

**TELEMEDICINE AS A DISRUPTER IN HEALTHCARE  
MANAGEMENT IN KENYA**

**BY**

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**UNITED STATES INTERNATIONAL UNIVERSITY- AFRICA**

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**TELEMEDICINE AS A DISRUPTER IN HEALTHCARE  
INDUSTRY IN KENYA**

**BY**

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**A Research Project Submitted to the Chandaria School of  
Business in Partial Fulfillment of the Requirement for the Degree  
of Masters in Business Administration (MBA)**

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## STUDENT'S DECLARATION

I, the undersigned, declare that this is my original work and has not been submitted to any other college, institution or university other than the United States International University-Africa for academic credit.

**Signed:** \_\_\_\_\_

**Date:** \_\_\_\_\_

Maureen Wangui Kangethe (ID 651432)

This research project has been presented for examination with my approval as the appointed supervisor.

**Signed:** \_\_\_\_\_

**Date:** \_\_\_\_\_

Prof. Peter M. Lewa

**Signed:** \_\_\_\_\_

**Date:** \_\_\_\_\_

**Dean Chandaria School of Business**

## **ABSTRACT**

The general objective of this study was to analyze telemedicine as a disruption in healthcare industry in Nairobi County by critically analyzing the service effectiveness, cost effectiveness and whether telemedicine improves accessibility of healthcare. This study was guided by the following objectives: To investigate service effectiveness of the use of telemedicine to facilitate the delivery of health care interventions and consultations in Nairobi County; To investigate the cost-effectiveness of the use of telemedicine to facilitate the delivery of health care interventions and consultations in Nairobi County; To investigate whether telemedicine improves accessibility of healthcare in Nairobi County.

This study used survey design to analyze telemedicine as a disrupter in healthcare management in Kenya. The total population of this study was the 40 public and private hospitals in Nairobi County. The study targeted the hospital management with one manager chosen from each hospital to make 40 managers. We interviewed 10 patients and doctors who use telemedicine from each of the 40 hospitals. The target population therefore was 440 respondents. Using convenience sampling, the sample was 120 respondents, which was 20% of the 400 patients.

The study findings revealed that there was service effectiveness on the use of telemedicine facilitates in the delivery of health care interventions and consultations in Nairobi County. Home exercise program, telephonic exercise monitoring are some of telemedicine aspects that enhances the effectiveness of delivery of health care. Telemedicine leads to a significant reduction in hospital costs and there are substantial savings in travel costs. It significantly lowers outpatient and emergency visits and there is significant reduction in mortality. The findings led to conclusion that telemedicine improves accessibility of healthcare in Nairobi County. Telemedicine makes the patient get subscription on time and the doctor attends to him in real time. The technology promotes a healthier lifestyle and enhances quality of life, mortality and heart failure-related reducing the risk of all-cause. Telemedicine reduces hospitalisations and improves health outcomes' and increases quality of life. The hospital management should sensitize the patients on the positive effect of the use of telemedicine. This can be done through meetings in the hospitals and public barazas that will educate them on the advantages of telemedicine.

The study finding will be of importance in providing an insight on attitude of doctors towards telemedicine and the extent of adoption of telemedicine in hospitals in Kenya. The research also provides an understanding on factors that influence adoption of telemedicine and its influence on health management. The findings benefits hospital administrators, doctors and other institutions that may want to implement telemedicine in Kenya.

The government and other policy makers will also benefit from the findings of this study. Other researchers can also use the findings in their research works or carry out more research based on the research limitations. The research contributes knowledge to the technology acceptance model by determining how perceived ease of use and perceived benefits of telemedicine influence attitude of doctors towards telemedicine.

Study only focused on the influence of three aspects on the use of telemedicine among public and private hospitals in Nairobi County; service effectiveness, cost-effectiveness and accessibility of healthcare so another study should be done on other aspects. This study only focused on hospitals in Nairobi County, Kenya, therefore another study should be done focusing on hospitals in other counties in Kenya.

## **ACKNOWLEDGEMENT**

To my family and friends, I am truly indebted to you for the support you have given me this far. I would also like to acknowledge my supervisor Prof. Peter Lewa for the guidance during the development of this project.

## **DEDICATION**

I dedicate this project to my dear family and friends who greatly motivated me. Special gratitude to my dear mother for her words of encouragement and push for tenacity ring in my ears.

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## **ACRONYMS AND ABBREVIATIONS**

<b>ICT</b>	: Information Communication Technology
<b>IDT</b>	: Innovation Diffusion Theory
<b>NESAC</b>	: North Eastern Space Applications Centre
<b>SPSS</b>	: Statistical package for social sciences
<b>WHO</b>	: World health organization

## CHAPTER ONE

### 1.0 INTRODUCTION

#### 1.1 Background of the Problem

Telemedicine refers to the process through which doctors can provide healthcare to patients located in distant areas through the use of Information Communication Technology (ICT) (Isabaliya, 2011). Tachakra (2003) defined telemedicine as delivery of healthcare across geographic separation by the use of telecommunication and computers. He further explained that telemedicine has the ability to increase access to care for rural areas or areas underserved by healthcare specialists; enhance the quality of care and improve access to medicine education.

According to World Health Organization WHO (2010), telemedicine means healing as a distance. World Health Organization WHO (2010) broadly defines telemedicine as the delivery of healthcare services where distance is critical by healthcare professionals using Information and Communication Technology for the exchange of valid information for diagnosis, treatment and prevention of disease. It includes patients' consultations via video conferencing, electronic transmission of patient still images, patient portals, remote monitoring of patient vital signs and electronic transmission of patient's medical information to distant locations for specialist doctors to review and provide diagnostic reports or second opinion.

Telecommunication can either be "store and forward" or real-time (Duncan & Sally, 2012). Store and forward telemedicine does not require real-time interaction between the doctor and the patient. In this case, the medical data of the patient such as lab tests and radiology images can be captured and transmitted electronically to the specialist doctor in a distant location. The specialist doctor reviews the medical data at a convenient time and sends the assessment electronically back to the facility where the patient visited. Store and forward telemedicine does not require the presence of the patient and the doctor at the same time (Duncan & Sally, 2012).

Research done in Maryland by Craig (2013) showed that most hospitals use telemedicine for consultations and imaging, but telemedicine is also used in diagnostics, monitoring and emergency. Telemedicine consultations provide care to patients or advice to other medical providers that involves client of the service is situated at a far location from that of the supplier. Telemedicine services are offered by hospitals or large medical groups that employ a diverse collection of experts and highly experienced medical and healthcare specialists. The specialists communicate with patients or providers at physically separate locations using a variety of communications and information technologies to exchange medical information. These technologies may range from complex live, interactive videoconferencing equipment and associated devices to simple image capture and transmission devices for storage and review of medical information. The specialist examines the patient's medical information, orders for additional diagnostic tests if necessary and provides direct treatment. Sometimes the specialist may not provide direct treatment but instead creates a consultation report for the referring physician.

Since telemedicine projects are expensive to implement (Khan, Varghese, Wootton & Gray, 2007), the source of funding for these projects should be greatly taken into account before the actual implementation for longevity (LeRouge, Tulu & Forducey, 2010). The costs involved include: setting up a reliable telemedicine link (Martínez, Villarroel, Seoane & Pozo, 2004; Strehle & Shabde, 2006), purchasing and maintaining telemedicine equipment (Alverson et al., 2004) and training personnel (Menachemi, Burke & Ayers, 2004; Herzlinger, 2006). Out of the three mentioned costs, ICT costs represent a significant proportion of the total cost of a telemedicine project (Harnett, 2006).

However, it is argued that ICT costs are falling due to increased competition in the telecommunications industry (Lamminen, 1999). These cost reductions are likely to facilitate telemedicine execution especially in developing countries which already face difficulties in funding the projects. However, the cost of acquiring, installing and maintaining a telemedicine system is also high therefore, a sustainable approach to funding telemedicine projects is essential (Al-qirim, 2005). According to Aas (2007), organisations wishing to go

further with pilot projects after the initial external funding is no longer available can focus on measures such as collaboration with other organisations.

Product diversity in healthcare sector is a major challenge to implementation of telemedicine in developing countries. This is because with constant advances of ICT, all devices to be used at the hub and spoke site have to be kept to date to enable interoperability. Although ICT has a tremendous potential for improving healthcare, rural areas of many developing countries have poor ICT network (Martínez et al., 2004). In addition, a long-term viability of ICT in rural areas of developing countries has to be considered in an attempt to enable the adoption and diffusion of telemedicine.

However, failure of organisation's administration to accept the new technologies has also hindered the speed of adoption of telemedicine technology in developing countries. According to Jennett et al., (2009), administrative readiness to accept change facilitates the adoption of a new technology. However, Bashshur (1995) claims that the fear that telemedicine will replace the physician or relegate him to a less important role has also slowed the adoption of telemedicine. In addition, Christensen et al., (2000) claims that organisations providing expensive healthcare tend to fight simpler healthcare innovations since they threaten their livelihoods.

According to Kotler and Keller (2006) factors that influence acceptance of an innovation are; relative advantage of the innovation as compared to already existing technologies. Kotler and Keller (2006) further report that compatibility and complexity of the innovation also affects adoption of the innovation. According to Maurice (2010) adoption of telemedicine in developing countries has been very low. He attributes the low level of adoption to poor ICT infrastructure, high ICT connectivity costs, lack of capacity development and lack of telemedicine policy framework.

A study done undertaken in Uganda established that the key factors hindering adoption of telemedicine included knowledge and skills, lack of telemedicine policy and change resistance by staff of hospitals were leading (Isabaliya, 2011). Some studies have also been

done in Kenya to assess the status of e-health. The study done on the status of e-health in Kenya reports that adoption of e-health is highly influenced by development plans, national ICT policies and with buy-in from healthcare workers (Kilwake & Matoke, 2012).

Considering that Kenya has a shortage of doctors and that most of the specialist doctors are concentrated in the cities, there is inequality in access to quality healthcare services for those who live in distant towns or remote areas. Patients who live in distant areas have to travel to the major cities in search of specialist doctors. In 2013, the public health services (primary and secondary level) moved from the national government and Ministry of Health to the county governments. Since then, the Ministry of Health is limited to providing support and technical guidance to the counties and is responsible for regulating the health sector and the counties for providing the health services. While devolution of health to the county level is a good thing, the handing over of the services from the national to county governments has not been smooth, and that counties have had teething problems in taking over this responsibility. Telemedicine can therefore be used to reduce this inequality (Kenya Ministry of Health & WHO 2004). Since doctors are the key players in provision of healthcare services; doctors' perception of telemedicine is important to adoption of telemedicine in hospitals.

Nairobi County is however privileged as it houses the best private hospitals in Kenya e.g. Aga Khan Hospital, The Nairobi Hospital e.t.c. Despite this, 80 percent of Kenyans living in Nairobi depend on the public sector for health services. The industry has faced turbulence in human resource management leading to recurrent health worker strikes both at county and national levels. Based on this, people currently have limited access to care due to doctors' strikes. Telemedicine can therefore be used to bridge this gap as patients can be able to still consult with the doctors despite the turbulence being faced in the industry. This study therefore will investigate telemedicine as a disrupter in healthcare management in Nairobi County.

## **1.2 Statement of the Problem**

Accessing specialized health care has continuously been a challenge across Africa. This is caused by the partial number of specialized medical doctors in African countries as related to developed continents. Kenya has a burden of disease which historically been focused on

communicable diseases. Nevertheless, research indicates a large and fast increase in the occurrence of non-communicable diseases.

Non Communicable Diseases (NCDs) or lifestyle diseases such as such as cancers, cardiovascular diseases, hypertension and diabetes are becoming more and more prevalent among young, working adults and Anxiety Disorder, substance abuse and mental health issues among Africa's youth, all coupled with poor access to qualified doctors, are becoming the biggest stumbling blocks to Africa its achieving full economic potential. A report by Kenya National e-Health Strategy 2011-2017 (2011) indicated that having impartial and inexpensive healthcare at the highest attainable standards to citizens is one of the global goals of Kenyan Vision 2030.

For most people this is the trend, they self-medicate in shocking proportions, and the massive responds to illness in the same way: if you are not feeling well, you go to the nearest shop, buy a couple of tablets and move on. The reason for this is simple: in Kenya, there's just one doctor for every 8,000 people. We simply don't have the number of medics required for each person to be able to see a doctor when they feel ill. In addition, those who live in parts of Kenya that are rural do not receive treatment as a result of expenses involved to travel to urban centers where the medical specialists are grounded. Specialists found in urban areas do not visit the rural hospitals since they are busy and the cost for travelling to rural areas is expensive.

This bad situation of inadequate specialists is supported by the dilapidated public health hospitals in the country and also expensive private healthcare. Nonetheless, thanks to an astounding rate of people embracing mobile phones, 30 million Kenyans fully 75% of the population have a working mobile phone connection. It's against this backdrop that telemedicine was introduced. Telemedicine was recognized as a tactical area of interference in Kenyan e-Health plan found in Vision 2030. This research therefore sought to determine the service effectiveness, cost effectiveness and ease of accessibility of telemedicine in healthcare industry in Nairobi County.

Globally, Asia is increasingly challenged by the social disparities between its urban and rural populations due to the massive growth it experienced in the recent years. Of the region's 4

billion people, 80 per cent live in rural areas often without adequate access to education and healthcare.

This creates an immediate need for the region's governments, communities and industry partners to address the challenges of the region's existing healthcare structures and ensure that everyone has access to adequate healthcare.

Currently most people in Asia rely on state subsidies, while more than 130 million people can pay for private healthcare. The majority of people in the region survives on US\$ 1 per day and would by no means be able to access basic medical care (The World Bank, World Development Report 2008). Governments, companies and communities need to find solutions that will allow medical care to cross the geographical, social and cultural barriers within the health sector and ensure that everyone is able to access healthcare.

In the developed world, the growing availability of broadband Internet, Wi-Fi, cellular networks and the move to digital television are opening doors to an amazing array of telemedicine and telehealth services. But even in far less developed economies where broadband is scarce and electricity and phone service may be unreliable, commodity communications technologies are being used to extend healthcare services to those in need.

Closer home, in Africa, many countries are embracing telemedicine and are making huge strides in improving their health care system e.g. Kenya, Mali e.t.c. Regardless of its contributions in the form of various procedures and discovery of drugs, Africa still faces major healthcare challenges. Unfortunately owing to reasons such as shortages of physicians, specialists, medicines, equipment, and lack of proper awareness was not implemented enough to a level where it can serve its own people. Telemedicine though still in its developing phase in Africa is potentially very useful as a conduit to quality health care. Therefore, the statement of the problem is to analyze telemedicine as a disruption in healthcare industry in Nairobi County by critically analyzing the service effectiveness, cost effectiveness and investigate if telemedicine improves accessibility of healthcare

### **1.3 General Objective**

The general objective of this study was to analyze telemedicine as a disruption in healthcare industry in Nairobi County by critically analyzing the service effectiveness, cost effectiveness and investigate if telemedicine improves accessibility of healthcare.

### **1.4 Specific Objectives**

This study was guided by the following objectives:

- 1.4.1 To investigate service effectiveness of the use of telemedicine to facilitate the delivery of health care interventions and consultations in Nairobi County.
- 1.4.2 To investigate cost-effectiveness of the use of telemedicine to facilitate the delivery of health care interventions and consultations in Nairobi County.
- 1.4.3 To investigate if telemedicine improves accessibility of healthcare in Nairobi County.

### **1.5 Justification of the Study**

#### **1.5.1 Doctors**

The study findings are of importance in providing an insight on attitude of doctors towards telemedicine and the extent of adoption of telemedicine in hospitals in Kenya. The research also provides an understanding on factors that influence adoption of telemedicine and its influence on health management. The findings benefits hospital administrators, doctors and other institutions that may want to implement telemedicine in Kenya.

#### **1.5.2 Patients**

The study findings are of importance to patients who in future will be able to understand the effectiveness of telemedicine in regards to service, cost and ease of accessibility. It will broaden their minds to think of other non-conventional ways of accessing healthcare.

### **1.5.3 ICT Firms**

The study findings are of importance to companies who are in the ICT industry as they can be able to develop different applications and software that could aid delivery of healthcare to people in Nairobi County and other parts of Kenya and hence increase their profitability.

### **1.5.4 Private hospitals in Nairobi County**

The study findings are of importance to the private hospitals in Nairobi County as it will inform them on the opportunities in telemedicine and this may open up a new revenue stream for them. The adoption of I.T. in healthcare could emerge as a sustainable competitive advantage for the private hospitals.

### **1.5.5 Other Hospitals**

The study findings are of importance to the other hospitals in Kenya because it may help the different hospitals despite their size to access specialists mostly found in the big private hospitals.

### **1.5.2 Government and Policy Makers**

The government and other policy makers will also benefit from the findings of this study. Other researchers can also use the findings in their research works or carry out more research based on the research limitations. The research will contribute knowledge to the technology acceptance model by determining how perceived ease of use and perceived benefits of telemedicine influence attitude of doctors towards telemedicine.

## **1.6 Scope of the Study**

This study focused on telemedicine as a disrupter in healthcare management in Nairobi County. However, the findings and recommendations of the study can be generalized and applied to other counties with similar profile and public sector environment as that of Kenya. This study focused on service effectiveness, cost effectiveness and ease of access. This study

targeted the 40 public and private hospitals in Nairobi County according to the list of hospitals registered in Nairobi County. The respondents were the doctors and patients.

## **1.7 Definition of Terms**

This study had the following definition of terms:

**1.7.1 Accessibility of healthcare** refers to helping people to command appropriate health care resources in order to preserve or improve their health (Tachakra, 2003).

**1.7.2 Cost-effectiveness** refers to the degree to which telemedicine is effective or productive in relation to its cost (Duncan & Sally 2012).

**1.7.3 Healthcare Management** refers to the provision of leadership and direction to organizations that delivers person health service (Isabaliya, 2011).

**1.7.4 Telemedicine** denotes the concept conveyance of healthcare amenities at a distance thereby reducing the need for patients and doctors to travel (Maurice, 2010).

## **1.8 Chapter Summary**

This project is organized into five chapters. Chapter one covered the background of the study, statement of the problem, as well as the general objective and specific objectives of this study. In this section, the significance of the study, the scope and definition of terms are also well presented, with the final section covering the chapter summary. The second chapter was a summary of the literature review and this was organized according to the research questions. Chapter three discussed the research methodology which covered the research design, population and sampling design, data collections methods, research procedures, data analysis methods and chapter summary. Chapter four discussed the results and findings and finally Chapter five summarized the discussions, conclusions and recommendations.

## **CHAPTER TWO**

### **2.0 LITERATURE REVIEW**

#### **2.1 Introduction**

This chapter presents literature on the previous studies done on telemedicine. The information presented is guided by the objectives of the study; service efficiency of using telemedicine to facilitate delivery of health care, cost effectiveness of the use of telemedicine to facilitate the delivery of health care, telemedicine improving accessibility of healthcare and the chapter summary.

#### **2.2 The Service Effectiveness of the Use of Telemedicine in Facilitating the Delivery of Health Care Interventions and Consultations**

This section covers literature on service effectiveness of the use of telemedicine in facilitating the delivery of health care interventions and consultations.

##### **2.2.1 Use of Telemedicine to Facilitate the Delivery of Health Care**

Telemedicine is a term with several synonyms (telehealth, e-health), which cover a wide range of topics, all concerning the delivery of health care at a distance (Patterson, 2014). “Health care” itself is a broad concept, encompassing diagnosis and treatment of patients, education of staff, patients, and the general public, and administrative activities, such as collecting public health data, as well as research. All of these may be assisted by judicious use of telemedicine.

A major encounter to implementation of telemedicine in countries which are developing is the product diversity in healthcare sector. This is so since with consistent advances of ICT, the devices to be used need to be updated to allow interoperability. Though ICT carry a marvelous probable for refining healthcare, rural areas have deprived ICT infrastructure (Martínez et al., 2004). Additionally, a long-term capability of ICT in rural areas of countries which are developing has to be well-thought-out in effort to allow the acceptance of telemedicine.

Telemedicine has been used during World War 1 in Australia. This was done through establishment of a radio communication link in remote areas of Australia that linked the remote ones with the urban specialist (Zundel, 1996). Furthermore, Cadilhac et al., (2014) revealed that telemedicine can progress the delivery of acute stroke treatments in Australian rural communities due to the inadequate access to medical specialists. A Victorian Stroke Telemedicine project was aimed at connecting neurologists at the hub site in Melbourne located 200km away from the spoke site in Bendigo health centre. A ten percent increase on the number of patients treated was observed during the period.

A study by Goodwin (2010) revealed that awareness, understanding of the benefits of a new technology and literacy levels to be implemented has a great influence on the rate of acceptance of the technology by the adopters.

The development of telemedicine in America has been largely as a result of the funding the technology has been given by the regime. As asserted by Christensen et al., (2000), government and industrial leaders have an important effect to adoption of a new technology. One of the reasons leading to the expansion of telemedicine in America is support from the government. The study showed that tele-diagnosis can upsurge the accessibility of healthcare delivered to people living in secluded areas (Strehle & Shabde, 2006). Nevertheless, the government is a lagging partner in telemedicine deployment. He asserts that government policies generally slow down the adoption process of telemedicine technology.

### **2.2.2 Service Effectiveness**

Gronroos (2001) revealed that there are two quality extents of service effectiveness that include technical quality and functional. Technical quality is determined by an answer to the question what does a consumer get. For example, if consumer saves in a bank, consumer gets interest rate; if consumer uses bus, consumer gets to specific destination; if consumer goes to a restaurant, consumer has delicious lunch. However, it is very important it that technical quality is offered to consumers. That is why functional quality is the way consumer gets the service. For example, in a bank case it is the matter of staff politeness, is it trustworthy and similar; in case of a bus transport it is the matter of a bus tidiness, comfort, if the bus reaches

destination in time, is the bus crew polite; in case of a restaurant, are the waiters polite, is the restaurant clean and tidy as well as other important determinants in the very service.

Parasuraman, Berry and Zeithaml (2011) indicated that consumers had more difficulties to evaluate service quality than a product quality and that percept service quality is the result of comparison of the expectations of a consumer with performances of experienced service. They also state that quality evaluation is not based only upon the service results but upon the process of service delivery. Also, when buying service, a user has much less tangible elements than when a product is bought and it is more difficult to give objective quality evaluation.

Having in mind that products of service quality are in interaction between consumers and elements in service organization, Lehtinen and Lehtinen's state that a concept of three quality dimensions is more acceptable: 1. physical quality representing physical aspects of a service; 2. corporative quality expressing the image of a service company, and 3. interactive quality resulting from interaction between service staff and a consumer and among consumers themselves. In that case, difference between quality linked to the process of offering services and quality referring to the service result itself is pointed out. Rust and Oliver extend Gronroos model by adding the third dimension. Their three dimensional model of a service quality involves: service product (technical quality), service delivery (functional quality) and service environment.

### **2.2.3 Relationship between Service Effectiveness and Use of Telemedicine**

A study by Dario et al., (2004), interoperability which incorporates equipment standardization, integrating culture and also financial and workflow systems is the major challenge to using real time medical interaction. According to Wootton (2008) the main advantage of this method is that the one on one interaction between the specialist and the patient allows the specialists to obtain detailed medical information as if the patient walked in to the hospital.

A study done by Young and Ireson (2003) indicated that Telehealth expertise was helpful in conveying pediatric acute care to children in schools. Pediatric providers, nurses, parents, and children testified primary care school based telehealth as a suitable substitute to traditional health care delivery systems.

Moreover, medical images are conveyed live therefore not influencing the standards of the images transmitted as in the form of asynchronous transmission where images are compressed and then kept (Wootton, 2008). Concentrating on the creation of eClinics in marginalized areas in Kenya, synchronous collaboration is ideal since it allow live discussion with the specialist situated in referral hospitals.

Telemedicine can be helpful in disease prevention and health promotion in many areas. Telemedicine applications, such as audio-visual aids, video conferencing, and healthcare-related conversations with pediatricians/general physicians can be used to inform and motivate people. A variety of applications can advance and support primary, secondary and tertiary health promotion and disease prevention in the poor states of the country which have minimal infrastructure and scarce healthcare facilities. Notably, ISRO and North Eastern Space Applications Centre (NESAC) already have the required infrastructure in 25 nodal telemedicine centers in northeastern states and are working on 47 centers currently (Dasgupta & Deb 2008). Besides Village Resource Centers, an important part of ISRO – NEC initiative, can play an important role in the dissemination of knowledge and brining about changes in healthcare attitudes and practices. There have been studies which show that simple quality improvement initiatives can improve vaccination rates in rural populations.

Dermatology is another clinical specialty that can make substantial use of the advances in ICT because of its inherently visual nature in both diagnosis as well as follow-up. This makes it ideal for the utilization of virtual medicine. In India, Kantiraj et al validated the store and forward teledermatology and videoconferencing in a large number of patients while using gold standard (face-to-face) comparison between teledermatologists and clinical dermatologists (Kanthraj, 2013).

Nair and Nair also reported that tele dermatology is a viable alternative to face to face encounters via both store and forward and videoconferencing options. Based on their experience, they implemented a project identifying common skin disorders via this approach (Nair & Nair, 2015). It is of note that tele dermatology can be used not only in the diagnosis and treatment of patients, but also in the education of healthcare professionals (Boyers, Schultz, Baceviciene, Blaney, & Marvi 2015).

This study will be guided by Innovation Diffusion Theory (IDT). Diffusion of an innovation is a major test in all industries as well as in healthcare (Omachonu & Einspruch, 2010) because they can be rejected or adopted (Rogers, 2003). The amount of influence upon an organisation or individual to reject or adopt an innovation is mostly founded on the features of the innovation (Rogers, 2003).

Nevertheless, the degree of adoption of innovations varies although common of the innovations follow S-shaped innovation logistic growth curve (Zanaboni & Wootton, 2012) where the slope of the innovation adoption curve is influenced by five attributes: Relative advantage which is the degree to which an innovation is perceived as being better than the ideas it supersedes. The greater the perceived relative advantage of an innovation, the more rapid its rate of adoption is going to be. The innovation can be better in terms of economic aspects or general performance. Degree to which an innovation is perceived as difficult to understand and use. As an innovation's complexity increases, the likelihood of adoption decreases. Innovation's complexity can be reduced through user training and demonstration (Greenhalgh, Robert, Bate, Macfarlane & Kyriakidou, 2008).

The rate to which an innovation may be tried on a limited basis. Trial ability is more significant in the early stages of adoption. Innovations that can be experimented on a limited basis are adopted more easily. The degree to which the benefits of an innovation are clearly visible to the organisation and end users. Menachemi et al., (2004) defines it as the ease with which the relative advantage of an innovation can be observed. The more clearly the adopting organisation and end users see or understand the innovation, the more likely they are to adopt the innovation. The degree to which an innovation is supposed as being consistent with the

existing values, past experiences and needs of potential adopters. The adoption of an incompatible innovation often requires the prior adoption of a new value system. An idea that is not compatible with the prevalent values and norms of the adopters will not be adopted as rapidly as an innovation that is compatible.

Similarly, in the setting of the healthcare business, if the practitioners and healthcare executives are acquainted with the technology they are bound to find the technology to be easier and useful to adopt (Thakur, Hsu & Fontenot, 2012).

### **2.3 Cost-Effectiveness of the Use of Telemedicine to Facilitate the Delivery of Health Care Interventions and Consultations**

This section covers literature on cost effectiveness of the use of telemedicine in facilitating the delivery of health care interventions and consultations.

#### **2.3.1 Cost-Effectiveness**

Cost-effectiveness is the extent to which the program has achieved or is expected to achieve its results at a lower cost compared with alternatives (Craig, 2010). Shortcomings in cost-effectiveness occur when the program is not the least-cost alternative or approach to achieving the same or similar outputs and outcomes. An assessment of cost-effectiveness takes the benefits arising from the activities of the program as a given and asks whether these could have been produced at a lower cost compared with alternatives.

Cost-effectiveness analysis by itself does not provide enough information for a policymaker to make an investment decision, but such analysis does provide a very useful starting point for researchers and policymakers to collaborate in assessing the efficiency of the different programs and their relevance to the particular situation. Cost-effectiveness analyses results, with detailed information on underlying costs and impacts, combined with an understanding of the problem being addressed and of other contextual factors such as current input prices and local institutions, can provide important insights into which programs are likely to provide the greatest value for money in a particular situation, and to identify the key factors to which these outcomes are most sensitive (Banerjee, Shawn, Esther & Leigh 2007). When cost-effectiveness analyses have been done with data at a highly disaggregated level, where

assumptions about key factors such as program take-up or unit costs are made explicit, it is much easier to perform sensitivity analysis. This sort of sensitivity analysis gives policymakers an idea of how cost-effective a similar program might be in their situation by varying key assumptions to reflect their context.

Kremer, Rebecca and Edward (2009) show the relative cost-effectiveness of different programs carried out by International Child Support in Kenya; while Banerjee et al., (2007) compare education programs run by the NGO Pratham in India. Limiting an analysis to programs carried out by the same organization in the same country makes it easier to ensure that costs and impacts are calculated using the same methodology, but it restricts the range of interventions that can be compared. Drawing comparisons across projects performed in different countries, by different organizations, and in different years, as we discuss in this chapter, raises many more questions about how to ensure comparability, but it also holds the promise of being a more useful tool for policymakers.

### **2.3.2 Relationship between Cost-Effectiveness and the Use of Telemedicine**

According to WHO (2010), ICT has an unlimited potential to solve some of the encounters faced by developing and developed countries in providing cost effective, accessible and high quality healthcare. Research done by Croteau and Vieru (2002) reports that the clinical areas where telemedicine can be applied are consultations, radiology, pathology, dermatology, surgery, cardiology, home healthcare and teaching through teleconferencing. Doctor consultation done through telemedicine is referred to as Teleconsultation. This can be done through video conferencing (American Telemedicine Association, 2013). Application of telemedicine in pathology is referred to as Telepathology whereas when applied in radiology it is referred to as Teleradiology (Croteau & Vieru, 2002).

Ehlers et al., (2008) analyzed the budgetary impact and cost-effectiveness of the national use of thrombolysis with alteplase for acute ischemic stroke via telemedicine in Denmark. Jackson et al., (2008) evaluated the cost-effectiveness of telemedicine and standard ophthalmoscopy for retinopathy of prematurity management. The results show that standard

ophthalmoscopy for retinopathy of prematurity management and telemedicine are highly cost-effective compared with other healthcare interventions.

Johnston et al., (2004) estimated the cost effectiveness of the technology transfer teleophthalmology project in terms of a cost per disability-adjusted life year averted. The authors found the technology transfer project to be cost-effective in reducing the burden of eye disease.

Stoloff et al., (1998) studied the demand for telemedicine and the cost-effectiveness of various technologies such as telephone and fax, e-mail and Internet, video teleconferencing, teleradiology, and diagnostic instruments, as well as their bandwidth requirements for a shipboard telemedicine service. Zurovac et al., (2012) examined the cost-effectiveness of text-message reminders sent to health workers' mobile phones. They concluded that a simple text-messaging intervention improving health worker adherence to malaria guidelines is effective and inexpensive.

Meanwhile, developing countries face problems in adopting telemedicine technology particularly the public sector as a result of scarcity of funds (Zanaboni & Wootton, 2012; Nyamu et al., 2015), telemedicine is deemed to be cheaper to adopt. A study by Craig (2010) Comparison of outcomes of patients admitted to two small. One hospital received neurological services by telehealth, the other in-person. Neurological services were provided via Telemedicine. Comparing case-mix, process of management, and outcomes for all patients using ICD-10 codes with a final diagnosis of neurological condition there were no appreciable differences noted between the clinical outcomes and the length of stay between patients receiving services in-person and those who received services via telehealth.

One of the longer-running examples of telemedicine used in low-resource settings is the RAFT network, which provides both educational and clinical services to centers in Africa and South America (Bediang, et al., 2014). The educational activities include the weekly delivery of video-lectures for continuing and postgraduate medical education. Much of this early video delivery depended on the use of satellite links, which are relatively expensive, and in recent years the RAFT program has begun to make use of low bandwidth Internet

connections. In South Africa, a tele-education network evolved from a failed government telemedicine program (Mars, 2014).

An alternative method of transmitting video for telemedicine is to make use of free or low-cost web-based tools. For example, Jefee-Bahloul (2014) conducted a pilot trial of telepsychiatry in Jordan using Skype, while Adambounou et al., (2014) used the file transfer facilities of the LogMeIn web service for tele-ultrasound between Togo and France.

Consulting with a doctor over video conference may not be the traditional office visit, but studies and practice have shown that care delivered via telemedicine is not only safe and effective, but can actually increase the safety and effectiveness of care. For example, a study by Eron (2010) of heart failure patients by the University of Missouri found that telemedicine allowed for earlier detection of key warning signs in patients and more timely interventions by providers. According to the same study, telemedicine patients also experienced fewer hospital readmissions. Another study comparing patients with chronic illnesses receiving care through in-person visits and telemedicine found no significant differences between quality of care indicators such as patients' self-management and medication use, or patient satisfaction.

## **2.4 Telemedicine improving Accessibility of Healthcare**

This section covers literature on improvement of accessibility of the use of telemedicine in facilitating the delivery of health care interventions and consultations.

### **2.4.1 Accessibility of Healthcare**

Access has been conceptualized in numerous ways. While the term access is often used to describe factors or characteristics influencing the initial contact or use of services, opinions differ regarding aspects included within access and whether the emphasis should be put more on describing characteristics of the providers or the actual process of care (Frenk, 1992). Some authors view access more as an attribute of health services, noting the fact that services can be accessed or utilised by those requiring care.

While most authors do recognize the influence of characteristics of users as well as characteristics of providers on access, many put more emphasis on characteristics of health care resources that influence the utilisation of services, acting as a mediating factor between the ability to produce services and their consumption. Penchansky is amongst those that more explicitly conceptualised access in terms of the fit between characteristics of providers and health services, and characteristics and expectations of clients. Here, access may be conceived as the interface between potential users and health care resources, and would be influenced by characteristics of those who supply as well as those who utilise the services. (Salkever, 2007).

Public provision of health care services is among the biggest problems in developing countries and the accessibility of health care institutions is one of the most important factors in constituting healthy communities. The degree of accessibility of health care institutions is one of the most significant indicators for measuring the efficiency of the health care system (Gatrell & Elliott 2009).

The access of public to health care institution could be seriously restricted by distance (Black et al., 2004). Longer distances may affect especially the access of elderly and of physically-impaired people to health care. In general, longer the distance to health care facilities higher the risk of fatalities (Hare & Barcus 2007), although this is disputed by some studies (Drummer & Parker 2004).

According to Oliver and Mossialos (2004), accessibility of health care is a complex indicator for the health of the health care system in a country or region and implies adequacy in numbers, fair geographical distribution and absence of any type of barrier (economic, social, or cultural) to medical care.

Poor countries suffer from lack of or insufficient medical infrastructure. Moreover, the health care facilities tend to concentrate in the capital and the biggest cities while vast rural areas remain uncovered by medical services. Economically and socially more advanced countries generally have an adequate number of health care facilities but problems may still exist due to their unequal territorial distribution or due to the existence of certain barriers that may restrict the access of certain categories of people to health care. While we do not intend to

minimize the importance of these social, economic or cultural barriers, in this study we focus mainly on the issue of geographical (physical) access to health care facilities (Şentürk et. al., 2011).

#### **2.4.2 Relationship between Telemedicine and Accessibility of Healthcare**

By increasing access to care through more frequent and patient-centered communication with qualified providers, telemedicine yields great results in improving the quality, safety and efficiency of our health care system. As asserted by Khan et al., (2007), developing countries have an average 44,000 people served by one doctor whereas developed countries have an average of 200-500 people served by one doctor. Toure et al., (2012) asserts that telemedicine could be the only healthcare technology that can progress the accessibility of healthcare by many.

A study by Cadilhac et al., (2014) claims that telemedicine would help improve the delivery of acute stroke treatments in Australian rural communities due to the limited access to medical specialists. A Victorian Stroke Telemedicine project was established aimed at linking neurologists at the hub site in Melbourne who were located 200km away from the spoke site in Bendigo health centre. A 10% increase on the number of patients treated was observed during the period.

Telemedicine can play a major role in health promotion especially in improving the knowledge, beliefs and attitudes of common people. It is common knowledge that amongst the most common reasons for the underperformance of major public health programs in India are the lack of knowledge of prevention of many communicable diseases by vaccines and erroneous beliefs and practices in the rural population.

A study by Leggett et al., (2011) examines the diagnostic accuracy and acceptability of telemedicine in the field of rheumatology. One hundred patients had a telephone and televisual consultation and the results were compared with a face-to-face consultation. While the telephone consultations were often unsatisfactory, the televisual consultations were highly accurate (97%) and acceptable to patients, general practitioners, and specialists.

The benefits of telemedicine extend far beyond improving access to care. Telemedicine makes our health care system more efficient, improves quality of care, helps contain costs by facilitating chronic disease management, addresses staffing shortages by enabling access to a team of health care professionals, reduces travel times for patients and providers, and decreases the length and number of hospital stays. It has also been found to improve patient satisfaction by providing access to health professionals and services that would otherwise require traveling long distances and incurring additional costs (American Telemedicine Association, 2012).

For example, telemedicine is regularly used to expand access to wound care, radiology, obstetric and gynecological care, as well as primary care. It can also facilitate care delivery for patients who require translators or have disabilities that affect their mobility. While the use of telemedicine technology such as patient portals and transmission of still images is already commonplace, it is expected to become a standard practice of medicine in coming years as federal incentives for adopting health information technology are accelerating its implementation, and as new payment models necessitate more effective and efficient provision and coordination of care.

Increased utilization of telemedicine allows providers to reach more patients. For example, in both rural and urban areas, telemedicine can be used to triage patient care, reserving limited appointment times for those who need to be seen in person, and providing more routine elements of care via telemedicine. The Medical Association of Georgia recommends using telemedicine to increase access to specialty care by enabling trauma specialists to consult with doctors in smaller emergency rooms until a patient can be transferred to a major trauma center (Atlanta Business Journal, 2012).

## **2.5 Chapter Summary**

The various reviewed literature, has led to the conclusion, telemedicine is a developing technology whose dispersion process is comparable to that of other technologies. Telemedicine can be the meaning of innovation that is a new expertise in healthcare industry particularly in developing countries.

## **CHAPTER THREE**

### **3.0 RESEARCH METHODOLOGY**

This chapter offers the methods and procedures that were utilized to carry out this study. It included the introduction, research design, population and sampling design, data collection methods, research procedures, data analysis methods and chapter summary.

#### **3.1 Research Design**

This study used survey design to analyze telemedicine as a disrupter in healthcare management in Kenya. Cooper and Schindler (2008), defines a research design as the scheme, outline or plan that is used to generate answers to research problems. According to Gronhaug (2005), a survey is method of carrying out research using structured questionnaire that are given to a sample of a population and designed to elicit specific information from the respondents. They are designed to gather information on such things as attitudes, intentions, awareness, behaviors and motivations. This design was adopted by the researcher as the suitable research design since it facilitates the collection of original data necessary to realize the research objectives.

#### **3.2 Population and Sampling Design**

##### **3.2.1 Population**

Cooper and Schindler (2008) describe a population as the total collection of elements whereby references have to be made. The total population of this study was the 40 public and private hospitals in Nairobi County. The study involved the hospital management who was one from each hospital to make 40 managers. The study involved 10 patients and doctors who use telemedicine from each of the 40 hospitals. The target population was therefore 440 respondents.

### 3.2.2 Sampling Design

This is the procedure that guides the researcher towards selecting the appropriate sample. It guides the process of grouping units to the frame, determining the sample size, allocating the sample to the classes of the frame units and finally selecting the sample (Jwan, 2010).

#### 3.2.2.1 Sampling Frame

Sampling frame is a published list in which, there are a set of directions for identifying a population (Gall & Borg, 2007). It is the source material or device from which a list of all elements within a population that can be sampled is drawn (Jwan, 2010). The sampling frame was hospital managers, doctors and patients.

#### 3.2.2.2 Sampling Technique

This is the procedure that guides the researcher towards selecting the appropriate sample. It guides the process of grouping units to the frame, determining the sample size, allocating the sample to the classes of the frame units and finally selecting the sample (Jwan, 2010).

#### 3.2.2.3 Sample Size

According to Garner (2010), a sample is a small proportion of an entire population and in the study; the sample was 120 respondents, which was 20% of the 400 patients visiting the hospitals in Nairobi County. This is representative of the entire department because according to Mugenda and Mugenda (2003) a 20% sample provides adequate representation of a small population. The respondents, was categorized into one, the hospital managers and secondly, the 80 patients and doctors. The sample size is shown in the Table 3.1.

**Table 3.1: Sample Size**

<b>Positions</b>	<b>Population</b>
Hospital managers	40
Patients and doctors	80
<b>Total</b>	<b>120</b>

### **3.3 Data Collection Methods**

According to Jwan (2010) data collection refers to the practice of gathering information on variables, in a systematic way that enables one to answer stated research questions. A self-administered questionnaire was used as data collection instruments. The questionnaire included structured and unstructured questions and was administered through drop and pick method to respondents. Respondents were asked to rate their opinion according to a 5-point Likert-type scale, (5 = strongly agree, and 1 = strongly disagree). Structured questions were used in so as to save on time and expense as well as to facilitate in easier analysis as they are in immediate usable form; while the unstructured questions was used so as to encourage the respondent to give an in-depth and felt response without feeling held back in revealing of any information. With semi structured questions, a respondent's response may gave an insight to his feelings, background, hidden motivation, interests and decisions and give as much information as possible without holding back.

### **3.4 Research Procedures**

Data collection procedure refers to protocol that must be followed to ensure that data collections are applied correctly and efficiently (Mugenda & Mugenda, 2003). The researcher sought to collect data from the managers and patients in the targeted hospitals in Nairobi County. An introductory letter for data collection was first obtained from USIU. The researcher further made appointments with the respective respondents in respective respondents. The questionnaires were administered by hand to 120 respondents; the researcher was on standby for the respondents to fill them out and provided any clarifications whenever needed.

#### **3.4.1 Pilot Testing**

Before administering the instruments to the sample representing the target population, a pilot test was conducted in order to improve validity of the questionnaire. This was done on 5% of 120 sample size (5 respondents) from the hospital in the neighbouring Machakos County. The pilot study ensured that the questions get the intended responses.

### **3.4.2 Reliability of the Research Instrument**

According to Mugenda and Mugenda (2003) the reliability of an instrument is the measure of the degree to which a research instrument yields consistent results or data after repeated trials. In order to test the reliability of the instruments to be used in the study, the test- retest method was used. The Cronbach Reliability coefficient was used to test for reliability. Cronbach's alpha reliability coefficient normally ranges between 0 and 1. However, there was actually no lower limit to the coefficient the researcher adapted 0.8 to test the reliability.

### **3.4.3 Validity of the Research Instrument**

Validity is the degree to which an instrument measures what is supposed to measure (Kothari, 2004). It is the degree to which results obtained from the analysis of the data actually represent the phenomenon under study. The content validity of the item was discussed with the supervisor. The supervisor and other professionals in the field was also asked to read through the items and comment accordingly. They carried out verification of the items in the questionnaire to determine if these items are consistent with the objectives of the research and are devoid of any ambiguity. Where items were found to be unsuitable, they were discarded or changed appropriately and additional items were included in the questionnaire.

### **3.5 Data Analysis Methods**

Kothari (2004) defined data analysis as the process of bringing order, structure and meaning to the mass of information collected. Data analysis consists of examining categorizing; tabulating or otherwise recombining the evidence to address the initial prepositions of the study (Cox, 2010). The data collected was cleaned and coded to enhance basic statistical analysis. The data analysis involved quantitative and qualitative methods (numerical and descriptive). Qualitative data was analyzed based on content analysis while quantitative data will be analyzed using descriptive and inferential statistics. Data was analyzed with the help of electronic spreadsheet SPSS Program which has analysis tools. Multiple regression was used to determine the relationship between the independent variables and dependent variable. The model took the form:

The basic regression model was:

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + e$$

Where; Y – is the dependent variable (Delivery of health care interventions and consultations)

X<sub>1</sub>- Service effectiveness,

X<sub>2</sub>- Cost effectiveness,

X<sub>3</sub>- Accessibility of health care

β<sub>0</sub> – is the constant, e is the error of prediction.

β<sub>1-n</sub> = the regression coefficient or change included in Y by each χ.

e = error term

The collected data was presented using statistical techniques which included percentages and frequency distribution tables.

### **3.6 Chapter Summary**

This chapter enumerated the research methodology that will be applied for this study. It includes the introduction, research design, population and sampling design, data collection methods, research procedures, data analysis methods and chapter summary.

## CHAPTER FOUR

### 4.0 DATA ANALYSIS INTERPRETATION AND DISCUSSION

#### 4.1 Introduction

Findings and the interpretations are on the analysis of telemedicine as a disruption in healthcare industry in Nairobi County by critically analyzing the service effectiveness, cost effectiveness and investigate if telemedicine improves accessibility of healthcare. The findings were presented according to research objectives: To investigate service effectiveness of the use of telemedicine to facilitate the delivery of health care interventions and consultations in Nairobi County, to investigate cost-effectiveness of the use of telemedicine to facilitate the delivery of health care interventions and consultations in Nairobi County and to investigate if telemedicine improves accessibility of healthcare in Nairobi County.

#### 4.2 Response Rate of Instruments

The study issued questionnaires to 120 respondents that included 40 hospital managers and 80 patients and doctors. Table 4.1 presents the response rate.

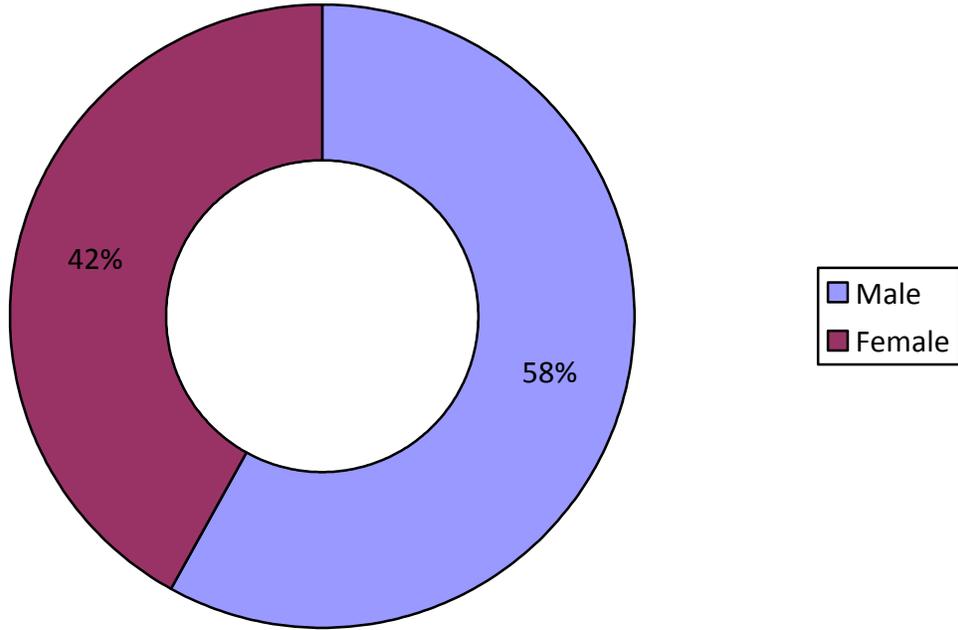
**Table 4.1: Response Rate**

<b>Respondents</b>	<b>Sample</b>	<b>Responded</b>
Hospital managers	40	35
Patients and doctors	80	73
<b>Total</b>	<b>120</b>	<b>108</b>

The number of hospital managers who responded were 35 while 73 patients and doctors also answered the questionnaires. This gave a 90% rate of response which was higher than the 70% threshold recommended by Kothari (2004).

#### 4.3 Personal Information

The study collected personal information of the participants in the study. This was necessary in order for the study to describe the information concerning the participants for conclusions in the study. Figure 4.1 presents the gender of the respondents.



**Figure 4.1: Gender of the respondents**

This study ensured its sample involved both male and female. Majority (58%) were male while (42%) were female respondents. Therefore, the findings on the analysis of telemedicine as a disruption in healthcare industry in Nairobi County is a representation from both gender. Table 4.2 presents the age bracket of the respondents.

**Table 4.2: Age bracket of the respondents**

Age bracket	Frequency	Percentage
Below 25 Years	12	11
25 to 35 Years	72	66
36 to 45 Years	20	18
46 years and above	4	5
<b>Total</b>	<b>108</b>	<b>100</b>

The distribution of respondents' age indicated that the leading age group of between 25–35 years had 72 (66%). They were followed by 36-45 years age group at 20 (18%), third category was below 25 years at 12 (11%). Fourth category was 46 years and above at 4 (5%).

This means that the study involved a variety of respondents of various age groups. Table 4.3 presents the highest level of education of the respondents.

**Table 4.3: Highest Level of education of the respondents**

<b>Highest Level of education</b>	<b>Frequency</b>	<b>Percentage</b>
Diploma	77	71
Degree	24	22
Masters	5	4
PHD	2	3
<b>Total</b>	<b>108</b>	<b>100</b>

A large number 77 (71%) of the respondents had diploma as their highest level of education while 24 (22%) had degrees. And another 5 (4%) of the respondents had masters. This means that the respondents were capable to understand the effects of telemedicine on delivery of health care interventions and consultations. Table 4.4 presents the length of time of using telemedicine of the respondents.

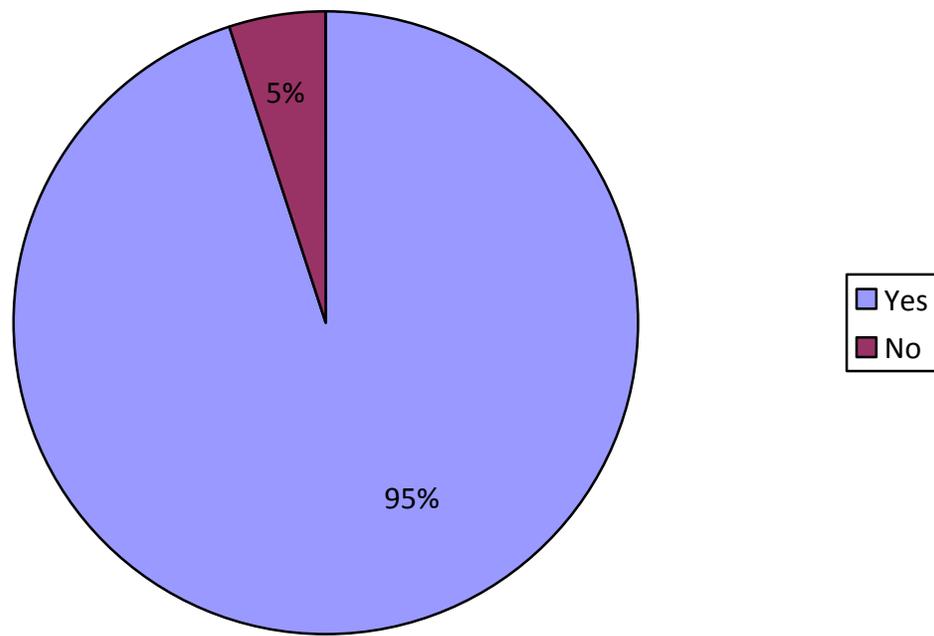
**Table 4.4: Length of time of using telemedicine**

<b>Length of time</b>	<b>Frequency</b>	<b>Percentage</b>
0-5	86	79
6-10	12	11
11-15	5	5
16-20	5	5
More than 20	0	0
<b>Total</b>	<b>108</b>	<b>100</b>

Majority 86 (79%) of the respondents had an experience of between 0-5 years of using telemedicine while 12 (11%) had used if for between 6-10 years. A few 5 (5%) had an experience of between 11-15 years while another 5 (5%) had an experience of between 16-20 years. This shows that the respondents were experienced in recognizing the effects of telemedicine on delivery of health care interventions and consultations.

#### 4.4 Service Effectiveness of the Use of Telemedicine to Facilitate the Delivery of Health Care Interventions and Consultations

This study investigated service effectiveness of the use of telemedicine to facilitate the delivery of health care interventions and consultations. This was done by examining the various aspects of use of telemedicine that makes the delivery of healthcare service effective. Figure 4.2 shows the findings on whether the use of telemedicine enhancing service effectiveness in delivery of health care.



**Figure 4.2: Use of telemedicine enhancing service effectiveness in delivery of health care**

Majority (95%) of the respondents agreed that the use of telemedicine enhances service effectiveness in delivery of health care while (5%) disagreed. This shows that telemedicine makes the delivery of health care more effective. Gronroos (2001) revealed that there are two quality extents of service effectiveness that include technical quality and functional. Technical quality is determined by an answer to the question what does a consumer get. For example, if consumer saves in a bank, consumer gets interest rate; if consumer uses bus, consumer gets to specific destination; if consumer goes to a restaurant, consumer has delicious lunch. However, it is very important it that technical quality is offered to

consumers. That is why functional quality is the way consumer gets the service. For example, in a bank case it is the matter of staff politeness, is it trustworthy and similar; in case of a bus transport it is the matter of a bus tidiness, comfort, if the bus reaches destination in time, is the bus crew polite; in case of a restaurant, are the waiters polite, is the restaurant clean and tidy as well as other important determinants in the very service. Table 4.5 presents the findings on service effectiveness of the use of telemedicine to facilitate the delivery of health care.

**Table 4.5: Service effectiveness of the use of telemedicine to facilitate the delivery of health care**

<b>Effectiveness of the Use of Telemedicine</b>	<b>Mean</b>	<b>Standard deviation</b>
Home exercise program, telephonic exercise monitoring	4.0351	1.30883
Self-monitoring is enhances diseases management	4.1930	1.30163
Improvement in adherence to medication	4.0351	1.42635
Self-care education is enhances management of illness	4.5439	1.41510
Telemedicine led to reduction in physician and emergency visits	4.0351	1.30883
Improvement in control of serious illness	4.3211	0.2157
It facilitates self-management for chronic patients	4.0251	0.8254

A large number of the respondents agreed that home exercise program, telephonic exercise monitoring as shown by a mean of 4.0351 and a standard deviation of 1.30883. Majority agreed that it enables for self-monitoring and diseases management as shown by a mean of 4.1930 and a standard deviation of 1.30163. Telemedicine was also revealed to improve in adherence to medication as indicated by a mean of 4.0351 and a standard deviation of 1.42635. Self-care education enhances management of illness as shown by a mean of 4.5439 and a standard deviation of 1.41510. A large number also agreed that telemedicine led to reduction in physician and emergency visits as revealed by a mean of 4.0351 and a standard deviation of 1.30883. Many agreed that it led to improvement in control of serious illness as shown by a mean of 4.3211 and a standard deviation of 0.2157. Majority also agreed that it

facilitates self-management for chronic patients as revealed by a mean of 4.0251 and a standard deviation of 0.8254. Parasuraman et al., (2011) indicated that consumers had more difficulties to evaluate service quality than a product quality and that percept service quality is the result of comparison of the expectations of a consumer with performances of experienced service. They also state that quality evaluation is not based only upon the service results but upon the process of service delivery. Also, when buying service, a user has much less tangible elements than when a product is bought and it is more difficult to give objective quality evaluation. Table 4.6 shows the findings on whether the telemedicine is a positive way to offer support and treatment for individuals.

**Table 4.6: Telemedicine is a positive way to offer support and treatment for individuals**

<b>Illness</b>	<b>Yes</b>	<b>No</b>
Depression and/or Anxiety	91 (84%)	17 (16%)
Long Term Condition	56 (52%)	52 (48%)
Bereavement	27 (25%)	81 (75%)

Majority 91 (84%) of the respondents agreed that telemedicine was a positive way to offer support and treatment for individuals who were suffering from depression and/or anxiety while 56 (52%) indicated for those suffering from long term condition a few 27 (25%) revealed that it was suitable for those who were bereavement. Having in mind that products of service quality are in interaction between consumers and elements in service organization, Leihtinen and Leihtinen's state that a concept of three quality dimensions is more acceptable: physical quality representing physical aspects of a service; corporative quality expressing the image of a service company, and 3. interactive quality resulting from interaction between service staff and a consumer and among consumers themselves. In that case, difference between quality linked to the process of offering services and quality referring to the service result itself is pointed out. Rust and Oliver extend Gronross model by adding the third dimension. Their three dimensional model of a service quality involves: service product (technical quality), service delivery (functional quality) and service environment.

#### 4.5 Cost-effectiveness of the use of telemedicine to facilitate the delivery of health care interventions and consultations

The study examined the various aspects of cost-effectiveness of the use of telemedicine to facilitate the delivery of health care interventions and consultations. The findings are shown below. Table 4.7 presents the findings on cost-effectiveness of the use of telemedicine to facilitate the delivery of health care interventions and consultations.

**Table 4.7: Cost-effectiveness of the use of telemedicine to facilitate the delivery of health care interventions and consultations**

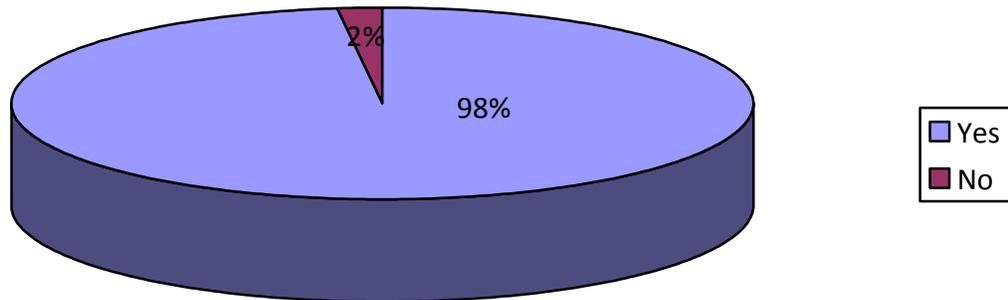
<b>Cost-effectiveness of the use of telemedicine</b>	<b>Mean</b>	<b>Standard deviation</b>
Significant reduction in hospital costs	4.3158	1.24151
Substantial savings in travel costs	4.0357	1.02628
Significantly lower outpatient and emergency visits	4.3684	1.17461
Significant reduction in mortality	4.9298	1.19313
Reduction in length of hospital stays	4.0158	1.24151
Reduced length and number of hospital stays and readmissions, Optimised medical therapy and better quality of life'	4.5211	1.8204
Improved health outcomes	4.0158	0.1857
Substantial reduction in the frequency of repeated hospitalisations	4.0256	0.2275

Majority agreed that telemedicine leads to a significant reduction in hospital costs as revealed by a mean of 4.3158 and a standard deviation of 1.24151. A large number also agreed that there was substantial savings in travel costs as shown by a mean of 4.0357 and a standard deviation of 1.02628. Many agreed that telemedicine significantly lower outpatient and emergency visits as shown by a mean of 4.3684 and a standard deviation of 1.17461. A large number agreed that there was significant reduction in mortality as indicated by a mean of 4.9298 and a standard deviation of 1.19313. Majority agreed that it led to reduction in length of hospital stays as shown by a mean of 4.0158 and a standard deviation of 1.24151. Majority agreed that telemedicine led to reduced length and number of hospital stays and readmissions, optimised medical therapy and better quality of life' as revealed by a mean of 4.5211 and a standard deviation of 1.8204. A large number indicated that it led to improved

health outcomes as shown by a mean of 4.0158 and a standard deviation of 0.1857. Majority said that telemedicine led to a substantial reduction in the frequency of repeated hospitalisations as indicated by a mean of 4.0256 and a standard deviation of 0.2275. Ehlers et al., (2008) analyzed the budgetary impact and cost-effectiveness of the national use of thrombolysis with alteplase for acute ischemic stroke via telemedicine in Denmark. Jackson et al., (2008) evaluated the cost-effectiveness of telemedicine and standard ophthalmoscopy for retinopathy of prematurity management. The results show that standard ophthalmoscopy for retinopathy of prematurity management and telemedicine are highly cost-effective compared with other healthcare interventions. Johnston et al., (2004) estimated the cost effectiveness of the technology transfer tele-ophthalmology project in terms of a cost per disability-adjusted life year averted. The authors found the technology transfer project to be cost-effective in reducing the burden of eye disease.

#### **4.6 Telemedicine improving Accessibility of Healthcare**

This study investigated if telemedicine improves accessibility of health care by inquiring from the respondents if the telemedicine improves accessibility of healthcare. The study probed various aspects of telemedicine that improves accessibility of healthcare using a scale of 1=totally disagree to 5=totally agree. Figure 4.3 presents the findings on whether telemedicine improves accessibility of healthcare.



**Figure 4.3: Telemedicine improves accessibility of healthcare**

A large number (98%) of the respondents agreed that the use of telemedicine enhances accessibility of healthcare while a few (2%) disagreed. The respondents indicated that telemedicine makes the patient get subscription on time and the doctor attends to him in real time. Telemedicine can play a major role in health promotion especially in improving the knowledge, beliefs and attitudes of common people. It is common knowledge that amongst the most common reasons for the underperformance of major public health programs in India is the lack of knowledge of prevention of many communicable diseases by vaccines and erroneous beliefs and practices in the rural population. A study by Cadilhac et. al., (2014) claims that telemedicine would help improve the delivery of acute stroke treatments in Australian rural communities due to the limited access to medical specialists. A Victorian Stroke Telemedicine project was established aimed at linking neurologists at the hub site in Melbourne who were located 200km away from the spoke site in Bendigo health centre. A 10% increase on the number of patients treated was observed during the period. Table 4.8 presents the findings on telemedicine improving accessibility of healthcare.

**Table 4.8: Telemedicine improving accessibility of healthcare**

<b>Telemedicine improving accessibility of healthcare</b>	<b>Mean</b>	<b>Standard deviation</b>
Telemedicine technology promotes a healthier lifestyle	4.9123	0.02261
It enhances quality of life mortality and heart failure-related reducing the risk of all-cause	4.8421	1.11467
Reduces hospitalisations and improves health outcomes'	4.5789	1.05131
Increased quality of life	4.3860	1.16119
Enhances better self-management of disease by patients	4.8511	0.1258
Fewer episodes of health worsening	4.2105	1.5780

Majority of the respondents agreed that telemedicine technology promotes a healthier lifestyle as shown by a mean of 4.9123 and a standard deviation of 0.02261. A large number also agreed that it enhances quality of life mortality and heart failure-related reducing the risk of all-cause as revealed by a mean of 4.8421 and a standard deviation of 1.11467. Many indicated that telemedicine reduces hospitalisations and improves health outcomes as

indicated by a mean of 4.5789 and a standard deviation of 1.05131. Majority agreed that it increased quality of life as shown by a mean of 4.3860 and a standard deviation of 1.16119. A large number revealed that it enhances better self-management of disease by patients as revealed by a mean of 4.8511 and a standard deviation of 0.1258 while a large number agreed that fewer episodes of health worsening as shown by a mean of 4.2105 and a standard deviation of 1.5780. A study Leggett et al., (2011) examines the diagnostic accuracy and acceptability of telemedicine in the field of rheumatology. One hundred patients had a telephone and televisual consultation and the results were compared with a face-to-face consultation. While the telephone consultations were often unsatisfactory, the televisual consultations were highly accurate (97%) and acceptable to patients, general practitioners, and specialists.

#### 4.7 Accessibility of Healthcare

This study probed the various aspects of accessibility of healthcare that are enhanced by telemedicine. The findings are shown below. Table 4.9 presents the findings on accessibility of healthcare.

**Table 4.9: Accessibility of healthcare**

<b>Accessibility of healthcare</b>	<b>Mean</b>	<b>Standard deviation</b>
Duration of admissions is shorter with Telemedicine technology'	4.5820	0.2583
Decrease in number of office visits	4.1208	1.8521
Cost-effective	4.8920	0.5258
Increases quality of life	4.0238	0.2547
Significant reduction in hospitalisations	4.2096	1.0125

Majority of the respondents agreed that the duration of admissions is shorter with telemedicine technology' as shown by a mean of 4.5820 and a standard deviation of 0.2583. A large number also agreed that there was a decrease in number of office visits as revealed by a mean of 4.1208 and a standard deviation of 1.8521. Many also agreed that telemedicine was cost-effective as indicated by a mean of 4.8920 and a standard deviation of 0.5258. A large number also agreed that there was increases quality of life as shown by a mean of

4.0238 and a standard deviation of 0.2547. A large number agreed that telemedicine was significant reduction in hospitalisations as indicated by a mean of 4.2096 and a standard deviation of 1.0125. The benefits of telemedicine extend far beyond improving access to care. Telemedicine makes our health care system more efficient, improves quality of care, helps contain costs by facilitating chronic disease management, addresses staffing shortages by enabling access to a team of health care professionals, reduces travel times for patients and providers, and decreases the length and number of hospital stays. It has also been found to improve patient satisfaction by providing access to health professionals and services that would otherwise require traveling long distances and incurring additional costs (American Telemedicine Association, 2012).

For example, telemedicine is regularly used to expand access to wound care, radiology, obstetric and gynecological care, as well as primary care. It can also facilitate care delivery for patients who require translators or have disabilities that affect their mobility. While the use of telemedicine technology such as patient portals and transmission of still images is already commonplace, it is expected to become a standard practice of medicine in coming years as federal incentives for adopting health information technology are accelerating its implementation, and as new payment models necessitate more effective and efficient provision and coordination of care.

#### 4.8 Regression Analysis

Regression Analysis was carried out for focus on service effectiveness, cost effectiveness and accessibility of health care and delivery of health care interventions and consultations. To test for the relationship that the independent variables have on delivery of health care interventions and consultations, the study did the multiple regression analysis. The results are presented in Table 4.10.

**Table 4.10: Model Summary**

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.616 <sup>a</sup>	.380	.364	0.48690

Predictors: (Constant), Service effectiveness, Cost effectiveness and Accessibility of health care

The three independent variables that were studied explain 38% of delivery of health care interventions and consultations as represented by the  $R^2$ . This therefore means that other factors not studied in this research contribute 62% of the delivery of health care interventions and consultations. This implies that these variables are significant therefore need to be considered in any effort to boost delivery of health care interventions and consultations. The study therefore identifies variables as critical determinants of delivery of health care interventions and consultations. Then a test for significance was done as in Table 4.11.

**Table 4.11: ANOVA**

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	23.516	1	5.879	24.798	.000 <sup>b</sup>
	Residual	38.405	60	.237		
	Total	61.921	61			

a. Dependent Variable: Delivery of health care interventions and consultations

Predictors: (Constant), Service effectiveness, Cost effectiveness, Accessibility of health care.

The significance value is 0.000 which is less than 0.05 thus the model is statistically significant in predicting how service effectiveness, cost effectiveness and accessibility of health care influence delivery of health care interventions and consultations. The F critical at 5% level of significance was 24.798. This shows that the overall model was significant. The study ran the procedure of obtaining the coefficients, and the results were as shown in Table 4.12.

**Table 4.12: Coefficients**

Model		Unstandardized Coefficients		Standardized Coefficients		Sig.
		B	Std. Error	Beta	t	
1	(Constant)	28.468	3.155		9.024	.000
	Service effectiveness	.144	.090	.151	1.606	.008
	Cost effectiveness	.075	.059	.085	1.262	.029
	Accessibility of health care	.044	.075	.055	.592	.035

a. Dependent Variable: Delivery of health care interventions and consultations

According to the regression coefficients established, taking all factors into account (Service effectiveness, cost effectiveness, and accessibility of health care) constant at zero delivery of health care interventions and consultations was 28.468. The data findings analyzed also shows that taking all other independent variables at zero, a unit increase in service effectiveness will lead to a 0.144 increase in delivery of health care interventions and consultations; a unit increase in cost effectiveness will lead to a 0.075 increase in delivery of health care interventions and consultations, a unit increase in accessibility of health care will lead to a 0.044 increase in delivery of health care interventions and consultations. At 5% level of significance and 95% level of confidence, service effectiveness had a 0.008 level of significance, cost effectiveness showed a 0.029 level of significance and accessibility of health care showed a 0.035 level of significance.

All the significance values were less than 0.05 ( $p < 0.05$ ) implying that they were statistically significant in explaining delivery of health care interventions and consultations. This may imply that when the service effectiveness is done, accessibility of health care is done and cost effectiveness done then the delivery of health care interventions and consultations will be enhanced.

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \varepsilon$$

Where: Y = Delivery of health care interventions and consultations

$\{\beta_i; i=1,2,3\}$  = The coefficients for the various independent variables

$X_i$  for;  $X_1$  = Service effectiveness

$X_2$  = Cost effectiveness

$X_3$  = Accessibility of health care

$\varepsilon$  = Error term

In the model  $\theta$  is the constant term while the coefficient  $\beta_1$  to  $\beta_3$  was used to measure the sensitivity of the dependent variable (Y) to unit change in the independent variable ( $X_1$ ,  $X_2$ , and  $X_3$ ).  $\varepsilon$  is the error term which captured the unexplained variations in the model.

## CHAPTER FIVE

### 5.0 SUMMARY, CONCLUSION AND RECOMMENDATIONS

#### 5.1 Introduction

This chapter summarizes the study and makes conclusions based on the results. The implications from the findings and areas for further research are also presented.

#### 5.2 Summary

The study aimed to analyze telemedicine as a disrupter in healthcare management in Kenya. The researcher singled out three effects of telemedicine on delivery of health care interventions and consultations; to investigate service effectiveness of the use of telemedicine to facilitate the delivery of health care interventions and consultations in Nairobi County, to investigate cost-effectiveness of the use of telemedicine to facilitate the delivery of health care interventions and consultations in Nairobi County and to investigate if telemedicine improves accessibility of healthcare in Nairobi County.

In this study on investigating service effectiveness of the use of telemedicine to facilitate the delivery of health care interventions and consultations in Nairobi County, it was revealed that majority (95%) of the respondents agreed that the use of telemedicine enhances service effectiveness in delivery of health care while (5%) disagreed. This shows that telemedicine makes the delivery of health care more effective. A large number of the respondents agreed that home exercise program, telephonic exercise monitoring as shown by a mean of 4.0351 and a standard deviation of 1.30883. Majority agreed that it enables for self-monitoring and diseases management as shown by a mean of 4.1930 and a standard deviation of 1.30163. Telemedicine was also revealed to improve in adherence to medication as indicated by a mean of 4.0351 and a standard deviation of 1.42635. Self-care education enhances management of illness as shown by a mean of 4.5439 and a standard deviation of 1.41510. A large number also agreed that telemedicine led to reduction in physician and emergency visits as revealed by a mean of 4.0351 and a standard deviation of 1.30883. Many agreed that it led to improvement in control of serious illness as shown by a mean of 4.3211 and a

standard deviation of 0.2157. Majority also agreed that it facilitates self-management for chronic patients as revealed by a mean of 4.0251 and a standard deviation of 0.8254. Majority 91 (84%) of the respondents agreed that telemedicine was a positive way to offer support and treatment for individuals who were suffering from depression and/or anxiety while 56 (52%) indicated for those suffering from long term condition a few 27 (25%) revealed that it was suitable for those who were bereavement.

The findings on the investigation of cost-effectiveness of the use of telemedicine to facilitate the delivery of health care interventions and consultations in Nairobi County revealed that majority agreed that telemedicine leads to a significant reduction in hospital costs as revealed by a mean of 4.3158 and a standard deviation of 1.24151. A large number also agreed that there was substantial savings in travel costs as shown by a mean of 4.0357 and a standard deviation of 1.02628. Many agreed that telemedicine significantly lower outpatient and emergency visits as shown by a mean of 4.3684 and a standard deviation of 1.17461. A large number agreed that there was significant reduction in mortality as indicated by a mean of 4.9298 and a standard deviation of 1.19313. Majority agreed that it led to reduction in length of hospital stays as shown by a mean of 4.0158 and a standard deviation of 1.24151. Majority agreed that telemedicine led to reduced length and number of hospital stays and readmissions, optimised medical therapy and better quality of life' as revealed by a mean of 4.5211 and a standard deviation of 1.8204. A large number indicated that it led to improved health outcomes as shown by a mean of 4.0158 and a standard deviation of 0.1857. Majority said that telemedicine led to a substantial reduction in the frequency of repeated hospitalisations as indicated by a mean of 4.0256 and a standard deviation of 0.2275.

The study on if telemedicine improves accessibility of healthcare in Nairobi County revealed that a large number (98%) of the respondents agreed that the use of telemedicine enhances accessibility of healthcare while a few (2%) disagreed. The respondents indicated that telemedicine makes the patient get subscription on time and the doctor attends to him in real time. Majority of the respondents agreed that telemedicine technology promotes a healthier lifestyle as shown by a mean of 4.9123 and a standard deviation of 0.02261. A large number also agreed that it enhances quality of life mortality and heart failure-related reducing the risk of all-cause as revealed by a mean of 4.8421 and a standard deviation of 1.11467. Many

indicated that telemedicine reduces hospitalisations and improves health outcomes' as indicated by a mean of 4.5789 and a standard deviation of 1.05131. Majority agreed that it increased quality of life as shown by a mean of 4.3860 and a standard deviation of 1.16119. A large number revealed that it enhances better self-management of disease by patients as revealed by a mean of 4.8511 and a standard deviation of 0.1258 while a large number agreed that fewer episodes of health worsening as shown by a mean of 4.2105 and a standard deviation of 1.5780. Majority of the respondents agreed that the duration of admissions is shorter with telemedicine technology' as shown by a mean of 4.5820 and a standard deviation of 0.2583. A large number also agreed that there was a decrease in number of office visits as revealed by a mean of 4.1208 and a standard deviation of 1.8521. Many also agreed that telemedicine was cost-effective as indicated by a mean of 4.8920 and a standard deviation of 0.5258. A large number also agreed that there was increases quality of life as shown by a mean of 4.0238 and a standard deviation of 0.2547. A large number agreed that telemedicine was significant reduction in hospitalisations as indicated by a mean of 4.2096 and a standard deviation of 1.0125.

### **5.3 Conclusions**

It can be concluded that service effectiveness on the use of telemedicine facilitates the delivery of health care interventions and consultations in Nairobi County. The use of telemedicine enhances service effectiveness in delivery of health care and makes the delivery of health care more effective. Home exercise program, telephonic exercise monitoring are some of telemedicine aspects that enhances the effectiveness of delivery of health care.

The study concludes that there is realization of cost-effectiveness in the use of telemedicine to facilitate the delivery of health care interventions and consultations in Nairobi County. Telemedicine leads to a significant reduction in hospital costs and there are substantial savings in travel costs. It significantly lower outpatient and emergency visits and there is significant reduction in mortality.

The findings led to conclusion that telemedicine improves accessibility of healthcare in Nairobi County. Telemedicine makes the patient get subscription on time and the doctor

attends to him in real time. The technology promotes a healthier lifestyle and enhances quality of life mortality and heart failure-related reducing the risk of all-cause. Telemedicine reduces hospitalisations and improves health outcomes' and increases quality of life.

#### **5.4 Recommendations**

- i. The hospital management should sensitize the patients on the positive effect of the use of telemedicine. This can be done through meetings in the hospitals and public barazas that will educate them on the advantages of telemedicine.
- ii. The hospital should improve on the telemedicine among the patients so that more people can embrace its usage and get to gain its advantages. This can be done by conducting road shows to enlighten them.
- iii. The hospital management should motivate the employees and use them to educate the patients on the use of telemedicine. This will enhance the usage of telemedicine and make them save and have effective health services through embracing telemedicine.

#### **5.5 Area for Further Research**

This study only focused on the influence of three aspects on the use of telemedicine among public and private hospitals in Nairobi County; service effectiveness, cost-effectiveness and accessibility of healthcare so another study should be done on other aspects. This study only focused hospitals in Nairobi County, Kenya, therefore another study should be done focusing on other hospitals in other counties.

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## APPENDICES

### APPENDIX 1: LETTER OF INTRODUCTION

Dear Respondent

#### **RE: COLLECTION OF DATA**

My name is Maureen Wangui Kangethe. I am a student at USIU University. As part of my course requirements, I am expected to conduct a research and present it as a thesis. My topic is on *Telemedicine as a disrupter in healthcare management in Kenya*. Any information you provide will be treated with uttermost confidentiality. All the information provided will be used for academic exercise only.

Please note that any information you give will be treated with extreme confidentiality and at no instance will it be used for any other purpose other than for this project. Your assistance will be highly appreciated. I look forward to your prompt response.

Yours faithfully,

Maureen Wangui Kangethe

Student - USIU University

## APPENDIX II: QUESTIONNAIRE

My name is Maureen Wangui Kangethe, a student at United States International University. I am conducting this research on: “Telemedicine as a disrupter in healthcare management in Kenya” in partial fulfillment of the requirements for a Master’s Degree in Business Administration. I kindly request your assistance in filling this questionnaire as honestly as possible. Rest assured that the answers you provide will be treated with utmost confidentiality and will be used for academic purposes only.

*Please provide the following information by filling in the required data or by putting a check (✓) against the statement that corresponds to your answer.*

### **Section A: Personal Information.**

1. What is your gender?

Male [ ]      Female [ ]

2. What is your age bracket?

Below 25 Years      [ ]      25 to 35 Years      [ ]

36 to 45 Years      [ ]      46 years and above      [ ]

3. What is your Highest Level of education?

Diploma [ ]    Degree [ ]    Masters [ ]    PHD [ ]

Other (please specify): \_\_\_\_\_

4. How long have you been using telemedicine?

0-5 [ ]    6-10 [ ]    11-15 [ ]    16-20 [ ]    More than 20 [ ]

### **Section B: Service Effectiveness of the Use of Telemedicine to Facilitate the Delivery of**

#### **Health Care Interventions and Consultations**

5. Do you think the use of telemedicine enhances service effectiveness in delivery of health care?

Yes [ ]      No [ ]

6. Explain your answer to 5 above

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7. Kindly rate the following statements on service effectiveness of the use of telemedicine to facilitate the delivery of health care using the scale: (1=totally disagree to 5=totally agree).

<b>Effectiveness of the Use of Telemedicine</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>
Home exercise program, telephonic exercise monitoring					
Self-monitoring is enhances diseases management					
Improvement in adherence to medication					
Self-care education is enhances management of illness					
Telemedicine led to reduction in physician and emergency visits					
Improvement in control of serious illness					
It facilitates self-management for chronic patients					

8. Do you think Telemedicine is a positive way to offer support and treatment for individuals with?

<b>Illness</b>	<b>Yes</b>	<b>No</b>
Depression and/or Anxiety		
Long Term Condition		

Bereavement		
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**Section C: Cost-effectiveness of the use of telemedicine to facilitate the delivery of health care interventions and consultations**

Kindly rate the following statements on cost-effectiveness of the use of telemedicine to facilitate the delivery of health care interventions and consultations using the scale: (1=totally disagree to 5=totally agree).

<b>Cost-effectiveness of the use of telemedicine</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>
Significant reduction in hospital costs					
Substantial savings in travel costs					
Significantly lower outpatient and emergency visits					
Significant reduction in mortality					
Reduction in length of hospital stays					
Reduced length and number of hospital stays and readmissions, optimised medical therapy and better quality of life'					
Improved health outcomes					
Substantial reduction in the frequency of repeated hospitalisations					

**Section D: Telemedicine improving accessibility of healthcare**

Do you think the telemedicine improves accessibility of healthcare?

Yes [ ] No [ ]

If Yes, explain\_\_\_\_\_

Kindly rate the following statements on telemedicine improving accessibility of healthcare using the scale: (1=totally disagree to 5=totally agree).

<b>Telemedicine improving accessibility of healthcare</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>
Telemedicine technology promotes a healthier lifestyle and					
It enhances quality of life mortality and heart failure-related reducing the risk of all-cause					
Reduces hospitalisations and improves health outcomes'					
Increased quality of life					
Enhances better self-management of disease by patients					
Fewer episodes of health worsening					

**Section E: Accessibility of healthcare**

Kindly rate the following statements on accessibility of healthcare using the scale: (1=totally disagree to 5=totally agree).

<b>Accessibility of healthcare</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>
Duration of admissions is shorter with Telemedicine technology'					
Decrease in number of office visits					
Cost-effective					
Increases quality of life					
Significant reduction in hospitalisations					

**Thank you**

### APPENDIX III: BUDGET

<b>TASK/ACTIVITY</b>	<b>COST (Kshs)</b>
Pilot Testing of questionnaire	20,000
Questionnaire printing & photocopying	10,000
Field data collection	20,000
Printing & binding thesis report	10,000
Publishing of journal articles	15,000
Local Travelling for data collection	10,000
<b>Total Budget</b>	<b>85,000</b>

**APPENDIX IV: WORK PLAN**

Activity/ Action/ Event	Jan to May 2018				June to July 2018				Aug 2018
	Approval by Supervisor	■	■						
Distribution of Questionnaires			■	■					
Data collection					■	■			
Data analysis and presentation							■	■	
Presentation of draft report									■
Presentation of final report									■