A FRAMEWORK FOR ADOPTION AND INTEGRATION OF E-HEALTH IN MATERNAL HEALTHCARE: A CASE OF SUB COUNTY HOSPITALS IN UASIN GISHU COUNTY

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DECLARATION AND APPROVAL

Declaration by the Student

I declare that this research thesis is my original work and has not been presented in any other university.

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DEDICATION

I dedicate this thesis to my family and supervisors for their support and for greatly encouraging me in my pursuit for my masters.

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ABSTRACT

Electronic health has fundamentality transformed the way patient data is shared and accessed across health systems. In Kenya maternal health care still faces challenges including, inaccessibility of quality maternal health services, delivery, ante-natal, and post-natal services. Adoption and integration of e-health into maternal health are expected to contribute to the delivery of maternal health and consequently increasing life expectancy at birth. Relatively few healthcare providers of maternal health have fully adopted E-Health, in Uasin Gishu County low diffusion is due partially to the quality of data Technology investment, which works on the far side getting technology to ever-changing work processes and cultures, and guaranteeing that physicians, nurses, and different employees use it. Manual record-keeping related to medical facilities is a theme of medical debates thanks to the confusion it's caused by medical practitioners. The study was guided by the following objectives; to review the existing e-health framework in Uasin Gishu County; to identify challenges in adoption and integration of e-health on maternal health delivery in Uasin Gishu County; to develop a framework for e-health adoption on maternal healthcare in Uasin Gishu County. This study employed a descriptive survey research design. The study was carried out in sub-county hospitals, in Uasin Gishu County. The study subject was drawn from the target population of 408 respondents from the six sub-county hospitals including Ainabkoi, Kapsaret, Kesses, Moiben, Soy, and Turbo. The sample size was 124 calculated using the 30% formula of Mugenda and Mugenda (2003). The probability sampling technique was used in this study. The study used both questionnaire and interview schedule in data collection. The analysis was done through inferential statistics. Descriptive statistics such as mean, standard deviation, with the aid of Statistical Package for the Social Sciences (SPSS) version 22.0 will be used to analyze collected data. Based on the study findings the study indicated that consumer health informatics as a form of e-health is commonly used and that M-health was the least used form of e-health among sub-county hospitals in Uasin Gishu County towards maternal healthcare. On forms of e-health that should be implemented in the facilities, the study concludes that Health information Systems is well entrenched in maternal healthcare provision among sub-county hospitals in the county. The study concluded that the average ICT technologies across the facilities in Uasin Gishu County are almost evenly distributed owing to a small standard deviation from the mean. Facilities were also found to be well connected to the Internet as the majority had an internet connection. On the application of e-Health achieved in the health sector, the study concludes that improved teaching methods are the most common application of e-Health achieved. There is a need to bring on board all the stakeholders in the health sector towards the implementation of e-health in maternal health. Stakeholders like the government were not found to be well involved in the process. The study also recommended that measures to improve the application of e-health need to be put in place. The study will be of importance to the management of sub-county hospitals and future scholars.

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LIST OF ABBREVIATIONS AND ACRONYMS

CBD: Central Business District

CPOE: Computerized Provider Order Entry

CDSS Clinical decision support systems

EHRS: Electronic Health Records System

EMRS: Electronic Medical Records System

HIT: Health Information Technology

HMIS: Health Management and Information System

HRIO: Health Records Information Officers

ICT: Information Communication Technology

IT: Information Technology

KDHS Kenya Health Demographic Survey

MCH: Maternal and Child Health

MDG: Millennium Development Goals

MMR: Maternal Mortality Rates

MOH: Medical Officer of Health

NGO: None Governmental Organization

ODI: Overseas Development Institute

PEOU Perceived ease of use

PU- Perceived usefulness

SDGs: Sustainable Development Goals

SPSS: Statistical Package for the Social Sciences

TAM Technology Acceptance Model

WHO: World Health Organization

CHAPTER ONE
INTRODUCTION

1.1 Background to the Study

Healthcare information technology applications are accounted for to have positive relationship with improved patient security results (Siegrist & Kane, 2003). Amarasingham, Plantinga, Diener-West, Gaskin and Powe (2009) showed Health Information Technology (HIT) systems could expand understanding health by lessening difficulties and death rates, just as by limiting clinical mistakes.

Management of health information across high-tech systems as well as the secure interchange of information on health between providers, clients, quality monitors and payers (Ahmed, Desta, Tekle & Mweta, 1993). Through the use of healthcare information technology, clinics plan to decrease maternal clinical mistakes, for example, requesting and directing some unacceptable portion of a medicine. Suppliers want to access and share persistent data all the more effectively, in this manner improving consideration (Lupton, 2014). Medical care Information Technology (IT) comprises an extensive exhibit of novel advancements envisioned to share and oversee health interconnected data. The most essential kind of E-health is a structure that electronically solicits stores and sorts out health data of the patients. When correctly implemented, such a structure can help arrange persistent consideration, lessen clinical blunders and improve managerial proficiency (Carlsen & Bystrov, 2014).

Maternal health is very important for pregnant mother and preconception, family planning, prenatal, and postnatal care to minimize maternal morbidity as well as mortality. The computerization of medical records of pregnant mothers in hospitals

and health clinics involves the use of various technology which includes; the utilization of the Internet for correspondence and data trade; improvement of attractive cards for client identity; electronic planning frameworks for arrangements, assessments and clinic confirmations; and mechanized conventions for determination and treatment uphold are among other innovation applications (Parii, 2014).

For Electronic Clinical Records, otherwise called Electronic Health Records (EHRs), mechanized clinical records, as well as patient records based on the computer, among diverse names), numerous descriptions exist, depending upon the group of stars of capabilities that are integrated (Tarasawa & Brailler, 2003). They can be used just as an uninvolved device to store understanding facts or can incorporate different excellent help capabilities, for example, personalized patient updates and approving cautions.

Pregnant mothers ought to though follow with other reserves in the maternal care as witnessed in some nations which have efficaciously followed free maternal care. For example, in Australia where the maternal healthcare gadget is applauded as one of the satisfactory inside the Southern Hemisphere, there is frequent maternal care this is tax-subsidized by using public coverage software and gathers for most medical care, which include doctor and sanatorium amenities and pharmaceuticals earlier than the inception of the program, the authorities of Australia capitalized heavily on fitness services to the level that thirds of the entire bed areas of Australian hospitals are located in public hospitals, there may be a share of 10 midwives and nurses for each 500 ladies and as much as nine% of the GDP is spent on fitness (Dento, 2015).

Other studies point out that cost is just one important factor in determining utilization of maternal care. A number of socio-demographic features of the individual affect the fundamental tendency to seek and utilize maternal care. With the advent of a devolved system of health in most developed countries such as the United States, the sharing of medical information is a key factor to ensure successful treatment rates of patients (Carlsen & Bystrov, 2014). The maternal health care in particular requires patients records be kept properly during the pre and the post visits of patients. The Healthcare Information technology plays a crucial role in capturing, sharing, storing and retrieving patients information safely and in a way that it can be accessed from various locations within a given authorized networks (Oleru, 2015). According to Dents (2013), the United States and England have made tremendous gains in ensuring that the health sector is well devolved. These countries have invested heavily in infrastructure that leads to the successful implementation and use of Healthcare Information Technology that are necessary in the hospital setting to assist doctors perform their medical functions. Parii (2014) however notes that the success of this healthcare information technology heavily dependents on their design and continuous improvement.

In Africa however, maternal health care has been a major problem to manage. Most doctors in hospitals have no specific ways of keeping track of patient's information besides the manual systems which have their cons including, risk to damage, insufficiency of information, prone to loss and lack of understanding when given to other doctors (Karenent, 2013). South Africa in particular has implemented a complete Healthcare Information Technology that focuses in ensuring the maternal

health care records for all potential and new mothers is available in various hospital to make treatment of the same to be as effective as possible. This has in 2004 reduced the maternal mortality rate in the country by 5% over a period of one year (Baicu *et al*., 2005).

Poor road infrastructure and transport pose as another barrier to fulfilling care to the pregnant women. This is very visible in the rural areas where in most cases, clinics are located very far away from where people live and in many instances they cannot be reached with ease. Many times, these health facilities are isolated since there are no roads or access routes. In cases where roads exist, the said roads are not passible as a result of poor quality of roads and rains which form pools in the roads making them impassible. The Overseas Development Institute (ODI) reports that in rural Zimbabwe, 28% of maternal deaths were due to problems associated directly to transportation, compared with the 3% reported in Harare (David, 2008).

In Tunisia, remarkable steps have been made in improving maternal care and reducing the cases of deaths yet there has been less achievement of these improvements in the villages. Women, especially those suffering from obstetric complications are in very great danger since delay to reach the medical care centers may have far reaching consequences. Obstructed labour over an extended period of time can result in obstetric fistula which is a painful, unhygienic and embarrassing consequence and this is brought about by failure to access medical attention within the right time and this greatly affects the rural women, frequently leading to their social isolation. It has been noted that enhancing road access to health facilities can have a far reaching effect on care; one investigation indicated that the utilization of

public health facilities in Ghana nearly folded when distance to hospitals or clinics was halved (World Health Organization, 2009).

In Eastern Africa, failure to reach health centers in time results in deaths of pregnant women in much number of cases, and by extension, lack of roads means that very few health centers are present in the countryside areas. Only 34% of women giving birth in Eastern Africa, can access an experienced attendant and these results in many deaths associated to pregnant mothers (World Health Organization, 2008).

As a measure, many governments in Africa are aiming at mobilizing health personnel to the rural areas with the goal of providing healthcare to the locals. The United Nations has indicated that in Tunisia, 80% reduction in deaths occurring during child birth can be attributed to the fact that the country stressed on provision of experienced attendants to women giving birth (Rauel, 2009). Community Health Workers (CHWs) play a great role in availing healthcare to populations that are underserved and can go a long way in reducing the number of women who die during child birth. In an investigation done in the Upper East Region of Ghana, an increase in preparation and deployment of community health nurses contributed highly to the reduction of mortality rates among women and children (Chan & Kaufman, 2010).

Kenya health sector was devolved in 2013 and counties have being given the responsibility of managing all structures relating to health. Despite challenges such as underfunding of the counties by the national government, some of the counties have managed to put in place healthcare information technology that assist medical practitioners treat patients (Sharma *et al*., 2015). A case in point is the Bomet

County where level 4 hospitals are currently using customized maternal healthcare application to capture patient's records. There are however major challenges in the efficient storage and retrieval of records. A lot needs to be done in our counties relating to the storage of maternal health records necessitating the need for Healthcare Information technology to assist in the management of records in the devolved system of governance currently being used by counties to manage the health docket (Axelsson, 2000).

In Uasin Gishu County the quality of health care remains wanting. In 2013, of the 250 maternal deaths (per 100,000), 184 were due to poor quality health care in the county hospitals (Mwaliko, 2009). The usage of clinical services in the region in 2015 is well documented indicating that there is a higher utilization of self-medication compared clinical visits. For examples, the numbers of women who have self-medicated within the CBD were 12381 women, 75810 in major sub counties and about 2558 men in the CBD while 6692 men have self-medicated (National Center for Health Statistics, 2017). This is a clear indication of the poor quality of health in the county to the extent that the citizens don't believe in the county health services. Automation among many other solutions has been proposed.

1.2 Problem Statement

Annually an estimated 290,000 women lose their lives due to pregnancy and delivery-related causes. 90 percent of these maternal deaths occur in developing nations (Korenromp *et al.,* 2019). In many countries, especially in sub-Saharan Africa, these deaths hinder economic and social development. Among the eight Sustainable Development Goals (SDGs) set in 2015, goal 5 seeks to improve

maternal health. To achieve this goal, lower income countries have been making an effort to improve E-health the situation, with their governments increasing expenditure on health and reducing out-of-pocket health expenditures and incorporating innovations (WHO, 2015).

e-Health is noted as one of the important means in efforts to solve problems in the health sector, especially for the improvement of the disparity in achieving the SDGs. In recent years, e-Health, through the use of ICT that takes into account cost-safety, is expected to contribute to the improvement of health care services, health surveillance, health education, health care human resources education, and research. Notably, it is highly expected that e- Health will lead the change of the current situation efficiently and effectively, in the area of improvement of access to health services and health information (the use of m Health and the introduction of telemedicine), and the improvement of human resources for health to work in rural areas (the use of the supervision system and distance education)

Proper maternal health requires Supports of statistics technology, by means of imparting new methods for hospitals and their patients to comfortably get right of entry to and use fitness data, Information Technology (IT) application are reported to have positive association with enhanced patient safety, can Improve the first-rate and performance of fitness care. But, especially few maternal health care vendors have fully followed e-health.

There have been cases where patients receive wrong medication because their treatment history is unknown or is unavailable in a different hospital facility. Complains by patients about registration of information especially when they visit

other sub county hospitals and missed appointments because doctors were not available on date when patients had been scheduled to visits the hospital next has also been reported not only in Uasin Gishu County but in all hospitals including private hospitals. These challenges have been hypothesized to be as a result of lack of proper e-health technology and where it exists the integration to other hospitals systems lacks. There is very little existence of systems that have database systems, integrated systems and decision systems to support the healthcare service delivery. Management of maternal health records is one area where because of this pre and post visits records management and scheduling has been a big problem (WHO, 2013). Most available literature deals with healthcare information systems and management of health records but very few research exists on adoption and integration of E-health. It is against this backdrop that the study aimed to assess the adoption and integration of e-health in maternal health.

1.3 Objectives of the Study

1.3.1 General Objective

The study focused on a framework for adoption and integration of e-health in maternal healthcare in Uasin Gishu County Hospitals.

1.3.2 Specific Objectives

i. To review the existing e-health adoption framework in Uasin Gishu County Hospitals.

ii. To identify the challenges of e-health adoption and integration on maternal health in Uasin Gishu County Hospitals.

iii. To develop framework for e-health adoption and integration on maternal health in Uasin Gishu County Hospitals.

1.4 Research Questions

i. Which are the existing e-health adoption frameworks in in Uasin Gishu County Hospitals?

ii. What are the challenges of e-health adoption and integration on maternal healthcare in in Uasin Gishu County Hospitals?

iii. How the framework can support e-health on maternal healthcare in in Uasin Gishu County Hospitals?

1.5 The Scope of the Study

The study focused on a framework for adoption and integration of e-health in maternal healthcare in Uasin Gishu County Hospitals. Specifically, the study sought to review the existing e-health adoption framework, identify the challenges of e-health adoption and integration on maternal health and to develop framework for e-health adoption and integration on maternal health. The study was conducted in in Uasin Gishu County Hospitals between January, 2019 and June, 2020.

1.6 Justification of the Study

The study is projected to enable healthcare in Uasin Gishu County to operate extra efficiently by providing timely, available and first-class health care to its clients at a condensed value. To the patients or clients, the investigation offers them the possibility to observation their digital health data in a well-timed and handy way.

Moreover its miles viewed as able to make certain that the right sufferers' fitness statistics is electronically available to the proper character on the proper vicinity and period to facilitate informed care and remedy choices. Healthcare managers alternatively have get entry to timely and entire statistics approximately health system activities and results.

1.7 Limitation of the Study

From the outset it was recognized that with the limited time available, the researcher was not able to conduct a national study including all the hospital in all 47 counties. Instead, Uasin Gishu, Sub-County hospitals were selected as it has high number of patient and has a reputable image. The researcher sought the assistance of friends and colleagues to aid in data collection so as to save on time. The study being a descriptive survey was carried at one time or over a short period of time thus the results were for a specific point in time giving no indication or sequence of events.

This study was limited to public health hospitals within Uasin Gishu County and as a consequence, the principal investigator did not take into consideration other privately owns hospitals and facilities run by mission in the County. The e-health framework was also not tried in the real working setting.

1.7 Operational Definition Of Terms

Consumer health: Denotes decisions made by people regarding the purchase as well as use of health information and services which will have direct impact on individual health.

Consumer health IT data Involves examination of information of the patients from the viewpoint of consumer knowledge, and health literacy with the aim of

enabling patients at the same time offering them understanding to take own decisions on health.

E-health Refers to an upcoming field in the connection of public health, medical informatics, and business, denoting to health information and services enhanced or delivered via internet-related technologies.

Electronic health record Refers to the systematized collection of population and patient health information that is electronically-stored in a digital format.

Framework for adoption: Refers to making a pledge to utilize the methods, approaches and means laid out in a specific structure. This pledge comprises the willingness to go as far as restructuring why and how to partake efforts and activities within an organization.

Framework for integration: Refers to a set of standards that support the integration and interoperability between applications defined in the Applications Framework**.**

Health Information System (HIS): Is a gadget designed to control healthcare data. This includes systems that accumulate, manage and transmit a patient's electronic medical record (EMR), a medical institution's operational management or a machine supporting healthcare coverage choices.

Health Knowledge: Refers to denotes information, facts, as well as skills obtained through education or experience as well as the

	practical or theoretical understanding of a health related subject and health-care.
Health IT systems	This is information technology applied to health and health care. It supports health information management across computerized systems and the secure exchange of health information between consumers, providers, payers, and quality monitors.
Maternal health	Maternal health is the physical health of pregnant mothers during the period of pregnancy

M-health: Is an abbreviation for mobile health, a term used for the practice of medicine and public health supported by mobile devices.

Telemedicine and Telehealth	Refers to remote non-clinical services, such as provider training, administrative meetings, and continuing medical education, in addition to clinical services.

CHAPTER TWO
LITERATURE REVIEW

2.1 Introduction

There are compelling arguments for the adoption and integration of e-health in Healthcare because of its potential for improving the performance of fitness care transport and exceptional of care, mainly via interoperable information standards. The start of such standardization is digital patient statistics (EMRs and EHRs). the main blessings of these information relate to progressed legibility and comprehensiveness of recording records, advanced access to well-timed information with the aid of care providers and forget admission to with the aid of more than one users (no longer geographically certain) and the ability to include expert help equipment consisting of guidelines and expert analysis. Similarly, EHRs have the potential to use multimedia including pictures, sound, and video to offer complete affected person records (Plowman-Prine *et al*., 2009).

2.2 Concept of Maternal Healthcare

Decentralization of maternal health services has been most a hit in international locations where the method took place slowly consistent with improvements in local capacity. This indicates that the procedure may be better appropriate to greater mature and evolved fitness systems (Aitken, De iuliis & Mclachlan, 2009). There appears to be a tendency to underestimate the complicated nature of the devolved procedure and to introduce devolution of maternal healthcare as a reform while the public fitness system is in crisis. These consequences in exacerbating the mismanagement troubles and the neglect of fitness services (Hardee & Formenti, 2012). Evidence from Indonesia and Pakistan suggests that a positive feature of

devolution of maternal health care has been the prominence on expansion of the District Health Systems (DHS) that operate maternal health as a decentralized function (Bossert & Beauvais, 2002).

According to Bossert and Beauvais (2002), the utilization of antenatal care did no longer growth as expected after decentralization because maternal baby fitness services persevered to be seen as divisional duty as opposed to a district crucial provider. It's far hard to be sure of the extent to which decentralization has supported maternity offerings, but, its miles argued that a functioning district machine has the "capacity" to offer the continuum of care wanted for powerful referral from communities to emergency obstetric care centers (Kalisten, 2012).

African countries have slowly, over the years, adopted devolution of the health service especially in maternal health care. Despite this efforts however, a study by Blaise and Kegels (2004) On a sensible method to the assessment of the exceptional control motion in fitness care structures: an evaluation among EU and African contexts based totally on Mintzberg's organizational models suggests that improved local autonomy within the provision of maternal fitness offerings has taken region to a completely small volume and the utilization of those offerings has not multiplied extensively (Bates, 2005). Activities that have been, to a small extent, successful have included the Shifting management decisions regarding maternal health and different government services to neighborhood districts. Reform projects have given extra political and administrative autonomy to neighborhood government, and have protected the implementation of user fees, in no longer simplest maternal fitness

care, however in fitness centers in fashionable to rise nearby revenue for district programs (Bradley *et al*., 2010).

Efforts made to increase the participation of health carrier customers in topics regarding their fitness and to combine different provider providers, which include non-governmental companies (NGOs) and traditional fitness providers, into the formal gadget. For instance, maternal health care in Uganda has been made precedence in public guidelines and provisioning had been endorsed to enhance maternal healthcare. Though decentralization has added health physical infrastructure to nearness in rural regions, specific offerings for maternal healthcare aren't essentially if at these fitness centers. Ideally, information technology in the health sector is expected to help reduce the Maternal Mortality Ratio (MMR) from the current 448 deaths per every 100,000 lives per birth to the Millennium Development Goals (MDG) target of 147 deaths per every 100,000 lives per birth (Bossert, Marchant, Calu & Shaham, 2013). The improved efficiency of the general public sector thru decentralization, concentration of limited authorities price range on an important bundle of offerings, improvement of opportunity financing mechanisms at the local ranges, increasing involvement of the personal quarter through contracting and law on the neighborhood stage and, introducing sustainability and greater authorities possession through zone wide tactics, all of which are introduced by decentralization of maternal health care (Ghai, 2008).

The impact of decentralization on maternal health turned into first of all restrained due to low stages of institutional deliveries and get admission to (Mwaliko, 2009). the scenario steadily improves because of adoption of well-known management

protocols, in carrier education, even though it's miles noted that the extent of improvement varies in line with the commitment of the control employees and the rate of development of procedures to govern the devolved maternal health process in most countries, (van Bilsen *et al.,* 2014).

2.3 Concept of E-Health

Devolution of government functions leads to decentralization of most of its functions relating to different ministries. e-health, including maternal health care, is also being decentralized. Decentralization of e-health specifically the health care is defined as The manner by which authority, features and financial resources are step by step transferred to lower stage units (Haley & Bég, 2012). The aim of decentralization is to improve the effectiveness and performance of the maternal fitness care system by using developing e-health this is suitable and responsible to local wishes and which lets in managers to manipulate (Cruz et al., 2013). In the health region, the initial method has usually involved de-concentration of powers, with decentralization best taking region when it is part of the wider political agenda of nearby government (Haley & Bég, 2012).

A very high rate has been reported with respect to the shift to digital hospitals which is viewed as being very rapid. Despite the fact that the implementation of eHealth technologies have mainly been done by hospitals in the United states, their initial capabilities cannot be unavoidably generalized to modern healthcare since the technologies and systems are each developing. It is essential to offer an informed evaluation of the available accessible evidence (Moahi, 2009).

A general need has been identified to deliver a valuation of the works currently available on the expected effects as a result of hospital implementing technologies relating to eHealth. A review was conducted and which entailed systematic reviews targeting the effects of e-Health know-hows which include, computerized provider order entry, E-Prescribing, electronic medical records (EMRs) and comparing the findings with previous narrative reviews published between January 2010 and October 2015 (Rao, 2017). The studies applied the similar examination strategy and selection principles and based on the results of the seven relevant articles, it was ascertained that three, representing (42.9%) looked into the effects of more than one e-Health system and out of these, two representing (28.6%) studies were high quality, three representing (42.9%) intermediate quality while two (28.6%) low quality (Lu, Kotelchuck, Hogan, Johnson & Reyes, 2014).

From the studies, it was identified that EMRs can be directly linked with conflicting findings though the effects were uninvestigated in the reviews done increasingly recently and only varied results with relation to conversation between healthcare providers were reported. For E-Prescribing, reviews done later reported that there is restricted evidence pertaining to welfares though when joined with CDSS, increasingly reliable positive results were reported (Lu *et al*., 2014)

Basing on this overview, other hospitals in Australia and elsewhere can be enlightened concerning the likely effects that may result from e-Health technologies. Findings show that the impacts associated with these frameworks is mainly varied though positive findings have been recorded which inspire the digital revolution of hospital practice that is in progress (Asangansi & Braa, 2010).

Many governments are going a long way in directing large resources towards the implementation of e-Health technologies in hospital practice and the main goal is the improvement of clinical and financial outcomes. The consequences are yet to be realized completely in exercise since in literature, contradictory results have been reported from time to time (Bossert & Beauvais, 2002).

A general need has been identified to carry on with preceding narrative appraisal of methodical reviews and to categorize the impacts of e-Health technologies into a typology of results to make it possible to have overall findings comparisons and reported made. By doing this, it would be possible to synthesize 7 years of E-Health effects. The areas for which mixed results have been reported include EMRs, and on this, many benefits have been compromised by practices stemming from resistance that has been witnessed and that is directed towards EMRs (Mechael, 2015).

Limited evidence exists with relation to effectiveness for CPOE and E-Prescribing. CDSS are related with the greatest outstanding positive outcomes directly attributable to hospital and clinician level impacts. Transformed interest has been observed in the literature relating to eh effect of E-Health technologies on communication and in this case both between clinicians and with patients (Asangansi & Braa, 2010). Furthermore, other new insights have come up in relation to effects on clinical judgment, altering practice as well as staff retention. E-Health technologies have the ability to impact in a positive way on financial and clinical results. These advantages are however not certain and varied results are stated many times. A look into this background brings to the fore the necessity for hospitals as

well as decision making centers to classify with clarity and act on the successful implementation of e-Health technologies (Tabatabai, Alizadeh & Heidari, 2013).

2.4 Theoretical Framework

According to Davis (1993), Technology Acceptance Model (TAM) Is an statistics systems concept that fashions how customers come to simply accept and use a generation. The real system use is the give up-point where human beings use the generation. E-health in itself is a technology driven approach that pursuits at fixing fitness related troubles in the network and therefore it is crucial to subject it to the theoretical technological models which have been studied earlier than regarding technological improvements and adoption. Some of the methodical are discussed below;

Technology Acceptance Model:

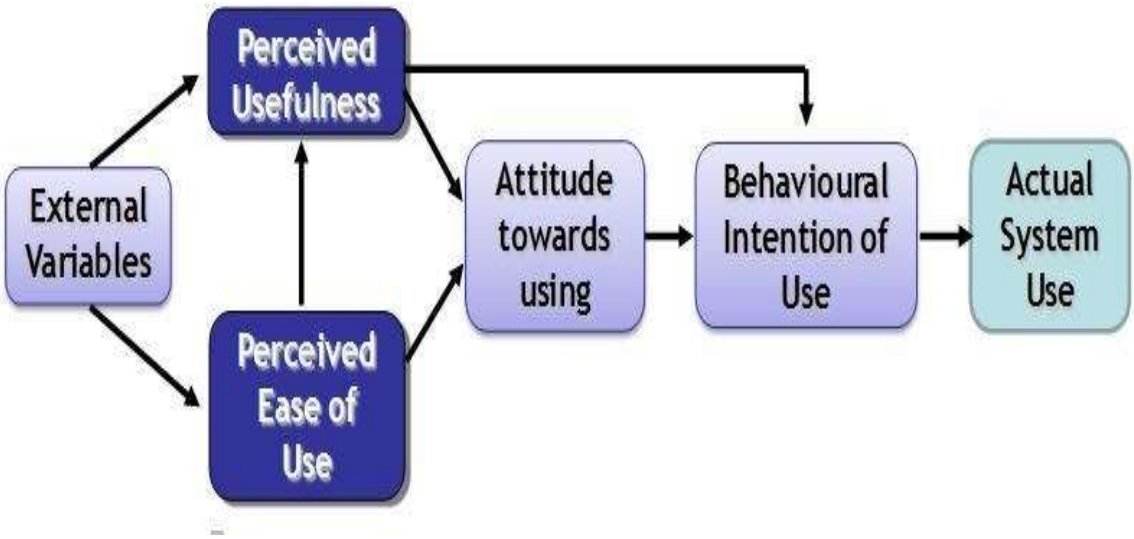

Figure 2.1: Technology Acceptance Model (TAM)

Source: Davis et al., (1993)

It’s far a technological concept that models how customers come to simply accept and use technology (Davis et al., 1993). The principle suggests that once customers are supplied with a new generation, there are a number of things that have an impact on their decision approximately how and while they’ll use it.

Fred Davis defined Perceived usefulness (PU) because the extent to which an individual trusts that utilizing a specific system might beautify his/her performance of a job. Perceived Ease-Of-Use (PEOU) - Davis described this as the extent to which an individual hopes that the usage of a specific machine might be free from attempt (Bansal & Gefen, 2010).

Governments use this power to implement national rules and requirements. There are primary kinds of transfers, conditional and unconditional (sharma, 2011). A conditional switch from the valuable authorities to a county, or other territory, involves a certain set of situations. If the decrease level of presidency is to get hold of this form of switch, it ought to conform to the spending commands of the vital authorities. The concepts of monetary federalism are linked to horizontal and vertical monetary relation (sharma, 2011). The notions associated with horizontal financial associations are linked to regional inequities and parallel competition. Further the ideas linked to monetary relations are associated with vertical economic disparity between the 2 senior ranges of presidency this is the midpoint and the provinces/states. While the notion of parallel monetary imbalance is surprisingly non-debatable, the concept of vertical monetary imbalance is pretty controversial.

In relation to this study, the theory can be used to evaluate the nature of devolution of maternal health care services. A unique degree of health care decentralization is

though hard to broaden. Health care devolution which includes that of maternal fitness care is a complicated marvel acceptance of a number of fiscal, political, and managerial dimensions. A lot of those factors areas are but, not clean to measure empirically, for example, who decides the services range to be blanketed, who units the governing framework, or who makes a decision the financing apparatus of the gadget as an entire. The middle query is the volume to which health care coverage consisting of that of maternal health is determined centrally or locally (Banting & Corbett, 2002). But, to this point the handiest to be had quantifiable measure of healthcare devolution is a monetary one: the ratio of sub country wide spending on health to the entire health spending for all of the levels of presidency. Inside the absence of extra appropriate parameters of devolution, comparable economic devolution signs (aggregated for all the public region activities) have been extensively utilized by the investigators in this discipline succeeding oats' pioneer paintings in 1972. The volume of fiscal sports at each degree of presidency is a chief thing in determining its impact at the allocation of assets. Furthermore, in assessment to dichotomous decentralization indicators or federalism, financial statistics replicate the continuum dimension of the devolution method.

2.5 Empirical Review

2.5.1 Electronic Health Records On Maternal Health

Electronic health records are essential component in the management of maternal healthcare records (Aitken, Berndt & Cutler, 2009). The electronic health records is responsible for capturing all the maternal patients data entry and storing it in a logical way in which it can be retrieved in future (Kane & Labianca, 2011). The

Database management system provides medical practitioners with a platform to capture all maternal patients' information and additional roles which they may require in treating patients (Cleary, Molyneux & Gilson, 2013).

The Electronic health records in maternal healthcare information systems are very important especially if the information will be shared between different entities (Finchman *et al*., 2011). Electronic health records have a sharing component which makes information available to another connected application on the same platform. This means that information in the healthcare information systems can be accessed and shared with different hospital entities even if the information was not captured with the other hospitals satellite in the locality (Kane & Labianca, 2011). Doctors or medical practitioners are able to view patients' detailed information from any local hospital if the Electronic health records are interlinked with all the hospitals found in one county to another county hospital (Suresh, 2013).

Database system employs use of electronic health statistics which can be regularly carried out with CPOE and selection guide efforts; therefore, its miles hard to evaluate one by one their impact on quality (Corso, Gastaldi & Locatelli, 2010). But, an electronic maternal health document has the possibility to make health statistics extra to be had to providers and sufferers when they want it. The accessibility of laboratory and radiology reviews, affected person-specific antiquities, and medical reminders, at the side of different functions which include CPOE and bar coding, have the capability to improve exceptional (Edwards, Rodin & Silow-Carroll, 2012).

Edwards, Rodin & Silow-Carroll (2012) further state that this is essential in devolved systems because it would allow healthcare institutions in the same locality or those sharing Electronic health registers to be capable to share information of patient (Kane & Labianca, 2011). For example, the case of Kenya where healthcare is devolved counties has been given the mandate to ensure that they manage healthcare which includes managing health records. Kenya Demographic Health Survey, (2014) promises that counties need to developed applications which can capture and store patients' information in the different sub-county hospitals. This is irrespective of the sub-county hospitals from which the information was captured (Oduor, 2013).

Maternal health care is a statistics extensive enterprise (Rodrigues, 2010), in which dependable and well-timed facts is a critical useful means for the scheduling and tracking of provision of service at all ranges (Locatelli, Restifo, Gastaldi & Corso, 2012).

The integration of information technology within maternal health Care has been considered by sequences of stages developing since the Nineteen Sixties (Khoumbati et al., 2009). Adoption of health informatics began particularly from monetary structures, providing help to the business enterprise's billing, payroll, accounting and reporting structures. Medical sections propelled a primary initiative throughout the 1970s that supported such internal sports as laboratory, radiology, and pharmacy (Wickramasinghe et al., 2008), in which equipment may want to help high-quantity processes with the enactment of identical methods. Monetary structures once again became conspicuous in the 1980s, with primary investments in

price bookkeeping and materials control systems (Grimson, 2001). Throughout the 1990s, consideration became towards company-wide clinical arrangements, together with medical statistics sources and visualizations of a totally electronically computerized medical record (Bates, 2005).

2.5.2 Telehealth and Telemedicine On Maternal Health

This new perspective of healthcare information technology integration is made of Special systems as an entire which will be included and orchestrated with the intention to guide care in an affected person-centric view of corporations and methods (calsen, 2014). From this standpoint, e-fitness has lots to offer to assist fitness care price administration and to enhance the satisfactory of care (Kolodner et al., 2008). Further to the entrenched role of ICT in diagnostic and clinical equipment (Dal corso, 2014), healthcare records systems are uniquely located to capture, keep, technique, andTalk well-timed facts to choice makers for healthier organization of fitness care at all the above-mentioned tiers of evaluation (Finchman *et al.,* 2011).

According study done by Gurdasani *et al,* (2015) on system integration of patients clinical data for clinical research examined Electronic fitness facts (EHRs), augmented with improvements in generation and greater adoption charge, are used in healthcare centers as an integrated virtual repository system to facilitate powerful management of sufferers and care related statistics using integration information systems in hospitals (Dal Corso, 2011). EHRs, promising to provide a super form of longitudinal patient fitness record, provide top notch and improved possibilities for clinical research (Kipruto et al., 2015). the have a look at goal makes a specialty of the identifying the clinical-facts wishes and necessities of clinical researchers from

to be had EHR systems, and map their records want with current EHR infrastructure the examine employed qualitative strategies look at layout was used to assesses the scientific-records needs and necessities of scientific researchers(worried in hypersensitive reaction & bronchial asthma, and airway studies) and to assess what is clearly documented in EHRS (Haley & Bég, 2012). And following observational have a look at, the look at evaluated two clinical research protocols taken into consideration to be concrete examples of the granularity and scope of clinical-data that might be required for scientific studies observe.

The study findings revealed those scientific researchers' tremendous attitudes in reusing right here to aid and expedite their clinical studies and related techniques (Haley & Bég, 2012). EHR information satisfactory and statistics get right of entry to problems have been denoted to impede EHR reuse in clinical research. education on assets of current EHR structures, seamless integration of standalone structures for automatic scientific-information switch and get right of entry to, and integration of seek and notification gear inside EHR structures were considered obligatory to effectively and correctly exploit EHRS in clinical studies (Kolodner et al., 2008). With few exceptions, diagnosed information elements of the two protocols have been mapped with available EHR medical-information; although there was no deliberate connection of the research with EHR systems.

The study concluded that scientific researchers perceive EHRs as able to help and expedite their studies; however, to facilitate reuse in clinical research, considerations on medical researchers' statistics needs and machine requirements need to be found out in close collaboration with EHR venders (Mills *et al*., 2010).

One of the primary motivators for adopting of Decision support system in maternal health carries the belief that they enhance the maternal health quality (Sidrov, 2006). Yet, similarly studies is required to improved report and recognize the connection between decision aid gadget and maternal health needed to make those choice changes regularly; the suggestions and clinical proof usually develop, as does expertise approximately the situation of the patient. It is able to offer a tool to keep, integrate, and replace this statistics base (Sidrov, 2006).

Medical choice assist can be extensively and genuinely defined as the usage of facts to assist a clinician diagnose and/or deal with an affected person's health hassle (dents, 2013). Sorts of data are involved facts approximately the affected person; and facts approximately the kind of health trouble afflicting the patient and alternative checks and remedies for it (Aitken 2009). Medical decision support is in no way a brand new phenomenon such facts historically have been to be had from several resources. But, those assets have barriers that frequently lessen their reliability or their accessibility on the point of care (Aitken *et al*., 2009).

2.5.3 m-Health Systems On Maternal Health

Studies that have been done in the past have brought to the forefront various the avenues through which mHealth can be seen to improve health information systems and greatly strengthen health services in various ways among which are emergency medical response, health promotion, treatment adherence, disease surveillance, and point-of-care support (Michael & Dodowa Health Research Center, 2009). Other than this, there is tangible literature that seems to connect the various aspects of m-Health with the Sustainable Development Goals (SDGs), the United Nations-

sanctioned global goals for health as well as development indicators to be attained by 2025 (Slonisky and Mechael, 2008).

The involvement of locally placed partners to develop messages that are seen by the local cultures as appropriate as well as messages that the locals can easily understand has been viewed as a way of infusing and sustaining mHealth applications (Consulting Vital Wave, 2009). The project dubbed mobile-midwives that is in Aceh Besar showed that technologies that allowed the application of Bahasa, which is local Indonesian were much more easy to reach and also seemed to have more impact in comparison to other digital media that could have been used and which were majorly in English (Chib, 2010).

In the same way, the study that was done in Zanzibar, Tanzania called "Wired Mothers" indicated that services based on the SMS platform that were meant for expectant mothers were modified to fit the local context with the aim of achieving the aim of adopting the behavioral change practices (Lund and Hemed, 2010). Mediations have been witnessed and these have also used an approach that based mHealth programs at the local grassroots level and made use of staff with the most vibrant capacity to reach out to pregnant women.

Crisis reaction and support programs at point-of-care included frontline workers, paid health workers and volunteer auxiliaries who were fully involved in the health ecosystems of their communities in all aspects (Michael & Dodowa Health Research Center, 2009). As an example, Uganda has a program called the RESCUER program which has shown that empowering health workers affiliated to the community with mobile communication gave room for the improvement of the links that exist

between community members and health amenities (Musoke, 2002). Every other example is the ‘‘woman medical examiner’’ initiative in Pakistan. This initiative has labored with widely wide-spread, aggressive and socially regularly occurs medical experts who possessed easy admittance to moms and could channel marginalized populations with the official fitness device (Chan and Kaufman, 2010). Thus, applications must construct upon the nearby context and sources at the same time as still introducing a revolutionary tool for healthcare delivery.

A study conducted by Oden (2010) as undertaken in Switzerland using a sample size of 20 hospitals that were making efforts to install Decision support system with the objective of enhancing maternal health care in the region. The study survey research design employed correlation analysis to identify the role of health information systems.

The study findings indicated that Healthcare Information Technology decision support system helps decision makers accumulate useful data from an amalgamation of raw data, personal knowledge, and documents, or commercial models to recognize and resolve problems as well as make decisions (Carpenter, 2014). The finding also indicated that decision sustenance system link health remarks with health knowledge that eventually impact choices on health (Bossert & Beauvais, 2002).

The study findings also indicated that the decision support system focuses on using knowledge management in such a way so as to achieve clinical advice for patient care based on multiple items of patient data (Boyd, 2005). Therefore, decision support systems are essential in the management of health care and can determine

the satisfaction levels of maternal health care among mothers. The use of decision support systems in maternal health care is therefore viewed as an important step in the management of maternal health. The study concluded that all hospitals need to install decision support system to enhance service delivery in maternal healthcare department. This is as a result of the critical and necessary nature of the decision support system in reducing child mortality. The study recommended further adoption and implementation of the decision support system (Ahmed *et al.*, 1993).

A study conducted in Nigeria by Otis (2013) whose objective was to evaluate the role of healthcare information technology in maternal health care decision making. The study employed a descriptive survey research design in the local area using a sample size of 200 respondents employed descriptive statistics in analysis the data collection.

2.5.4 Effect of consumer health IT data on Maternal Health

The study findings indicated that selection help gadget presents clinicians, workforce, patients or other persons with information and individual-precise records, logically clarified or offered at suitable times, to beautify health as well as health care. The examine reveals additionally confirmed that decision aid device help in avoidance of errors, damaging activities progressed performance, fee-advantage, and issuer and affected person satisfaction (Otis, 2013).

A core set of signs that draw on those which are globally recommended and standardized and which might be relevant and beneficial for choice-makers at each stage of the health systems are an important factor of HMIS. signs produced through national HMIS consist of production and utilization of services, monitoring of

commodity and stock-out facts, morbidity and mortality, and in some cases content and first-class of care in maternal health care, decision support system can be used for planning and management (Otis, 2013).

The study concluded that hospital needs to put in place robust decision support systems that will improve efficiency and manage maternal health care. The study therefore recommended the review of decision support systems in a decentralized system of maternal health care to ensure that services are effectively given (Otis, 2013).

Governments use this strength to put in force countrywide rules and standards. There are number one styles of transfers, conditional and unconditional (Slater, 2011). A conditional switch from the imperative government to a county, or other territory, includes a sure set of conditions. If the decrease degree of presidency is to receive this kind of switch, it must conform to the spending instructions of the central government. The standards of financial federalism are related to vertical and horizontal monetary relation (Slater, 2011). The notions associated with horizontal financial family members are related to nearby imbalances and horizontal competition. Similarly the notions associated with financial relations are related to vertical financial imbalance between the two senior stages of presidency this is the centre and the states/provinces. Whilst the idea of horizontal monetary imbalance is exceedingly non-arguable, the concept of vertical monetary imbalance is pretty debatable (Ash, *et al,* 2007).

In relation to this study, the study can be used to try and evaluate the nature of devolution of maternal health care services. A unique degree of health care

devolution is however hard to broaden. Health care devolution which includes that of maternal fitness care is a complicated phenomenon embracing a number of political, fiscal and administrative dimensions. A lot of those factors areas are but, not clean to measure empirically, for example, who determines the range of the services to be blanketed, who units the regulatory framework, or who makes a decision the financing mechanism of the gadget as an entire. The middle query is the volume to which health care coverage consisting of that of maternal health is determined centrally or locally (Banting & Corbett, 2002). But, to this point the handiest to be had quantitative measure of healthcare devolution is a monetary one: the ratio of sub country wide health spending to the entire health spending for all of the levels of presidency. Inside the absence of extra appropriate measures of devolution, comparable economic devolution signs (aggregated for all the public region activities) have been widely used by the researchers in this discipline following oats' pioneer paintings in 1972. The volume of fiscal sports at each degree of presidency is a chief thing in determining its impact at the allocation of assets. Furthermore, in assessment to dichotomous indicators of devolution or federalism, financial statistics replicate the continuum dimension of the devolution method.

2.6 Knowledge Gap

The study done by (Suresh, 2013), Doctors or medical practitioners were not able to view patient's detailed information from any local hospital if the Electronic health records are interlinked with all the hospitals found in one county to another county hospital. Further, in a study done by (Khoumbati *et al*., 2009), it is noted that the integration of information technology within maternal health care has not been characterized by a series of phases evolving since the 1960s.

Health Informatics adoption started out especially from economic systems, providing support to the organization's billing, payroll, accounting and reporting systems. Scientific departments launched a prime initiative at some stage in the Seventies that supported such internal activities as radiology, laboratory and pharmacy (Wickramasinghe et al., 2008), in which equipment ought to assist excessive-volume operations with the implementation of standardized processes. Economic structures all over again have become prominent within the 1980s, with principal investments in value accounting and materials management structures (Grimson, 2001).

The study findings have not indicated that the choice support device focuses on using expertise control in this kind of way which will gain medical advice for affected person care based totally on a couple of gadgets of affected person data (Grimson, 2001). Therefore, decision support systems are essential in the management of health care and can determine the satisfaction levels of maternal health care among mothers. The use of decision support systems in maternal health care is therefore viewed as an important step in the management of maternal health (Oden, 2010).

The study findings done by (Otis, 2013) indicated that decision support system does not provide staff, patients, clinicians or other persons with knowledge as well as person-specific information, intelligently filtered or presented at appropriate times, to enhance health and health care.

2.7 Conceptual Framework

The study applied the following conceptual framework to illustrate how various variables interrelate in the study. The researcher arrived at the conceptual framework by using objectives of the study. The conceptual consists of independent and dependent variables.

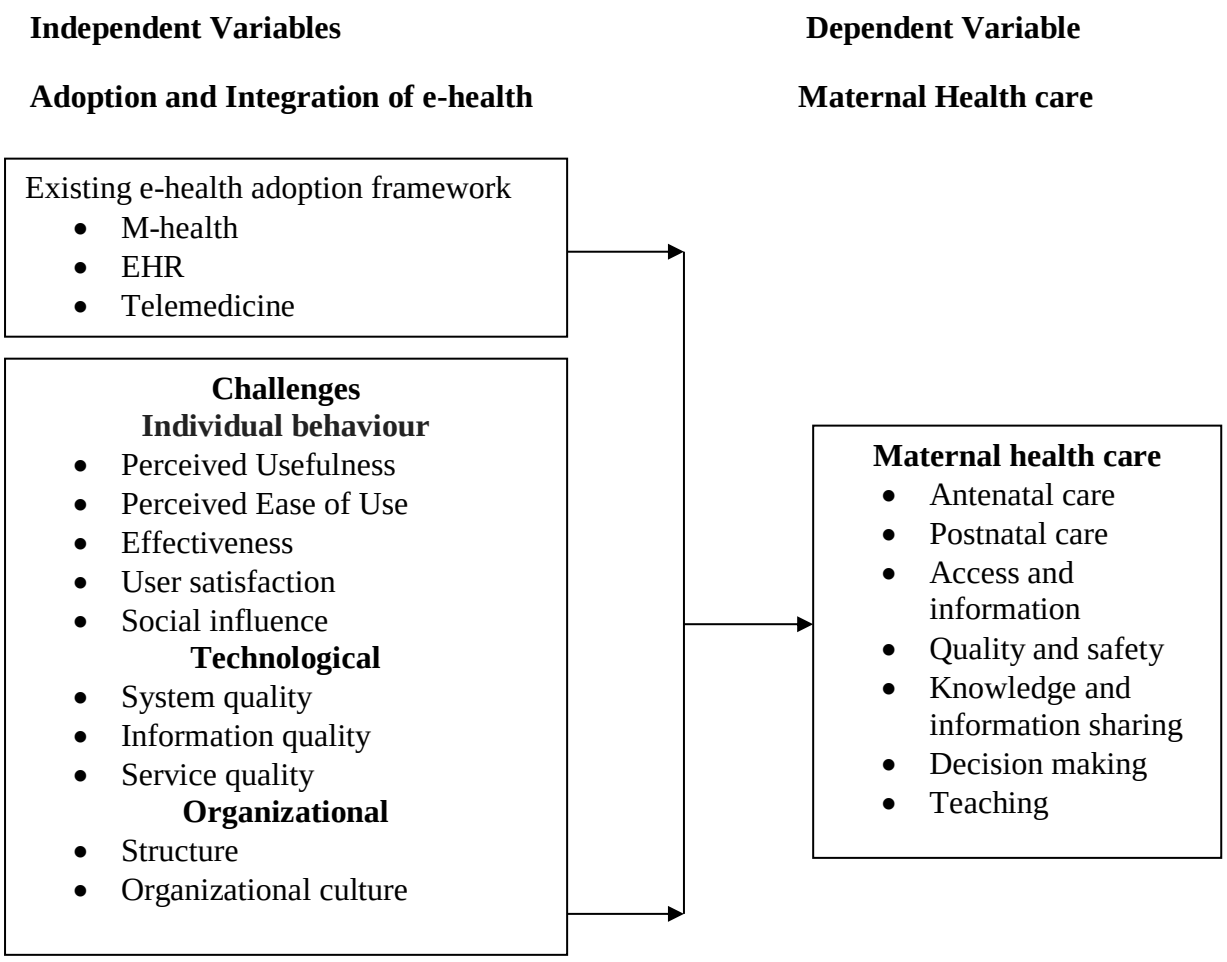

Figure 2.2: Conceptual Framework

CHAPTER THREE
RESEARCH METHODOLOGY

3.0 Introduction

This chapter presents information on the research design as well as the study methodology. It is divided into the following sections: The study design, target population, sample size, sampling technique, data collection instruments, as well as data collection procedures and finally data analysis methods.

3.1 Research Design

The study utilized a descriptive survey research design. Descriptive-survey research uses surveys to acquire statistics approximately various topics. These statistic pursuits to apprehend the quantity to which fantastic situations can be received amongst the ones topics (Schneider & Wagemann, 2010). A descriptive survey attempts to set up the variety and distribution of some social traits, at the side of education or schooling, career, and location, and to find out how these traits may be related to positive behavior styles or attitudes (Schneider & Wagemann, 2010). Descriptive studies layout is a legitimate method for getting to know specific topics and as a precursor to extra quantitative research. at the equal time as there are some legitimate worries approximately the statistical validity, so long as the restrictions are understood by manner of the researcher, this form of observe is an invaluable clinical device. While the effects are always open to question and to unique interpretations, there’s no doubt that they’re advanced to appearing no research in any respect.

3.2 Study Area

The study was conducted within Uasin Gishu County specifically on County Hospitals. The county has a hundred and seventy health facilities ranging from level 2 to 6. Most of the centers are focused inside Eldoret municipality however whose catchment extends up to Uganda, Rwanda and south Sudan. On the apex of the fitness gadget is the Moi Teaching and Referral Health Facility. While the wide variety of current centers is pretty considerable they may be not enough to carrier the extensive catchment area inclusive of the health desires of the county itself. The average distance to a health center within the county is 7kms which is better than the goal of 5kms. The whole wide variety of fitness facilities within the county is 176. Of these, there are about ninety authority's facilities, which include four tier 3 facilities, 86 tier 2 facilities and a number of private and fbo facilities. inspite of the available health services, there lacks an effective and useful referral device, inadequate ambulance insurance, coupled with non-purposeful community units which were set up to allow groups' get right of entry to information about offerings and to provide a hyperlink to the formal health shape.

3.3 Target Population

A target population can be described as the comprehensive set of subjects from which a sample can be studied. The study targeted a total of 408 respondents from the six sub county hospitals including Ainabkoi, Kapsaret, Kesses, Moiben, Soy and Turbo. The researcher used records of 2018 to get the target population of Sub County Hospitals in Uasin Gishu County.

Table 3.1 Target Population

Category	Total
Directors	2
MOHs	12
HRIOs	22
Nurses	372
Total	**408**

Source: Human Resource Office Data, Uasin Gishu County (2018)

3.4 Sampling Procedure

Sample size is a number of objects or individuals chosen to include in a statistical sample (Sekaran & Bougie, 2013). The determination of a sample size is dependent on the following parameters (Smith, 2013). The small samples do not reproduce salient characteristics of the accessible population to an acceptable degree. For the purpose of getting a representative sample, the sample size of the study was calculated using 30% rule as recommended by (Mugenda & Mugenda, 1999).

To reach the sample size, probability sampling technique was used in this study to ensure fair representation and a generalization of the findings to the general population (Kothari, 2004). In specific terms there was the use of stratified random sampling, where by the study was conducted in a natural location where the respondents where approached as they carried out the daily routines.

Table 3.2 Table Sample size

Category	Strata	Sample size
Director	2x0.3	1
MOHs	12 x0.3	4
HRIOs	22x0.3	7
Nurses	372x0.3	112
TOTAL	**408**	**124**

Source: Human Resource Office Data, Uasin Gishu County (2018)

3.5 Instrumentation

This study section determined the instrument that were used, their reliability and validity. The study employed both questionnaire and interview schedule.

3.5.1 Questionnaire

The researcher used questionnaire and interview schedule to collect primary data. The data collection strategy was determined by the questions of the study. The questionnaire was administered to nurses and HRIOs. The questionnaire was both closed-ended and open-ended questions. On open-ended questions asked, the respondents were required to formulate their own answers, whereas in the closed-ended questions the respondent picked an answer from a given number of options. The response options for closed-ended questions were exhaustive and mutually exclusive. The questionnaires were viewed as effective in this study. The questionnaire was divided into four sections and based on this, section A of the questionnaire collected demographic information, Section B collected information on E Health, section C collected information on integration, and section D collected information on M Health application system.

3.5.2 Interview Schedule

According to Kothari (2012), an interview is a verbal exchange wherein inquiries are probed and solutions are specified. In not unusual phrasing, the word "interview" denotes to a one-on-one talk with one person appearing within the function of the interviewer and the opposite within the interviewee's role. The interviewer queries questions, the interviewee replies, with members taking turns speaking. The study employed both structured and unstructured interview schedule. This was used to obtain data from the medical officers of health and directors. This was suitable since it allowed room for more elaboration. The use of interview was essential to the respondents since the data collected was first hand.

3.5.3 Reliability of the Research Instruments

Diem (2011) termed reliability as the portion of the extent to which a studies instrument yields constant outcomes after recurrent trials; Okari (2011) describes reliability as the general uniformity of a quantity. A degree is stated to have a high dependability if it produces similar consequences beneath steady situations. "It's miles the feature of a hard and fast of take a look at rankings that pertains to the quantity of random errors from the dimension method that is probably embedded within the rankings. Scores that are particularly dependable are correct, reproducible, and consistent from one checking out occasion to some other. This is, if the checking out process has been repeated with a set of take a look at takers, essentially the equal outcomes could be obtained. It ensures that the instrument generates similar data. In this study, test re-test method was used to measure reliability since it allowed for comparison of existing situation.

3.5.4 Validity of the Research Instruments

According to Diem (2011), validity refers to the meaningfulness and accuracy of implication that is based totally at the investigation outcomes. It is the diploma to which ends up received from the examination of the statistics certainly constitute the marvel underneath have a look at. The responses of the subjects had been checked in opposition to the research goals to determine the validity of the questionnaires.

The questions to be decided on and protected inside the questionnaire had been investigated for his or her validity by way of dialogue with the supervisor. The expert opinion in this case was the manager who assessed the data series gear a good way to decide the degree to which the studies devices measured studies variables of the selected case. The reliability of the questionnaires changed into confirmed thru exam of internal consistency of the measures. This was carried out with the aid of computing Cronbach's alpha of zero.7 value coefficients on facts gathered the use of the evolved questionnaires.

3.6 Method of Data Collection

Before collecting the data, the research permit was obtained from the Ministry of health in Uasin Gishu County, prior to data collection and an introductory letter from the Rongo University. The researcher scheduled a day to view the site of the study. Eventually a day was scheduled where the researcher was able to administer the questionnaires to respondents.

3.7 Data Analysis

The collected data was scrutinized and analyzed which comprised of modification, categorization, coding and tabulation of the gathered information to make specific

consistency and completeness. The raw records accrued became decreased to homogeneous corporations to shape a meaningful relationship.

Data was analyzed using the descriptive statistics including means and percentages and standard deviation was employed in data analysis. Qualitative data from interviews were analyzed thematically based on emerging themes.

3.8 Ethical Considerations

According to Resnik (2011), there are numerous motives for adhering to moral norms in studies. Norms promote the ambitions of research, such as know-how, falsifying or misrepresenting research data, promote the fact and avoid blunders. moreover, due to the fact research regularly involves an incredible deal of cooperation and coordination among many one of a kind human beings in different disciplines and institutions, ethical requirements sell the price which can be essential to collaborative work, inclusive of accept as true with, accountability, mutual admire and fairness.

As an example, many moral norms in studies, which include pointers for dating, copyright, and patency guidelines, statistics sharing policies, and confidentiality and peer critiques, are designed to shield intellectual assets hobby whilst encouraging collaborations. A number of the moral norms help to ensure that researchers can be held responsible to the public. Except, norms in studies also assist to construct public aid for studies. Humans are more likely to fund the studies undertaking if they could believe the fine and integrity of studies. Eventually, a number of the norms of the studies sell a diffusion of vital ethical and social values, including social duty, human rights, compliance with law, fitness and protection. Ethical

lapses in research can significantly damage human and animal subjects, college students and the public.

Ethical issues, knowledgeable consent, confidentiality and anonymity: given the significance of the moral issues in numerous methods, the researcher did not take any one's work and wherein someone's paintings was covered, such had been stated thru citation and citation. In this study copyright and elements of patenting were respected and a plagiarism of any form becomes vehemently prevented. In the complete studies length, respondents' identities had been now not disclosed in any manner in any respect and confidentiality became located such that, any facts obtained changed into now not disclosed to some other individual.

CHAPTER FOUR
DATA PRESENTATION, ANALYSIS AND INTERPRETATION

4.0 Introduction

This study focused on e-health and maternal health and sought to establish a framework for adopting and integrating e-health in maternal health. The specific objectives of the study were to; review the existing e-health adoption framework in Uasin Gishu County Hospitals; identify the challenges of e-health adoption and integration on maternal health in Uasin Gishu County Hospitals and to develop framework for e-health adoption and integration on maternal health in Uasin Gishu County Hospitals. This chapter covers data analysis, presentation and interpretation.

4.2 Response Rate

The sample size in this study was made up of 124 respondents and based don this, the same number of questionnaires were given out to respondents. Out of 124 questionnaires that were distributed to the respondents for the study 124 were successfully filled and brought back. This represents a response rate of 100%. According to Nachmias (2009) a response rate exceeding 50% was believed to be sufficient for analysis. This level of response was therefore deemed appropriate enough.

4.3 Demographic Information

This section presents the background characteristics of the respondents in the study role in the hospital age, gender, level of education were captured. It was important to discover the personal characteristics of the respondents as this would allow the researcher recognize the form of people protected inside the study and additionally to gauge the first-class of responses contained in the data accrued. The statistics

contained within the records has a bent of impacting significantly on the very last outcome of a take a look at.

4.3.1 A framework for adoption and integration of e-health

The investigation sought to find out the role of the participants in the hospital. The participants were asked to indicate if they were Director, MOH, HRIO or Nurse. From the findings it was established that 0.8% of the participants were Directors, 3.2% were MOHs, 5.6% were HRIOs and the remaining 90.3% were nurses. From these findings we can infer that the majority of the participants were nurses. Table 4.1 below show the findings.

Table 4.1: A framework for Adoption and Integration of e-health

Role in the Hospital	Frequency	Percentage	Total
Director	**1**	**0.8**	**0.8**
MOH	4	3.2	3.2
HRIO	7	5.6	5.6
Nurses	112	90.3	90.3
Total	**124**	**100.0**	**100.0**

Source: Field Data (2019)

4.3.2 Age Brackets of the Respondents

The study also sought to find out the respondents' age distribution. The participants were provided with age ranges and asked to indicate the range which they belonged to. From the data collected it was established that 12.9% of the participants fell in the 18-23 years range, 12.9% in the 24-29 years, 26.6% in the 30-35 years range and the remaining 47.6% were 36 years and above. From these findings we can infer that the majority of the respondents were 36 years and above. The findings were as shown in Table 4.2.

Table 4.2 Age Brackets of the Respondents

Age	Frequency	Percentage	Total
18-23 Years	16	12.9	12.9
24-29 Years	16	12.9	12.9
30-35 Years	33	26.6	26.6
36 and above years	59	47.6	47.6
Total	**124**	**100.0**	**100.0**

Source: Field Data (2019)

4.3.3 Level of Education of the Respondents

The study also sought to establish the level of education of the respondents. From the data collected it was established that 53.2% of the respondents had college level of education while 46.8% had university level of education. These findings reveal that the level of education was almost evenly distributed between those with college level of education and those with university level of education. However, those with college level education were slightly higher.

Table 4.3 Level of Education of the Brackets

Level	Frequency	Percentage	Total
College	66	53.2	53.2
University	58	46.8	46.8
Total	**124**	**100.0**	**100.0**

Source: Field Data (2019)

4.4 Existing of E-Health Adoption Framework in Uasin Gishu County Hospitals

According to Finchman *et al*., (2011), electronic health records in maternal healthcare information systems are very important especially if the information will be shared between different entities. This makes information available to another

connected application on the same platform and allows medical practitioners to be able to share patient information from different locations. This study therefore sought to establish the forms e-health being used by the hospitals taking part in the study. The respondents were provided with a list of e-health components and asked to indicate the ones used in their facilities. From the data collected it was indicated that 16.1% percent of participants indicated that they used Electronic Health records (EHR), 9.7% indicated they currently used Telemedicine, another 8.9% indicated that they used M-health, 25.8% indicated current use of Health Information System while 23.4% indicated that they currently used Health Knowledge Management. The remaining 23.4% of the participants indicated they currently used Consumer Health Informatics. From these findings we see that the most commonly used form of e-health was Health Information System with slightly over a quarter of those interviewed picking this form of e-health as being currently used in their facility. Consumer Health Informatics as a form of e-health was also found to be commonly used. M-health was the least used form of e-health. The findings are shown in Figure 4.1.

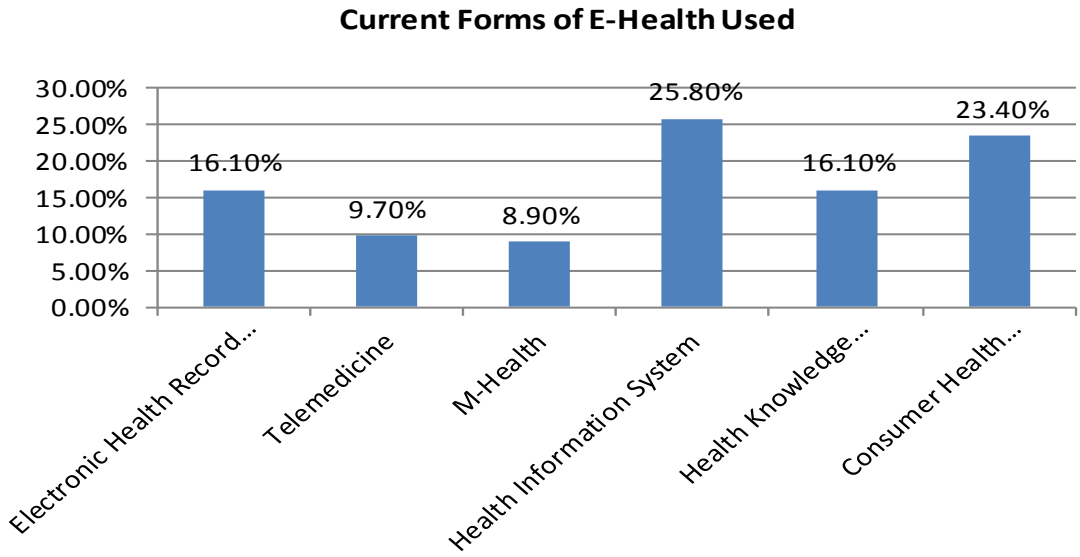

Figure 4.1 Current Forms of E-Health Used

Source: Field Data (2019)

4.4.1 Forms of e-health Preferred to implemented in the hospitals

This study also sought to find out the forms of e-health the interviewed medical practitioners thought should be implemented in their facilities if they were already not in place. This was important as it will help this study determine the forms of e-health the practitioners viewed as significant towards improving maternal health care in their facilities. From the data collected, Health Information System was cited as the number one form of e-health that the respondents wanted to be implemented in their facilities. This represented 26.6% of the total participants. M-health was the second most cited form of e-heath with 22.6% of those interviewed saying they would like this form of e-health to be implemented in their facility. 15.3% of the respondents indicated telehealth while 13.7% indicated Electronic health records. Consumer health Informatics and Health Knowledge management were the least indicated forms with 12.1% and 9.7% of the respondents indicating these forms respectively. From these findings it is clear that the medicals practitioners are

putting a lot of weight behind Health information Systems. Table 4.4 shows the findings.

Table 4.4 Forms of e-health Preferred to implemented in the hospitals

E-Health	Frequency	Percentage	Total
Electronic Health Record	17	13.7	13.7
Telemedicine	19	15.3	29.0
M-Health	28	22.6	51.6
Health Information System	33	26.6	78.2
Health Knowledge Management	12	9.7	87.9
Consumer Health Informatics	15	12.1	100.0
Total	124	100.0	

Source: Field Data (2019)

4.5 Challenges faced in the Integration of e-Health

4.5.1 Key Current Stakeholders' Profile of e-Health

According to Bossert, Marchant, Calu & Shaham (2013), the current Maternal Mortality Ratio (MMR) stands at 448 deaths per every 100,000 lives per birth as compared to the Millennium Development Goals (MDG) target of 147 deaths per every 100,000 lives per birth. They further note that ideally, information technology in the health sector is expected to help reduce these rates and it needs a multifaceted approach that brings on board different stakeholders. It was therefore important for this study to find out the current stakeholders in maternal health care and late on see how these stakeholders can be involved in the development of e-health towards reducing Maternal Mortality Ratio. The respondents were provided with a list of potential stakeholders in the health sector and asked to indicate those who were involved in provision of different forms of support in their facilities. From the data collected, 26.6% of the respondents indicated that insurers were viewed as the key current stakeholders in the health sector. 21.8% indicated patients, 18.5% of the

respondents indicated Health providers, 12.1% indicated the government, another 12.1% indicated educators while the remaining 8.9% indicated employers. From the findings it is clear that insurers, patients and health providers are seen as the most important stakeholders in the health sector across the health facilities in Uasin Gishu County. The findings were as shown in figure 4.2 below.

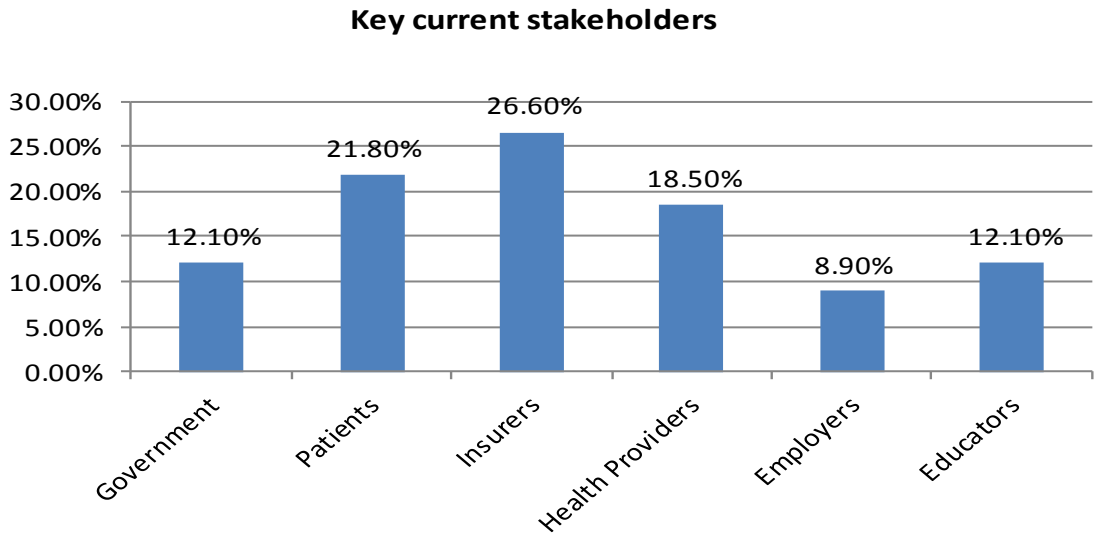

Figure 4.2 Key Current Stakeholders' Profile of e-Health

Source: Field Data (2019)

4.5.2 Stakeholders Influence in E-Health Implementation Rating

A longitudinal a descriptive survey in England and Wales shows that stakeholder principle in preferred and engagement of stakeholders in mainly has the strength to assimilate each the it task administration and organizational exchange views of era-led alternate, and deliver new intuitions regarding innovation and organizational trade sustainability in healthcare region. Moreover, as engagement of stakeholders does no longer usually lead to fruitful challenge consequences (Buchanan et al., 2007). Given the assumption that the achievement of e-fitness

improvement process is intently associated with inclusion of diverse stakeholders, this examine sought to investigate the impact of different stakeholders in e-health. The respondents were provided with Likert scale and asked to rate the level of influence of the different stakeholders in e-health in their facilities. The participants indicated 1 if they thought the stakeholder had high influence and 5 if they thought the stakeholder had low influence. From the data collected it was established that insurers were thought to have the highest level of influence with 26.6% of the respondents indicating that they had high influence. 21.8% rated patients as the second most influential stakeholder; health providers were rated as third most influential stakeholders with 18.5% of the respondents indicating this. Government and Educators were ranked as the fourth most influential stakeholders with each accounting for 12.1% of the total respondents. Employers were ranked as the least influential stakeholders with 8.9%. These findings are in line with research findings by Buchanan *et al*. (2007) who found that there is a rising research form that practical enactment of change in healthcare sector truly requires an widespread engagement of stakeholders to deliver inventions in patient care and attain change sustainability. They further note that, stakeholders can play an powerful title role both as promoters, as well as inhibitors of organizational change. The study findings were bas shown in Table 4.5;

Table 4.5 Stakeholders Influence in E-Health Implementation Rating

Stakeholders Influence	Frequency	Percentage	Total
Government	15	12.1	12.1
Patients	27	21.8	33.9
Insurers	33	26.6	60.5
Health Providers	23	18.5	79.0
Employers	11	8.9	87.9

Educators	15	12.1	100.0
Total	**124**	**100.0**	

Source: Field Data (2019)

4.5.3 ICT Technologies Challenges in e-Health Services

Information communication technology (ICT) and web services have a main effect at the exceptional of services and peoples' lifestyle. To reap country wide and worldwide health appropriate use of ICT must be implemented which can bridge the virtual and fitness hole. The technological improvements cause new programs for disseminating healthcare data to diverse audiences the usage of innovative interoperable design. These applications are easy, smooth to apply, engaging, and able to delivering applicable information for primary healthcare to various customers (Khan, 2010). It is against this backdrop that this study sought to find out the ICT technologies in place used to support e-Health services in the facilities. The respondents were provide with a list of technologies and asked to indicate from the ranges provided the number that was available in their facility. The data was analyzed using mean and standard deviation and the results are presented in table 4.8 below.

The mean number of desktops in the facilities was found to be 2.9 with a standard deviation of 1.2, the mean number of laptops was 3.4 with a standard deviation of 1.4, PDAs had a mean of 4.1 with a standard deviation of 1.4, mobile phones had a mean of 4.1 and a standard deviation of 1.5, printers had a mean of 4.3 and a standard deviation of 1.5 and tablets had a mean of 3.7 and a standard deviation of 1.4. From these data we see that the standard deviation of all the items is pretty

small implying that the data was closely dispersed around the mean. From these data we can infer that the average ICT technologies across the facilities in Uasin Gishu County was almost evenly distributed owing to small standard deviation.

Table 4.6: ICT Technologies Challenges in e-Health Services

Descriptive Statistics	N	Minimum	Mean	Std. Deviation
Desktop	124	1.00	2.9435	1.21844
Laptop	124	1.00	3.3952	1.40741
PDAs	124	1.00	4.1048	1.47510
Mobile	124	1.00	4.1371	1.54780
Printers	124	1.00	4.3387	1.50277
Tablet	124	1.00	3.7984	1.40255
TOTAL	124			

Source: Field Data (2019)

4.5.4 Health Institution has Internet Connection

According to Flatley-Brennan (1998), the Internet has unfolded an international of opportunities in remedy: while related to the internet, regular scientific gadgets can collect useful additional records, supply extra perception into signs and traits, allow remote care, and normally supply sufferers greater manipulate over their lives and treatment. The researcher, cognizant of this fact sought to find out the internet connection situation in the facilities. The findings showed that 79.8% of the respondents indicated that their facility had internet connection while the remaining 20.2% indicated that they had no internet connection. Table 4.6 below show the findings.

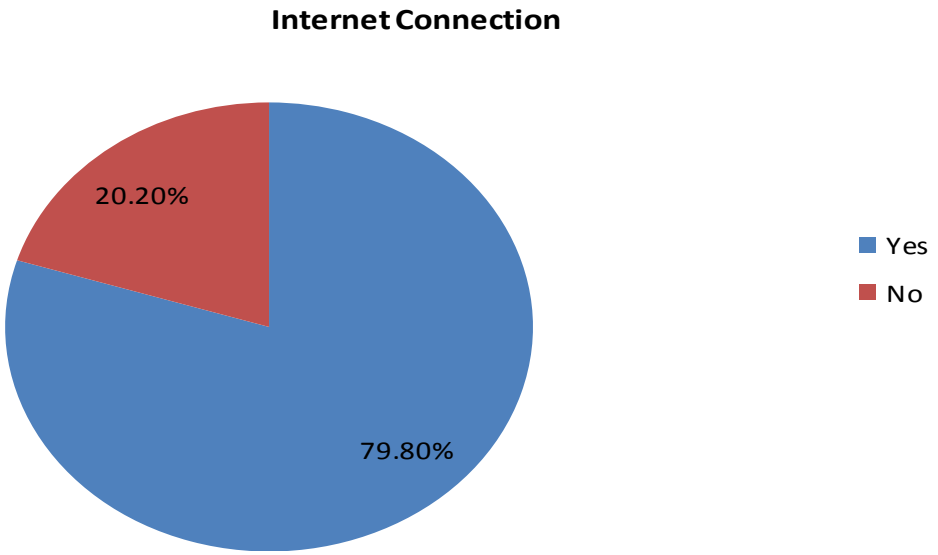

Figure 4.3 Health Institution has Internet Connection

Source: Field Data (2019)

4.5.5 Type of Internet Connectivity Used in the Hospital

This study also sought to find out the type of internet connectivity used in the facilities under study. The respondents were provided with a list of types of connectivity's and asked to indicate the one used in their facility. From the data collected t was established that the majority of the facilities used Local Area Network (LAN) connection. 29% of the total respondents. 10.5% indicated that they used Wide Area Network (WAN), 12.1% indicated they used modem, 24.2% indicated they used Wireless connection and the remaining 24.2% indicated they used other types of connections. These findings indicate that the majority of the facilities either use LAN or wireless connections. Table 4.7 shows the findings.

Table 4.7 Type of Internet Connectivity Used in the Hospital

Type of Connectivity	Frequency	Percent	Total
Local Area Network (LAN)	36	29.0	29.0
Wide Area Network (WAN)	13	10.5	39.5
Modem	15	12.1	51.6
Wireless	30	24.2	75.8
Other	30	24.2	100.0
Total	**124**	**100.0**	

Source: Field Data (2019)

4.6 Application of E-Health in Maternal Health Care

4.6.1 Application of e-Health Achieved in the Health Sector

E-Health is applied in the health sector to achieve a number of desired results. These results range from enhancing healthcare services availability and access to improving decision making in health sector. The respondents were provide with a list of potential achievements of e-health and asked to indicate the one they rated highly. 17.7% of the respondents indicated that e-health has been used in their facility to enhance healthcare services availability and access; 10.5% indicated that it has been used to achieve improved health quality, safety and outcomes; 12.1% indicated that it has been used to achieve increased service efficiency, productivity and cost effectiveness; 2.4% indicated that it has been used to achieve enhanced knowledge sharing amongst practitioners; 26.6% indicated that it has been used to achieve better decision making and 30.6% indicated that it has been used to achieve improved teaching methods. From these findings it is clear that improved teaching methods are the most common application of e-Health achieved in the health sector.

This was cited by almost a third of the total respondents interviewed. Enhancing better decision making was also ranked highly coming second to improved teaching method. Enhancing knowledge sharing amongst practitioners was the least cited application of e-Health achieved in the Health Sector.

Table 4.8 Application of e-Health Achieved in the Health Sector

Application	Frequency	Percentage	Total
To enhance healthcare services availability and access	22	17.7	17.7
To improve health quality, safety and outcomes	13	10.5	28.2
To increase service efficiency, productivity and cost effectiveness	15	12.1	40.3
To enhance knowledge sharing amongst practitioners	3	2.4	42.7
To better decision making	33	26.6	69.4
To improved teaching methods	38	30.6	100.0
Total	**124**	**100.0**	

Source: Field Data (2019)

4.6.2 Challenges in Implementation of e-Health

Despite the potential benefits of e-health, these systems implementation is often reported as problematic. Implementation of EHR and electronic prescribing systems has lagged in most European nations as well as in the USA (Ross *et al*, 2015). Costs associated with implementing e-health often spiral and time delays are reported. Barriers to implementation of innovations within the healthcare setting may arise at the individual, organizational and wider levels of the healthcare systems, and interact in complex and variable ways (Lau, 2014). Those factors may also be innovation-precise and context-unique. research have defined economic, prison, social and moral limitations to implementation, bobbing up at the organizational and

individual stage, such as customers' lack of expertise of the benefits, low e-health literacy, a scarcity of evidence of price-effectiveness and interoperability. The ability of various facts era systems and software programs to speak, exchange records and use the information that has been exchanged) as well as security issues (Stroetmann et al, 2012). Spotting and expertise obstacles and facilitators are essential for devising techniques and interventions to enhance the huge effective use of e-fitness, and addressing blockages to implementation. This this study sought to investigate the challenges faced by the different facilities in Uasin Gishu County.

From the data collected the results were as follows: 12.9% indicated e-Health standards challenges, 10.5% indicated ICT capacity, 9.7% indicated E-legislation, 12.9% indicated e-Health Infrastructure, 23.4% indicated Security and privacy issues and the remaining 30.6% indicated Technical Organizational issues. From these results we infer that the biggest challenge of implementing e-Health is technical organizational issues. Security and privacy issues were also found to be another major challenge facing the implementation of e-Health.

Table 4.9 Challenges in Implementation of e-Health

Implementation	Frequency	Percent	Total
E-Health standards	16	12.9	12.9
ICT capacity	13	10.5	23.4
E-legislation	12	9.7	33.1
E-Health Infrastructure	16	12.9	46.0
Security and privacy issues	29	23.4	69.4
Technical Organizational	38	30.6	100.0
Total	**124**	**100.0**	

Source: Field Data (2019)

4.6.3 Need Training in the Use of e-Health Systems

Training in the use of e-Health systems is important in ensuring the utilization of e-Health. This study sought to find out if the respondents required any training. The respondents were required to indicate with a Yes or No answer. From the data collected it was established that 38.7% of the respondents indicated that they needed training and the majority, 61.3% indicated they did not need training. From these results we infer that the majority of the respondents were adequately trained in the use of e-Health systems.

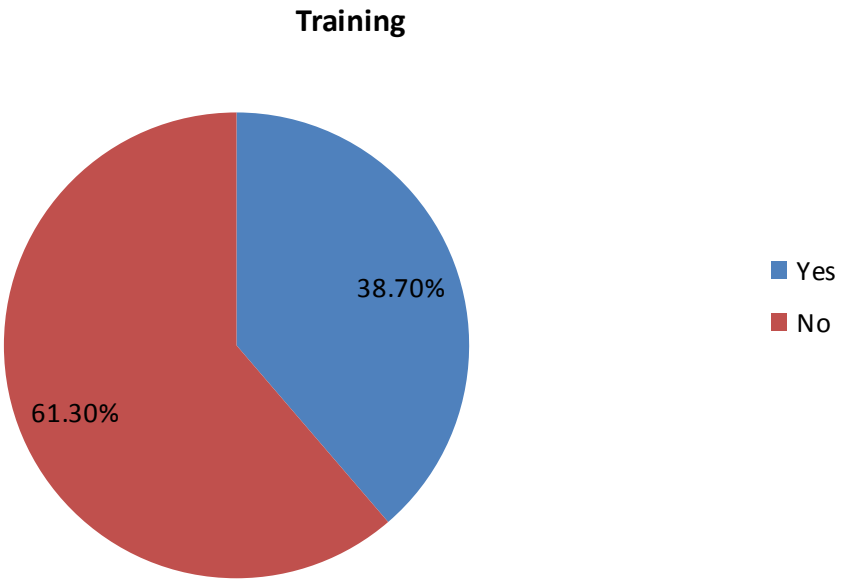

Figure 4.4 Need Training in the Use of e-Health Systems

Source: Field Data (2019)

4.6.4 Knowledge of Computer Usage

E-Health implementation and utilization requires knowledge of computer use. The study therefore sought to find out the knowledge of compute use among the respondents. The study findings showed that 20.2% of the respondents indicated they had novice knowledge, 7.3% had average knowledge while the majority, and 72.6% were experienced. From these findings we can infer that the majority of the respondents were experienced in computer use. The findings were as shown in table 4.10.

Table 4.10 Knowledge of Computer Usage

Computer	Frequency	Percentage	Total
Novice	25	20.2	20.2
Average	9	7.3	27.4
Experienced	90	72.6	100.0
Total	**124**	**100.0**	

Source: Field Data (2019)

4.6.5 Had direct experience or training in utilizing e-health systems

The study also sought to find out if the respondents had any direct experience or training in utilizing e-Heath systems as this would help the researcher to ascertain the level of exposure of the respondents to the use of e-health. The results showed that 35.5% of the respondents had direct experience or training in utilizing e-health systems while the remaining 64.5% did not have direct experience or training in utilizing e-health systems. From these findings it can be inferred that the majority of the personnel need to be trained in e-health system usage. It also means that there is a gap in the level of staff competence in the area of e-health systems. Table 4.10 above shows the findings.

4.7 Framework for e-Health Adoption and Integration On Maternal Health

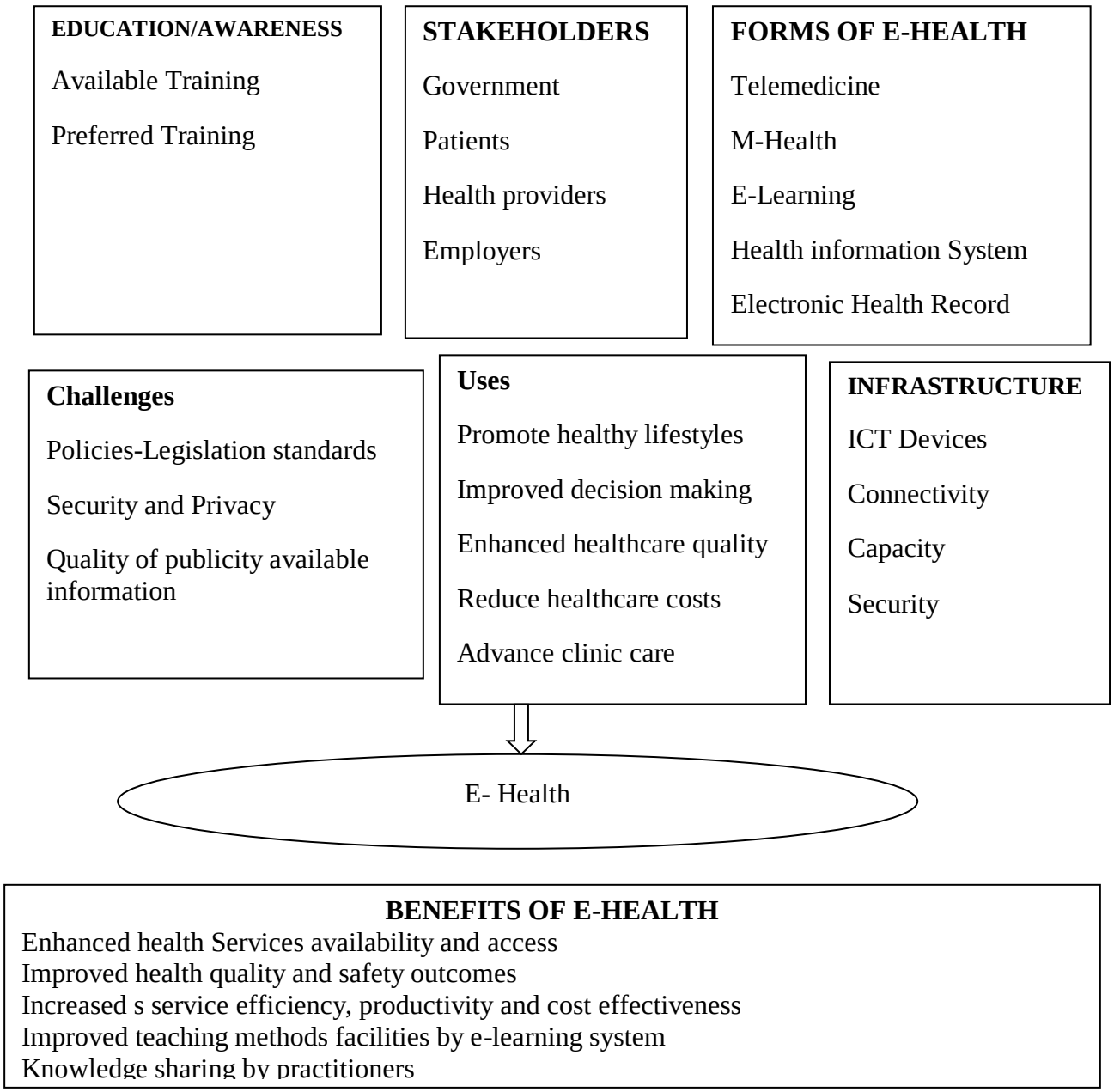

Figure 4.5: A framework for adoption and integration of E-Health.

From the findings shows that the framework constituted numerous additives consisting of sponsors of e-fitness, varieties of e-health, ICT infrastructure and potential, demanding situations of implementation of e-health, schooling and schooling and blessings of implementation of e-health discussed.

4.7.1 Stakeholders of e-health

The writing survey in part two in segment distinguishes different partners, for example, bosses, patients, health suppliers, government authority, back up plans, instructors and analysts as the significant partners that are significant for the usage of e-health in the health area (Kane, 2003).

The partners need to cooperate and uphold each other towards the fruitful execution of e-health. The examination discoveries in part four area shows that businesses, patients, health suppliers, government authority, guarantors and teachers as a portion of the partners that impacts the take-up of e-health (Sidorov, 2006).

4.7.2 Forms of e-health

The National e-health technique was created in 2011 and moored on the accomplishment of vision 2030, as talked about in part two writing audit segment of significance for thought in guaranteeing fruitful execution of e-health are the different types of e-health.

The discoveries of the exploration show that there is have to actualize e-health with different respondents demonstrating that they might want the diverse favored types of e-health executed. The examination in section four shows that knowing the types

of e-health is significant in usage since it will decide the foundation as of now set up (Kane, 2003).

4.7.3 ICT Infrastructure and Capacity

From the discoveries it was no authentic establishment research revelations partially four territories further shows that ICT structure limit is a test in execution of e-prosperity in the prosperity workplaces. This consequently certifies that ICT structure is an essential portion in executing e-prosperity in the overall prosperity associations (Kane, 2003).

4.7.4 Implementation of Telemedicine

Telemedicine provides the capacity to enhance admittance to clinical administrations while possibly bringing down the expenses related with the conveyance care.

The usage of telemedicine needs the investment of government, doctors, clinicians, health suppliers just as patients.

Successful implementation should be as follows;

i. Make and keep up a directing board made out of multi-disciplinary group of partners, for example, patients, doctors, clinicians, health suppliers, government and the executives staff to create mission and vision of the framework usage

ii. Recognize a telemedicine facilitator to execute, asses, oversee and give administrative oversight to telemedicine

iii. Test the telemedicine structure widely including the product and equipment

iv. Enroll and train staff who is keen on usage and use of telemedicine

v. The directing advisory group to control the usage and deal with the difficulties of execution

vi. Provide a feedback loop and communication plan for staff and patients.

4.7.5 Implementation of Electronic Health Record on maternal Health.

The electronic health framework implementation follows the following phases;

Planning- plan on which record to transform from paper to virtual, what facts to transform, who on team of workers will enter records, have workforce who will use the her become concerned in choices regarding the set-up of the systems files and map crucial exercise workflows.

Testing- do software and hardware trying out to put together the infrastructure, and installation a test environment to be used with destiny updates.

Schooling- allocates sufficient time for personnel schooling. Examine body of workers' readiness to head stay

Move-live- agenda the move-live in close proximity to the end of the schooling classes, lessen provider time table and provide adequate sources including in-house assignment managers, fantastic customers and supplier trainers

Submit cross- stay- behavior publish move-stay assessment by assessing the group of workers' degree of frustration, monitors productivity and determine whether or not the her is meeting set up goals. Compare the cross-live with personnel, issuer on-

going training and support through presenting education classes that will help make stronger and refresh personnel on them.

CHAPTER FIVE

DISCUSSSION OF FINDINGS, CONCLUSION AND RECOMMENDATIONS

5.1 Introduction

This study sought to determine the effect of e-health on maternal health and sought to establish a framework for adopting and integrating e-health in maternal health. The specific objectives of the study were to; review the existing e-health adoption framework in Uasin Gishu County Hospitals; identify the challenges of e-health adoption and integration on maternal health in Uasin Gishu County Hospitals and to develop framework for e-health adoption and integration on maternal health in Uasin Gishu County Hospitals. This chapter presents the discussion of findings, conclusions, recommendations and areas of further research.

5.2 Discussions of Findings

Based on the study findings, the study established that the majority of the respondents were nurses and that the majority of those interviewed were 36 years and above. The findings also revealed that the level of education was almost evenly distributed between those with college level of education and those with university level of education. However, those with college level education were slightly higher.

5.2.1 The existing e-health adoption framework

The findings revealed that the most commonly used form of e-health was Health Information System with slightly over a quarter of those interviewed picking this form of e-health as being currently used in their facility. Consumer Health Informatics as a form of e-health was also found to be commonly used. M-health was the least used form of e-health.

This was important as it will help this study determine the forms of e-health the practitioners viewed as significant towards improving maternal health care in their facilities. From the data collected, Health Information System was cited as the number one form of e-health that the respondents wanted to be implemented in their facilities. From the findings it was clear that the medical practitioners are putting a lot of weight behind Health information Systems.

This study also sought to find out the forms of e-health the interviewed medical practitioners thought should be implemented in their facilities if they were already not in place. This was important as it helped the study determine the forms of e-health the practitioners viewed as significant towards improving maternal health care in their facilities.

From the data collected, Health Information System was cited as the number one form of e-health that the respondents wanted to be implemented in their facilities. These findings revealed that was clear that the medicals practitioners are putting a lot of weight behind Health information Systems.

According to Bossert, Marchant, Calu & Shaham (2013), the current Maternal Mortality Ratio (MMR) stands at 448 deaths per every 100,000 lives per birth as compared to the Millennium Development Goals (MDG) target of 147 deaths per every 100,000 lives per birth. They further note that ideally, information technology in the health sector is expected to help reduce these rates and it needs a multifaceted approach that brings on board different stakeholders. It was therefore important for this study to find out the current stakeholders in maternal health care and late on see how these stakeholders can be involved in the development of e-health towards reducing Maternal Mortality Ratio. The study findings revealed that insurers,

patients and health providers are seen as the most important stakeholders in the health sector across the health facilities in Uasin Gishu County.

A longitudinal a descriptive survey in England and Wales recommends that partner hypothesis all in all and partner commitment in especially has the ability to coordinate both the IT venture the board and hierarchical change points of view of innovation drove change, and convey new bits of knowledge with respect to development and authoritative change manageability in medical care area. Additionally, as partner commitment doesn't generally prompt fruitful venture results (Buchanan et al., 2007). Given the suspicion that the achievement of e-Health improvement measure is firmly identified with incorporation of different partners, this examination tried to research the impact of various partners in e-health. The examination discoveries were discovered to be in accordance with research discoveries by Buchanan et al. (2007) who found that there is a developing exploration body that viable usage of progress in medical care area really requires a broad partner commitment to convey advancements in quiet mind and accomplish supportability of progress. They further note that, partners can assume a persuasive job both as advertisers, and as inhibitors of hierarchical change.

Information communication technology (ICT) and web services have majorly affect the nature of administrations and people groups' way of life. To accomplish public and worldwide health suitable utilization of ICT should be applied which can connect the computerized and health hole. The mechanical developments lead to new applications for spreading medical care data to assorted crowds utilizing imaginative interoperable plan. These applications are straightforward, simple to utilize, drawing in, and equipped for conveying pertinent data for essential medical

services to different clients (Khan, 2010). It is against this backdrop that this study sought to find out the ICT technologies in place used to support e-Health services in the facilities. From the results we see that the standard deviation of all the items is pretty small implying that the data was closely dispersed around the mean. From these data we can infer that the average ICT technologies across the facilities in Uasin Gishu County were almost evenly distributed owing to small standard deviation from the mean.

According to Flatley-Brennan (1998), the Internet has opened up a universe of potential outcomes in medication: when associated with the web, common clinical gadgets can gather priceless extra information, give additional knowledge into side effects and patterns, empower far off consideration, and for the most part give patients more power over their lives and treatment. The researcher, cognizant of this fact sought to find out the internet connection situation in the facilities. The findings showed that the majority of the facilities had internet connection.

The study findings revealed that the majority of the facilities either use LAN or wireless connections. E-Health is applied in the health sector to achieve an number of desired result. These results range from enhancing healthcare services availability and access to improving decision making in health sector. The study findings revealed that improved teaching methods is the most common application of e-Health achieved in the health sector. This was cited by almost a third of the total respondents interviewed. Enhancing better decision making was also ranked highly coming second to improved teaching method. Enhancing knowledge sharing amongst practitioners was the least cited application of e-Health achieved in the Health Sector.

5.2.2 Challenges of e-health adoption and integration on maternal health

Despite the potential benefits of e-health, implementation of these systems is often reported as problematic. Implementation of EHR and electronic prescribing systems has lagged in most European nations as well as in the USA (Ross *et al*, 2015). Costs associated with implementing e-health often spiral and time delays are reported. Barriers to implementation of innovations within the healthcare setting may arise at the individual, organizational and wider levels of the healthcare systems, and interact in complex and variable ways (Lau, 2014). These components may likewise be development explicit and setting explicit. Studies have portrayed monetary, legitimate, social and moral boundaries to execution, emerging at the authoritative and individual level, including clients' absence of attention to the advantages, low e-health education, a lack of proof of cost-viability and interoperability. The capacity of various data innovation frameworks and programming applications to convey, trade information and utilize the data that has been traded) just as security concerns (Stroetmann et al, 2012). Perceiving and getting obstructions and facilitators is pivotal for contriving techniques and intercessions to improve the broad successful utilization of e-health, and tending to blockages to execution. This this study sought to investigate the challenges faced by the different facilities in Uasin Gishu County. The study results revealed that the biggest challenge of implementing e-Health is technical organizational issues. Security and privacy issues were also found to be another major challenge facing the implementation of e-Health.

5.2.3 Framework for e-health adoption and integration on maternal health

Training in the use of e-Health systems is important in ensuring the utilization of e-Health. This study sought to find out if the respondents required any training. The respondents were required to indicate with a Yes or No answer. The study results

revealed that the majority of the respondents were adequately trained in the use of e-Health systems. E-Health implementation and utilization requires knowledge of computer use. The study therefore sought to find out the knowledge of compute use among the respondents. The study findings showed that the majority of the respondents were experienced in computer use.

5.3 Conclusions

Based on the study findings the study concludes that Consumer Health Informatics as a form of e-health is commonly used and that M-health was the least used form of e-health among sub-county hospitals in Uasin Gishu County towards maternal healthcare. On forms of e-health should be implemented in the facilities, the study concludes that Health information Systems is well entrenched in maternal healthcare provision among sub-county hospitals in the county. Additionally, the study concludes that insurers, patients and health providers are the most important stakeholders in the health sector across the health facilities in Uasin Gishu County. The also concludes that practical implementation of change in healthcare sector actually requires an extensive stakeholder engagement to deliver innovations in patient care and achieve sustainability of change and therefore stakeholders can play an influential role both as promoters, and as inhibitors of organizational change. The study also concludes that the average ICT technologies across the facilities in Uasin Gishu County are almost evenly distributed owing to small standard deviation from the mean. Facilities were also found to be well connected to the Internet as the majority had internet connection. On application of e-Health achieved in the health sector, the study concludes that improved teaching methods are the most common application of e-Health achieved. This was cited by almost a third of the total respondents interviewed. Additionally, enhancing better decision making was also

ranked highly coming second to improved teaching method hence the study concludes that enhancing knowledge sharing amongst practitioners seems to be a benefit that is not being realized by the sub county hospitals in their utilization of e-health. The biggest challenge in implementation of e-health in maternal care among the sub county facilities in the county was found to be technical organizational issues. Additionally, security and privacy issues were also found to be another major challenge facing the implementation of e-Health. Finally the study concludes that the majority of health providers were adequately trained in the use of e-Health systems and that the majority of the respondents were well experienced in computer use.

5.4 Recommendations

Based on the study findings and conclusions the study therefore makes the following recommendations:

There is need to bring on board all the stakeholders in health sector towards implementation of e-health in maternal health. Stakeholders like the government were not found to be well involved in the process. It is therefore important that strategies that will ensure all stakeholders are brought on bought are put in place. Practical implementation of change in healthcare sector actually requires an extensive stakeholder engagement to deliver innovations in patient care and achieve sustainability of change.

The study also recommends that measures to improve the application of e-health needs to be put in place. Application like enhancing healthcare services availability and access; improving health quality, safety and outcomes and increasing service efficiency, productivity and cost effectiveness were found to be least achieved. In

order to rip the maximum benefits that e-health offers, there is need to put measures in place that will ensure these benefits are achieved.

In keeping with the proposed framework, the research recommends that e-fitness implementation have to keep in mind having the subsequent additives for successful implementation;

i. Infrastructure component
ii. A given form of e-health
iii. E-health Stakeholders
iv. Challenges encountered in e-health implementation
v. E-health infrastructure
vi. Uses/application
vii. Education and training e-health users

The researcher made use of experts' opinion to validate the framework blanketed a complete of four specialists (administrators, medical doctors and health companies). This demonstrates that all the interviewed professionals agree that e-fitness implementation is vital and useful in the public fitness quarter. To a bigger extent, the professionals agree that the framework proposed analyses the important thing challenges of e-health implementation. Half of the experts reveal that the evolved framework excellently provides solution to the important thing challenges and the other half says it is ideal sufficient. All of them too big volume is inclined to put in force the hints in the proposed framework and would suggest the framework to other groups.

5.5 Areas of further Research

This study focused on the effect of e-health on maternal health and sought to establish a framework for adopting and integrating e-health in maternal health. The study made the following recommendations for further research.

i. The research recommends that further studies should be conducted on implementation of e-health to include personal fitness facilities.

ii. The study additionally propose that a similarly examine to consciousness on critical attention of e-health implementation thinking of e-fitness security troubles pertaining the handling of affected person data. For the reason that statistics of patients is touchy and the sharing and storing of the statistics in digital format is exposed to outside threats, the issues of safety and confidentiality should be taken into consideration by using figuring out how first-class the e-health technologies may be protected and secured.

iii. Its miles in the end advocated that a similarly have a look at be performed on e-health implementation framework inside the real operational environment.

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APPENDICES

APPENDIX I : CONSENT FORM

I am Silas Kosgei am a student at Rongo University pursuing Masters' Science in Health informatics Rongo University. As the part of requirement for the completion of my studies am supposed to conduct a study titled **"A FRAMEWORK FOR ADOPTION AND INTERGRATION OF E-HEALTH IN MATERNAL HEALTHCARE: A CASE OF SUB COUNTY HOSPITALS IN UASIN GISHU COUNTY"** .For the above stated reason, I kindly request you to allow me to collect the data from your hospital. The researcher assures you confidentiality of respondents. Any information gathered will be treated with at most confidentiality.

I have read and understood the content of the consent form.

Dr. Edward Anino Signature……  **Date……**

(Dean, School of Graduate Studies)

Silas Kosgei Signature…… Date……

(Researcher)

Respondent: **Signature…… Date……**

In case of any complains, you are always free to consult the chairman ethical review committee

Rongo University, P.O. Box 103-40404 Rongo

APPENDIX II: e-HEALTH IMPLEMENTATION IN PUBLIC HOSPITALS QUESTIONNAIRE

PART A: DEMOGRAPHIC INFORMATION

1. Please indicate your role in the hospital

   Director [ ]

   MOH [ ]

   HRIO [ ]

   Nurse [ ]

2. Age:

   18 –23 years [ ] 24-29 years [ ] 30-35 years [ ]

   36 & Above years [ ]

3. Gender

   Male years [ ] Female [ ]

4. Level of education

   College [ ]

   University [ ]

PART B: E-HEALTH IMPLEMETATION

5. Please indicate the current forms of e-health used in your hospital

   Electronic Health Record (EHR) [ ]

   Telemedicine [ ]

   M-health [ ]

   Health Information System [ ]

   Health Knowledge management [ ]

   Consumer health informatics [ ]

   Other: _____

6. What are the forms of e-health you would like to be implemented in your hospital

Electronic Health Record (EHR)	[ ]
Telemedicine	[ ]
M-health	[ ]
Health Information System	[ ]
Health Knowledge management	[ ]
Consumer health informatics	[ ]
Other:	_____

PART C: INTEGRATION OF e-HEALTH

7. Who are the key current stakeholders in health sector?

Government	[ ]
Patients	[ ]
Insurers	[ ]
Health Providers	[ ]
Employers	[ ]
Educators	[ ]
Other:	[ ]

8. Please rate the stakeholders in order of their influence in e-health implementation 1= high influence; 5=Low influence

	1	**2**	**3**	**4**	**5**
Government					
Patients					
Insurers					
Health Providers					
Employers					
Educators					

9. Please indicate the ICT technologies in place within the hospital used to support e-health services

	0-5	**6-15**	**16-25**	**26-35**	**36-45**	**Above 45**
Desktop						
Laptop						
PDAs						
Mobile Phone						
Printers						
Tablet						

10. Does your health institution have internet connection?

Yes [ ] No [ ]

11. Please indicate the connectivity used in you hospital (Tick all that apply)

Local Area Network (LAN) [ ]

Wide Area Network (WAN) [ ]

MODEM [ ]

WIRELESS [ ]

Other: [ ]

PART D: APPLICATION OF e-HEALTH

12. Please indicate the application of E-health achieved in the health sector

To enhance healthcare services availability and access	
To improve health quality, safety and outcomes	
To increase service efficiency, productivity and cost effectiveness	
To enhance knowledge sharing amongst practitioners	
To better decision making	
To improved teaching methods	

13. Please indicate the challenges in implementation of e-health in your hospital

E-health standards [ ]

ICT capacity [ ]

E-legislation [ ]

E-health Infrastructure [ ]

Security and privacy issues [ ]

Technical organizational [ ]

14. Do you think you need training in the use of e-health systems

Yes [ ] No [ ]

15. How will you rate your knowledge of computer usage?

Novice	[ ]
Average	[ ]
Experienced	[ ]
Other:	[ ]

16. Have you ever had any direct experience or training in utilizing e-health systems

Yes [ ] No [ ]

APPENDIX III: IMPLEMENTATION OF e-HEALTH IN PUBLIC HOSPITALS INTERVIEW GUIDE

SECTION A: BACKGROUND INFORMATION

1. Please indicate the name of your hospital

   _____

   __

2. Please indicate your Name (Optional)

   _____

   __

3. Please indicate your role in the hospital

   _____

   __

4. Please indicate the current forms of e-health in use in your hospital

   _____

   __

5. What preferred forms of e-health would you like to be implemented in your hospital?

   _____

   __

PART B: BENEFITS, CHALLENGES AND REQUIREMENTS FOR IMPLEMENTATION OF E-HEALTH

6. Please indicate the key current stakeholders in health sector

_____

__

7. Please rate the stakeholders in order of their influence in e-health implementation

_____

__

8. Please indicate the ICT technologies in place within the hospital used to support e-health services

_____

__

9. Does your health institution have internet connection?

_____

__

10. Please indicate the connectivity used in you hospital

_____

__

11. Do you think you need training in the use of e-health systems

_____

_____

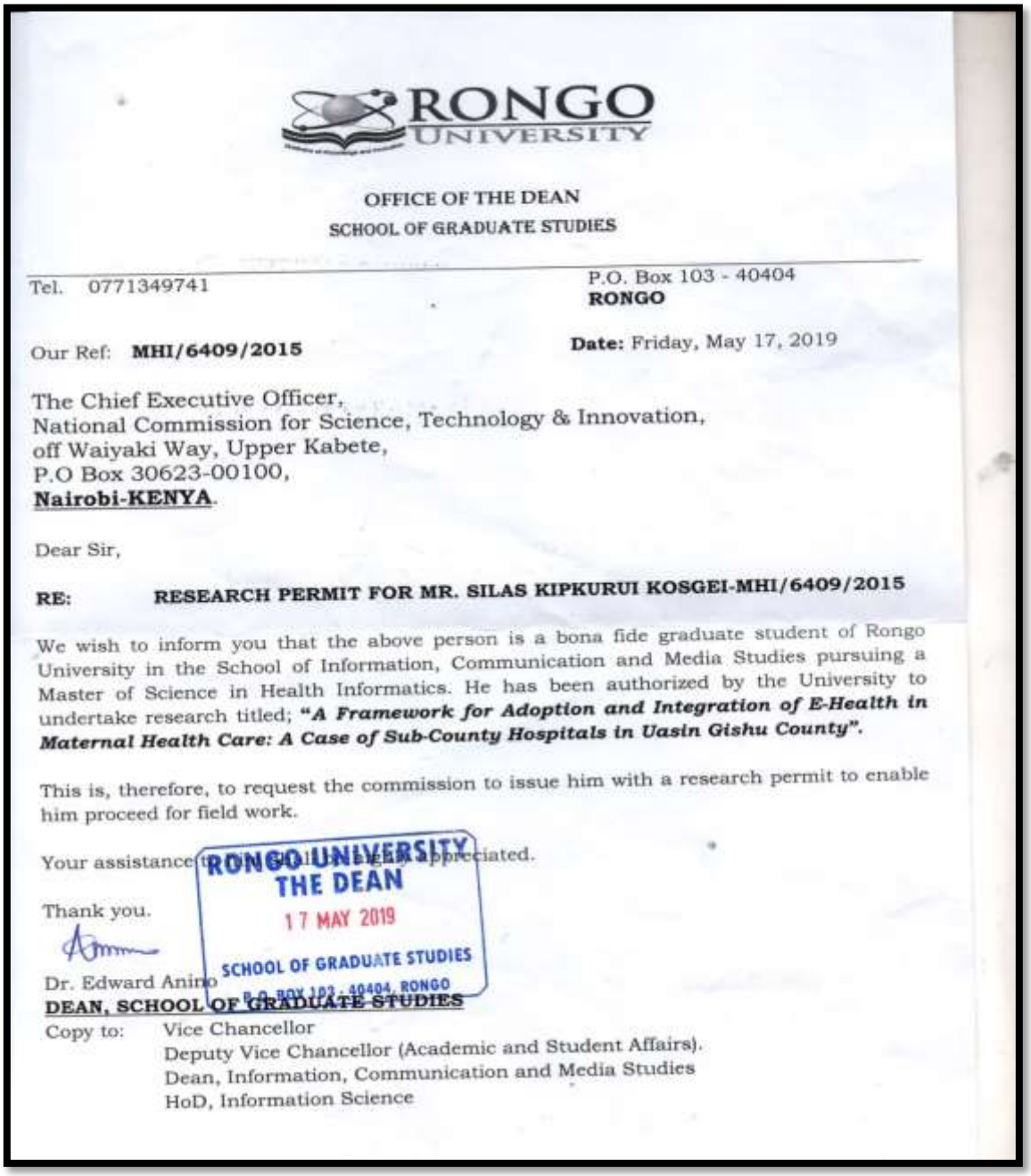
12. How will you rate your knowledge of computer usage?

_____

_____

13. Have you ever had any direct experience or training in utilizing e-health systems

APPENDIX IV: INTRODUCTORY LETTER



RONGO UNIVERSITY

OFFICE OF THE DEAN
SCHOOL OF GRADUATE STUDIES

Tel. 0771349741

P.O. Box 103 - 40404
RONGO

Our Ref: **MHI/6409/2015**

Date: Friday, May 17, 2019

The Chief Executive Officer,
National Commission for Science, Technology & Innovation,
off Waiyaki Way, Upper Kabete,
P.O Box 30623-00100,
Nairobi-KENYA.

Dear Sir,

RE: RESEARCH PERMIT FOR MR. SILAS KIPKURUI KOSGEI-MHI/6409/2015

We wish to inform you that the above person is a bona fide graduate student of Rongo University in the School of Information, Communication and Media Studies pursuing a Master of Science in Health Informatics. He has been authorized by the University to undertake research titled; ***"A Framework for Adoption and Integration of E-Health in Maternal Health Care: A Case of Sub-County Hospitals in Uasin Gishu County".***

This is, therefore, to request the commission to issue him with a research permit to enable him proceed for field work.

Your assistance in this matter will be appreciated.

RONGO UNIVERSITY
THE DEAN
17 MAY 2019
SCHOOL OF GRADUATE STUDIES
P.O. BOX 103 - 40404, RONGO

Thank you.

Dr. Edward Anino
DEAN, SCHOOL OF GRADUATE STUDIES

Copy to: Vice Chancellor
Deputy Vice Chancellor (Academic and Student Affairs).
Dean, Information, Communication and Media Studies
HoD, Information Science

APPENDIX V: RESEARCH AUTHORIZATION

REPUBLIC OF KENYA

THE PRESIDENCY

MINISTRY OF INTERIOR AND COORDINATION OF NATIONAL GOVERNMENT.

Telegrams: "DISTRICTER" Eldoret
Telephone: Eldoret 31421/2
Email-dccturbo2016@gmail.com
When replying please quote

DEPUTY COUNTY COMMISSIONER'S OFFICE
TURBO SUB-COUNTY
UASIN GISHU COUNTY
P.O. BOX 30-30100
ELDORET

Ref. No. ADM.15/4/VOL.VI/30

18th September, 2019

TO WHOM IT MAY CONCERN

RE: RESEARCH AUTHORIZATION:
MR. SILAS KOSGEI ID. NO.13365230

This is to confirm that the above named is a student at Rongo University. He has been authorized to carry out research in Uasin Gishu County on "***A framework for Adoption and Intergration of E-Health Maternal Healthcare: A case of Sub County Health Hospitals in Uasin Gishu County***" for the period ending **9th September, 2020.**

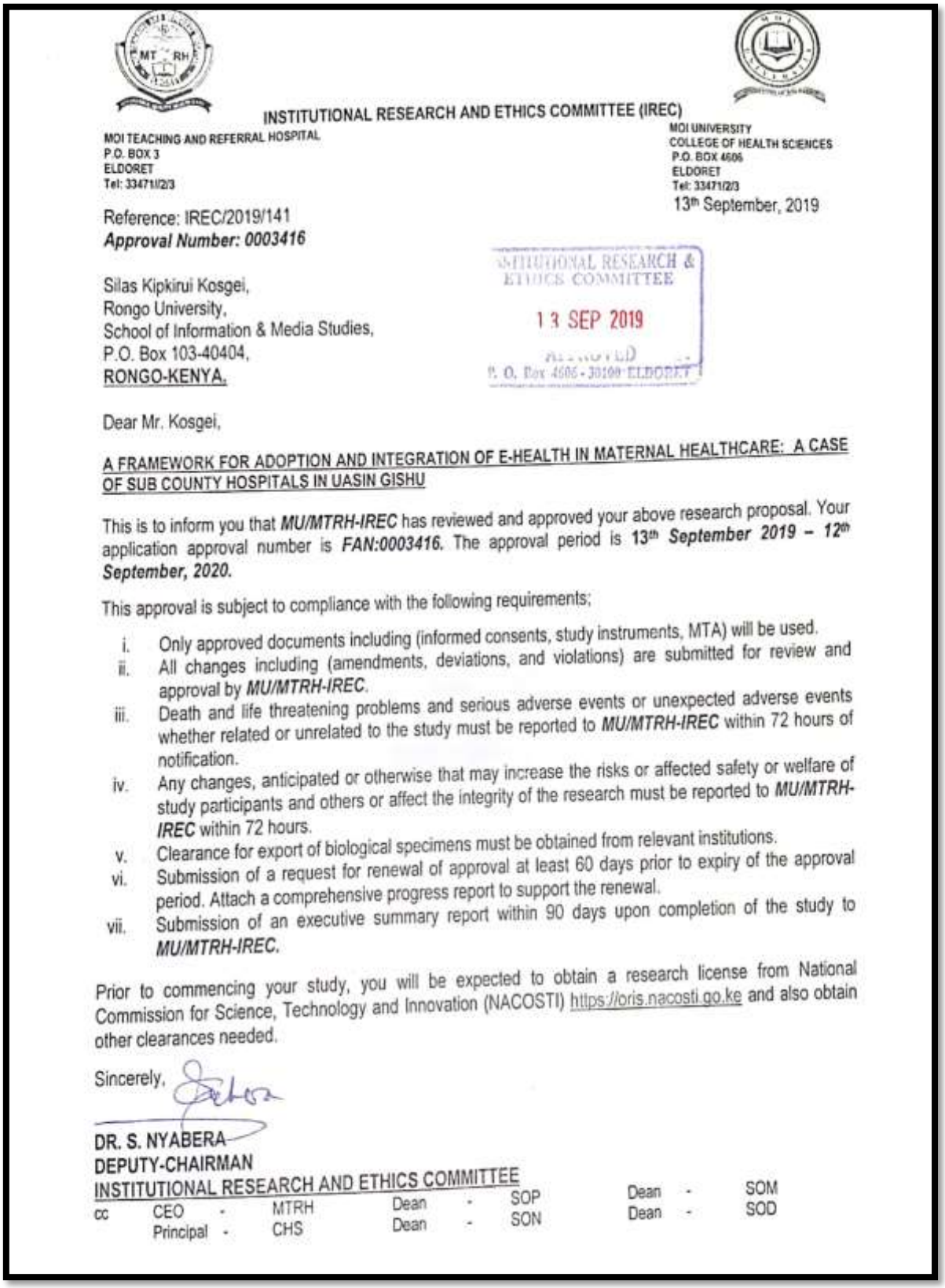
Kindly give him the necessary assistance.

DEPUTY COUNTY COMMISSIONER
TURBO SUB - COUNTY

Mohamed R. Mwabudzo
For: Deputy County Commissioner
SOY SUB COUNTY

C.C
County Commissioner
UasinGishuCounty.

APPENDIX VI: IREC APPROVAL PERMIT



INSTITUTIONAL RESEARCH AND ETHICS COMMITTEE (IREC)

MOI TEACHING AND REFERRAL HOSPITAL
P.O. BOX 3
ELDORET
Tel: 33471/2/3

MOI UNIVERSITY
COLLEGE OF HEALTH SCIENCES
P.O. BOX 4606
ELDORET
Tel: 33471/2/3

13th September, 2019

Reference: IREC/2019/141
Approval Number: 0003416

INSTITUTIONAL RESEARCH & ETHICS COMMITTEE
13 SEP 2019
APPROVED
P. O. Box 4606 - 30100 ELDORET

Silas Kipkirui Kosgei,
Rongo University,
School of Information & Media Studies,
P.O. Box 103-40404,
RONGO-KENYA.

Dear Mr. Kosgei,

A FRAMEWORK FOR ADOPTION AND INTEGRATION OF E-HEALTH IN MATERNAL HEALTHCARE: A CASE OF SUB COUNTY HOSPITALS IN UASIN GISHU

This is to inform you that ***MU/MTRH-IREC*** has reviewed and approved your above research proposal. Your application approval number is ***FAN:0003416.*** The approval period is **13th *September 2019 – 12th September, 2020.***

This approval is subject to compliance with the following requirements;

i. Only approved documents including (informed consents, study instruments, MTA) will be used.
ii. All changes including (amendments, deviations, and violations) are submitted for review and approval by ***MU/MTRH-IREC***.
iii. Death and life threatening problems and serious adverse events or unexpected adverse events whether related or unrelated to the study must be reported to ***MU/MTRH-IREC*** within 72 hours of notification.
iv. Any changes, anticipated or otherwise that may increase the risks or affected safety or welfare of study participants and others or affect the integrity of the research must be reported to ***MU/MTRH-IREC*** within 72 hours.
v. Clearance for export of biological specimens must be obtained from relevant institutions.
vi. Submission of a request for renewal of approval at least 60 days prior to expiry of the approval period. Attach a comprehensive progress report to support the renewal.
vii. Submission of an executive summary report within 90 days upon completion of the study to ***MU/MTRH-IREC.***

Prior to commencing your study, you will be expected to obtain a research license from National Commission for Science, Technology and Innovation (NACOSTI) https://oris.nacosti.go.ke and also obtain other clearances needed.

Sincerely,

DR. S. NYABERA
DEPUTY-CHAIRMAN
INSTITUTIONAL RESEARCH AND ETHICS COMMITTEE

cc CEO - MTRH
Principal - CHS
Dean - SOP
Dean - SON
Dean - SOM
Dean - SOD

APPENDIX VII: NACOSTI PERMIT

REPUBLIC OF KENYA

NATIONAL COMMISSION FOR SCIENCE,TECHNOLOGY & INNOVATION

Ref No: **810492**

Date of Issue: **09/September/2019**

RESEARCH LICENSE

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