of healthcare practitioners, extent/areas of application of telemedicine technologies, attendance of telemedicine trainings and adequacy of the trainings. All these measures were used since they have a direct influence on the decision to use and the consistency of using telemedicine technologies.

In the technological space, it is expected that the higher the computer literacy of a user, the higher the likelihood of the user to adopt to new technologies. Therefore, computer literate healthcare practitioners are more likely to adopt telemedicine technologies in healthcare delivery. Also, the more the areas of application of telemedicine technologies in healthcare setup, the more the likelihood of consistent use and adoption by the healthcare practitioners. In enhancing the use and adoption of new technologies, training the users plays a critical role. It is expected that training a user on how to use a new technology increases the chances of the user to adopt the technology. Therefore, training healthcare practitioners on how to use telemedicine technologies could increase their chances of adopting and frequency of using telemedicine technologies in healthcare delivery.

This section finalizes by analyzing some of the reasons that hinder the adoption of telemedicine by clinicians at Kenyatta National Hospital. Tests of association were also conducted on the above-mentioned measures of adoption of telemedicine to establish the nature of association and relationship amongst them.

4.4.1 Status of telemedicine use at Kenyatta National Hospital

This information was sought so as establish whether the healthcare practitioners at KNH have in the past used telemedicine technologies in provision of healthcare to patients. As presented on cross table below, 97 (52.7%) respondents agreed to have used telemedicine systems before for provision of healthcare to patients while 87 (47.3%) indicated otherwise. Those that agreed to have used telemedicine before constituted of 5 (5.2%) administrators, 21 (22%) doctors and 71 (73%) nurses. This was a positive indication as it meant that majority of healthcare practitioners at KNH had embraced use of telemedicine systems for healthcare delivery. However, as illustrated in the cross tabulation below, still a good number had not yet embraced use of telemedicine systems at Kenyatta National Hospital.

Table 7 **Telemedicine Usage**

		Status of telemedicine use	
Variable	Overall, N = 184[1]	No, N = 87[1]	Yes, N = 97[1]
Profession			
Administrator	9 (4.9%)	4 (4.6%)	5 (5.2%)
Doctor	45 (24%)	24 (28%)	21 (22%)
Nurse	130 (71%)	59 (68%)	71 (73%)

Further analysis on the use of telemedicine at KNH was conducted by investigating the frequency of use by those that have been able to use telemedicine systems in the hospital before. These findings were presented in Table 8 below. Respondents were allowed to indicate their frequency of use of telemedicine technologies on a Likert scale of 5 which included; always, mostly, never, quite a bit and rarely. From those that had indicated to have used telemedicine systems before, 50 (27% of total respondents), indicated to use telemedicine systems quite a bit, 22 (12%) indicated that they rarely use telemedicine, 14 (7.6%) indicated to use telemedicine most the time and 11 (6%) indicated that they always use telemedicine systems in healthcare delivery. 87 (47% of the total respondents) indicated that they never use telemedicine. This group comprised of all those that had earlier indicated to have not used telemedicine before. From this analysis, it is evident that majority of the healthcare practitioners at KNH use telemedicine but not too often.

Table 8 **Telemedicine Frequency of Use**

		Profession		
Variable	Overall, N = 184[1]	Administrator, N = 9[1]	Doctor, N = 45[1]	Nurse, N = 130[1]
Usage frequency				
Always	11 (6.0%)	1 (11%)	3 (6.7%)	7 (5.4%)
Mostly	14 (7.6%)	1 (11%)	2 (4.4%)	11 (8.5%)
Never	87 (47%)	4 (44%)	24 (53%)	59 (45%)
Quite a bit	50 (27%)	2 (22%)	7 (16%)	41 (32%)
Rarely	22 (12%)	1 (11%)	9 (20%)	12 (9.2%)

4.4.2 Ability to Use Telemedicine Technologies

The respondents were tested on their ability to use various technologies that are used in telemedicine systems. This was important since the ability to use these technologies was an indication of the ability to use telemedicine systems hence likelihood of respondents to adapt telemedicine in healthcare delivery. The technologies tested for included; video conferencing, wireless technology, audio conferencing, internet-based technology, smartphone apps, e-mail, mobile diagnosis technologies and data monitoring technologies. From the analysis, E-mail, smartphone apps, and audio conferencing were the top three technologies that respondents had the ability to use as they accounted for 162 (88%), 140 (76%) and 108 (59%) of the total respondents. These were followed by video conferencing 95 (52%), Mobile diagnosis technologies, wireless

technologies, data monitoring technologies and lastly internet-based technology. Averagely, majority of the respondents (more than 50% of total respondents) indicated that they have the ability to use at least half of the eight technologies that they were tested for. Internet-based technologies, data monitoring technologies and wireless technologies were the least popular technologies and had least number of respondents with the ability to use them.

Table 9 **Telemedicine Technology Used**

		Profession		
Variable	Overall, N = 184[1]	Administrator, N = 9[1]	Doctor, N = 45[1]	Nurse, N = 130[1]
Video Conference	95 (52%)	4 (44%)	29 (64%)	62 (48%)
Wireless Technology	80 (43%)	3 (33%)	19 (42%)	58 (45%)
Audio Conferencing	108 (59%)	4 (44%)	29 (64%)	75 (58%)
Internet-Based Technology	58 (32%)	4 (44%)	15 (33%)	39 (30%)
Smartphone Apps	140 (76%)	6 (67%)	38 (84%)	96 (74%)
E-mail	162 (88%)	8 (89%)	40 (89%)	114 (88%)
Mobile Diagnosis	89 (48%)	3 (33%)	20 (44%)	66 (51%)
Data Monitoring	65 (35%)	2 (22%)	12 (27%)	51 (39%)

4.4.3 Computer literacy

The table below shows the cross tabulation of computer literacy of the respondents by their profession. This was measured and rated in three levels; low, medium and high rate of computer literacy.

Table 10 **Computer literacy**

		Profession		
Variable	Overall, N = 184[1]	Administrator, N = 9[1]	Doctor, N = 45[1]	Nurse, N = 130[1]
Computer literacy				
High	26 (14%)	1 (11%)	8 (18%)	17 (13%)
Low	54 (29%)	1 (11%)	13 (29%)	40 (31%)
Medium	104 (57%)	7 (78%)	24 (53%)	73 (56%)

The analysis revealed that the level of computer literacy for majority of the respondents is medium which accounted for 104 (57 %) respondents where 7 (78%) were administrators, 24 (53%) were doctors, and 73 (56%) were nurses. Also, 54 (29%) and 26 (14%) of the respondents have low and high level of computer literacy respectively.

4.4.4 Telemedicine training

Information on invitation to telemedicine training was also sought and the analysis findings were as follows. From 184 respondents, 111 (60.32%) did not receive any invite to attend telemedicine training in the hospital. Only 73 (39.68%) had received invitation to attend the trainings. These included 3 (4.1%) administrators, 21 (29%) doctors and 49 (67%) nurses. These respondents were further asked for information on the adequacy of the trainings and responded as follows; 44 (60%) indicated that the trainings were adequate, 16 (22%) rated the trainings very adequate while only 13 (18%) indicated that the trainings were not adequate.

Table 11 **Invitation to telemedicine training**

		Response	
Variable	Overall, N = 184[1]	No, N = 111[1]	Yes, N = 73[1]
Profession			
Administrator	9 (4.9%)	6 (5.4%)	3 (4.1%)
Doctor	45 (24%)	24 (22%)	21 (29%)
Nurse	130 (71%)	81 (73%)	49 (67%)

Adequacy of telemedicine training

		Profession		
Variable	Overall, N = 73[1]	Administrator, N = 4[1]	Doctor, N = 10[1]	Nurse, N = 59[1]
Adequacy of training				
Adequate	44 (60%)	4 (100%)	5 (50%)	35 (59%)
Not adequate	13 (18%)	0 (0%)	1 (10%)	12 (20%)
Very adequate	16 (22%)	0 (0%)	4 (40%)	12 (20%)

4.4.5 Reasons for not utilizing telemedicine technologies

Table 12 below presents the analysis of some of the reasons for not using telemedicine by healthcare practitioners at Kenyatta National Hospital.

Table 12 **Reasons for not using telemedicine**

		Profession		
Variable	Overall, N = 184[1]	Administrator, N = 9[1]	Doctor, N = 45[1]	Nurse, N = 130[1]
Lack of technical know-how				
Agree	75 (41%)	4 (44%)	19 (42%)	52 (40%)
Disagree	20 (11%)	2 (22%)	2 (4.4%)	16 (12%)
Neutral	30 (16%)	1 (11%)	10 (22%)	19 (15%)
Strongly agree	41 (22%)	1 (11%)	10 (22%)	30 (23%)
Strongly disagree	18 (9.8%)	1 (11%)	4 (8.9%)	13 (10%)
Lack of adequate training				
Agree	44 (24%)	2 (22%)	16 (36%)	26 (20%)
Disagree	20 (11%)	1 (11%)	3 (6.7%)	16 (12%)
Neutral	21 (11%)	0 (0%)	7 (16%)	14 (11%)
Strongly agree	84 (46%)	3 (33%)	18 (40%)	63 (48%)
Strongly disagree	15 (8.2%)	3 (33%)	1 (2.2%)	11 (8.5%)
Lack of sufficient incentives				
Agree	26 (14%)	4 (44%)	11 (24%)	11 (8.5%)
Disagree	94 (51%)	4 (44%)	19 (42%)	71 (55%)
Neutral	36 (20%)	0 (0%)	7 (16%)	29 (22%)
Strongly agree	5 (2.7%)	0 (0%)	3 (6.7%)	2 (1.5%)
Strongly disagree	23 (12%)	1 (11%)	5 (11%)	17 (13%)
Lack of computer access				
Agree	41 (22%)	2 (22%)	16 (36%)	23 (18%)
Disagree	39 (21%)	1 (11%)	3 (6.7%)	35 (27%)
Neutral	28 (15%)	2 (22%)	10 (22%)	16 (12%)
Strongly agree	47 (26%)	3 (33%)	11 (24%)	33 (25%)
Strongly disagree	29 (16%)	1 (11%)	5 (11%)	23 (18%)

Findings on the analysis of various reasons that may cause/ influence the use of telemedicine by healthcare practitioners are presented in this section. This was critical as the reasons may equally illustrate reasons for in adoption of telemedicine. These reasons were rated on a scale of; strongly disagree, disagree, neutral, agree, and strongly agree. Out of the four reasons tested for, majority of the respondents agreed to three reasons as being the cause of not using telemedicine. Lack of adequate training was rated as the highest reason since 84 (46%) of the respondents strongly agreed. 75 (41%) of the respondents also agreed to lack of technical know-how as the second reason and lastly 47 (26%) also agreed to lack of computer access as another reason for failure to utilize telemedicine technologies in healthcare delivery. However, 94 (51%) of the respondents disagreed to lack of sufficient incentives as being a reason for not using telemedicine. This included 4 (44%) administrators, 19 (42%) doctors and 71 (55%) nurses. There weren't any other reasons that were cited by the respondents as being the reason for not using telemedicine technologies.

4.5 User-specific factors influencing adoption of telemedicine (Perceived ease of use, usefulness, attitude and personality)

This study, as stated in the earlier chapters, set-out to investigate whether user-specific factors of perceived ease of use, usefulness, attitude and personality influence acceptability and adoption of telemedicine technologies by healthcare practitioners at Kenyatta National Hospital. In this section, these factors were tested by use of different measures. Perceived ease of use was measured by getting information on the complexity of telemedicine systems and user experience during interaction with telemedicine systems. Perceived usefulness was measured by getting information on the ability of telemedicine to improve healthcare delivery and by further comparing the merits to demerits of telemedicine systems. Finally, user attitude and personality were measured by getting information on the possible negative and positive impacts of using/adopting telemedicine systems. All the three factors were measured on a scale of 5; strongly disagree, disagree, neutral, agree and strongly agree. The findings were presented on Table 13 below.

Table 13 **User-specific factors of telemedicine adoption**

Scale	Factors					
	Complexity	**Frustrating Interaction**	**Improved Health care**	**Advantageous**	**Job loss**	**Willing to learn**
Agree	42 (23%)	24 (13%)	83 (45%)	44 (24%)	38 (21%)	48 (26%)
Disagree	52 (28%)	40 (22%)	26 (14%)	21 (11%)	26 (14%)	31 (17%)
Neutral	14 (7.6%)	31 (17%)	29 (16%)	27 (15%)	72 (39%)	39 (21%)
Strongly agree	35 (19%)	35 (19%)	40 (22%)	72 (39%)	18 (9.8%)	45 (24%)
Strongly disagree	41 (22%)	54 (29%)	6 (3.3%)	20 (11%)	30 (16%)	21 (11%)

From the analysis, the respondents agreed to 4 out of the six measures. 72 (39%) of the respondents strongly agreed that telemedicine has more merits than demerits as compared to manual systems of healthcare delivery. Furthermore, 83 (45%) of the respondents agreed that telemedicine has the potential of improving healthcare delivery if adopted. Also, 54 (29%) of the respondents strongly disagreed that interacting with telemedicine systems is frustrating. This was an indication that telemedicine has a positive user experience. 48 respondents, accounting for 26% of the total, also agreed that they would learn how to use telemedicine as a way of contributing to organizational goals. However, 52 (28%) of the respondents agreed that telemedicine systems are complex to use. As to whether adoption of telemedicine can cause loss of jobs, majority of the respondents, 72 (39%) remained neutral on this question.

4.5.1 Correlation analysis

The nature and extent of correlation between adoption of telemedicine and the different user-specific factors of perceived ease of use, usefulness and user attitude and personality was further examined by use of Polychoric correlation. This correlation coefficient technique is a measure of association between ordinal variables which is based on the assumption that there is an underlying joint continuous distribution and that the variables follow a bivariate normal distribution. This technique works on the following hypothesis;

- Null hypothesis (H_0): $\rho = 0$ (The coefficient is zero thus there is no correlation)
- Alternative hypothesis (H_a): $\rho \neq 0$ (The coefficient isn't zero and thus there is correlation)

4.5.1.1 Adoption of telemedicine and Perceived Usefulness

Usefulness as defined in the literature, refers to the extent to which one believes a particular technology has the quality of utility and practical worthiness and has the ability to enhance efficiency and effectiveness. One would therefore expect that the behavioral intentions to adopt a technology would be influenced by how useful the user deem it. Therefore, in this study, it is expected that if the healthcare practitioners see telemedicine technologies to be useful, then they would adopt it. The table below summarizes the results of correlation between choice of using telemedicine and measures of perceived usefulness.

The potential of telemedicine systems to improve healthcare delivery had a correlation of 0.07165 with the choice of using telemedicine by healthcare practitioners. This was an indication of a weak positive relationship meaning that the more the healthcare practitioners see telemedicine to have the potential of improving healthcare delivery, the more they are likely to adopt it. The correlation also had a p-value of 0.02721 which indicated a statistically significant relationship hence there is a bigger chance that the choice of using telemedicine could be attributed to this factor and not chance.

Also, the ability of telemedicine to be more advantageous than the manual systems of healthcare delivery had a weak positive correlation of 0.08431 with the choice of using telemedicine. This meant that the more the healthcare practitioners perceived telemedicine to have more merits than demerits as compared to manual systems of healthcare delivery, the more likely they can adopt telemedicine systems. The p-value was also estimated to be 0.04608 which was less than 5% level of significance and thus indicates statistically significant relationship. This section of analysis therefore concludes that perceived usefulness of telemedicine technology by healthcare practitioners influences its adoption.

Table 14 Correlation between adoption of telemedicine and perceived usefulness

	Polychoric correlation	**Test of bivariate normality**		
Explanatory variable	2 – Step estimate	Chi-square	Df	P-Value
Potential to improve healthcare delivery	0.07165 (0.09939)	9.162	3	0.02721
Advantageous systems over manual systems	0.08431 (0.0938)	7.155	3	0.04608

4.5.1.2 Adoption of telemedicine and Perceived Ease of Use

In the context of this study, perceived ease of use has been used to refer to the extent to which a user of a specific technology believes that the technology in question is easy to use and understand. Therefore, as its second objective, this study set out to assess the degree to which this variable influence adoption of telemedicine technologies by healthcare practitioners. To increase the behavioral intention and likelihood of a user to adopt a technology, it is critical that the user believes that the technology doesn't require a lot of effort to use.

In this study, the researcher thus assumes that the less complex and frustrating the use of telemedicine is, the more likely the health practitioners at KNH will adopt telemedicine. The nature and extent of relationship between perceived ease of use and choice of using telemedicine was further examined and the findings summarized in the table below.

Table 15 Correlation between adoption of telemedicine and perceived ease of use

	Polychoric correlation	**Test of bivariate normality**		
Explanatory variable	2 – Step estimate	Chi-square	Df	P-Value
Complexity of telemedicine systems	-0.0532 (0.09558)	1.034	3	0.7931
User experience when using telemedicine	-0.01691 (0.09538)	8.392	3	0.03857

The choice of using a telemedicine system and the complexity of the system was estimated to have a correlation coefficient of -0.0532 which indicated a negative weak correlation. This meant that indeed the more complex telemedicine is, the less likely healthcare practitioners will adopt it. However, the p-value was estimated to be 0.7931 which is greater than the 0.05 (5%) level of significance set for this study. It can therefore be concluded that the relationship between choice of using/adopting telemedicine by healthcare practitioners at KNH and complexity of using telemedicine technologies is not statistically significant and that there is a 79.31% chance that the choice of using/adopting telemedicine by healthcare practitioners at KNH occurred due to chance or other reasons and not necessarily due to complexity of telemedicine technologies.

Also, the correlation between choice of using/adopting telemedicine and user experience was examined. The correlation was estimated to be -0.01691 which also indicated a negative weak correlation. This meant that the more frustrating the interaction with a telemedicine system is, the less likely clinicians will adopt the technology. The p-value was also estimated to be 0.03857 which was less than the set 0.05 (5%) level of significance. Unlike complexity of using telemedicine, user experience has a statistically significant relationship with the choice of using telemedicine since there is only a 3.85% chance that the choice of using telemedicine occurred due to chance and other reason. This meant that there is a 96.15% chance that the decision of whether to use telemedicine or not by healthcare practitioners, could be attributed to user experience.

Therefore, since there is correlation between choice of using telemedicine and both measures of perceived ease of use as illustrated above, it can therefore be concluded that perceived ease of use influences the adoption of telemedicine by healthcare practitioners at KNH.

4.5.1.3 Adoption of telemedicine and User attitude and Personality

The correlation between adoption of telemedicine and user attitude and personality was assessed and results presented in the table below. User attitude and personality was measured by getting respondents response on possible job loss due to adoption of telemedicine and their willingness to adopt telemedicine as a way of contributing to organizational goal.

Table 16 Correlation between adoption of telemedicine and user attitude and personality

	Polychoric correlation	**Test of bivariate normality**		
Explanatory variable	2 – Step estimate	Chi-square	Df	P-Value
Likelihood of job loss	-0.03983 (0.09508)	0.504	3	0.918
Willingness to learn as contribution to organizational goals	0.0359 (0.09491)	10.63	3	0.01388

The results indicated a negative correlation of -0.03983 between likelihood of job loss and choice of using telemedicine. This meant that the more the likelihood of job loss due to adoption of telemedicine, the less the likelihood of adopting telemedicine systems. The p-value was estimated to be 0.918 thus indicating a statistically insignificant relationship between the variables. Equally, learning use of telemedicine as a way of contributing to organizational goals had a weak positive correlation of 0.0359. This meant that the more

the respondents are willing to learn telemedicine systems as a way of contributing to organizational goals, the more the likelihood of its adoption in the hospital. The p-value was estimated to be 0.01388 indicating statistically significant relationship. Therefore, it can be concluded that there exists a correlation between adoption of telemedicine and user attitude and personality as illustrated by correlation coefficients of the measures above.

4.6 Key Informants Interview Analysis

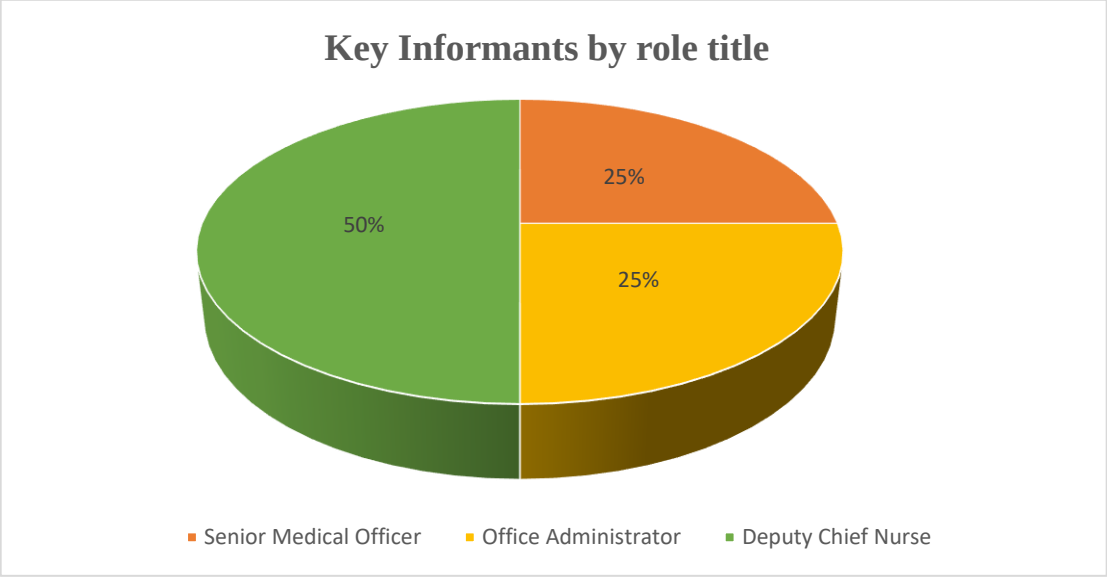
4.6.1 General Information

Generally, the researcher sent a total of six interview letter invitations to six key informants between the months of July, 2022 and August, 2022. However, out of the six key informants invited for the interviews, only four (66.67%) of them responded and accepted to participate in the interviews. Two of the key informants agreed to physical meeting while the other two agreed to only virtual meeting through Microsoft Teams platform. The virtual interviews lasted approximately twenty-five minutes while the physical interviews lasted approximately twenty minutes. None of the respondents agreed to being audio recorded hence all the data collected from the interviews were through note taking.

4.6.2 Analysis and Findings

Analysis of the data collected begun by cleaning of the notes taken for typos and the data was then well pasted into excel sheets. By use of a color-coding and numeric approach, content analysis was then conducted. This enabled the researcher to identify common themes in the text. This analysis was repetitively conducted twice so as to help in identification of areas that required additional consideration and further review. In complimenting content analysis, the data was further analyzed in aggregates and findings presented in frequencies so as to broadly enable the researcher identify the most common themes and responses from the respondents.

The analysis of the key informant participants by their role categories was conducted and the result presented in the pie chart figure below. The key informants that participated in the interview included; one Senior Medical Officer, one Administrator and two Deputy Chief Nurses.



Key Informants' responses for each question

The responses to the questions posed to the interviewees were analyzed and summarized in table form. In each table and for each question, responses provided by two or more key informants were listed as common themes while those that were provided by only one interviewee were categorized as other responses.

Table 17 **Use of ICT in provision of healthcare**

Question: Does the hospital employ the use of ICT in provision of healthcare to patients?		
Response	**Count**	**%**
Yes	4	100
Common themes (Response from two or more Informants)		
1. ICT is mostly if not always used in consulting with patients.	2	50%
2. ICT is always used in provision of laboratory services.	4	100%
3. ETP technology is mostly used in transfer of drug prescriptions.	3	75%
4. In radiology, ICT is used mostly in interpretation of images.	3	75%
5. Major and minor surgeries are always supported by ICT infrastructure.	4	100%
Other response		
6. Electronic recording of patient health information		

Table 18 **Use of telehealth technologies in provision of healthcare.**

Question: Do you use telehealth technologies to provide healthcare to access, diagnose, and communicate with offsite individuals like patients and other healthcare providers?

Response	Count	%
Yes	4	100
Common themes (Response from two or more Informants)		
1. Telemedicine infrastructure is installed	4	100%
2. Technologies such as: email, video and audio conferencing are used daily	3	75%
3. The installed infrastructure isn't fully operational.	2	50%
Other response		
4. Telemedicine has been averagely adopted		
5. Not all healthcare practitioners are familiar with the system		

Table 19 **Determinants influencing decision to accept and adopt telemedicine technology.**

Question: In your opinion, what are the main determinants influencing healthcare practitioners' decision to accept and adopt telemedicine technologies?

Response	Count	%
Yes	4	100
Common themes (Response from two or more Informants)		
1. Usefulness of the technology.	3	75%
2. Cost	2	50%
3. Ease of adopting	2	50%
4. Implementation planning and strategy	4	100%
Other response		
5. Individual attitude towards technology		
6. Government e-health policy		

Table 20 **Challenges of using telemedicine in patient care.**

Question: In your opinion, what are the challenges of using telemedicine in patient care?

Response	Count	%
Yes	4	100
Common themes (Response from two or more Informants)		
1. Poor integration with the present hospital systems.	2	50%
2. Lack of awareness of telemedicine services.	3	75%
3. Lack of technical skills by both patients and health practitioners.	4	100%
4. Telemedicine technology is expensive	3	75%
5. Inadequate telemedicine training	4	100%
Other response		
6. Improper reimbursement models for use of telemedicine		
7. Lack of comprehensive strategies and national e-health policies		
8. Concerns over privacy patient data		

Table 21 **Sustainability of telemedicine systems for patient care**

Question: In your opinion, is it sustainable for the hospital to use ICT systems for patient care and administrative functions within the hospital?

Response	Count	%
Yes	4	100
Common themes (Response from two or more Informants)		
1. Improving IT literacy will assist achieve sustainability	4	100%
2. Increasing budgetary allocation to technology will ensure sustainability	4	100%
3. KNH has the capacity to sustain use of ICT	3	75%

Table 22 **Recommendations**

Question: In your opinion, what should the government and relevant stakeholders do to ensure success of telemedicine?

Response	Count	%
Yes	4	100
Common themes (Response from two or more Informants)		
1. Increase allocation of resources towards telemedicine implementation	2	50%
2. Create awareness	4	100%
3. Come up with proper implementation strategies and planning	3	75%
4. Conduct public participation with the relevant parties prior to implementation	3	75%
5. Provide adequate training	4	100%
Other response		
6. Deploy efficient and effective telemedicine technology		

CHAPTER FIVE: SUMMARY OF FINDINGS, CONCLUSION AND RECOMMENDATIONS

5. 1 Overview

This chapter of the research aims at summarizing the research and its findings, draw conclusions based on the findings and offer recommendations. The core purpose, objectives, research methods and analysis results are briefly discussed and presented systematically as guided by the set objectives and research questions. The chapter finalizes by providing suggestions for further studies.

5. 2 Summary of Findings

The importance of telemedicine has been highlighted throughout the literature especially as emphasized by the Institute of Medicine (2012), who observed that telemedicine has a wide range of applications which include; remotely conducting videoconferences between doctors and patients, remotely monitoring key signs, electronic sharing of medical records and in special cases such as tele-rehabilitation or remote surgery. WHO (2019) adds that owing to telemedicine's overwhelming evidence on the benefits, applicability, viability, sustainability, clinical usefulness and scalability in provision of healthcare in Kenya, its adoption by healthcare practitioners, will see the country rip a lot of benefits especially in achieving Universal Health Coverage. The ability of delivering healthcare services to patients despite their geographical locations will enable the government to achieve improved equitable access to health services by all Kenyans at a generally reduced cost which is UHC's goal

5.2.1 Adoption of telemedicine

Since adoption of telemedicine formed the response variable of this study, it was important that the current status of telemedicine use at KNH was investigated alongside other factors that might have influenced the healthcare practitioners' decision to accept telemedicine and the possible reasons for not using telemedicine technology. From the findings, 52.7% of the respondents admitted to using telemedicine systems at KNH while 47.3% did not. This indicated that majority of healthcare practitioners at KNH had embraced telemedicine. However, still a significant percentage had not yet embraced telemedicine and those that did, used it quite a bit.

This finding was further backed by response from a key informant who when asked about status of use of telehealth technologies at KNH responded by saying;

"*The facility installed telemedicine infrastructure long ago, probably in 2010 when it's pilot was done. However, the system isn't fully operational. This technology hasn't been fully embraced and put to use".*

The analysis revealed that most frequently used telemedicine technologies at KNH included; e-mail, video and audio conferencing and mobile diagnosis technologies through smartphone apps. Other technologies minimally used included; wireless technologies, data monitoring technologies such as health monitoring smart watches and internet-based technologies. These technologies together with other ICT infrastructures were jointly used in provision of doctor-patient consultations, laboratory services, electronic transfer of drug prescriptions (ETP), interpretation of images in radiology, and general support of minor and major surgery procedures.

Further investigation into the possible reasons for the current average rate of adoption and use of these technologies, revealed that lack of computer literacy and technical know-how were amongst other factors, significant contributors to this phenomenon. Majority of healthcare practitioners at KNH were found to be averagely computer literate and only a few had attended telemedicine trainings. Some further indicated complexity of the proposed technologies and undemonstrated usefulness of the technology as contributing factors. It is assumed that the more complex a technology is, the lesser the chances of its adoption. This seems to be the case at KNH following a response from a key informant who stated;

"The planners should have considered both patients' and clinicians' opinions on the devices/systems they're comfortable with when using telemedicine services."

Lastly, costs attached to adoption of telemedicine technology and improper implementation plan and strategy, were possible reasons for not using telemedicine. Poor planning and strategizing lead to poor integration of the technology with the existing hospital systems which severely flaws the workflow and lead to inefficiency and ineffectiveness. Furthermore, an expensive technology isn't sustainable in the long run.

5.2.2 Perception of ease of use

As stated in the literature on the earlier chapters, it is assumed that the easier\less complex a technology is to use, the higher the chances of its adoption and consistent use by the users the technology is intended for. This makes this factor key whenever investigating adoption of a technology. Analysis conducted on key informants' data indicated ease of use as one of the determinants influencing decision to accept and adopt telemedicine technologies by clinicians. Furthermore, lack of technical know-how and enough training were identified as common themes on challenges of using telemedicine. These three factors seemed to have a

direct linear relationship. It was assumed that lack of enough telemedicine training directly resulted to lack of adequate technical skills which in-turn lead to difficulty in using the technology hence the average rate of adoption. Further investigation was done by use of inferential analysis which checked for existing correlation between different measures of perceived ease of use and adoption of telemedicine. From the analysis, both measures of complexity and user experience were found to have a weak negative correlation with adoption of telemedicine. However, only user experience was found to have a significant relationship with adoption of telemedicine as it was estimated to have a p-value of less than 0.05. Since both measures had a correlation and at least one of the measures had a significant relationship with the response variable, it was therefore evident that to some extent, perceived ease of use influence adoption of telemedicine by healthcare practitioners.

5.2.3 Perception of usefulness

Usefulness of a technology, goes a long way to influence the behavioral intentions of a user to adopt and use the technology. Perceived usefulness could be defined as the subjective probability that when a specific technology has been used to complete a task, efficiency and effectiveness is enhanced. Therefore, usefulness of a technology has a direct influence on choice of acceptance and subsequent adoption. In this study, two different measures were used to test the influence of this factor on adoption of telemedicine by clinicians. Both measures were found to have a positive weak correlation with adoption of telemedicine as they both had a statistically significant relationship with the response variable having registered p-values of less than 0.05 (5%). This meant that more than 95% of the variations in the choice of adopting /using telemedicine could be attributed to the two measures of perceived usefulness. Therefore, it was concluded that perceived usefulness of telemedicine technology had an influence on its adoption by healthcare practitioners.

5.2.4 User attitude and personality

These could be defined as the way an individual thinks, see and respond to certain events or situations. In the past, human behavior has been measured by these two factors. These two factors were therefore important for this study in understanding their influence on decision to adoption of telemedicine technology by clinicians. From the analysis in chapter four, both measures of attitude and personality had a weak correlation with the response variable. Therefore, it could be concluded that to some extent these factors had an influence on adoption of telemedicine. Moreover, analysis on key informants' data exclusively revealed that individual user attitude towards a technology had an impact on its acceptance and adoption by the individual.

5.3 Conclusions

From the above research summary, it could be concluded that telemedicine technology has been averagely adopted at Kenyatta National Hospital. However, still a good percentage of clinicians haven't yet accepted nor adopted to these technologies and therefore there is still a big gap on telemedicine adoption levels that should be filled. User-specific factors of perceived ease of use, usefulness and individual user attitude and personality were found to have an influence on the choice of telemedicine adoption by the healthcare practitioners.

5.4 Recommendations

The following recommendations were made as ways that can be used to increase the level of adoption of telemedicine technologies:

The hospital administration should offer adequate training to clinicians so as to improve on their level of IT literacy and technical know-how which would make it easy to adopt and use new technologies. Furthermore, planners should consider both the patients' and clinicians' opinions on the devices/systems they are comfortable with when using telemedicine services. This will ensure that the telemedicine technology deployed is easy to use. Additionally, the promoters of the technologies should purpose to demonstrate to the users the benefits and usefulness of the technology. This will go a long way to positively influence the users' choice of acceptance and adoption of the technology. The technology deployed should be one that guarantees efficiency and effectiveness in workflow.

Further, awareness on telemedicine technology should be created to both patients and healthcare practitioners. This will ensure that the existence of this technology is known to all the stakeholders. The policy and infrastructural implementors should come up with proper implementation plan and strategies that will ensure proper integration of the new technology and the existing hospital systems so as to enhance scalability and operationalization of the system. Lastly, both the government and hospital administrations should purpose to increase the resources deployed for implementation of telemedicine systems and be complemented with development of good government e-health national policies.

5.5 Suggestions for Further Studies

1. Factors determining the adoption of telemedicine in healthcare delivery for non-medical practitioners, care givers and patients;

2. The impact of telemedicine on information/data protection and rights in Kenya;
3. Role of telemedicine in doctor-patient communication especially for Non-Communicable and infectious Diseases in Kenya; and
4. This study used only two measures in measuring the effect of each factor on the response variable, studies should be conducted using more measures for each of the factors under investigation. This will assist in better generalizing the effects of the factor under investigation on the response variable.

REFERENCES

Abowitz, D. A., & Toole, T. M. (2010). Mixed method research: Fundamental issues of design, validity, and reliability in construction research. *Journal of construction engineering and management*, *136*(1), 108-116.

Al Agha, K., Bertin, M. H., Dang, T., Guitton, A., Minet, P., Val, T., & Viollet, J. B. (2009). Which wireless technology for industrial wireless sensor networks? The development of OCARI technology. *IEEE Transactions on Industrial Electronics*, *56*(10), 4266-4278.

Attia, A. (2005). Why should researchers report the confidence interval in modern research? *Middle East Fertil Soc J*, *10*(1), 78-81.

Baker, J., & Stanley, A. (2018). Telemedicine technology: a review of services, equipment, and other aspects. *Current allergy and asthma reports*, *18*(11), 1-8.

Barasa, Edwine, Peter Nguhiu, and Di McIntyre. "Measuring progress towards sustainable development goal 3.8 on universal health coverage in Kenya." *BMJ global health* 3, no. 3 (2018).

Bashshur, R., Shannon, G., & Sapci, H. (2005). Telemedicine evaluation. *Telemedicine Journal & e-Health*, *11*(3), 296-316.

Beckman, H., Kaplan, S. H., & Frankel, R. (1989). Outcome based research on doctor-patient communication: A review. *Communicating with medical patients*, 223-227.

Benschoter, R. A., Eaton, M. T., & Smith, P. (1965). Use of videotape to provide individual instruction in techniques of psychotherapy. *Academic Medicine*, *40*(12), 1159-61.

Bodenheimer, T., & Grumbach, K. (2003). Electronic technology: a spark to revitalize primary care. *Jama*, *290*(2), 259-264.

Britten-Jones, M. (1999). The sampling error in estimates of mean-variance efficient portfolio weights. *The Journal of Finance*, *54*(2), 655-671.

Chau, P. Y. (1996). An empirical assessment of a modified technology acceptance model. *Journal of management information systems*, *13*(2), 185-204.

Chen, K., & Chan, A. H. (2011). A review of technology acceptance by older adults. *Gerontechnology*.

Cochran, WG (1963): Sampling Techniques, 2nd Ed., New York: John Wiley and Sons, Inc.

Cole, S. L., Grubbs, J. H., Din, C., & Nesbitt, T. S. (2012). Rural inpatient telepharmacy consultation demonstration for after-hours medication review. *Telemedicine and e-Health*, *18*(7), 530-537.

Craig, J., & Petterson, V. (2005). Introduction to the practice of telemedicine. *Journal of telemedicine and telecare*, *11*(1), 3-9.

Creswell, J. W. (2013). Steps in conducting a scholarly mixed methods study. *Digital commons.*

Cukor, P., Baer, L., Willis, B. S., Leahy, L., O′ LAUGHLEN, J. O. H. N., Murphy, M., ... & Martin, E. (1998). Use of videophones and low-cost standard telephone lines to provide a social presence in telepsychiatry. *Telemedicine Journal*, *4*(4), 313-321.

Currell, R., Urquhart, C., Wainwright, P., & Lewis, R. (2000). Telemedicine versus face to face patient care: effects on professional practice and health care outcomes. *Cochrane Database of Systematic Reviews*, (2).

Davis, F.D. (1989), "Perceived usefulness, perceived ease of use, and user acceptance of information technology", MIS Quarterly, Vol. 13, No. 3, pp. 319-340.

Denzin, N. K., & Lincoln, Y. S. (Eds.). (2011). *The Sage handbook of qualitative research*. sage.

Doolittle, G. C., & Allen, A. (1997). Practising oncology via telemedicine. *Journal of Telemedicine and Telecare*, *3*(2), 63-70.

Ekeland, A. G., Bowes, A., & Flottorp, S. (2012). Methodologies for assessing telemedicine: a systematic review of reviews. *International journal of medical informatics*, *81*(1), 1-11.

Elford, R., White, H., Bowering, R., Ghandi, A., Maddiggan, B., & John, K. S. (2000). A randomized, controlled trial of child psychiatric assessments conducted using videoconferencing. *Journal of Telemedicine and Telecare*, *6*(2), 73-82.

Falana, M. Y. D. M. Garment Making: A Way Forward To Sustainable Development Of Individuals.

George, S. M., Hamilton, A., & Baker, R. (2009). Pre-experience perceptions about telemedicine among African Americans and Latinos in south central Los Angeles. *Telemedicine and e-Health*, *15*(6), 525-530.

Gordon, H. L., Hoeber, M., & Schneider, A. (2012). Telepharmacy in a rural Alberta community cancer network. *Journal of Oncology Pharmacy Practice*, *18*(3), 366-376.

Grigsby, J., Brega, A. G., & Devore, P. A. (2005). The evaluation of telemedicine and health services research. *Telemedicine Journal & e-Health*, *11*(3), 317-328. Grigsby, J., Brega, A. G., & Devore, P. A. (2005). The evaluation of telemedicine and health services research. *Telemedicine Journal & e-Health*, *11*(3), 317-328.

Haug, M. R., & Lavin, B. (1983). Consumerism in medicine: Challenging physician authority.

Heale, R., & Twycross, A. (2015). Validity and reliability in quantitative studies. *Evidence-based nursing*, *18*(3), 66-67.

Hersh, W. R., Hickam, D. H., & Erlichman, M. (2006). * The evidence base of telemedicine: overview of the supplement. *Journal of telemedicine and telecare*, *12*, 1.

Hjelm, N. M. (2005). Benefits and drawbacks of telemedicine. *Journal of telemedicine and telecare*, *11*(2), 60-70.

Hjelm, N. M. (2005). Benefits and drawbacks of telemedicine. *Journal of telemedicine and telecare*, *11*(2), 60-70.

Hu, P. J., Chau, P. Y., Sheng, O. R. L., & Tam, K. Y. (1999). Examining the technology acceptance model using physician acceptance of telemedicine technology. *Journal of management information systems*, *16*(2), 91-112.

Jennett, P., Jackson, A., Healy, T., Ho, K., Kazanjian, A., Woollard, R., ... & Bates, J. (2003). A study of a rural community's readiness for telehealth. *Journal of Telemedicine and telecare*, *9*(5), 259-263.

Kaushal, Rainu, David Blumenthal, Eric G. Poon, Ashish K. Jha, Calvin Franz, Blackford Middleton, John Glaser et al. "The costs of a national health information network." *Annals of Internal Medicine* 143, no. 3 (2005): 165-173.

Kavanagh, S. J., & Yellowlees, P. M. (1995). Telemedicine--clinical applications in mental health. *Australian Family Physician*, *24*(7), 1242-1247.

Kay, M. Santos, J. & Takane, M. (2010). Telemedicine Opportunities and developments in Member States: Report on the second global survey on eHealth. Global Observatory for eHealth Series - Volume 2. Geneva, Switzerland; World Health Organization.

Kenyatta National Hospital. (2018, June). Annual Report and Financial Statements, 2017 report. *https://knh.or.ke/publications/financial/KNHANN~1.PDF*

Kothari, A., Edwards, N., Hamel, N., & Judd, M. (2009). Is research working for you? Validating a tool to examine the capacity of health organizations to use research. *Implementation Science*, *4*(1), 1-9.

Krupinski, E. A., & Bernard, J. (2014, March). Standards and guidelines in telemedicine and telehealth. In *Healthcare* (Vol. 2, No. 1, pp. 74-93). Multidisciplinary Digital Publishing Institute.

L. Roter, D., & A. Hall, J. (1991). Health education theory: an application to the process of patient-provider communication. *Health Education Research*, *6*(2), 185-193.

Leung ST, Kaplan KJ. Medicolegal aspects of telepathology. Hum Pathol 2009; 40:1137-1142.

Macharia, L. W., Mureithi, M. W., & Anzala, O. (2018). Cancer in Kenya: types and infection-attributable. Data from the adult population of two National referral hospitals (2008-2012). *AAS Open Research*, *1*.

Markus, M. L., & Keil, M. (1994). If we build it, they will come: Designing information systems that people want to use. *MIT Sloan Management Review*, *35*(4), 11.

Marshall, C., Rossman, G. (2016). Designing qualitative research (5. ed.). Thousand Oaks.

Mathieson, K. (1991). Predicting user intentions: comparing the technology acceptance model with the theory of planned behavior. *Information systems research*, *2*(3), 173-191.

McGuire, S. (2012). Institute of Medicine. 2012. Accelerating progress in obesity prevention: solving the weight of the nation. Washington, DC: the National Academies Press. *Advances in nutrition*, *3*(5), 708-709.

Mechanic, R., Coleman, K., & Dobson, A. (1998). Teaching hospital costs: implications for academic missions in a competitive market. *Jama*, *280*(11), 1015-1019.

Medicare Payment Advisory Commission, & Book, A. D. (2012). Healthcare spending and the Medicare program. *Washington, DC: MedPAC*.

MINISTRY OF HEALTH – REPUBLIC OF KENYA. (2019, January). UHC Policy Brief. https://www.health.go.ke/wp-content/uploads/2019/01/UHC-QI-Policy-Brief.pdf

Moser, P. L., Hauffe, H., Lorenz, I. H., Hager, M., Tiefenthaler, W., Lorenz, H. M., ... & Kolbitsch, C. (2004). Publication output in telemedicine during the period January 1964 to July 2003. *Journal of telemedicine and telecare*, *10*(2), 72-77.

Mucic, D. (2008). International telepsychiatry: a study of patient acceptability. *Journal of Telemedicine and Telecare*, *14*(5), 241-243.

Parahoo, K. (2001). Research utilization among medical and surgical nurses: a comparison of their self reports and perceptions of barriers and facilitators. Journal of Advanced Nursing, 9, 21- 30.

Peersman, G. (2014) Overview: Data Collection and Analysis Methods in Impact Evaluation, Methodological Briefs: Impact Evaluation 10, UNICEF Office of Research, Florence.

Perna, G. (2013). The promise of mobile: connecting to underserved populations. *Healthcare informatics: the business magazine for information and communication systems*, *30*(5), 12-14.

Resnik, D. B. (2007). Responsibility for health: personal, social, and environmental. *Journal of medical ethics*, *33*(8), 444-445.

Saga, V. L., & Zmud, R. W. (1994). The nature and determinants of IT acceptance, routinization, and infusion. Levine L, ed. Diffusion, Transfer and Implementation of Information Technology.

Sathian, B., Nagaraja, S. B., Banerjee, I., Sreedharan, J., De, A., Roy, B., ... & Menezes, R. G. (2014). Awareness of breast cancer warning signs and screening methods among female residents of Pokhara valley, Nepal. *Asian Pacific journal of cancer prevention*, *15*(11), 4723-4726.

Saunders, H., Stevens, K. R., & Vehviläinen-Julkunen, K. (2016). Nurses' readiness for evidence-based practice at Finnish university hospitals: a national survey. *Journal of Advanced Nursing*, *72*(8), 1863-1874.

Shamoo, A. E., & Resnik, D. B. (2009). *Responsible conduct of research*. Oxford University Press.

Shorten, A., & Smith, J. (2017). Mixed methods research: expanding the evidence base.

Singh, A. S., & Masuku, M. B. (2014). Sampling techniques & determination of sample size in applied statistics research: An overview. *International Journal of economics, commerce and management*, *2*(11), 1-22.

Sood, S. P., Negash, S., Mbarika, V. W., Kifle, M., & Prakash, N. (2007). Differences in public and private sector adoption of telemedicine: Indian case study for sectoral adoption. *Studies in health technology and informatics*, *130*, 257.

Sudman, Seymour. 1976. Applied Sampling. New York: Academic Press.

Suzuki, R., Otake, S., Izutsu, T., Yoshida, M., & Iwaya, T. (2006). Monitoring daily living activities of elderly people in a nursing home using an infrared motion-detection system. *Telemedicine Journal & e-Health*, *12*(2), 146-155.

Szasz, T. S., & Hollender, M. H. (1956). A contribution to the philosophy of medicine: the basic models of the doctor-patient relationship. *AMA archives of internal medicine*, *97*(5), 585-592.

Tachakra, S., & Rajani, R. (2002). Social presence in telemedicine. *Journal of Telemedicine and Telecare*, *8*(4), 226-230.

Taherdoost, H. (2016). Sampling methods in research methodology; how to choose a sampling technique for research. *How to Choose a Sampling Technique for Research (April 10, 2016)*.

The DHS Program. (2015, July). Kenya Demographic and Health Survey, 2014 survey. https://dhsprogram.com/pubs/pdf/fr308/fr308.pdf

Venkatesh, V., & Davis, F. D. (2000). A theoretical extension of the technology acceptance model: Four longitudinal field studies. *Management science*, *46*(2), 186-204.

Volkert, S. E. (2000). Telemedicine: Rx for the future of health care. *Mich. Telecomm. & Tech. L. Rev.*, *6*, 147.

Waitzkin, H. (1991). *The politics of medical encounters: How patients and doctors deal with social problems*. Yale University Press.

Wellington, J. (2000). Educational research: Contemporary issues and practical approaches. London: Continuum.

Whitten, P. S., & Mackert, M. S. (2005). Addressing telehealth's foremost barrier: provider as initial gatekeeper. *International journal of technology assessment in health care*, *21*(4), 517-521.

WHO | World Health Organization. (2019, July16). Universal health coverage. https://www.who.int/health-topics/universal-health-coverage#tab=tab_1

Wisdom, J., & Creswell, J. W. (2013). Mixed methods: integrating quantitative and qualitative data collection and analysis while studying patient-centered medical home models. *Rockville: Agency for Healthcare Research and Quality*.

World Health Organization. (2010). Telemedicine: opportunities and developments in member states. Report on the second global survey on eHealth. https://www.who.int/goe/publications/goe_telemedicine_2010.pdf.

Wotton, R. (2012). Twenty years of telemedicine in chronic disease management – An evidence synthesis. *Journal of Telemedicine and Telecare*, **18**, 211– 220.

APPENDICES

Appendix I: Consent form/ Letter of Introduction

UNIVERSITY OF NAIROBI (UoN)
COLLEGE OF HEALTH SCIENCES
P O BOX 19676 Code 00202
Telegrams: varsity
(254-020) 2726300 Ext 44355

KNH-UoN ERC
Email: uonknh_erc@uonbi.ac.ke
Website: http://www.erc.uonbi.ac.ke
Facebook: ttps://www.facebook.com/uonknh.erc
Twitter: @UONKNH_ERC
ttps://twitter.com/UONKNH_ERC

KENYATTA NATIONAL HOSPITAL (KNH)
P O BOX 20723 Code 00202
Tel: 726300-9
Fax: 725272
Telegrams: MEDSUP, Nairobi

PARTICIPANT INFORMATION AND CONSENT FORM SAMPLE ADULT CONSENT

FOR ENROLLMENT IN THE STUDY

(To be administered in English or any other appropriate language e.g Kiswahili translation)

Title of Study: DETERMINANTS INFLUENCING ADOPTION OF TELEMEDICINE: A CASE STUDY OF KENYATTA NATIONAL HOSPITAL

Principal Investigator\and institutional affiliation: CATHERINE GATETUA - STUDENT

Co-Investigators and institutional affiliation: _____

Introduction:

I would like to tell you about a study being conducted by the above listed researchers. The purpose of this consent form is to give you the information you will need to help you decide whether or not to be a participant in the study. Feel free to ask any questions about the purpose of the research, what happens if you participate in the study, the possible risks and benefits, your rights as a volunteer, and anything else about the research or this form that is not clear. When we have answered all your questions to your satisfaction, you may decide to be in the study or not. This process is called 'informed consent'. Once you understand and agree to be in the study, I will request you to sign your name on this form. You should understand the general principles which apply to all participants in a medical research: i) Your decision to participate is entirely voluntary ii) You may withdraw from the study at any time without necessarily giving a reason for your withdrawal
iii) Refusal to participate in the research will not affect the services you are entitled to in this health facility or other facilities. We will give you a copy of this form for your records.

May I continue? YES / NO

This study has approval by The Kenyatta National Hospital-University of Nairobi Ethics and

Research Committee protocol No. KNH-ERC/RR/186

WHAT IS THIS STUDY ABOUT?

The researchers listed above are interviewing individuals who are either doctors, nurses, or administrators. The purpose of the interview is to find out determinants influencing adoption of telemedicine at KNH. Participants in this research study will be asked questions about factors influencing adoption of telemedicine. Participants will also have the choice to undergo test such as _____.

There will be approximately 196 participants in this study randomly chosen. We are asking for your consent to consider participating in this study.

WHAT WILL HAPPEN IF YOU DECIDE TO BE IN THIS RESEARCH STUDY?

If you agree to participate in this study, the following things will happen:

You will be interviewed by a trained interviewer in a private area where you feel comfortable answering questions. The interview will last approximately 10 minutes. The interview will cover topics such as; personal details, telemedicine adoption levels, influence of various factors to adoption of telemedicine technology.

After the interview has finished***, (explain in details any procedures that are necessary e.g blood draws, counseling etc.)***

We will ask for a telephone number where we can contact you if necessary. If you agree to provide your contact information, it will be used only by people working for this study and will never be shared with others. The reasons why we may need to contact you include: making a follow-up and seeking clarifications pertaining to your interview responses.

ARE THERE ANY RISKS, HARMS DISCOMFORTS ASSOCIATED WITH THIS STUDY?

Medical research has the potential to introduce psychological, social, emotional and physical risks. Effort should always be put in place to minimize the risks. One potential risk of being in the study is loss of privacy. We will keep everything you tell us as confidential as possible. We will use a code number to identify you in a password-protected computer database and will keep all of our paper records in a locked file cabinet. However, no system of protecting your confidentiality can be absolutely secure, so it is still possible that someone could find out you were in this study and could find out information about you.

Also, answering questions in the interview may be uncomfortable for you. If there are any questions you do not want to answer, you can skip them. You have the right to refuse the interview or any questions asked during the interview.

It may be embarrassing for you to have_____We will do everything we can to ensure that this is done in private. Furthermore, all study staff and interviewers are professionals with special training in these examinations/interviews. Also,_____may be stressful (e.g event recalls).

You may feel some discomfort when _____ and you may have a small bruise or swelling in your _____. In case of an injury, illness or complications related to this study, contact the study staff right away at the number provided at the end of this document. The study staff will treat you for minor conditions or refer you when necessary.

ARE THERE ANY BENEFITS BEING IN THIS STUDY?

You may benefit by receiving free_____testing, (list e.g. Counselling, health information etc) . We will refer you to a hospital for care and support where necessary. Also, the information you provide will help us better understand_____. This information is a contribution to science and _____

WILL BEING IN THIS STUDY COST YOU ANYTHING?

(Explain) _____

WILL YOU GET REFUND FOR ANY MONEY SPENT AS PART OF THIS STUDY?

(Enter statement) _____

WHAT IF YOU HAVE QUESTIONS IN FUTURE?

If you have further questions or concerns about participating in this study, please call or send a text message to the study staff at the number provided at the bottom of this page.

For more information about your rights as a research participant you may contact the Secretary/Chairperson, Kenyatta National Hospital-University of Nairobi Ethics and Research Committee Telephone No. 2726300 Ext. 44102 email uonknh_erc@uonbi.ac.ke.

The study staff will pay you back for your charges to these numbers if the call is for study-related communication.

WHAT ARE YOUR OTHER CHOICES?

Your decision to participate in research is voluntary. You are free to decline participation in the study and you can withdraw from the study at any time without injustice or loss of any benefits.

CONSENT FORM (STATEMENT OF CONSENT)

Participant's statement

I have read this consent form or had the information read to me. I have had the chance to discuss this research study with a study counselor. I have had my questions answered in a language that I understand. The risks and benefits have been explained to me. I understand that my participation in this study is voluntary and that I may choose to withdraw any time. I freely agree to participate in this research study.

I understand that all efforts will be made to keep information regarding my personal identity confidential.

By signing this consent form, I have not given up any of the legal rights that I have as a participant in a research study.

I agree to participate in this research study:	**Yes**	**No**
I agree to have (define specimen) preserved for later study:	Yes	No
I agree to provide contact information for follow-up:	Yes	No

Participant printed name: _____

Participant signature / Thumb stamp_____ Date

_____

Researcher's statement

I, the undersigned, have fully explained the relevant details of this research study to the participant named above and believe that the participant has understood and has willingly and freely given his/her consent.

Researcher 's Name:_____Catherine Gatetua_____ **Date**:

_____

Signature: _____

Role in the study:___Principal Investigator_____*[i.e. study staff who explained informed consent form.]*

For more information contact_Catherine Gatetua_____at 0722347790_____from

_____to _____

Witness Printed Name (*If witness is necessary, A witness is a person mutually acceptable to both the researcher and participant*)

Name: _____ Contact information : _____

Signature /Thumb stamp: Date;

_____

Appendix II: Survey Questionnaire

Questionnaire on Assessment of The Role of Telemedicine in Oncology Health Care Delivery

Introduction

Please read each question carefully and respond to it appropriately. Kindly answer all the questions to your utmost ability. All your responses will be kept confidential.

PART ONE: Demographics

1. What is your age? _____
2. What is your Profession?

   Doctor ☐ Nurse ☐ Administrator ☐
3. Kindly tick your gender

   Male ☐ Female ☐
4. Kindly, Indicate your education level

   Primary ☐ Secondary ☐

   College ☐ University ☐

5. How many years of Professional experience do you have? _____

PART TWO: Questions on adoption of telemedicine

6 a) Have you been able to use telemedicine in provision of healthcare to patients before?

Yes ☐ No ☐

b) If Yes, how frequent do you use telemedicine technology for healthcare delivery?

Never ☐ Mostly ☐

Rarely ☐ Always ☐

Quite a bit ☐

7 Have you been invited to a training for telemedicine before? _____

Yes ☐ No ☐

If so, how would you rate the training?

Not Adequate ☐ Adequate ☐ Very Adequate ☐

8 Which types of telemedicine technologies does the hospital use? Tick those applicable.

Video conferencing ☐ Wireless technologies ☐

Audio conferencing ☐ Internet-based technologies ☐

Smartphone Apps ☐ Data monitoring ☐

Email ☐ Mobile Diagnosis ☐

9 How would you rate your computer literacy?

Low ☐ Medium ☐ High ☐

Tick where appropriate in this table to indicate different thoughts on reasons for not utilizing telemedicine for healthcare delivery

12	**Tick where applicable**	**Strongly disagree**	**Disagree**	**Neutral**	**Agree**	**Strongly agree**
a)	Lack of technical know-how					

b)	Lack of adequate training					
c)	Lack of sufficient incentives					
d)	Lack of computer access					
e)	Other					

PART THREE: Questions on user-specific factors that influence adoption of telemedicine.

(Perceived ease of use, usefulness and user attitude and personality)

13	**Please tick where applicable**	**Strongly disagree**	**Disagree**	**Neutral**	**Agree**	**Strongly agree**
a)	Telemedicine systems are complex to use					
b)	Interacting with telemedicine is frustrating					
c)	Telemedicine has the potential of improving healthcare delivery					
d)	Telemedicine has more merits than demerits as compared to manual systems of healthcare delivery					
e)	Telemedicine is likely to cause loss of jobs					
f)	I would learn how to use telemedicine as a way of contributing to organizational goal					

Thank you for your cooperation

END

Appendix III: Interview schedule

Introduction

Please read each question carefully and respond to it appropriately. Kindly answer all the questions to your utmost ability. All your responses will be kept confidential.

Section A: Background Information

1. Gender

   Male ☐ Female ☐

2. What is your Profession

   ☐ Doctor

   ☐ Nurse

   ☐ Administrator

3. Years of professional experience in current position? _____

Section B: Telemedicine Services

4. Does the hospital employ the use of ICT in provision of healthcare? Yes ☐ No ☐

   If yes, in which areas and how frequent? Please tick where applicable in the table below.

Area of application	**Not Applicable**	**Never**	**Seldom**	**Quite a bit**	**Mostly**	**Always**
Patient Consultations/telenursing						
Drug prescription/ telepharmacy						
Radiology						
Laboratory						
Minor surgery						
Major surgery						

Any other area, (Kindly Specify) ……						

5. a) Do you use telehealth technologies to provide healthcare to access, diagnose and communicate with offsite individuals like patients and other healthcare providers?

   Yes ☐ No ☐

   b) If yes, which telemedicine modalities do you use in order to support patient care and how often? Please tick where applicable in the table below.

Telemedicine modality	**Not Applicable**	**Never**	**Seldom**	**Quite a bit**	**Mostly**	**Always**
Video conference						
Remote patient monitoring						
Mobile health apps (mHealth)						
Telephone calls						
Secure messaging						
Any other area, (Kindly Specify) ……						

6. In your opinion, what are the main determinants influencing healthcare practitioners' decision to accept and adopt telemedicine technology?
7. In your opinion, what are the challenges of using telemedicine in patient care?
8. What are the adoption levels of the use of telemedicine systems for healthcare delivery in the hospital? ☐ Low ☐ Average ☐ High

9. In your opinion, is it sustainable for the hospital to use ICT systems for patient care and administrative functions within the hospital?
10. a) In your opinion, are there enough resources dedicated to the implementation of telemedicine in healthcare delivery?
    b) If not, what should the government and stakeholders improve on so as to ensure the success of telemedicine and would best assist you as a healthcare practitioner in using telehealth to provide patient care
11. What are the issues regarding the cultural awareness of telehealth experienced in your practice?

……..

…….....

Thank you for your cooperation

END

Appendix IV: Plan of Activities

ACTIVITY	2021		2022										
	Oct	Nov	Jan	Feb	Mar	Apr	May	June	July	Aug	Sep	Oct	Nov
Application for ERC Approval and awaiting reviews													
Working on 1st reviewers' comments and resubmission													
Working on 2nd reviewers' comments and resubmission													
Data collection at KNH													
Data analysis and findings report writing													
Presentation of research findings and working on supervisor comments and submission for examination													

Source: Researcher, 2022

Appendix V: Budget

No	Item	Description	Cost
1	Research Proposal	Internet browsing for literature	2,000
		Proposal typesetting (50 pages @ 40/=)	2,000
		Printing (50 pages @ 10)	500
2	Stationery	-	1000
3	Data Collection	Questionnaire printing	10,000
		Travelling expenses	5,000
		Meal expenses	5,000
		Communication expenses	5,000
		Research assistant	10,000
		Miscellaneous	3,000
5	Data analysis	Software expenses	3,000
7	Contingencies	-	5,000
ss8	**Total**		**51,500**

Source: Researcher, 2022