UTILISATION OF E-HEALTH SERVICES AMONG HEALTH CARE WORKERS AND PATIENTS ATTENDING PUBLIC AND PRIVATE HEALTH FACILITIES IN MOROTO DISTRICT

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DECLARATION

I, **Okot Silvester** do here by declare that this research work entitled ***"****utilization of e-health services among health care workers and patients attending public and private health facilities in Moroto district*" is my original work and has never been submitted in any institution for any academic award or any other purpose. All the processes of this work that were used have been acknowledged.

Signed…….

Okot Silvester

Researcher

Date……

APPROVAL

This is to certify that this research report by Okot Silvester has been submitted for examination with my approval as a supervisor.

Signed……

MRS. MIRIAM ONDIA

SUPERVISOR

Date……....

DEDICATION

I dedicate this work to all those who have contributed in one way or the other to the achievement of this Master's Degree in Public Health.

Special dedication goes to my wife Mrs. Sharon Olia Okot, my son Okot Ezra Jesse, my parents Mr. Patrick Ogwal and Mrs. Gertrude Ogwal. Not forgetting my brothers Mr. Boniface Obua and the family and Deogratias Omara and my beloved sister Miss. Grace Akidi and all my friends who provided me support in various forms during my course of study.

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OPERATIONAL DEFINITIONS

For the purpose of this study, the following terms have been defined as;

E-health services refer to any interactive communication by voice, text messages, Internet, social networks (Facebook, What's App, Twitter, Google, etc.) through information technology aimed at enhancing community and individual health outcomes. Thus, this definition allows including all potentially relevant e-Health initiatives at a provider level for easy adoption at community and individual level.

E-health Initiatives and opportunities constitute;

a) m-Health - This refers to healthcare via wireless and mobile e-health technologies. There are several specific applications of mobile health services and these include mobile phone-based health services such as: remote patient-to-physician communication via a mobile device particularly in form of follow up calls after a procedure or test; mobile applications for the detection of counterfeit drugs that allow patients to text-message to a unique product code found on prescription medicine and receive back a text indicating whether it is a valid or counterfeit prescription, patient self-education about healthcare and public communication in case of disease outbreaks or public health pandemic through access to the Internet via a broadband network. This therefore should provide opportunities to revolutionize health care services.

b) Social Media and health Technologies

This refers to the use of social network applications that can be installed in computers, smart phones, tablets, I-pads among others through Internet technologies. This is used for many purposes including provision and utilization of healthcare services.

c) E-health initiatives - These refers to a vital health information and health services provided or communicated to the public through new/emerging reinforced technology. These include; the available LCD/smart phones, computers, tablets, I-pads among others with high compatibility software that allows easy self-guided installations of applications with support of Internet network. Online health information in form of text or audio - voice and video can be accessed.

Health care workers; refers to a team/group of health professionals such as clinicians, nurses, doctors, laboratory technologies/technicians, midwifes working in public and private health facilities. They in their day today work interact as they treat patients.

Patients; refers to any individuals seeking and attending health services at the public and private health facilities. For the purpose of this study, the focus will be those seeking and attending health care services at the out-patient department which is the entry point.

Public health facilities; these refer to the government owned diagnosis and treatment centers where there are trained health care workers to provide health services.

Private health facilities; these refer to the diagnosis and treatment centers owned by private individuals or companies. It comprises both for profit making and none-profit making. They also have trained health care workers/professionals that provide health services to the community.

Utilization; In this it refers to application information communication technology to access or provide health care services by patients and health workers respectively.

Knowledge and skills; Knowledge in the context of this study refers to the acquired information and familiarity of patients and health workers with the use of ICT and e-health services. While skills refer to the hands-on capacity of both the patients and health workers to apply or use ICT gadgets for e-health services.

Accessibility; refers to the availability and user-friendliness of ICT gadgets with its complements such as data bundles, airtimes and internet services among others in order to consume or provide e-health services by health workers to patients.

Affordability; This refers to the ability of the patients and health workers to buy or access ICT gadgets with its compliments for e-health services.

LIST OF ACRONYMS

EHC:	Electronic Health Card
E-Health:	Electronic Health Services
EU:	European Union
HER:	Electronic health record
HIS:	Hospital Information System
HIV:	Human Immune Virus
ICT:	Information Communication Technology
IT:	Information Technology
LCD:	Liquid Crystal Display
M-Health:	Mobile Health
MOH:	Ministry of Health
MTN:	Mobile Telecommunication Network
NGO:	Non-Governmental Organisation
PDA:	Personal Digital Assistants
PHR:	Personal Health Records
SPSS:	Statistical Package for Social Sciences
UHIN:	Uganda Health Information Network
UK:	United Kingdom
UNICEF:	United Nation Children Emergency Funds
UTL:	Uganda Telecommunication Network
WHO:	World Health Organization

ABSTRACT

Background: E-health is seen as one of the major emerging remedies in reducing high healthcare cost, improving health access and quality of health care system in both the developed and developing counties, whereby embracing it is paramount. The use of ICT in health care has the potential to change the delivery and management of health care services. Its adoption and utilization remains low in developing countries Uganda inclusive.

Objective: The study aimed at establishing the level of utilization of e-health services among health care workers and patients attending public and private health facilities in Moroto district.

Method: A descriptive cross sectional study was employed to assess the factors associated with the utilization of e-health services among health workers and patients in Moroto district, July to October 2016. A total of 32 health care workers and 352 patients attending public and private health facilities were included in this study using non-probability, purposive sampling technique. A structured questionnaire and interview guide was used to collect data. Data were entered and analyzed using SPSS version 20.

Result: From the assessment done, generally the utilization of e-health services was reported as low at 30% and specifically 25% and 30.4% among health care workers and patients respectively. Factors such as rating of knowledge level of using ICT gadgets for e-health services was reported having average level of knowledge on using ICT gadget (p=0.00), learning the use of e-health online platform (p=0.000), level of knowledge and skills in ICT (p=0.000), familiarity with e-health services (p=0.000), frequency of internet access (p=0.000), ability to buy ICT gadget (p=0.001) and cost rating of e-health services (p=0.000) were found to independently influence unitization of e-health services.

Conclusion: The findings indicated very low level of utilization of e-health services

Recommendation: There is need to enhance awareness on the use of e-health services by NGOs, health facility management and MOH Uganda. The Government should also provide a functionalized deliberate e-health policy to enhance accessibility, knowledge/skills and addresses cost related barriers to improve quality of health care services.

CHAPTER ONE

INTRODUCTION

1.0 Introduction

The study was conducted to assess the utilization levels of e-health services among health workers and patients attending public and private health facilities in Moroto district. The chapter introduces the study by presenting the background to the study, statement of the problem, research objectives, research questions, scope of the study, significance of the study and the conceptual framework.

1.1 Background to the study

E-health services refer to any interactive communication using information technology aimed at enhancing community and individual health outcomes. The emerging field of Electronic Healthcare (e-health) has been documented for many years as one of the major emerging remedies in reducing high healthcare cost, improving health access and quality of health care system. According to (WHO, 2004), e-health refers to the use of digital data - transmitted, stored and retrieved electronically in support of health care, both at local sites and those at a distance. E-health is also considered as using information and communication technology (ICT) in health care operations such as use of wireless technologies to transmit e-health data to facilitate services (Briggs, 2008). E-health is applied through many ways that include Telemedicine. One example of telemedicine is remote electronic clinical consultation (Perednia and Allen, 1995) involving delivering health care over geographical distances using communications technology such a phone, fax, and computers connected to the Internet (Huston and Huston, 2000). E-health covers the development and use of a wide range of ICT systems for healthcare such as electronic health records, health information systems, mobile devices, e-learning tools, and decision support systems (Gerber *et al*., 2010).

From the global perspective, hospitals in developed countries have been implementing electronic medical records to lower costs and to improve quality of care. Transforming the health sector with enabling technologies is a major priority of the European Union member states. European Commission

Council for health information, stated that "e-health" is today's tool for substantial productivity gains, while providing tomorrow's instrument for restructured, citizen-centered health care systems and, at the same time, respecting the diversity of Europe's multi-cultural, multi-lingual health care traditions. There are many examples of successful e-health developments including health information networks, electronic health records, telemedicine services, wearable and portable monitoring systems, and health portals" (European Union, 2005). France for instance, developed the concept of *digital hospitals* via telemedicine technologies (Currie & Finnegan, 2009). In the United States of America $1.2 billion grant was unveiled to facilitate adoption of electronic health records in all hospitals by 2014 (Stacy & Ulku, 2012). Germany is also working on an Electronic Health Card (EHC) which will allow the physicians to check the administrative data of the patient and to write prescriptions on EHC. Denmark leads the way in European e-health and patient-controlled health records (Cruick *et al*., 2012). This allows any Danish citizen to accesses their medical information and how it is accessed, a citizen can view treatments and diagnoses from his/her own hospital patient record, renew prescription drugs, monitor own drug compliance, survey shortest waiting lists for operations and quality ratings of hospitals, register as organ donor, and get access to local disease management systems in out-patient clinics (Makori, et al, 2013). Sood *et al,* (2008) noted that developed countries are using cutting edge technologies like 3D simulations, virtual reality and robotics to train clinicians and that ICT is included in the curriculum of medical courses. The Internet, and in particular broadband, provides a

foundation upon which various ehealth applications are built. Applications and services such as telemedicine, data transfer, and access to health information are usually internet dependent. Developed counties like Sweden, Denmark, Netherlands, Finland, United Kingdom, Norway, Germany, Switzerland, Belgium, and France perform well with over 70% of households with broadband connection (OECD, 2013).

Developing countries are now waking up to the realization that they have to embrace information and communication technologies to deal with the problem of access, quality and costs of healthcare. Ojo *et al* (2007) additionally argues that adoption of ICT in health sector across developing countries will accelerate knowledge diffusion and increase access to health information. Videoconferencing tools have been deployed in Tunisia for tele-diagnosing while in Botswana there is extensive eLearning for AIDS programs by community health workers. In Rwanda efforts are on-going to connect the district hospitals with referral hospitals for the transfer of medical information (Makori, et al, 2013). Access to and quality of healthcare services by majority of citizens in developing countries is low which is partly attributed to inadequate highly trained health workers and high cost of healthcare services. These are the problems that can be lessened through embracing e-health in developing countries (Currie and Finnegan, 2009; Ojo *et al.*, 2007). MOH Uganda and its health partners (UNICEF and others) have started investing in e-health developments such as Mtrack/rapid SMS for health workers and Village health team in Moroto and other districts (UNICEF, 2012). This study therefore, sought to do a systematic assessment of the utilization levels of e-Health services among health care workers and patients attending public and private health facilities in Moroto district.

1.2 Statement of the problem

The use of ICT in health care has the potential to change the delivery and management of health care services. E-health is seen as one of the major emerging remedies in reducing high healthcare cost, improving health access and quality of health care system in both the developed and developing counties, whereby embracing it is seen as being paramount in improving of health care service delivery.

Despite the well documented literature on the benefits of e-health utilization such as delivering health care over geographical distance; using communications technology such as phone, fax, and computers its adoption and utilization remains low in developing countries Uganda inclusive. The connectivity to internet not only enhances dissemination of health messages but also enables disease diagnoses and improves easy access to medical patient record; booking of appointments; renewing prescription of drugs; monitoring own drug compliance; surveying shortest waiting lists for operations and quality ratings of hospitals; including providing access to local disease management systems in out-patient clinics, (Omary *et al.*, 2010; Kathryn, 2011; Juma *et al*., 2012).

Although MOH Uganda and its health partners (UNICEF and others) have started investing in e-health developments such as Mtrack/rapid SMS for health workers and Village health team in Moroto and other districts (UNICEF, 2012), its adoption and utilization among health care workers and patients attending public and private health facilities has not been remarkable. Even e-health services within Uganda under projects such as U-Report, Uganda Health Information Network (UHIN) that use Personal Digital Assistants (PDAs) to provide early warning information about the spread of communicable diseases to citizens have registered a problem of low utilization among both health care workers and patients (Muchangi and Nzuki, 2014). Other simple provisions of e-health services such as SMS-

based quizzes used to increase knowledge and understanding of HIV/AIDS, have also remained at a low rate of utilization.

Reinforcements of health care service delivery through improved access, timeliness, patient centeredness, and equity and cost effectiveness of health care will not be enhanced easily without embracing e-health services utilization. Upon this background therefore, this study endeavored to establish the current utilization levels of e-Health services among health care workers and patients attending public and private health facilities in Moroto district.

1.3 Research objectives

1.3.1 General objective

To establish the level of utilization of e-health services among health care workers and patients attending public and private health facilities in Moroto district.

1.3.2 Specific objectives

This study was guided by the following specific research objectives;

i. To determine the proportion of health care workers and patients utilizing e-health services in Moroto.
ii. To establish the ICT knowledge and skill levels on applications of e-health services among health care workers and patients in Moroto district.
iii. To assess the level of accessibility to e-health services by health care workers and patients in Moroto district.
iv. iv. To determine the level of affordability of e-health services by health care workers and patients in Moroto.

1.4 Research questions

The following are the research questions asked to the study;

i. What is the proportion of health workers and patients utilizing e-health services?

ii. What is the level of ICT knowledge and skills on application of e-Health services among health workers and patients?

iii. To what level are e-health services accessible by health care workers and patients?

iv. To what level are health care workers and patients able to afford e-health services?

1.5 Significance of the study

The study findings may reveal the key challenges hindering adoption and utilization of e-health services in both public and private sectors.

The study may reveal the relevance of e-health services in improving the quality of lives as well as its potentials in reducing cost of health services as well as improving effectiveness of service delivery.

An understanding from the study provides relevant policy makers with the relevant options to improve policies and strengthen e-health functionalization directed at enhancing better living conditions of individuals and the community.

The findings of the study may also help future scholars as reference notes on concepts they could build on for further research.

1.6 Conceptual framework

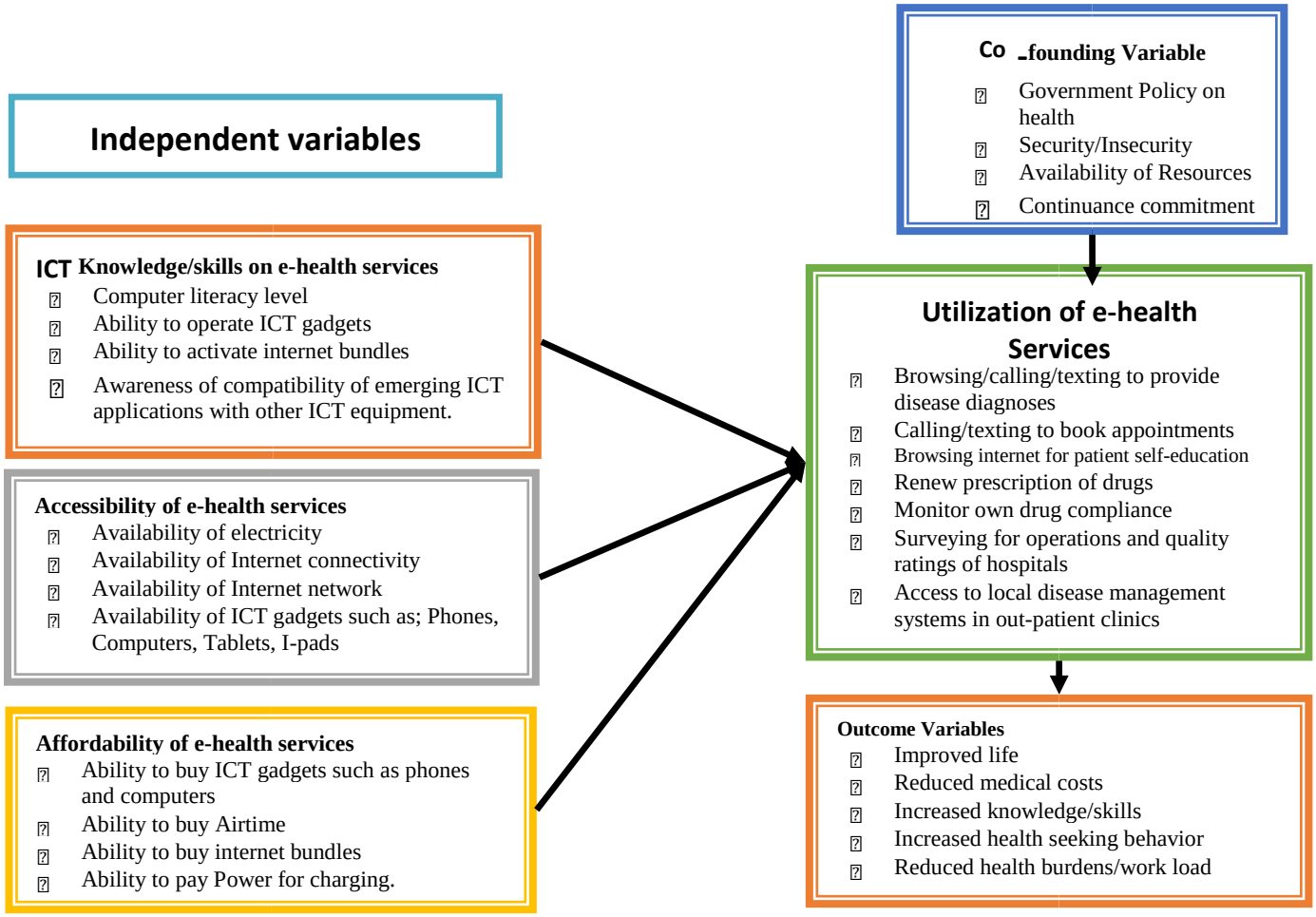


Figure 1:. Conceptual framework above shows relationships in ICT skills on e-health services, accessibility and affordability of e-health with its utilization.

Source: *Developed by the researcher with the idea from African Medical Research Foundation (1997)*

Description of the conceptual framework.

ICT knowledge and skills such as computer literacy level, ability to operate ICT gadgets, ability to activate internet bundles and being aware of the compatibility of emerging ICT applications influences utilization of e-health services. Factors that aid accessibility of e-health services such as availability of ICT gadgets, electricity, and Internet network & connectivity influences utilization of e-health services. Ability to buy ICT gadgets, buy airtime, internet bundles and pay power for charging ICT gadgets influences utilization of e-health services

CHAPTER TWO

LITERATURE REVIEW

2.0 Introduction

In this chapter theoretical underpinnings by other researchers was used to study the utilization of e-health services among health care workers and patients. The theories have discussed specifically in line with; utilization of health services, required skills in applying e-health services, accessibility and affordability of e-health services by health care workers and patients.

2.1 Utilization of e-health services

The use of ICT in health care has the potential to change the delivery and management of health care services. However, using ICT in health care is not only a technological break-through, it also involves creating a new state of mind that is a new way of thinking about health care services' (Ruxwana, Herselman and Conradie, 2010).

An example of using ICT in health care is using electronic health record (EHR) system. EHRs are known to decrease medical errors, facilitate the detection of adverse health events, increase safety of the process of giving medication, enable more appropriate use of healthcare services and potentially lower health care costs (Lobach and Detmer, 2007).

Despite the well documented literatures on the benefits of e-health utilization such as delivering health care over a geographical distance; using communications technology such as phone, fax, and computers connected to the internet to disseminate health messages; disease diagnoses; easy access to medical/patient record; booking of appointments; renewing prescription of drugs; monitoring own drug compliance; surveying shortest waiting lists for operations and quality ratings of hospitals; and access to local disease management systems

in out-patient clinics, its adoption and utilization remains low in developing countries Uganda inclusive (Omary *et al.*, 2010; Kathryn, 2011; Juma *et al*., 2012).

E-health service utilization can also be interpreted as using information and communication technology (ICT) in health care operations. The sub-category Mobile e-Health, is defined by Iluyemi and Briggs (2008) as using wireless technologies to transmit e-Health data and facilitate services.

Another application of e-health is Telemedicine, a branch of e-Health broadly described by Perednia et al. as the use of telecommunications to provide medical information and services (Perednia & Allen, 1995). Telemedicine involves delivering health care over a geographical distance, using communications technology such as phone, fax, and computers connected to the Internet (Huston & Huston, 2000). One example of telemedicine is remote electronic clinical consultation (Perednia & Allen, 1995). E-Health covers the development and use of a wide range of ICT systems for healthcare such as electronic health records, telemedicine, health information systems, mobile devices, e-learning tools, and decision support systems (Gerber *et al*., 2010).

Developing countries are now waking up to the realization that they have to embrace information and communication technologies to deal with the problem of access, quality and costs of healthcare. Ojo *et al* (2007) additionally argues that adoption of ICT in health sector across developing countries will accelerate knowledge diffusion and increase access to health information. This part presents literature on the eHealth adoption in developing countries.

Telemedicine and electronic learning (e-Learning) are being practiced in several countries (Makori, *et al*., 2013). ELearning is important for allowing acquisition of medical knowledge by healthcare providers as well as patients. Telemedicine plays a key role in offering medical services remotely and is very important in situations where healthcare providers are scarce.

Several Francophone African countries, such as Mali, Cote d'Ivoire, Senegal and Burkina-Faso, have implemented an online platform (RA FT) that allows for web-based seminars, training, discussions and sharing of best practices between healthcare professionals in each of the ten participating Francophone countries.

The level of ICT use by healthcare professionals in the hospitals was low. The use of mobile phone was high among healthcare professionals, confirming claims that the use of mobile phones had made its way in the healthcare services, (Huffer LL *et al*., Jan 2004).

Mobile phones are reported to help in remote diagnostic monitoring, data collection and health information dissemination over cellular networks, Tyrer H. W. 2009. In addition, the web-based application software in mobile phones can be configured to send and receive medical reports, pop up alerts any time at healthcare professionals' convenient.

E-Health is not a new concept in Uganda. (McCann, 2012). Karin Källander, an expert working for the malaria consortium in Kampala, Uganda, conducted a survey in 2011 and discovered around 40 different projects concerning e-Health in Uganda **(**Opportunities for eHealth companies in Africa, February 2012**)**.

Videoconferencing tools have been deployed in Tunisia for tele-diagnosing while in Botswana there is extensive eLearning for AIDS programs by community health workers. In Rwanda efforts are on-going to connect the district hospitals with referral hospitals for the transfer of medical information. This is going to be very important especially in the area of tele radiology (Makori, *et al*., 2013).

The problems that exist in the health sectors of many developing countries such as high mortality and morbidity rates, high population, and lack of enough medical staff can be addressed by telemedicine adoption (Orlando, 2007). However, it is worth noting that

telemedicine adoption is still low in most developing countries due to lack of necessary infrastructure required (Omary *et al.*, 2010). Most importantly, telemedicine adoption calls for internet connectivity across the countries.

The Presidential National Commission (PNC) on Information Society and Development (2006) states that ICT applications such as e-health are suitable for addressing the digital divide between rural and urban populations, including rich and poor, young and old, males and females, and unequal distribution of health professionals, particularly in specialist healthcare.

Computerized health information systems can improve treatment of patients, management of health institutions, and provide up-to-date information for policy and decision making. The PNC defines e-health as the combined utilization of electronic communication and information technology to generate, transmit, store and retrieve digital data for clinical, educational and administrative purposes (Presidential National Commission on Information Society and Development 2006).

According to the Municipal Demarcation Board (2007), the Eastern Cape Province is generally regarded as one of the poorer provinces in the country, even though it has played a significant historical role. It consists of six district municipalities and 38 local municipalities. The vision of the Department of Economic Development and Environmental Affairs in the Eastern Cape Province states that: …the province strives to be devoid of the inequalities of the past, to be unified through an integrated and sustainable, economic, social and cultural development; and thus to provide an acceptable quality of life for its entire people in the context of a united, non-racial, non-sexist and democratic South Africa (Eastern Cape Province, 2007).

In contrast, Thom (2007) states that this province is known as 'home to the poorest districts in the country'. Similarly, the Eastern Cape Department of Health (2006) is committed to attracting appropriately qualified employees to areas of service delivery with greatest need, to retaining good employees through a program of compensation and personal development in order to sustain quality healthcare, and to implementing e-health solutions through telemedicine programs that support education, training and academic services. In spite of these efforts, the Eastern Cape health system has continued to be plagued by challenges such as staff shortages, poor management and weak primary care, coupled with high levels of poverty and unsatisfactory access to basic services such as piped water (Thom, 2007).

What is needed is the *effective use* of ICTs in rural developmental interventions (Gurstein 2005), and attention to prerequisite variables that facilitate this.

2.2 Required ICT knowledge and e-skills for e-health services

E-Health Brings Efficiency to Legacy Healthcare Systems. E-Health systems bring lower costs of operations, and help to reduce demand pressures on core resources while increasing productivity. The associated returns can be expected to start accruing from year 1 and rising through year 5. In size, these short- to medium-term gains can amount up to 7% of the current operational (ex-capital investment) budget of the HSE (EU Commission, 2008 and UK Department of Health, 2010). This stage of development of an eHealth strategy is also associated with higher risks relating to failure (EU Commission, 2007 and 2008) and skills shortages in healthcare ICT.

The EU Commission (2007 and 2008) state that 74% of all IT projects in 2008 in healthcare have failed at some point along their deployment journey, and this percentage has remained unchanged since the 1980s. Approximately 28% of all projects fail completely. Risk factors

here relate to skills shortages in healthcare ICT. It should be noted though that the other side of this also holds true i.e. an investment and accumulation of healthcare ICT skills can lead to the development over time of e-Health exporting opportunities and also higher efficiencies within the existing healthcare delivery systems. Converting these challenges into opportunities requires careful design and implementation of the e-Health strategy, creation of incentives for staff training and up skilling, and increasing clinical awareness and understanding as to the benefits of increased system productivity.

The current and anticipated skills deficit exists at different levels, ranging from entry-level technicians and support staff to cross trained clinicians (nurses and doctors), e-Health management and ICT professionals, e-Health researchers and product development specialists. An underlying problem is the low number of e-Health academic specialists who are an essential resource in both: (1) the provision of Health Informatics training across the country, and (2) the establishment of an R&D base and source of eHealth innovation. In the European context, there are already a range of programmes and directives supporting the development of skills in this sector. These include: The *Digital Agenda for Europe – ecompetence Framework; the EU Horizon 2020 R&D Framework;* and various targeted e-Health initiatives. These provide the collaborative environment and the opportunities for funding to address some of the skills needs while working in partnership with colleagues in the Northern Ireland and other European countries.

When appropriately supported by ICT based solutions, the delivery of innovative healthcare may become more sustainable and effective, Lupari MT (2011). Concrete benefits derived from ICT have been reported in areas of prevention and self-management of no communicable diseases facilitating the delivery of healthcare in communities and at home,

EPPOSI (2012). Furthermore, there is a prominent role for ICT in supporting the reorganization of health services towards integrated care, European Commission (2011). However, ICT should not aim to replace services that require face-to-face contact between health professionals and patients, but it should complement and contribute to better service delivery in areas where it can play a genuine role. With this regards, it is important not to undermine the importance of highly competent healthcare professionals. The possible increase in effectiveness and quality of care by ICT tools requires not only the skills, but also changes in workflow and working methods. As mentioned above, ICT will rather be a tool, not the solution itself. Healthcare managers should be vigilant and ensure that the increased incorporation of eHealth/ICT does not alter workflow or methods in a way that is detrimental to the healthcare service. This may happen if the focus shifts too much towards costs and efficiency, rather than quality.

The emergence of new healthcare patterns to tackle multiple chronic conditions and the growing use of ICT tools also requires appropriate skills. Although the entire health workforce needs to be e-skilled, the development and promotion of advanced roles, e.g. providing individuals with the ability to manage and utilize ICT tools for enabling integrated care, has the potential to boost the quality, safety and cost effectiveness of healthcare, Delamaire and Lafortune (2010). Advanced roles have made an enormous difference to the governance and management of healthcare, and seek to improve efficiency, enhance patient care, and improve health outcomes, thus ultimately contributing to the sustainability of healthcare systems, Royal College of Nursing (2012).

ICT training among clinicians is cited as a key determinant of electronic health (Ochieng & Hosoi, 2005; Martins & Oliveira, 2008; Terry *et al.*, 2009; Marques *et al.,* 2011). According

to Ochieng and Hosoi (2005) on a study that sought to establish the factors influencing diffusion of electronic medical records in Japan, ICT skills are required to foster positive attitudes about electronic medical records which translate to greater adoption of electronic medical records.

Therefore, developed countries in an effort to raise ICT skills amongst clinicians have incorporated ICT training in health courses offered at various academic levels. New courses such as medical informatics, bioinformatics, computational biology, and health informatics have been started. Sood *et al* (2008) notes that developed countries are using cutting edge technologies like 3D simulations, virtual reality and robotics to train clinicians and that ICT is included in the curriculum of medical courses.

Availability of ICT skills amongst clinicians is likely to lead to the acceptance and actual use of e-Health in primary healthcare. This is because, clinicians with ICT skills are able to appreciate the possible benefits of ICT in execution and improvement of the various processes they are engaged in. Hospital Information Systems (HIS) have been introduced in most developed countries in European (Currie & Finnegan, 2009). These systems allow for seamless flow of administrative as well as clinical data between various hospital departments such as outpatients, accounts office, wards, pharmacy, laboratories, and theatres among others depending on the units within a hospital.

Attempting to improve health care delivery in the developing world through the use of ICT is not a new idea. In 2001, during the conference on *eHealth in Developing Countries* at Harvard University, several issues where raised that needed to be addressed. Hamish Fraser stated that computer training of the staff is often a bottleneck for effective use of ICT systems, and that success of software requires a dedicated and knowledgeable local staff. He also included a lack of common medical standards, a reduplication of efforts, and a lack of evaluation tools as factors that lessened the effect of software.

Alexander Jaded claimed that much of the work was being done in the dark, there was a lack of good data for internet and email access amongst health care staff and that many of the basics behind health in general, and e-Health in particular were unclear and poorly understood. The discussion called for better understanding of users' needs and workflow, more focus on the needs of the community not the whims of the donors, working with the government was a time waster and technical support infrastructure needed to be in place, as local physicians where extremely overburdened (e-Health in Developing Countries: The Future of Health Care, 2001).

The lack of computer skills was taken into account through an effective user interface and organizational solutions to promote the use of computers in the hospital and at home. Also, the hospital made use of the system optional but provided an incentive system to promote its use. To increase computer proficiency, the hospital provided training programs, demo versions of the system through CDs and via the Internet, helped staff buy and install computers for home use and based a step wise implementation on staffs' computer knowledge, i.e. when the system was made available to a member of the staff depended on the staff members' computer knowledge.

Studies in developing countries have highlighted the following drawbacks: lack of knowledge about ICT; unreliable ICT equipment; high cost of ICT; low level of skills of potential users; technology compatibility; and limited access to ICT as challenges hindering ICT use. Furthermore, lack of ICT infrastructure, access, skills and reluctance to use e-health in healthcare services have been reported as challenges in the use of ICT

The use of technology has shown the potential to support the health care systems in delivering cost effective and high quality of care, it is now essential to get an understanding

of the e-skills gap of health professionals required for delivering and deploying e-Health services effectively.

The following main challenges as regards the development of an e-skilled Health Workforce have been identified, Urbauer P, Herzog J, Pohn B, Forjan M, Sauermann S 2014:

The lack of knowledge and skills needed to use e-Health solutions remains one of the biggest barriers. This competence and confidence issue applies to both patients and health professionals, and represents a key variable influencing acceptance of an e-Health-enabled service.

There is not enough clarity as to what minimum e-skills health professionals and patients need for an appropriate use of an e-Health enabled service. There are already some projects that have been looking into identifying a set of e-skills needed but nothing has been done at EU level to cover the health workforce. Stakeholder engagement is key to facilitate such efforts.

E-health services require different communication approaches and different ways of collaboration among patients and health professionals. Although there is evidence of the benefits of e-Health services, its success is challenged by the lack of literacy for their deployment.

Current educational activities to foster the acquisition of e-skills are patchy. Indications and recommendations to include a set of e-skills at the different stages of education of the health workforce, undergraduate, postgraduate and during their continuous professional development are missing.

The complexity of multi-national health activities (such as research, cross-border patients and health professional mobility) leads to increasing challenges of the e-Health capability, capacity and roll-out.

Consideration must be given to the role that front-line professionals are usually excluded from the process of designing employment, educational and health policies at local, regional, national, European and international level. As a result, professionals might not readily accept the adoption of new technologies which have substantial implications for their working practices.

There is risk of extra costs because of the implementations of e-skills taken from the delivery of health care. Quality of care and efficient health service should remain the main task and objective of health professionals' education. Cost may be covered from a different budget than healthcare service.

2.3 Accessibility to e-health services

The use of information and communication technology (ICT) in health care (e-Health) is proposed as a useful tool to increase efficiency, improve access and improve the quality of care, Eyesnbach G. 2001.

Health care is primarily about people-to-people interactions. It is about understanding, diagnosis, physical contact, communication, and, ultimately, providing care. By bringing people together, telecommunication technologies have the potential to improve both the quality of and access to health care in the remotest areas of the developing world. Telemedicine offers solutions for emergency medical assistance, long-distance consultation, administration and logistics, supervision and quality assurance, and education and training

for healthcare professionals and providers (Wootton, et al, citing the Royal Society of Medicine Press and International Development Research Centre, 2009).

Health portals are gaining acceptance especially in dissemination of health information and structuring of web content. For instance, in Malta, a national e-Health Portal is in place for provision of various health services and information related to the promotion of healthy lifestyles and the application of the European Health Insurance Card (EHIC). Other enabling technologies in various stages of adoption across European Countries include Cloud Computing, Computer Physician Order Entry, Picture Archiving and Communications Systems (PACS), Telemedicine, and Health Portals (Currie & Finnegan, 2009).

In Uganda, SMS-based quizzes have also been used to increase knowledge and understanding of HIV/AIDS. With the number of mobile broadband subscriptions more than doubling from 2011 to 2013 (from 472 million to 1.16 billion subscribers) in developing countries (ITU, 2013), there is huge potential for using mobile phones to search for health related information.

Most people in Uganda have been walking long distances like10 km with the purpose of seeking medical treatment at a government health centre moreover with no certainty of the centre being open or knowing if the health center has medication in stock (Densmore, 2010). According to HSSP III 72% of the population of Uganda lives within 5km of a health care facility, but utilization is poor, due to lack of medicine, poor infrastructure and shortage of human resources (Government of Uganda, 2010).

HSSP III states that the prevalence of ICT equipment amongst health facilities, i.e. the percentage of health centres with ICT equipment, is 6.4%.

This ICT equipment consist of televisions, mobile phones, radio, and, to a lesser extent, computers. Current plans involve installing adequate ICT in hospitals and lower level

facilities as well as implementing ICT infrastructure for human resource operations. There is, however, a lack of basic infrastructure in the health sector, only 40% of all available equipment is in good condition and 17% needs to be repaired (Government of Uganda, 2010).

Use of ICT for public health promotion is also being experienced in developing countries. The Uganda Health Information Network (UHIN) uses personal digital assistants (PDAs) to provide early warning information about the spread of communicable diseases to citizens under the project AED-SATELLI FE. Praekelt Foundation's Project Masiluleke is another project that has successfully been used to offer free information about HIV testing locations via customers' mobile phones.

The Internet, and in particular broadband, provides a foundation upon which various eHealth applications are built. Applications and services such as telemedicine, data transfer, and access to health information are usually internet dependent. In Europe, Sweden, Denmark, Netherlands, Finland, United

Kingdom, Norway, Germany, Switzerland, Belgium, and France perform well with over 70% of households with broadband connection (OECD, 2013). This indicates these countries' readiness towards embracing internet-based eHealth solutions such as telemedicine, searching of health information online by patients and clinicians, and the adoption of PHR by patients.

Internet continues to play a key role in public health promotion. According to Griffiths *et al* (2006) one of the most common functions of internet is that it provides all sorts of health related information through use of different websites. This can be of great benefit to citizens in developing countries who are able to identify the latest information regarding illnesses, treatments, and best practices in medicine.

Successful ICT applications in rural areas require investment in infrastructure on three levels: (a) access to ICTs (Mansell and When 1998); (b) access to supporting communication infrastructure and networks (Conradie and Jacobs 2003); and (c) a supportive policy framework.

According to Gurstein (2005), the mere presence of and access to ICTs in rural areas is unlikely to be effective without relevant ICT-related skills, promotion of relevant content/information for ICT applications, and a policy framework in which interventions can function (Mansell and When 1998; van Audenhove 2001).

Mansell and Wehn (1998) suggest prerequisites include access to ICTs, a variety of ICT-related skills

(for producing and using ICTs and ICT services), and an appropriate policy framework. Conradie and Jacobs (2003) mention access to a supporting communication infrastructure that can serve as a link to relevant networks such as the Internet, while van Audenhove (2001) adds an appropriate 'info structure' system that can provide suitable content and applications via the ICTs. Another approach is to consider individual psychological variables that might underlie technology acceptance and use. According to the Technology.

Acceptance Model (TAM) (Davis 1989, 1993) and the Unified Theory of Acceptance and Use of Technology (UTAUT) (Venkatesh et al. 2003), two variables impact on the decision to actually use available ICTs: The Perceived Usefulness (PU) of that technology and the Perceived Ease of Use (PEU). PU can be described as the extent to which a person believes that using a particular technology will meet that person's need(s) or enhance job performance. Thus, PU is largely to do with perceived benefits of using the technology and it

is possible that some of the above-mentioned prerequisites for effective ICT use might also be perceived to be such benefits.

Availability of useful information (the content of an ICT application) could heighten its perceived usefulness, as could a supportive policy framework. The PEU variable describes the extent to which a person believes that using a particular technology will be free of effort. Even a useful technology application may not be used if users perceive it too complicated to use or that performance benefits of usage are outweighed by the effort involved (Davis, Bagozzi & Warshaw 1989; Sandberg & Wahlberg 2006). PEU has to do with perceived barriers to using the technology; it is also affected by variables relating to levels of ICT access, access to supporting communication infrastructures and the Internet, and ICT- related skills.

There are many barriers to the implementation of e-health solutions that cause delays or hinder its use. The Commission of the European Communities (2004) stated that healthcare systems around the world are faced with major challenges, although their nature and scale differ between developed and developing countries. The challenges and setbacks facing implementation of e-health in rural areas of South Africa are the focus of the present study and warrant further detailing here. The South African health sector faces many challenges, such as epidemics, historical issues, and factors that impact directly on the digital divide between developed and developing countries. Rural communities in particular are compromised by lack of infrastructure, services and expertise, limited resources, low literacy levels and professional isolation (Herselman *et al*., 2003; Olugbara et al. 2006).

Adoption and implementation of e-health solutions is often delayed when underlying problems are not resolved. For instance: According to IT-Online (2007), the four fundamentals of e-health solutions are improved access to healthcare, improved quality of care, illness prevention and health promotion, and better efficiency (i.e. better healthcare for the same or lower costs). However, the healthcare sector does not fully benefit from these fundamentals due to delays in reaching agreement on best practice and processes. In South Africa, there appears to be no uniform healthcare approach, let alone a system that can be truly proffered as a proven template for reform that enables by means of technology. Yet the recognized benefits of reform and automation go hand-in-hand. The lack of standardization and integration between health information systems are major barriers to the full realization of the benefits of e-health solutions.

In addition to these inherent problems, shortcomings in the knowledge and the skills of patients and health professionals to use ICT solutions represent other challenges. Even when implemented, the benefits of ICT cannot be realized if people are unable to use it. One challenge is to train people in the use of ICT solutions so they can improve their health or quality of service. However, there are other challenges that also need to be addressed before e-health solutions can be implemented in rural areas in South Africa.

Further challenges in providing access to healthcare services are due to geographic distribution, as much of the population resides in rural areas. One way to keep information in one place is to implement a card system. A ‘smartcard’ can be read electronically when a patient goes to a hospital or clinic (IT-Online 2007).

ICT infrastructure across the country needs to be improved in order to support not only transfer of information across the country, but also a successful e-health solution such as

EHR. Some rural hospitals have little or no access to technological resources, a major barrier to implementing solutions (Jacobs 2003).

2.4. Affordability of e-health services

"E-health is the cost-effective and secure use of information and communications technologies in support of health and health-related fields, including health-care services, health surveillance, health literature, and health education, knowledge and research" WHO, May 2005.

The value of eHealth is in its ability to help lower costs in health sector while delivering better health care within a citizen centered approach (Currie & Finnegan, 2009). Additionally, eHealth through the use of Personal Health Records (PHR) is a key factor in empowering patients and will help them to play an increasingly central and active role in their own healthcare (Markle, 2004).

In attempts to lower the costs, improve the quality and expand the access of health services, many developing countries' governments have put much hope in electronic health records (Nyella and Mndeme, 2010) and ICT based Health Information Systems (HIS) (Mosse and Sahay, 2005). The migration to electronic medical records is necessitated by limitations in paper based records that include temporal, spatial, and monetary constraints associated with continued paper-based record accumulation and compression over time.

"The South African telecommunications market is the largest in Africa totaling US$25 billion in 2006, but South Africa continues to descend down the international scales of competitiveness and e-readiness. Broadband penetration is low and bandwidth is expensive. Mobile phones have given access to millions who were previously marginalized from personal communications and mobile phone penetration is estimated at 75% with approximately 90% of the country covered by mobile telephony. It is likely that m-Health

will play an ever increasing role in medical informatics, telemedicine, surveillance and healthcare education in Africa." Mars, M and Seebregts, 2008.

Recording of patient information in many hospitals in developing countries has been on papers. Miller *et al* (2005) identifies limitations of these paper-based records as including illegibility, ambiguity, incomplete data, poor availability and data fragmentation. Laerum (2003) argues that recording of patient information on papers impede the continuity and quality of care for patients.

Additionally, paper-based systems have limited functionality; many people cannot easily view the same record at the same time (Hwang *et al*., 2009). Having electronic medical records can support medical professionals in their decision-making and also improve operating efficiency, thus improving medical care quality (Ayers *et al*., 2009). Other systems such as decision support systems have been shown to reduce medical errors in applications such as drug order entry (Bates *et al.*, 2001).

Research on e-Health in developing countries has shown that e-Health can be one solution to provide better access to healthcare facilities for patients and healthcare professionals, improve collaboration between different governmental bodies, and increase care quality (Cecchini & Scott, 2003; Khalifehsoltani and Gerami, 2010; Mostafa *et al*., 2010). According to a survey carried out by the World Health Organization (WHO), e-Health tools, among them Electronic Health Record (EHR) systems, are seen as extremely useful for 70% of the non-OECD countries (World Health Organization, 2006).

Before beginning any e-Health project, financing must be procured and its sustainability protected over the duration of the project. This requires proper planning and identification of benefits, so that value for money and affordability are balanced and results delivered as quickly as feasible. These are to support

"policy makers and health departments to make informed decisions when allocating scarce resources", S Broomhead and M Mars. January/February 2012,

CHAPTER THREE

METHODOLOGY

3.0 Introduction

This chapter describes the approaches the researcher used to get information on the research problem by presenting; the study design, study area, study population, sample size calculation, sampling procedures, study variables, sources of data, data collection techniques, data collection tools and instruments, data analysis procedure, quality control issues, ethical considerations, limitations of the study and plan for dissemination of results.

3.1 Study Design

The study design adopted in this study was a cross sectional study design. A cross sectional study design was used because data was collected at a one point in time for the purposes of the study and no follow up of respondents was made.

The study used both qualitative and quantitative approaches. Creswell, (2003) asserts that a design mixed methods is useful in capturing the best of both quantitative and qualitative. Qualitative techniques helped the researcher to come up with conclusions on variables that would not be measured quantitatively while quantitative techniques facilitated establishing values attached to numerical variables. A statement was used to assign variables that would not be adequately measured using numbers and statistics, form of mathematical numbers and statistics assigned to variables that would not be easily measured using statements or theme.

3.2 Study Area

Moroto District is found in the north-east part of Uganda bordered by Kaabong district in the north, Kenya to the east, Amudat district to the south, Nakapiripirit district to the southwest,

Napak district to the west, and Kotido district to the northwest. Moroto District is at the foot of Mt. Moroto. The coordinates of the district are 02 32N, 34 40E. Moroto District is part of the larger Karamoja sub-region. Moroto District is a plain covered by savannah grassland and some low-lying rocky hills. It is composed of three counties: Bokora County, Matheniko County, and Moroto Municipality. It is inhabited by the Karimojong a distinctive ethnic group that highly cherishes its traditions.

Moroto district have six sub-counties and these are; Nadunget, Rupa, Katikekile, Tapac and Municipality.

Moroto has one Regional referral hospital, one health center IV, three public HCIIIs, three private-not for profit HCIIIs, eight public HCIIs and five privately owned clinics.

3.3 Study Population

This constituted health care workers providing services and patients attending health care services in public and private health facilities in Moroto.

3.3.1 Inclusion criteria

The study included all health care workers providing health services in the public and private health facilities in Moroto district who consented to participate in the study. It also included all the patients attending public and private health facilities who consented to participate and not very sick and could read, write and speak English.

3.3.2 Exclusion criteria

The study excluded all health care workers in the public and private health facilities in Moroto district who did not consent to participate in the study or were not present in the facility during the time of data collection. It also excluded all the patients who did not

consent to participate and those that were very sick and including all those who could not read, write or speak English.

3.4. Sample size determination

The sample size for this study was calculated using the Kish and Leslie formula for sample size determination as reported by Israel (2009).

Sample size proportion $n = \frac{Z^2 pq}{e^2}$

n=population size e= margin of error/ confidence interval (0.05) z= z-score (at 95% confidence level (1.96) q= (1-P) or estimated the proportion of failure p= estimated proportion of success or percentage picking a choice (assumed to be 50 percent since the exact proportion is not known), expressed in decimal-assuming normal distribution, 0.5 is adequate, (Kotrlik &Higgins, 2001)

$$n = \frac{(1.96) \times (1.96) (0.5) (1-0.5)}{(0.05) \times (0.05)}$$

n=384 respondents.

These were categorized as both health care workers and patients whereby:

The health care workers comprised of 32 cadres from 09 facilities out of 14 public and 04 private health facilities in Moroto district.

And the patients **352** respondents considered

3.5 Sampling procedures

The researcher interviewed 32 health workers and 352 patients. Both non-probability and probability sample method were used to select the respondents. Purposive sampling method was used to segregate patients that were not very sick and could read, write and speak

English. After which simple random sampling procedure was utilized to select the respondents from all the patients that met the inclusion criteria until the required sample size was reached.

To select the health workers, the health facilities were purposively selected especially those that had high enrollment of patients such as; Moroto regional referral hospital, Army barracks HCIV, Nadunget HC III, Nakapelimen HCIII, and Rupa HC II which were all public health facilities and private health facilities included were Marie Stopes Uganda, Rainbow and Loima Medical centers, Doctors Complex clinic.

From these, categories of health care workers that were interviewed included doctors, clinicians who conducts diagnosis from the outpatient department, Nurses from various departments, Lab technologies/technicians and midwives that met the inclusion criteria until the required number of the sample size was reached.

3.6 Study variables

The following study variables guided the study.

3.6.1 Dependent variable

Dependent variable assessed "**utilization of e-health services"**. This took in to account Transfer of e-health data, dissemination of e-health messages, disease diagnoses, access to medical/patient record, booking appointments, renewing prescription of drugs, monitoring own drug compliance, survey for operations and quality ratings of hospitals and access to local disease management systems in out-patient clinics.

3.6.2 Independent variables

The independent variables assessed are;

a) ICT knowledge/skills on e-health; this included Literacy level, Ability to operate ICT gadgets,

   Ignorance/compatibility of emerging ICT software with other ICT equipment

b) Accessibility of e-health services such as availability of electricity; availability of internet connectivity; availability of internet network; availability of ICT gadgets such as phones, computers and others

c) Affordability of e-health services which included; ability to buy ICT gadgets such as phones and; computers, ability to buy Airtime; ability to buy internet bundles; ability to pay Power for charging.

3.7 Sources of Data

The data was generated from health workers and patients in both public and private health facilities in Moroto district. The health workers included the cadre of these category; included doctors, clinicians who conducts diagnosis from the outpatient department, Nurses from various departments, Lab technologies/technicians and midwives.

To back up the primary data, relevant literatures from different schoolers/researchers who have done related studies on electronic health services was used in the study.

3.8 Data collection techniques

The questionnaires were researcher administered while data was being collected from the patients. The researcher was assisted by research assistants in the distribution and administering of questionnaires. Interviews were conducted with health care workers in their

various capacities. The responses generated from the interviews helped to supplement the data collected through administering questionnaires.

3.9 Data collection tools

The data collection tools used constituted a set of questionnaires for patients and a key informant interview guide for the health care workers.

The questionnaire used had closed and open ended questions, as well as semi structured questions and scaled items to generate information while collecting data from the respondents. The scaled items, according to Macmillan and Schumacher (2001) allow fairly accurate assessments of opinions. Similarly, it has the ability to solicit information from several respondents within a short time (Gupta, 1999).

The researcher used a structured interview guide and with partly close ended questions in nature.

3.10 Data management and analysis

The qualitative data collected was entered into the SPSS version 20.0 spread sheet and was edited and cleaned to minimize obvious errors. Part of the qualitative data was coded and also entered into the SPSS version 20.0 spread sheet.

The data entered in to the computer was then manipulated to produce Univariate, Bivariate and Multivariate analysis. The analyzed data was presented in tables and figures.

Data was analyzed on SPSS as follows;

At the Univariate level of analysis, the findings obtained mainly involved descriptive analysis of frequency distributions and percentages. At this level, each variable was presented on contingency tables.

Bivariate level of analysis was used to establish the statistical association between the dependent and independent variables. And cross tabulations of key identified variables was done to determine the significance of the associations between the independent variables taking one at a time and the dependent variable, where the Pearson Chi-square test and their respective probability values (p-value) were calculated. The p-value of 0.05 was used as a cut-off point to test statistical significance between the variables compared.

At Multivariate analysis level, a logistic regression model was fitted to determine the relative Importance of the independent variables. Logistic regression was used because of the dichotomous nature of the dependent variable (zero (0) for those low utilization of e-health services and one (1) for high level of utilization of e-health services and to control for confounding factors within independent variables. The model estimated the probability of falling into either of the dichotomous values of the dependent variable given the effect of the independent variables. Variables with a p-value of ≤ 0.1 at bivariate analysis were the ones considered for the multivariate analysis. Both Enter and stepwise selection with removal testing was used, which based on the probability of the likelihood ratio statistic

Qualitative data analysis was conducted using thematic and content analysis. All interviews were transcribed and the transcripts were read and partly coded manually to identify concepts, patterns and themes relating to the objectives of the study. The analyzed data was interpreted and then discussed.

3.11 Quality control Measures

Research assistants was carefully selected by choosing from individuals that had attained tertiary level of education for purposes of handling effective communication. All the eight

research assistants selected were given a one-day training to conceptualize the tools and to understand data collection procedures.

The tools were pre-tested for validity and reliability in a neighboring district called Napak. The questions that were found unclear to the respondents were adjusted accordingly for better understanding without changing the meaning.

The researcher monitored the data collection procedures on a daily basis and crosschecked the submitted tools for accuracy, consistency and completeness. Daily meetings were organized between the researcher and the research team to resolve any arising issues that were likely to affect data quality. The data entered in to SPSS Version 20.0 was cleaned after the analysis to eliminate errors.

3.12 Ethical considerations

The study observed all procedures required in research. After the approval of research proposal by the Institute of Public Health and Management of International Health Science University, the researcher obtained a letter of introduction from the University. Permission to collect data was then sought from Moroto District Health Office (DHO). After authorization from the DHO, the researcher sought further permission from the Moroto hospital director and in each of the visited health facilities.

The researcher also ensured that the respondents understood the purpose of the study before seeking their consent. The respondent was made to sign the informed consent form before their participation.

The researcher made sure that confidentiality and their anonymity of participants was observed.

3.13 Limitations of the study

The researcher had the following limitations;

The study focused only on health care workers working at the health facilities and patients who can read and write in English. So the views of those who could not read and write were left out of this study.

3.14 Dissemination of the report

The research report will be submitted to International Health Science University. It shall be made available in the IHSU library for references. The Moroto District Health Office shall be given a copy. This report may also be presented in conferences and publications made online in peer review journal websites.

CHAPTER FOUR

PRESENTATION OF RESULTS

4.0 Introduction

This chapter is a presentation of analyzed findings of this study. This has been arranged as follows; Background information of respondents, Proportion of e-health utilization by respondents, ICT Knowledge and skill level in application of e-health services, Accessibility of e-health services by respondents and Affordability of e-health services by respondents. With all analysis presented ant Univariate, Bivariate and Multivariate levels.

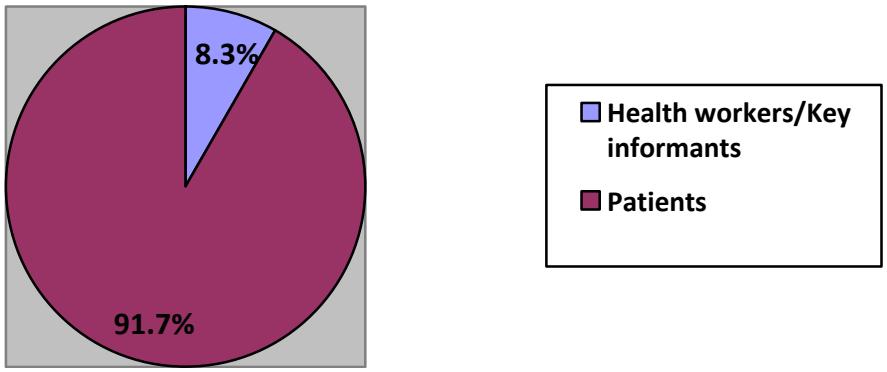
4.1 Background information

Table 1: General information of respondents

Variable	**Frequency of the respondents (Number)**	**Percentage, %**
Gender		
Male	132	34.4
Female	252	65.6
Residential geographical location		
Urban	134	34.9
Rural	250	65.1

Most of the respondents interviewed 65.6% were female compared to 34.4% who were male. The majority 65.1% resided in the rural areas while only 34.9% stayed in urban as indicated in the table above.

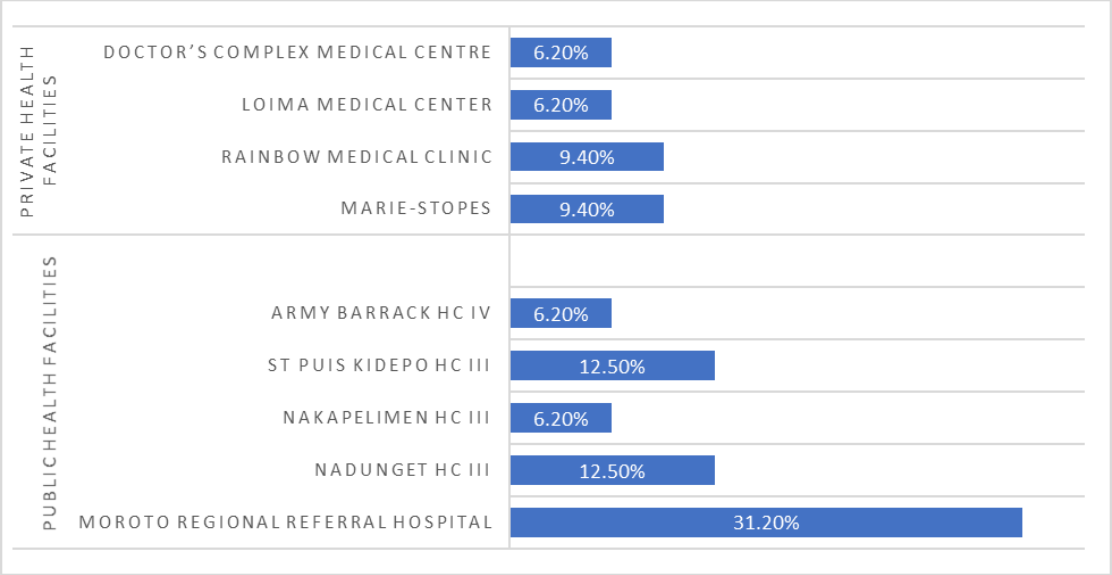
Figure 2: Respondents categories



Source: Field Data

Presentation in figure2 above indicates the categories of respondents who took part in the study. Whereby the patients formed the largest percentage that comprised 91.7% and the health workers constituted only 8.3% as shown in the pie-chart above.

Figure 3: Distributions of respondents according to health facilities



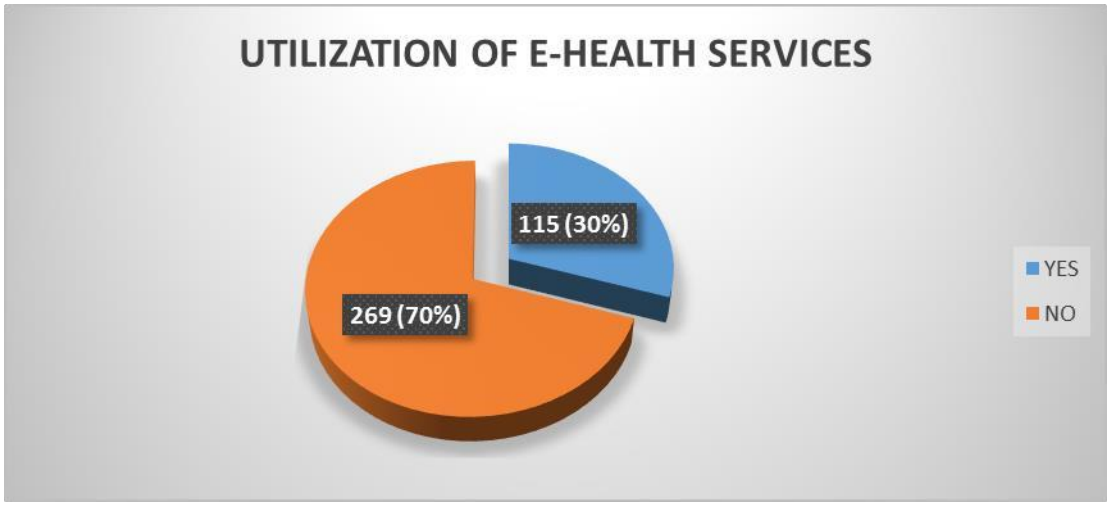
Source: Field Data

As indicated in the graph above, majority of respondents 31.2% interviewed were from Moroto regional referral hospital followed by Nadunget HC III and St Pius Kidepo HC III that constituted 12.5% each in the public health facilities while the majority of the respondents interviewed from private health facilities came from Rainbow clinic and Marie-Stopes centers that constituted 9.4% each.

4.2 Utilization of e-health services

4.2.1 Proportion of the utilization of e-health services

Figure 4: Proportion of respondents who utilized e-health services

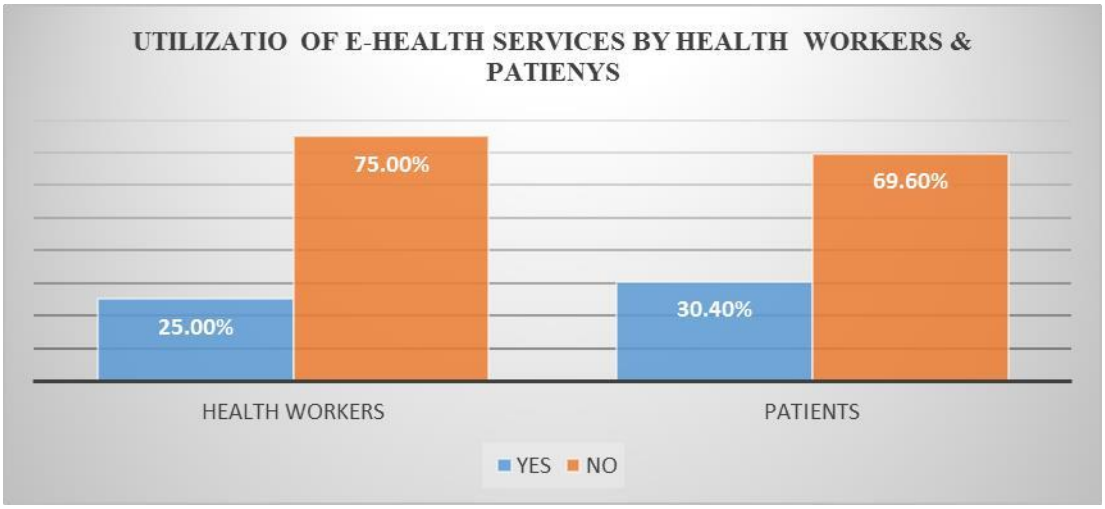


Source: Field Data

The pi-chart above indicates that, respondents who had ever utilized e-health services constitutes 115(30%) while those who had never used are 269(70%).

4.2.2 Proportion of respondents by category who utilized e-health services.

Figure 5: Proportion of utilized e-health services by respondents according to category.

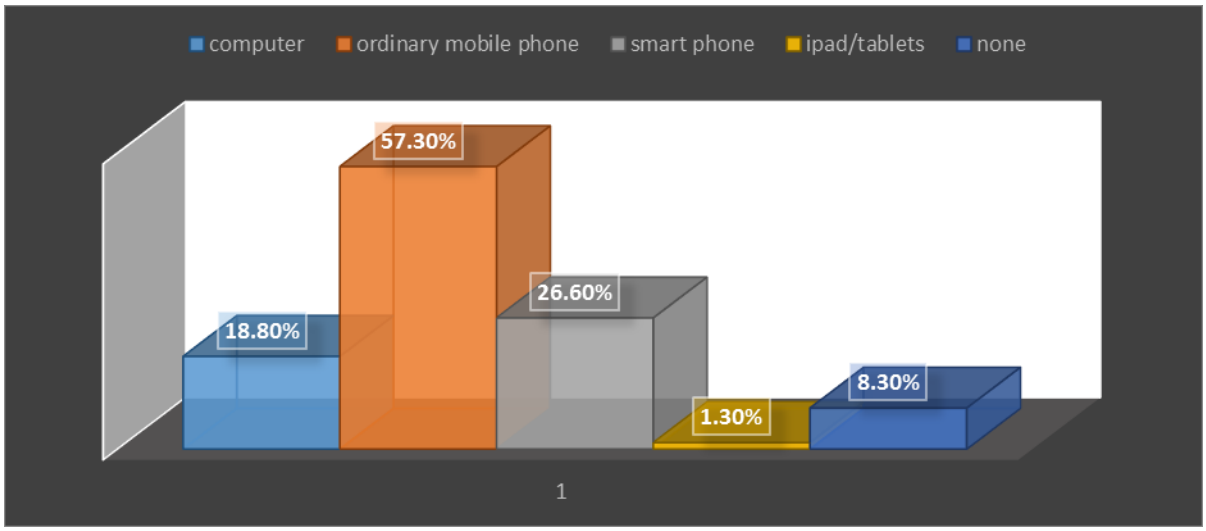


Source: ***Field Data***

Respondents by category who had ever utilized e-health services as shown in the above figure indicates that only 25% of the 32 health workers and 30.4 % of 352 patients utilized the services while majority of both categories did not.

4.2.3 Proportions of health care workers and patients who owned ICT gadgets.

Figure 6:Proportions of respondent who own ICT gadgets

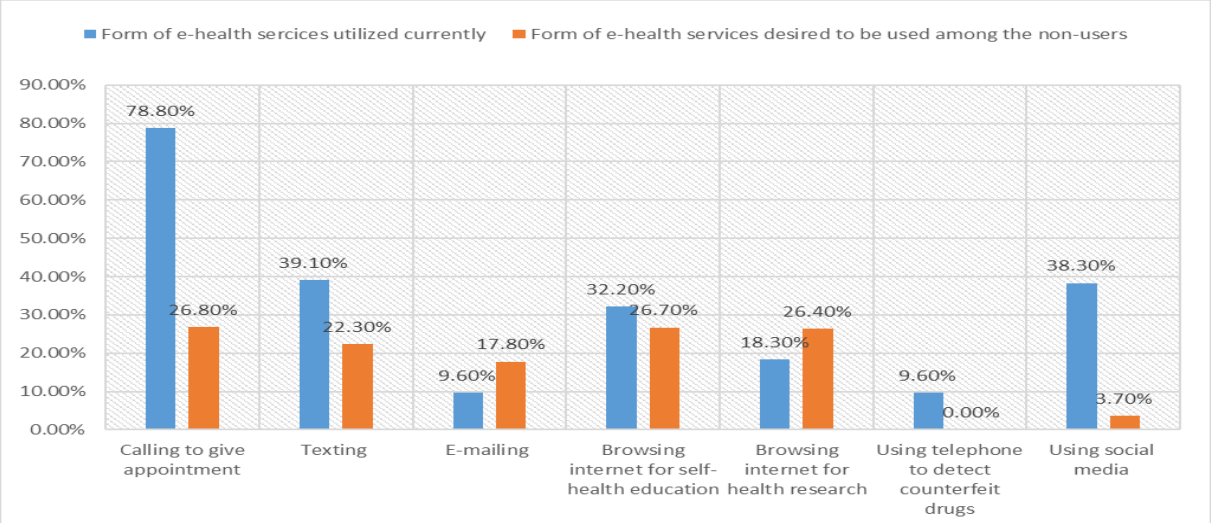


Source: Field Data (multiple responses)

Out of the 384 respondents interviewed, majority 57.3% owned ordinary mobile phone followed by 26.6% who owns smart phone and the least was Ipads/Tablets that constituted 1.3%. Meanwhile 8.3% reported not owning any ICT gadgets by the time of conducting this study as shown in the graph above.

4.2.4 Forms of e-health services used and desired to be used

Figure 7: Forms of e-health services currently utilized and those desired utilized by non-users



Source: Field Data (multiple responses)

Comparing e-health services that are utilized and those desired to be utilized by non-users, the majority of the respondents who had ever utilized e-health services indicated that 78.8% were calling to give appointment followed by texting 39.1% while minority 9.6% utilized e-mail.

Among those who had never utilized e-health services 269(70%), 26.8% reported that they would wish to utilize calling to give appointment as a form of e-health services, followed by 26.4% browsing internet for self-health education and the least preferred reported is using telephone to detect counterfeit drugs that did not score any percentage.

Table 2: Reasons for utilization of e-health services and challenges experienced

Of those who had never used e-health services 269 (70%) considered the following reasons if they were to use the services.		
To make a follow up	60	22.3
Whenever there is an emergency	192	71.3
To make appointments	96	35.7
When making health research	36	13.4
To disseminate health messages	28	10.4
Monitoring drugs compliance	21	7.8
Renew prescription of drugs	107	39.8
Access disease management information	209	77.7
What major challenges are being experienced in utilization of electronic health services?		
Lack of knowledge in ICT	192	50.0
Power challenge	172	44.8
Internet not reliable and expensive	145	37.8
What is your experience on the reliability of electronic health services for health care? (N-115)		
Always reliable	25	21.7
Sometime reliable	65	56.5
Never reliable	25	21.7
In your own view how do you think ICT can be used or applied to support e-health services in your facility		
Purchase of more electronic gadgets	110	28.6
Having telephone or e-mail contacts of clients for easy reached	96	25.0
Checking counterfeit of drugs and others by use of apps	66	17.2
Installing reliable internet	150	39.1
Others	8	2.1
Do you think electronic health services can improve service provision?		
Yes	300	78.1
No	84	21.9
If yes, in what way can it improve service provision?		
Ensure right time patient medication	72	24.0
Easy communication with patients	96	32.0
Easy diagnosis and management of patients	144	48.0
Save time	72	24.0
In what ways do you think your health facility could benefit from electronic health services?		
Health workers shall be knowledgeable on e-health services	188	49.0
Reduce queuing at health facility	64	16.7
Improve quality of medical care	108	28.1
Reduce unnecessary cost	84	21.9

Source: Field Data (multiple responses)

Majority of those who had never used e-health services preferred that they would use it for accessing disease management 209(77%), this was followed by 192(71.3%) of those who said they would utilize whenever in an emergency while least preferred is 21(7%) monitoring drugs compliance.

Out of 384 respondents interviewed, majority 192(71.3) reported lack of ICT knowledge as the major challenge being experienced in utilization of electronic health services while internet being expensive and un reliable was considered the least with 145(37.8%. Most of the respondents who utilized e-health services 56.5% reported that electronic health services were sometimes reliable compared to 21.7% who indicated that the services were neither reliable nor reliable. Majority of the respondents 39.1% thought that installing reliable internet would support e-health services. Three hundred respondents (78.1%) thought that e-health services could improve health care service provision. Among those who said

e-health services could improve health care services, 48% said it could make diagnosis and management of patients easy. Finally, 49% of the respondents thought that health workers should be knowledgeable on e-health services to improve the health care at the facility.

4.3 ICT knowledge and skills level on e-health services

Table 3: ICT knowledge and skills level of respondents on application of e-health services

Variable	Frequency, n	Percentage, %
How would you rate your knowledge level of using Information		
Communication and Technology gadgets like computers, phones, I-pads, tablets and others?		
Excellent	44	11.5
Good	70	18.2
Average	110	28.6
Poor	72	18.8
Very poor	88	22.9
What specific skills do you have in operating Information Communication Technology gadgets such as computers, smart phones, Ipads, tablets, modems and others?		
Calling	216	56.2
Chatting or texting	72	18.8
Browsing internet	48	12.5
Sending e-mail	48	12.5
How did you learn to use the electronic health online platform/applications?		
Institutional training	120	31.2
Followed online instruction	108	28.1
Learnt from friends	156	40.6
What are your ability to connect internet and social media in your computer or telephone?		
Yes	71	18.8
No	313	81.2
How would you rate your level of knowledge and skills in Information Communication Technology?		
Very good	84	21.9
Good	84	21.9
Average	132	34.4
Poor	48	12.5
Very poor	36	9.4
What are the major benefits of electronic health services to you and the communities?		
Easy dissemination of e-health messages	84	21.9
Reduce costs	72	18.8
Save time	48	12.5
Reduce workloads	84	21.9 9.4
Easy disease diagnosis and management	36	15.6
Others	60	
What are some of the electronic health services you are familiar with?		
Calling for follow up	168	43.8
Browsing internet for health research	72	18.8
Texting patients for appointment	84	21.9
Checking drug counterfeit by mobile texting	36	9.4

Source: Field Data.

Majority of the respondents, 28.6 % reported having average level of knowledge on using ICT gadget, most of the respondents 56.2% said they have specific skills on calling as the e-health services. 40.6% who constitute of the respondents had learned how to use e-health services through close friends. Most of the respondents 81.2% reported that they were unable to connect internet and social media in their computer or phone. Regarding the rating of knowledge and skills in ICT, 34.4% reported having average level of knowledge. On the benefits of e-health services, majority 21.9% said it makes it easy to disseminate health messages and reduce workload. And finally, 43.8% which constituted the majority of the respondents reported being calling as the familiar e-health service.

Table 4: Bivariate Analysis on ICT knowledge and skills level on utilization of e-health services

Variable	Utilization of e-health services		X^2	p-value
	Yes (%)	No (%)		
How would you rate your knowledge level of using Information Communication and Technology gadgets like computers, phones, I-pads, tablets and others?				
Excellent	11(9.5%)	33(12.3%)	12.08	.000*
Good	4(3.4%)	66(24.6%)		
Average	53(45.7%)	57(21.3%)		
Poor	48(41.4%)	24(9.0%)		
Very poor	0(0%)	88(32.8%)		
What specific skills do you have in operating Information Communication Technology gadgets such as computers, smart phones, Ipads, tablets, modems and others?	38(32.8%)	178(66.4%)	12.89	.000*
Calling patients	17(14.7%)	55(20.5%)		
Chatting or texting with patients	13(11.2%)	35(13.1%)		
Browsing internet	48(41.4%	0(0%)		
Sending e-mail				
How did you learn to use the electronic health online platform/applications?				
Institutional training	21(18.1%)	99(36.9%)	39.818	.000*
Followed online instruction	20(17.2%)	88(32.8%)		
Learnt from friends	75(64.7%)	81(30.2%)		
What are your ability to connect internet and social media in your computer or telephone?				
Yes	10(8.6%)	61(22.8%)	10.741	.001*
No	106(91.4%)	207(77.2%)		
How would you rate your level of knowledge and skills in Information Communication Technology?				
Very good	7(6.0%)	77(28.7%)		
Good	27(23.3%)	57(21.3%)	48.324	.000*
Average	64(55.2%)	68(25.4%)		
Poor	15(12.9%)	33(12.3%)		
Very poor	3(2.6%)	33(12.3%)		
What are the major benefits of electronic health services to you and the communities?				
Easy dissemination of e-health messages	29(25.0%)	55(20.5%)	62.503	.000*
Reduce costs	6(5.2%)	66(24.6%)		
Save time	24(20.7%)	24(9.0%)		
Reduce workloads	18(15.5%)	66(24.6%)		
Easy disease diagnosis and management	3(2.6%)	33(12.3%)		
What are some of the electronic health services you are familiar with?				
Calling patients for follow up	14(12.1%)	154(57.5%)	11.89	.000*
Browsing internet for health research	28(24.1%)	44(16.4%)		
Texting patients for appointment	26(22.4%)	58(21.6%)		
Checking drug counterfeit by mobile texting	24(20.7%)	12(4.5%)		

Source: Field Data.

Bivariate analysis of the rating of the knowledge level of using ICT gadgets was significant associated with utilization of e-health services (p=0.000). Other findings that were found with strong significant associations are; specific skills in operating ICT gadgets (p= 0.000), how respondents learnt how to use e-health platforms (p=0.000), ability of the respondents to connect internet or social media to a telephone or computer (p=0.001), level of knowledge in ICT (p=0.001), major benefits of electronic health services (p=0.000) and electronic health services respondents are familiar with (p=0.000).

4.4 Accessibility to e-health services

Table 5: Level of accessibility to e-health services by respondents that utilized

Variable	Frequency, n	Percentage, %
What internet network and services do you have in your facility/area?		
MTN	300	78.1
AIRTEL	48	12.5
UTL	36	9.4
How do you access internet services here in your area?		
Use of modem	180	46.9
Activate bundle on personal telephone	204	53.1
How often do you access internet?		
Daily	120	31.2
Twice a week	20	5.2
Weekly	10	2.6
More than a week	234	60.9
How is your internet Speed?		
Fast	84	21.9
Slow	192	50.0
Very slow	108	28.1
Do you have to travel to access internet?		
Yes	132	34.4
No	252	65.6
If yes, how far do you have to travel to access internet?		
<2km	252	65.6
2-4km	132	34.4
How often do you access electronic health services? Daily		
Twice a week	134	34.9
Weekly	61	15.9
More than a week	25	6.5
Barriers ever faced in accessing electronic health services?		
Power challenge	72	18.8
Internet challenge	132	34.4
Expensive to buy airtime	60	15.6
Expensive ICT gadget	120	31.2
Factors to facilitate smooth access to electronic health services?		
Constant reliable power	96	25.0
Reliable internet	168	43.8
Trained health workers on ICT and e-health service	120	31.2
Availability of ICT gadgets to health workers	96	25.0

Source: Field Data (multiple responses)

Majority of the respondents 78.1% reported MTN as the major internet network in their area while UTL scored the least 9.4%. Accessibility of internet was reported at 53.1% of the respondents using their personal phone to activate while 46.9% uses modems. Most of the respondents that constituted 60.9% reported accessing internet more than 7 days while some 31.2% could access daily. Of those who had access to internet, 50% reported it being slow although majority 65.6% reported accessing it within their area without travelling. For those who had to travel to access interment, majority 65.6% moved within two kilometers for those who utilized e-health services, 42.7% who constitute the majority accessed the services in more than 7 days. As the major barriers to e-health utilization, 34.4% of the majority reported internet as the major challenge followed by 31.2% who said expensive ICT gadgets. On the opinion of how to improve smooth access to electronic health services 43.8% of the majority respondents reported provision of reliable internet followed by 31.2% of the respondents who suggested for training of health workers on e-health services.

Table 6: Bivariate Analysis on the degree of accessibility and utilization of e-health services

Variable	Utilization of e-health services		X^2	p-value
	Yes (%)	No (%)		
What internet network and services do you have in your facility/area?				
MTN	99(85.3%)	201(75.0%)	15.464	.000*
AIRTEL	3(2.6%)	45(16.8%)		
UTL	14(12.1%)	22(8.2%)		
How do you access internet services here in your area?				
Use of modem	66(56.9%)	114(42.5%)	6.703	.007*
Activate bundle on my smart phone	50(43.1%)	154(57.5%)		
How often do you access internet?				
Daily	6(5.2%)	66(24.6%)	62.320	.000*
Twice a week	21(18.1%)	99(36.9%)		
Weekly	89(76.7%)	91(34.0%)		
More than a week	0(0%)	12(4.5%)		
How is your internet Speed?				
Fast	7(6.0%)	77(28.7%)	53.978	.000*
Slow	49(42.2%)	143(53.4%)		
Very slow	60(51.7%)	48(17.9%)		
Do you have to travel to access internet?				
Yes	42(36.2%)	90(33.6%)	.247	.350
No	74(63.8%)	178(66.4%)		
If yes, how far do you have to travel to access internet?			.069	.440
<2km	75(64.7%)	177(66.0%)		
2-4km	41(35.3%)	91(34.0%)		
>4km				
How often do you access electronic health services?				
Daily	33(28.4%)	87(32.5%)	3.645	.456
Twice a week	8(6.9%)	12(4.5%)		
Weekly	3(2.6%)	7(2.6%)		
More than a week	71(61.2%)	162(60.4%)		
In your experience, what barriers have you faced most in accessing electronic health services?				
Power challenge	17(14.7%)	55(20.5%)	70.146	.000*
Internet challenge	11(9.5%)	121(45.1%)		
Expensive to buy airtime	38(32.8%)	22(8.2%)		
Expensive ICT gadget	50(43.1%)	70(26.1%)		
What should be put in place to facilitate smooth access to electronic health services?				
Constant reliable power	4(3.4%)	44(16.4%)	39.408	.000*
Reliable internet	77(66.4%)	91(34.0%)		
Trained health workers on ICT and e-health service	16(13.8%)	44(16.4%)		
Availability of ICT gadgets to health workers.	18(15.5%)	78(29.1%)		

Source: Field Data.

From the table above, factors relating to accessibility to e-health services that were found to be statistically significant in influencing Utilization of the e-health services included;

The internet network and services available in the area that facilitate accessing e-health service (p=0.000), the gadgets used for accessing internet services in the area (p=.007), how the respondents accessed internet services, (p=0.000), and internet speed (p=0.000), barriers faced by the respondents in accessing electronic health services (p=0.000) and factors that will improve smooth access to electronic health services (p=0.000).

While the factors whether the respondents travel to access internet (p=.350), distances they travel to access internet (p=.440) and frequency respondents access electronic health services (p=.456) were all found to be statistically insignificant in influencing utilization of e-health services.

4.5 Affordability of e-health services

Table 7: Ability to affordability e-health services

Variable	Frequency, n	Percentage, %
Able to buy ICT gadgets (mobile phones, computers, etc.) for electronic health services		
Yes	228	59.4
No	156	40.6
Able to buy airtime for electronic health services		
Yes	180	46.9
No	204	53.1
Able to buy internet bundles for electronic health services	156	40.6
Yes	228	59.4
No		
In your experience, what major barriers have you faced in affording electronic health services?		
Expensive gadgets	156	40.6
Expensive airtime	36	9.4
Expensive data for internet	156	40.6
Long distance to access internet	24	6.2
How would you rate the cost of affording electronic health services?		
Affordable	12	3.1
Somehow affordable	108	28.1
Not affordable	264	68.8
What do you think are the ways we can reduce the cost of electronic health services in your area?		
Make power available	108	28.1
Make internet affordable and accessible	120	31.2
Reduce cost on ICT gadgets	132	34.4
Make the trained and qualified health workers available	24	6.2

Source: Field Data.

On the ability of the respondents interviewed 59.4% indicated that they were are able to buy ICT gadgets such as phones, computers for e-health services while 40.6% could not afford. In regard to ability to afford airtime and internet, 53.1% and 59.4% respectively reported that they could not afford for e-health services. In terms of cost related barriers, 40.6% of the respondents reported data for internet being expensive followed by 40.6% of respondents who reported ICT gadgets being expensive.

In rating the overall cost of affording e-health services, 68.8% of the respondents said it is not affordable while 28.1% reported e-health services the service is somehow affordable.

When the opinion of the respondents was sought on how best cost of e-health services could be reduced, 34.4% of the respondents suggested cost reduction in ICT gadgets while 31.2% of the respondents opted for provision of affordable and accessible internet.

Table 8: Bivariate analysis on affordability and utilization of e-health services

Variable	**Utilization of e-health services**		**X^2**	**p-value**
	Yes (%)	**No (%)**		
Able to buy ICT gadgets (phones, computers, I Pads, Tablets, etc.) for electronic health services			10.217	.001*
Yes	83(71.6%)	145(54.1%)		
No	33(28.4%)	123(45.9%)		
Able to buy airtime for electronic health services			.342	.318
Yes	57(49.1%)	123(45.9%)		
No	59(50.9%)	145(54.1%)		
Able to buy internet bundles for electronic health services			4.994	.017*
Yes	57(49.1%)	99(36.9%)		
No	59(50.9%)	169(63.1%)		
How would you rate the cost of affording electronic health services?			26.617	.000*
Affordable	1(9%)	11(4.1%)		
Somehow affordable	53(45.7%)	55(20.5%)		
Not affordable	62(53.4%)	202(75.4%)		
In your experience, what major barriers have you faced in affording electronic health services?			42.410	.000*
Expensive gadgets	33(28.4%)	123(45.9%)		
Expensive airtime	14(12.1%)	22(8.2%)		
Expensive data for internet	55(47.4%)	101(37.7%)		
Long distance to access internet	2(1.7%)	22(8.2%)		
What do you think are the ways we can reduce the cost of electronic health services in your area?			71.728	.000*
Make power available	40(34.5%)	68(25.4%)		
Make internet affordable and accessible	31(26.7%)	89(33.2%)		
Reduce cost on ICT gadgets	21(18.1%)	111(41.4%)		
Make the trained and qualified health workers available	24(20.7%)	0(.0%)		

Source: Field Data.

From the table above, based on the Chi-square values, the study revealed that**,** only one factor on affordability of e-health services, able to buy airtime for electronic health services (p= .318) was found not statistically significant in influencing utilization of e-health services. The rest of the factors on affordability of the service, were found statistically significant, able to buy ICT gadgets (phones, computers among others) for electronic health services (p= .001), able to buy internet bundles for electronic health services (p= .017), How would you rate the cost of affording electronic health services? (p= .000), in your experience what major barriers have you faced in affording electronic health services? (p= .000) and what do you think are the ways we can reduce the cost of electronic health services in your area? (p= .000).

Multivariate Analysis

Table 9: Multivariate Analysis on ICT knowledge/skills, accessibility, affordability and utilization of e-health services among health care workers and patients

	OR	95% CI	p-value
How would you rate your knowledge level of using Information Communication and Technology gadgets like computers, phones, Ipads, tablets and others?			0.000*
Excellent	3.05	1.76-4.81	
Good	2.74	0.17-7.01	
Average	2.48	0.023-4.88	
Poor	1.98	0.26-1.12	
Very poor	1.0	Reference	
How did you learn to use the electronic health online platform/applications?			0.008*
Institutional training	3.13	1.73-5.22	
Followed online instruction	4.96	3.13-8.23	
Learnt from friends	1.0	Reference	
How would you rate your level of knowledge and skills in Information Communication Technology?			.000*
Very good	3.24	0.05-1.53	
Good	3.90	1.26-5.38	
Average	2.50	0.01-2.75	
Poor	1.33	0.15-2.11	
Very poor	1.0	Reference	
What are some of the electronic health services you are familiar with?			.030*
Calling for follow up	3.37	1.94-9.02	
Browsing internet for health research	2.48	1.09-3.01	
Texting patients for appointment	1.85	0.59-2.01	
Checking drug counterfeit by mobile texting	1.0	Reference	
How often do you access internet?			.002*
Daily	0.78	0.25-3.09	
Twice a week	2.16	1.85-4.75	
Weekly	1.75	0.57-4.92	
More than a week	1.0	Reference	
Able to buy ICT gadgets (phones, computers, I Pads, Tablets, etc.) for electronic health services			001*
Yes	8.71	1.41-27.94	
No	1.0	Reference	
How would you rate the cost of affording electronic health services?			.000*
	7.7	2.64-77.24	
Affordable	6.6	3.99-97.42	
Somehow affordable	1.0	Reference	

Source: Field Data.

The final model was constructed using forward stepwise logistic regression. Variables with a significant association in the analysis ($p<0.05$) and those related to the objectives of the study. The analysis found rating of knowledge level of using ICT gadgets was significant associated with utilization of e-health services; people who had excellent rating were three

times more likely to utilize e-health services (OR=30.5), those who had good rating were two times more likely to utilize the service (OR=2.74), those who had average rating were two time more likely to utilize the services (OR=2.48) and those who had poor rating were almost two time more likely to use the services (OR=1.98) compare to those who had very poor rating.

How one learned how to use the electronic health online platform was significantly associated with utilization of e-health services; those who learned from the institutions were 3 times more likely to utilized the services (OR=3.13) and those who learned through following online instruction were almost five times more likely to utilize the service (OR=4.96) compared to those who learned from friends.

Level of knowledge and skills on ICT had a significant relationship with utilization of e-health services; those who had very good and good knowledge and skills were 3 and almost three times more likely to utilize the services (OR=3.24) and (OR=3.90) respectively and those who had average knowledge were two times more likely to utilized the services (OR=2.5) compared to those who had very poor knowledge. Knowledge on the forms of the e-health services was significantly associated with utilization of e-health services; those who knew calling for follow up as a form of e-health services were 3 times more likely to utilize the services (OR=3.37) and those who knew browsing internet for health research were two times more likely to utilize e-health services (OR=2.48) compared to those who said checking drug for counterfeit by mobile texting.

Frequency of accessing internet was significant associated with utilization of e-health services; those who access internet daily were less likely to utilize e-health services (OR=0.78), those who access internet weekly were two times more likely to utilize e-health services (OR=8.71) compared to those access internet in more than one week. Being able to

buy ICT gadgets had a significant association with utilization of e-health services; those who were able to afford ICT gadgets were 8 times more likely to utilize e-health services compared to their counterpart who were not able to buy ICT gadgets. And finally, rating of the cost of e-health services was significantly associated with utilization of e-health services; those who said e-health services were affordable were 7 times more likely to utilize the services (OR=7.7) and those who said e-health services were somehow affordable were 6 time more likely to utilize the services (OR=6.6) compared to those who said e-health services are not affordable.

CHAPTER FIVE

DISCUSSIONS

5.1 Introduction

This chapter present the discussion of findings obtained from the study findings in accordance with the specific objectives.

5.2 Proportions of health care workers and patients utilizing e-health services

The study found that 30% of the respondents were utilizing the e-health services, though only 25% of the 32 health workers utilized the services while 30.4% of the 352 patients utilized the services implying low level of utilization. This could be probably because of unreliable internet, expensive ICT gadgets, power shortage which has mostly constrained the rural population. This is in line with Huffer LL *et al*., Jan (2004) which stated that level of ICT use by healthcare professionals in the hospitals was low.

The study found that most of the respondents 26.8% called to give an appointment as the main form of e-health services and 78.8% would have wished to call and give an appointment as a form of e-health services. This makes calling for an appointment the commonest form of the e-health services in the study. This could be because most of the respondents at least had phones and they would be able to use it in case of need.

This is in line with Juma *et al*., (2012) which that e-health utilization was mainly inform of delivering health care over a geographical distance; using communications technology such as phone, fax, and computers connected to the Internet to disseminate health messages; disease diagnoses; easy access to medical/patient record; booking of appointments; renewing prescription of drugs; monitoring own drug compliance; surveying shortest waiting lists for

operations and quality ratings of hospitals; including providing access to local disease management systems in out-patient clinics, its adoption and utilization remains low in developing countries. Huffer LL *et al*., Jan (2004) also agrees with this when he stated that use of mobile phone was high among healthcare professionals, confirming claims that the use of mobile phones had made its way in the healthcare services.

5.3 ICT Knowledge and skills level on e-health services among health care workers and patients

The study revealed that rating of knowledge level of using ICT gadgets was significant associated with utilization of e-health services; people who had excellent rating were three times more likely to utilize e-health services, those who had good rating were two times more likely to utilize the service, those who had average rating were two time more likely to utilize the services and those who had poor rating were almost two time more likely to use the services compare to those who had very poor rating. This could probably be because electronic health services are an acquired and learned skills therefore for one to utilize such services they required certain skills and knowledge. This is consistent with Marcus Lupari MT (2011) who revealed that Knowledge of ICT is paramount in the awake of globalization and computer age. In his empirical study, respondents with adequate ICT knowledge are three times more likely to utilized e-health services as compared to respondents with limited skill/knowledge.

The study revealed that how one learned how to use the electronic health online platform was significantly associated with utilization of e-health services; those who learned from the institutions were 3 times more likely to utilized the services and those who learned through following online instruction were almost five times more likely to utilize the service compared to those who learned from friends. This could probably be because of the way

which one learned the skills that determines the level of skills one will get from the experience.

This is in line with Marques *et al.,* (2011) which stated that ICT training among clinicians is cited as a key determinant of electronic health. Similarly, Ochieng and Hosoi (2005) agrees with this when he reported that ICT skills are required to foster positive attitudes about electronic medical records which translate to greater adoption of electronic medical records. Furthermore, Currie & Finnegan, (2009) also concur with this study when he says Availability of ICT skills amongst clinicians is likely to lead to the acceptance and actual use of eHealth in primary healthcare. This is because clinicians with ICT skills are able to appreciate the possible benefits of ICT in execution and improvement of the various processes they are engaged in.

The study further revealed that most of the respondents 81.2% reported that they were unable to connect internet and social media in their computer or phone. This confirmed the fact that majority of the respondents 154(57.5%) were only using their common knowledge of calling as a form of e-health services. This finding is further seems to be in Agreement with a related study, according to Kimono EPPOSI (2012), utilization of ICT related services is largely underpinned by the knowledge and skills in ICT itself. This explains that inadequate/lack of ICT knowledge and skills constrains the accessibility and utilization of the e-health services. The findings also present a similar study that sought to establish the factors influencing diffusion of electronic medical records in Japan by (Ochieng and Hosoi, 2005) revealed that ICT training among clinicians is cited as a key determinant of electronic health that foster positive attitudes about electronic medical records which translate to greater adoption of electronic medical records.

5.4 Accessibility of e-health services among health care workers and patients

The study found that Frequency of accessing internet was significant associated with utilization of e-health services; those who access internet daily were less likely to utilize e-health services (OR=0.78), those who access internet weekly were two times more likely to utilize e-health services (OR=8.71) compared to those access internet in more than one week. This could probably be because people who have access to internet are more likely to get more information and hence use the e-health services. This is in line with Jacobs (2003) mention access to a supporting communication infrastructure that can serve as a link to relevant networks such as the Internet, while van Audenhove (2001) adds an appropriate 'info structure' system that can provide suitable content and applications via the ICTs. Similarly, Wahlberg (2006) also concluded that Availability of useful information (the content of an ICT application) could heighten its perceived usefulness, as could a supportive policy framework. The PEU variable describes the extent to which a person believes that using a particular technology will be free of effort.

The study also found that internet network availability in the area, use of ICT gadgets for accessing Internet, Internet speed ways of accessing Internet were found to have no association with utilization of e-health services. This is because the e-health services not just about the internet though internets add on its effects. Wahlberg (2006) which stated that Even a useful technology application may not be used if users perceive it too complicated to use or that performance benefits of usage are outweighed by the effort involved.

The study revealed that, factors related to accessibility to e-health services were found to be statistically significant in influencing utilization of the e-health services. These factors such as internet network/services availability in the area indicated by (p=0.000), use of ICT gadgets for accessing internet services (p=.007), ways of accessing internet services

(p=0.000), internet speed (p=0.000), barriers faced by the respondents in accessing electronic health services (p=0.000) and factors that will improve smooth access to electronic health services (p=0.000) were all having association with utilization of e-health services implying that for e-health services to be easily accessible and utilized, the above factors should be addressed to allow easy adoption. Specifically, the major factors hindering e-health accessibility included; lack of ICT knowledge by the respondents, expensive ICT gadgets, expensive and un reliable internet network especially in rural areas. This finding is also confirmed by similar research by (European Commission, 2011) that revealed that, there is a prominent role for ICT in supporting the reorganization of health services towards integrated care. This is also in line with the study conducted by (Eyesnbach G. 2001) who stated that, the use of information and communication technology (ICT) in health care (eHealth) is proposed as a useful tool to increase accessibility, efficiency, improve access and improve the quality of care.

5.5 Affordability of e-health services among health care workers and patients

The empirical findings indicated that, being able to buy ICT gadgets had a significant association with utilization of e-health services; those who were able to afford ICT gadgets were 8 times more likely to utilize e-health services compared to their counterpart who were not able to buy ICT gadgets. Rating of the cost of e-health services was significantly associated with utilization of e-health services; those who said e-health services were affordable were 7 times more likely to utilize the services (OR=7.7) and those who said e-health services were somehow affordable were 6 time more likely to utilize the services (OR=6.6) compared to those who said e-health services are not affordable. This implies that, the cost of ICT gadgets had a great impact in the utilization of e-health services.

This could probably be because affordability determines even the simplest form of the ICT gadgets required for the e-health services. As this study revealed, most of the e-health services were accessed through ordinary mobile phones which has limited e-health functions. Other ICT gadgets such as smart phones, computers, Ipads/Tablets among others should be made affordable to the population. This is agreement with S Broomhead and M Mars. January/February (2012) which stated that before beginning any e-Health project, financing must be procured and its sustainability protected over the duration of the project. This requires proper planning and identification of benefits, so that value for money and affordability are balanced and results delivered as quickly as feasible. This finding agree with (Omary *et al.*, 2010) who stated that telemedicine adoption calls for internet connectivity across the countries.

In regards to another study conducted by (Government of Uganda, 2010). HSSP III states that the prevalence of ICT equipment amongst health facilities which is the percentage of health centres with ICT equipment is still low at 6.4%. This implies that, the cost of ICT gadgets is not affordable for the patients and health workers or health facilities.

The study revealed that barriers to utilization of e-health economics such as expensive ICT gadgets, expensive airtime, and expensive bundle were found not to influence utilization of e-health services.

This could be because e-health services dos not mean using internet and beside it's the ordinary phone can perform a task in e-health services. This is in line with eHealth in Developing Countries: The Future of Health Care, (2001) which observed that there was a lack of good data for internet and email access amongst health care staff and that many of the basics behind health in general, and e-Health in particular were unclear and poorly understood. The discussion called for better understanding of users' needs and workflow,

more focus on the needs of the community not the whims of the donors, working with the government was a time waster and technical support infrastructure needed to be in place, as local physicians where extremely overburdened.

The study found that the following can be done to reduce the cost of e-health service; Make power available, make internet affordable and accessible, reduce cost on ICT gadgets, Make the trained and qualified health workers available. And this comments were not associated with utilization of the e-Health services. This could be because people misconception of a large infrastructure as the only form of e-health services. This is inconsistent with Government of Uganda, (2010) which reported that ICT equipment consists of televisions, mobile phones, radio, and, to a lesser extent, computers. Current plans involve installing adequate ICT in hospitals and lower level facilities as well as implementing ICT infrastructure for human resource operations. However, lack of basic infrastructure in the health sector, only 40% of all available equipment is in good condition and 17% needs to be repaired. The difference could be because of the types of the study where the government did a survey and consultation in only the public facilities whereas this study which focused on both public and private facilities.

CHAPTER SIX

CONCLUSIONS AND RECOMMENDATIONS

6.0 Introduction

This chapter presents the brief summary of study findings, conclusions of the study findings, recommendations and areas for further research.

6.1 Conclusion

Proportion of e-health utilization

The study generally revealed low level of utilization of the electronic health services among health care workers and patients in the setting area as it is indicated by small percentages utilized.

ICT knowledge and skills level

Rating of knowledge level of using ICT gadgets, level of knowledge and skills on ICT, learning how to use the electronic health online platform, Knowledge on the forms of the e-health services were significant associated with utilization of e-health services. Majority of health workers and patients had average level of ICT knowledge and skills which were mainly common knowledge of calling using ICT gadgets.

Accessibility of e-health services

The e-health accessibility was at a low level. This was majorly influenced by limited/unreliable Internet access, expensive Internet data bundles, and expensive ICT gadgets that were positively associated with utilization of e-health services.

Affordability of e-health services

Generally, the level of affordability of e-health services was low and this was found statistically significant with utilization of electronic health services. This has mainly been

hampered by expensive internet bundles, expensive ICT gadgets like computers, smart phones and airtime.

6.2 Recommendations

Based on the findings of the study, the suggests the following recommendations;

Low utilization of e-health services

MOH and other development partners such as NGOs should have enhanced awareness of both health workers and patients on the utilization of the electronic health service applications. This would increase the rate of usage of the service and reduce on patience time lag at the health facility, work load on health workers, and quality of health care thus increasing service delivery. This can be done through stepping up and integrating e-health strategies in health care interventions.

Limited ICT knowledge and skills for e-health services

With the facts revealed by this study indicating majority of health workers and patients having limited ICT knowledge and skills in operating ICT gadgets and others only having mainly common knowledge of calling using ICT gadgets, the MOH, hospital and other health facilities managements should train health workers and patients on the use and benefits of ICT gadgets for e-health services.

Low level of accessibility and affordability of e-health services

Basing on the facts of this study findings that revealed low level of e-health accessibility that were majorly influenced by limited/unreliable Internet access, expensive Internet data bundles, and expensive ICT gadgets MOH and other development partners should put in place and functionalize a deliberate policy that to enhance accessibility and affordability of e-health services among the population both in urban and rural areas where majority of patients

live. The policy should include equipping health facilities with ICT gadgets, subsidies on the cost of ICT gadgets and internet bundles, stepping up internet speed by telecommunication companies in rural areas, increasing rural electrification so that e-health utilization is enhanced.

6.3 Areas for further Research

Due to time and resource constraints, this study focused only on "Utilization of e-health services among health care workers and the patients attending public and private health facilities and how this is influenced by Accessibility to the service, Affordability of the service and Knowledge of ICT". Therefore, to supplement the effort of this study, further research should be carried out along the following areas;

- Analysis of the health institutional factor and its impact on the operation of the E-health service.
- Impact of the patient's socio economic demographics on Utilization of the E-health services.
- Analysis of social media usage and utilization of the e-health Services.
- An assessment of the Patient's Population demographics and Utilization of E-health services.

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APPENDICES

APPENDIX I: INDIVIDUAL CONSENT FORM

Introduction

I am **Silvester Okot** a student of International Health Sciences University conducting academic research as a partial requirement for an award of Master of Public Health. The study seeks to explore utilization of e-health services among health workers and patients attending health care services in public and private health facilities in Moroto District. I am therefore requesting for your participation in this study.

Your participation is very important and completely voluntary. The interview will take about 15 minutes to complete. If you agree to be interviewed, I will ask you questions in the study. If you do agree to be interviewed, you can stop the interview at any time if you wish. It is important that you be honest and truthful in answering these questions.

All information provided will be kept confidential. No one will also be informed of your participation in this interview. But others can know the report from our interview.

	YES	No
Do you have any questions to ask?		
Do you agree to participate in this study?		
If yes sign.....or thumb print.....		

APPENDIX II: QUESTIONNAIRES FOR PATIENTS

Section A: General information about the patient (Please tick the box [] with appropriate response)

1. What is your sex?

   Male [] Female []

2. How old are you?

   a) 18- 24 [ ] b) 25- 31 [ ] c) 32- 38 [ ] d) 39-45 [ ]

   e) 46-52 [ ] f) 53 above [ ]

3. In what environment do you work or stay?

   Urban [ ] Rural [ ]

4. What is your employment status?

   a) Formally employed [ ]
   b) Self-employed [ ]
   c) Operating a business [ ]
   d) Peasant farmer [ ]
   e) Not employed [ ]
   f) Others (specify) [ ].....

5. What is your educational level?

   a) Primary [ ]
   b) "O" level [ ]
   c) "A" level [ ]
   d) Tertiary [ ]
   e) No formal education [ ]

6. Do you have any understanding of e-health services? a) Yes [ ] b) No [ ]

Section B: Utilisation of e-health services by patients (Please tick all the boxes [ ] that applies to you with appropriate response).

1. Have you ever used any electronic health services? a) Yes [ ] b) No [ ]

   If yes, which of the following e-health services have you ever utilised?

   a) Calling a health worker using a telephone [ ]
   b) Texting a health worker [ ]
   c) E-mailing a health worker [ ]
   d) Browsing internet for patient self-health education [ ]

e) Browsing for research on health matters [ ]

f) Others (specify) [ ] ----------

2. Have you ever used any social media network?

a) Yes [ ] b) No [ ]

If yes, which of the following social media network have you ever utilized for e-health services?

a) Twitter	
b) Facebook	
c) What's up	
d) Skype	
e) E-health websites	
f) You tube	
g) Others----------	

3. If you were to use electronic health services, what would you prefer to do?

a) Booking appointments [ ]

b) Patient self-education [ ]

c) Detection of counterfeit drugs [ ]

d) Dissemination of e-health messages [ ]

e) Disease diagnoses & management [ ]

f) Monitoring own drug compliance [ ]

g) Renew prescription of drugs [ ]

h) Surveying for operations and quality ratings of hospitals [ ]

i) Access to local disease management systems in out-patient clinics [ ]

j) Others (specify) [ ] ----------

4. If you were to use e-health services, under what circumstances would you consider them? a) Whenever sick [ ]

b) Even when normal [ ]

c) when I need or want to pass out any health information [ ]

d) For research on health matters [ ]

e) Others (specify) [ ] ----------

5. What is your view of the reliability of electronic health services? ----------
---

6. Do you think e-health services can improve health seeking behaviors to you, your family and the community? a) Yes [ ]

b) No [ ]

If yes, in what way? ----------

Section C: ICT knowledge and skills' level on application of e-health services by patients (Please tick the box [ ] with appropriate response).

1. How would you rate your knowledge level in using Information Communication and Technology gadgets like computers, phones, Ipads, tablets and others?
   a) Excellent [ ] b) good [ ] c) average [ ]
   d) Poor [ ] e) very bad [ ]
2. What is your ability in operating the following Information Communication Technology gadgets for the benefits of electronic health services?

ICT gadget	**Calling**	**Self - texting**	**Receiving call**	**Sending e-mail**	**chatting**
Telephone/mobile phone					
Desk/laptop computer					
Tablet					
I-pad					
Others (specify)----------					

3. How did you learn to use the electronic health online platform/applications?
   a) I was trained by the institution prior to using the online platform [ ]
   b) I followed online instructions [ ]
   c) I learnt from a friend [ ]
   d) Others (specify).....
4. Are you able to activate/connect internet, install and use the applications, blogs and social media applications in your computer or telephone?
   a) Yes [ ] b) No [ ]

5. What are the challenges in acquiring ICT knowledge and skills to utilize electronic health services?----------

---

Section D: The degree of accessibility of e-health services by patients (Please tick all the box [ ] that applies with appropriate response)

1. In which of the following Information Communication Technology gadgets are you able to have access to electronic health services?

a) Mobile phone [ ] b) Smart phone [ ] c) Desk/laptops [ ]

d) Tablets [ ] e) I pads [ ] f) CDs [ ]

g) External drive [ ]

h) others (specify) .....

2. How and how often do you access electronic health services?

	Daily	**once a week**	**several times a week**	**Once a month**	**Never**
Twitter					
Facebook					
What's APP					
Skype					
E-health platform					
You tube					
Google search engine					
Websites					
Phone calls					
Phone texting					
E-mail					

3. Do you have internet network in your area?

   a) Yes [ ] b) No [ ]

4. How do you access internet services?

   a) Use a modem [ ]
   b) Rely on organization paid up internet [ ]
   c) Upload bundles on a smart phone [ ]
   d) Rely on institution paid up internet [ ]
   e) Others specify [ ].....

5. Where and how often do you access internet?

	All the time	**most of the time**	**some time**	**Never**
a) Internet café	[ ]	[ ]	[ ]	[ ]
b) Office/workplace	[ ]	[ ]	[ ]	[ ]
c) Home	[ ]	[ ]	[ ]	[ ]
d) Personal mobile smart phone	[ ]	[ ]	[ ]	[ ]

6. Do you have to travel to access internet?

   a) Yes [ ] b) No [ ]

   If yes, how far do you have to travel to access internet?

   a) Less than 2 km [ ]
   b) 2-4 km [ ]
   c) 4- 6km [ ]
   d) More than 6 km [ ]

7. How is your internet Speed? Tick appropriate response that apply.

   a) Very fast [ ] c) Fast [ ]
   b) Very slow [ ] d) Slow [ ]

8. To what extent do you agree with the following statements on electronic health?

	Strongly Agree	Slightly Agree	Strongly Disagree	Slightly Disagree
a) I find it difficult to access a computer	[]	[]	[]	[]
b) I find it difficult to access a telephone	[]	[]	[]	[]
c) I find it difficult to access internet	[]	[]	[]	[]
d) I find it difficult to access power	[]	[]	[]	[]
e) I find no time to access the online platform/bogs	[]	[]	[]	[]

9. In your own view, what barriers do you face most in accessing e-health services? ---------

---

Section E: The degree of affordability of e-health services by patients (Tick all appropriate response that apply).

1. Which of these applies to you in using electronic health services?

a) I use a personal laptop [ ]
b) I use a family shared computer [ ]
c) I use office computer [ ]
d) I use a public computer [ ]
e) I use a personal mobile phone [ ]
f) I use a family phone [ ]
g) I use a friends mobile phone [ ]

2. To what extent do you agree with the following?

a) I can afford to buy a computer [ ]
b) I can afford to buy airtime for electronic health service access [ ]
c) I afford to buy internet bundles for e-health service access [ ]
d) I borrowed money to buy a computer [ ]
e) My work place can buy internet for us [ ]
f) My work station cannot afford internet [ ]
g) I can afford to pay electricity/power for charging your computer, telephone and other information Communication Technology gadgets [ ]

3. How would you rate the cost for you to have an access to electronic health services?

Tick appropriate response that apply. a) Very expensive [ ]

b) Expensive [ ]

c) Affordable [ ]

d) Cheap [ ]

5 Briefly give your overall opinion about the cost and affordability of using electronic health services

---

7. What are the cost related barriers for electronic health services in your area?

Thank you for your participation

APPENDIX III: INTERVIEW GUIDE FOR HEALTH CARE WORKERS'/KEY INFORMANTS

Section A: General information about the health worker

1. Health Facility----------
2. Sex: Male [ ] Female [ ]
3. How many years of work experience do you have? ----------
4. Career position----------
5. Department----------
6. Work geographical location Urban [ ] Rural [ ]
7. What is understanding of electronic health services? ----------
   ----

Section B: Utilisation of e-health services by health workers.

1. What electronic health services have you ever used? Tick all appropriate responses that apply.
   g) Calling a patient using a telephone to give appointment [ ]
   h) Texting a patient [ ]
   i) E-mailing a patient [ ]
   j) Browsing internet for self-health education [ ]
   k) Browsing internet for research on health matters [ ]
   l) Using a telephone/computer to detect counterfeit drugs [ ]
   m) Using social media (Facebook, what's up, etc.) to disseminate e-health messages [ ]
   n) Calling or sending a massage/e-mail to diagnoses and manage diseases [ ]
   o) Monitoring patients drug compliance [ ]
   p) Renew patients prescription of drugs [ ]
   q) Access to new disease management information [ ]
   r) Others (specify) [ ] ----------
2. If you were to use electronic health services, which one would you prefer?
   ----
3. What are some of the social media you have ever used for electronic health services? -
   ----

4. If you were to use/provide electronic health services, under what circumstances would you consider?

---

5. Do you think electronic health services can improve service provision? In what way?

---

6. In your own view, how do you think Information Communication Technology can be used or applied in your facility to support electronic health services?

---

7. What are your views on the reliability and quality of electronic health services for healthcare in your facility?

---

8. How do you think your health facility could benefit from electronic health services? ----------

---

9. What do you think are the major challenges in provision and utilization of electronic health services in your facility? ----------

Section C: ICT knowledge and skills level on e-health by health workers

1. How would you rate your knowledge level of using Information Communication and Technology gadgets like computers, phones, I-pads, tablets and others?

---

2. What specific skills do you have in operating Information Communication Technology gadgets such as computers, smart phones, I pads, tablets, modems and others?

---

3. How did you learn to use the electronic health online platform/applications?

---

4. What are your ability to activate/connect internet, install and use the apps, blogs and social media applications in your computer or telephone? ----------

---

5. How would you rate your level of knowledge and skills in Information Communication Technology?----------

---

---

6. What are the major benefits of electronic health services to you and the communities?
   ---
7. What are some of the electronic health services you are familiar with? ----------
   ---
8. What are the major challenges in acquiring Information Communication Technology knowledge and skills in applying to
   electronic health services in your health facility?

Section D: Accessibility of e-health services by health workers.

1. Which Information Communication Technology gadgets are available for you in your health facility to enable you provide or access electronic health services?
   ---
2. How and how often do you provide or access electronic health services in your facility?
   ---
3. What internet network and services do you have in your facility/area?
   ---
4. How do you access internet services here in your facility?
   ---
5. Where and how often do you access internet?
   ---
6. Do you have to travel to access internet? If yes, how far do you have to travel to access internet? ---
7. How is your internet Speed?
   ---
8. To what extent do you find it easy to access a computer, phone, internet and power for e-health services?
   ---
9. In your own view, what barriers do you face most in accessing electronic health services? ----
   ---
10. What should be in place to facilitate smooth access to electronic health services?

Section E: Affordability of e-health services by health workers.

1. What Information Communication Technology equipment does your health facility have?

   ---

2. Share your views on your ability or your facility to;

   a) Buy airtime for electronic health services ----------

   ---

   b) Buy internet bundles for electronic health services ----------

   ---

   c) Make internet connectivity----------

   ---

   d) Buy Information Communication Technology gadgets (phones, computers, I Pads, Tablets, etc.) for electronic health services ----------

   e) Pay electricity/power for charging ----------

   ---

   3. How would you rate the cost for you to have an access to electronic health services? ----------

4. Briefly could you give your overall opinion about the cost and affordability of using electronic health services? ----------

   ---

   ----------What do you think are the ways we can reduce the cost of electronic health services in your area?----------

   ---

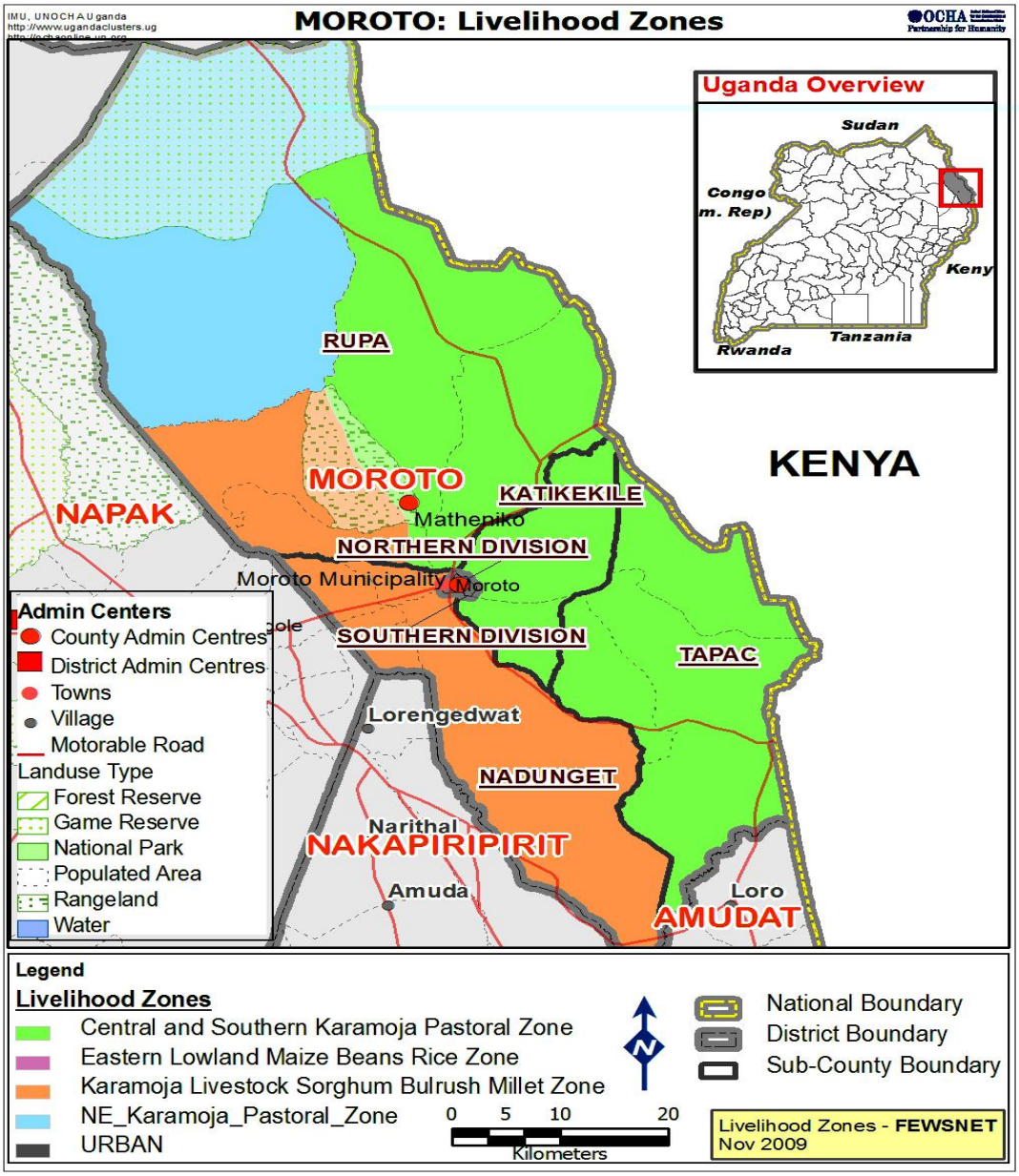
   ---

5. What are the cost related barriers for electronic health services in your area? ----------

   ---

Thank you for your participation

APPENDIX IV: MAP OF MOROTO DISTRICT



APPENDIX V: INTRODUCTORY LETTER

IHSU INTERNATIONAL HEALTH SCIENCES UNIVERSITY
sanitas per scientiam
PART OF INTERNATIONAL MEDICAL GROUP

making a difference to health care

e-Learning Department
Kampala, On the 21st/ September/ 2016

The

.....

.....

.....

Dear Sir/Madam,

RE: ASSISTANCE FOR RESEARCH

This is to introduce to you Silvester Okot, Reg No **2014-MPH-RL-IHS-032** a student of this University. As part of the requirements for the award of a Master's Degree of Public Health of this University, the student is required to carry out field research for submission of a Research Dissertation. Okot would like to carry out research on issues related to:

Utilisation of E-Health Services Among Health Care Workers and Patients Attending Public and Private Health Facilities in Moroto District.

I kindly request you to render this student any assistance necessary for his research.

I, and indeed the entire University are thanking you in anticipation for the assistance you will render to the student.

Sincerely Yours,

Mr. Jolan Bosco ALAGU
Dean, IPHM

20 SEP 2016
INSTITUTE OF PUBLIC HEALTH AND MANAGEMENT
P. O. Box 7782, Kampala - Uganda

The International Health Sciences University
P.O. Box 7782 Kampala – Uganda
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web: www.ihsu.ac.ug

APPENDIX VI: CORRESPONDENCE LETTER

DHO:
0776-191349/0701-747469
ADHO: 0772519187
Email: abuxabi@gmail.com
Secretary: 0782573566

In any correspondence on this subject please quote: HEA/

The Republic of Uganda

MOROTO DISTRICT LOCAL GOVERNMENT
District Health Office
P. O. BOX 4,
Moroto,
Uganda.

Date: 7th September 2016.

Dear Sir/Madam,

INTRODUCTORY LETTER OF MR. SILVESTER OKOT

Mr. Okot Silvester is a Masters' of Public Health student at the International Health Sciences University – Kampala and wishes to conduct a research titled "Utilization of e-health service among health care workers and patients attending Public and Private Health facilities in Moroto district"

Any help accorded to him is highly appreciated.

Thank you.

DISTRICT HEALTH OFFICER
07 SEP
MOROTO DISTRICT

Dr. Lubega Abubaker
DISTRICT HEALTH OFFICER/MOROTO.

Copies:

- LC V Chairperson-Moroto.
- Resident District Commissioner-Moroto.
- Chief Administrative Officer-Moroto.
- International Health Science University.