

**FACTORS INFLUENCING ADOPTION OF ELECTRONIC
HEALTH RECORD SYSTEMS IN SMALL PRIVATE
HEALTH FACILITIES.A CASE OF RUIRU DISTRICT,
KIAMBU COUNTY, KENYA**

BY

CHRISTINE NJOROGE

**A Research Project Report Submitted in Partial Fulfilment for the Requirements for
the award of the Degree of Master of Arts in Project Planning and Management of
The University of Nairobi**

2014

DECLARATION

This research project report is my original work and has not been presented for any award degree in any other university.

Signed Date

CHRISTINE WAITHIRA NJOROGE

Reg No.: L50/61658/2013

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

Signed.....Date.....

Dr Charles Rambo

Chairman ,DEMS

School of Continuing and Distance Education

University of Nairobi

DEDICATION

To my loving parents Mr. Peter Njoroge Gachuhi and Mrs. Shelmith Wanja Njoroge for their encouragement and support throughout my education journey.

To my lovely daughter Shantalle Wanjiku Njoroge for the inspiration to further my education.

To my grandmother the late Mary Waithira Gichuki, it is your words that made me work hard to achieve what you couldn't.

ACKNOWLEDGEMENT

I would like to thank my supervisor Dr Charles Rambo who is also the chairman of the Department of Extra-Mural studies for his patience, his incredible reading speed, the immeasurable amount of help he has continued to give me and his willingness to share his wisdom.

I extend thanks to the lecturers: Professor Christopher Gakuu, Professor Harriet Kidombo, Dr. John Mbugua, Professor P. Garnesh, and Dr. Steve Mogere among others and the entire staff for the invaluable assistance accorded to me during my studies.

Most importantly, I would like to credit my education attainment to the support and encouragement offered by my brilliant family especially my siblings. I would also like to thank my friends Paul Allela, Alex Kamau, Mercy Muriithi and Rachel Ambasa for the continued support they accorded me during the master's program.

TABLE OF CONTENT

DECLARATION	ii
DEDICATION	iii
ACKNOWLEDGEMENT	iv
TABLE OF CONTENT	v
LIST OF TABLES	viii
LIST OF FIGURES	ix
ABBREVIATIONS AND ACRONYMS	x
ABSTRACT	xi

CHAPTER ONE:INTRODUCTION	1
1.1 Background of the study.....	1
1.2 Statement of the Problem.....	6
1.3 Purpose of the Study.....	7
1.4 Objectives of the study.....	7
1.5 Research Questions.....	7
1.6 Significance of the Study.....	8
1.7 Delimitation of the study.....	8
1.8 Limitations of the Study.....	9
1.9 Assumptions of the Study.....	9
1.10 Definitions of Significant Terms used in the study.....	10
1.11 Organization of the Study.....	11

CHAPTER TWO:LITERATURE REVIEW	12
2.1 Introduction.....	12
2.2 The concept of EHR's in the provision of health services.....	12
2.3 Financial implications and adoption of Electronic Health Record Systems.....	14
2.3.1 Initial adoption costs.....	14
2.3.2 Ongoing costs.....	15
2.3.3 Induced costs.....	15
2.4 Level of ICT knowledge and adoption of Electronic Health Record Systems.....	16
2.4.1 Knowledge on computer skills.....	16
2.4.2 Complexity and limitations of the system.....	17

2.4.3 Customizability of the system.....	17
2.5 Access to ICT infrastructure and adoption of Electronic Health Record Systems	18
2.5.1 Local access to ICT equipments and facilities.....	18
2.5.2 Access to ICT professional technical training and support	18
2.6 Perception of practising health care practitioners' and adoption of Electronic Health Record Systems.....	19
2.6.1 Time to install and learn the system	19
2.6.2 System stability.....	20
2.6.3 Reliability of the systems.....	20
2.6.4 Organizational culture.....	21
2.6.5 Lack of leadership.....	22
2.7 Change Process and adoption of Electronic Health Record Systems	22
2.8 Organizational structure and adoption Electronic Health Record Systems.	22
2.9 Theoretical framework.....	23
2.10 Conceptual Framework	25
2.11 Knowledge gaps.....	27
CHAPTER THREE:RESEARCH METHODOLOGY	29
3.1 Introduction.....	29
3.2 Research Design.....	29
3.3 Target Population.....	29
3.4 Sample size and Sampling Procedure	30
3.4.1 Sample size	30
3.4.2 Sampling procedure	30
3.5 Research Instruments	31
3.5.1 Piloting of the Research Instrument.....	32
3.5.2 Validity of the Questionnaire.....	32
3.5.3 Reliability of the Questionnaire.....	33
3.6 Data Collection Procedure	34
3.7 Data Analysis Technique	34
3.8 Ethical Considerations	35
3.9 Operationalization of variables	35

CHAPTER FOUR:DATA ANALYSIS, PRESENTATION,INTERPRETATION AND DISCUSSION	38
4.1 Introduction	38
4.2 Questionnaire response rate	38
4.3 Demographic Characteristics of the Respondents	39
4.3.1 Distribution of respodents by gender	39
4.3.2 Distribution of respodents by Age	39
4.3.3 Distribution of respodents by level of education	40
4.3.4 Distribution of respodents by organization size.....	40
4.3.5 Distribution of respodents by years of experience.....	41
4.3.6 Distribution of respodents by current type of practise.....	42
4.4 Distribution of respodents by current system	42
4.5 Financial implication and adoption of EHR systems.....	43
4.6 Level of ICT knowledge	45
4.7 Access to ICT infrastructure.	47
4.8 Perception of Health care practitioners.....	49
4.7 Ranking of Factors influencing adoption of EHR systems.....	50
CHAPTER FIVE:SUMMARY OF FINDINGS, CONCLUSIONS AND RECCOMMENDATIONS	52
5.1 Introduction	52
5.2 Summary of findings.....	52
5.3 Conclusions.....	53
5.3.1 Demograhic factors.....	53
5.3.2 Financial implications.....	54
5.3.3 Level of ICT knowledge	53
5.3.4 Access to ICT infrastructure	54
5.3.3 Perception of Health care practitioners.....	55
5.4 Recommendations.....	56
5.5 Suggestions for further study	56
REFERENCES	57
APPENDICES	
I: Letter of transmittal of data collection instrument.....	61
II: Questionnaire.....	62
III: Krejiec and Morgan table.....	67

LIST OF TABLES

Table 2.1: Knowledge gaps.....	27
Table 3.1: Target Population.....	30
Table 3.2: Sampling Frame.....	31
Table 3.3: Operationalization of variables.....	36
Table 4.1: Questionnaire response rate.....	38
Table 4.2: Distribution of respondents by gender.....	39
Table 4.3: Distribution of respondents by age.....	40
Table 4.4 Distribution of respondents by level of education.....	40
Table 4.5: Distribution of respondents by organization size.....	41
Table 4.6: Distribution of respondents by years of experience.....	41
Table 4.7 Distribution of respondents by current type of practise.....	42
Table 4.8: Distribution of respondents by current systems.....	42
Table 4.9: Distribution of respondents by plans to upgrade.....	43
Table 4.10: Distribution of respondents according to budget plans.....	44
Table 4.11: Responses of respondents concerning financial implications.....	44
Table 4.12: Responses on cost recovery after EHR implimentation.....	45
Table 4.13: Respondents confidence in use of computer applications.....	46
Table 4.14: Respondents ease of use of systems.....	46
Table 4.15: Respondents access to ICT infrastructure.....	47
Table 4.16: Respondents access to training and support from vendors.....	48
Table 4.17: Perception of healthcare providers concerning adoption.....	49
Table 4.18: Ranking of factors influencing adoption.....	50
Table 5.1: Summary of findings.....	52

LIST OF FIGURES

Figure 1 :Technology Acceptance Model	24
Figure 2 :Conceptual framework model	26

ABBREVIATIONS AND ACRONYMS

AIDS	Acquired Immune Deficiency Syndrome
EHR	Electronic Health records
HIS	Health Information System
HITECH	Health Information Technology for Economic and Clinical Health.
HIV	Human Immunodeficiency Virus.
ICT	Information Communication Technology
KHPFP	Kenya Health Policy Framework Paper
NACP	National AIDS control programme
NHI	National Health Insurance Fund
NHSSP	National Health Sector Strategic Plan
PEOU	Perceived Ease of Use
PIH	Partners in Health
PU	Perceive Usefulness
ROI	Return on Investment
TAM	Technology Acceptance Model
TB	Tuberculosis.
SPSS	Statistical Package for Social Scientists
SWAp	Sector Wide Approach
WHO	World Health Organization

ABSTRACT

This research sought to explore factors influence of the adoption of Electronic Health Record systems in the provision of health services in Kenya by focusing on small private health care facilities in Ruiru district, Kiambu County. Electronic health records assist in collecting and storage of patients' data which can be retrieved in summary form to give a brief overview of the patients' medical history. This study was guided by four research objectives: financial implication, level of ICT knowledge, access to ICT infrastructure and the perception of the health care practitioners. Other variables examined were; years of experience, gender, the duration of computer and Internet use, and the frequency of ICT use among health care practitioners. The study was hinged on the Technology Acceptance Model as the key theoretical model. The web of interrelationships between the study variables was demonstrated by a conceptual framework. The study adopted a descriptive survey design with a target population of 76 health care practitioners in charge of the registered small private health facilities and a sample size of 63 obtained from the Krejcie and Morgan table. A six level questionnaire with both structured and unstructured questions with a 5-point likert scale was used. Pilot testing of the instrument was done using a group of respondents with similar characteristics as the sample population prior to the main research study to verify its validity and reliability. Both quantitative and qualitative data was sought in this research. Quantitative data was coded and analyzed using SPSS version 20. Qualitative data was analyzed by making inferences from the expressions and opinions of the respondents around the variables. The findings were presented in frequency tables and explanation presented in prose. 90% of the small health facilities don't have an ICT budget in their conception of operation. 92 % of the population is concerned about the high costs of investment while 72 % of the population is either sure or not sure that their costs from EHR implementation will be recovered. 57% of were of the age group that is technology receptive, and 94% had basic computer skills, but 72 % still felt that the EHR systems were still very complex to use. 74% of the population does not use computers in their practice. 81% had concerns about accessibility to training and support while 30% of the non adopters who had implemented the systems then stopped using them complained about their training and post-sale experience with their vendors. 89.4% of the population could use computers as a tool to aid their operation while 88.63% felt that the use of computers was reliable. 67% don't have sufficient time required to learn the system proficiently. 75% reported concerns about data entry workload: Only 2% reported to have fully implemented EHR systems, 24% are using both paper and electronic systems while 74% are not using any EHR systems. This results show a very low adoption status of the EHR systems. From the findings it can be concluded that Lack of capital resources was analyzed to have the most influence in the adoption while security and privacy concern had the least influence. The main recommendations were for Medical training schools to adapt using of EHRs in training their students, vendors to ensure their software are quality and offer after sale services and for the Government of Kenya to come up with standardization policies for the developers to follow. Further studies can be carried out on comparison between the attitudes of adopters vs. Non-adopters and also to establish if location of health facility has influence on adoption i.e. urban or rural setting.

CHAPTER ONE

INTRODUCTION

1.1 Background to the Study

In the 21st century, information is a crucial element in the decision making process. There is a very large power in the use of technology to produce and communicate useful and reliable information that will help to improve the delivery of health services. Quality service delivery is one of the key ingredients to the success of any organization that strives to ensure that their customers get a plus one service at any customer touch point. The International Organization for Standardization defines Quality“ as a relative concept and considers that if the inherent characteristic of a service meets the requirements of the customer, then it can be rated as that of high quality (Reinartz, 2004). Proper, quality and efficient health care is a very valuable and necessary benefit for the development of a country and it should cut across all race, age, and social status. Access to health care varies across countries, groups, and individuals, is largely influenced by social and economic conditions as well as the health policies and plans in relation to the personal and population-based health care goals within their societies.

In some countries and jurisdictions, health care planning is distributed among market participants, whereas in others, planning occurs more centrally among governments or other coordinating bodies. With the current technological advancements and the commitment by the governments to support technology growth, most of the functions should be digital in order to have efficiency and proper work plans. The real-time electronic systems will help in remote data collection and monitoring, communication of any disease end epidemic outbreak tracking, provide education and awareness and provide diagnostic and treatment support. Quality Customer service delivery channels in the healthcare industry have a huge economic impact in the long terms goal. It comprise of newer and effective technology that helps in saving time and provision of functional, efficient , effective and quality health services (Tam, 2005).

In the United states, a study on Electronic health records (EHRs) adaptation and usage cited that despite the presence of the EHR systems, doctors, and other caregivers have been slow to adopt them (Porter 2013). An audit in 2005 on the level of usage revealed that only a few US hospitals have a comprehensive EHR system and others had parts of it.74% of U.S. health care practitioners EHR adopters in 2011 said that using these systems promoted overall patient care, and 85% reported being satisfied with their systems (Jamoom, Beatty, Bercovitz, Woodwell, Palso, & Rechtsteiner, 2012). The HITECh Act in 2009 offers economic incentives for the health providers to use information technology in a useful way and this has accelerated pace for EHR adoption and usage. As of 2012, 69% of U.S. primary care health care practitioners were using EHRs, compared with 46% in 2009 – a 23% increase (Terry, 2012). However, only a few major organizations in the private sector have worked on the Implementation of EHR systems with fewer than half of those doctors having EHRs with capabilities of performing multiple functions that can help in electronic prescribing and decision support. Clearly barriers still remain to universal adoption and full use of electronic health records.

The United Kingdom publicly funded healthcare system was established in 2002 and it is said to have the biggest EHR market in Europe (Flinders, 2014).In 2005 their National Health Service unit invested (\$18 billion) in health information technology with an expectation that the system would increase efficiency and reduce medical errors by securely sharing the detailed but summarized health records of each person. Their national target is to have all doctors throughout the country adopt the EHR systems by 2014and go completely paperless by 2018.The systems have had colossal failure despite the intensive concentration on the EHR systems such that their government is slowing down on its implementation and assessing the barrier that it hadn't put into consideration before (Soumerai, 2010).

In Canada, EHRs' implementation is a pan-Canadian initiative with collaboration from federal government, provincial and territorial government, Canadian Health Infoway Inc and other organizations in the health care industry. From 2001, Canada through infoway, has sought technological solutions in order to expand their high quality health services across. The system so far has helped to reduce waiting time, increase improved access to

care in remote and rural communities, and better chronic disease management and prescribing practices e.t.c .The final system is therefore aimed at providing a sustainable, accessible, productive, quality and cost –effective database of health records. Many large clinics and hospitals have already implemented the use of electronic health records however in clinics where health care practitioners are 1-3, and the cost of implementation has slowed down the adaptation rate. (Canada health infoway, 2010)

Australia’s government invested AU\$1 billion in the electronic health program with an aim of improving patient care, by enabling health care practitioners to access and share information through the medical system. In the late 1990s’, General practices were encouraged to install clinical software packages to enable them transmit clinical data electronically. The system would provide; summaries of patients’ health information, have secure access for patients and health care practitioners and also help the health care practitioners have more precise and real-time information to help in decision and policy making. The National E-Health Transition Authority was in charge of developing the Shared Electronic Health Record to be used countrywide for ease over retrieval of data faster. An audit into the adoption of the EHR system however cited that there was a relatively slow start and low adoption rate in comparison to what the government was expecting. Only a few of the healthcare providers put up the “shared health summary” beating the purpose of having a national, electronic system (Taylor 2013).

In South Africa, adaptation takes a different pattern. An overview between 1994-2010 of the status of health care provided reflected that health outcomes have grown poorer due to the weak health systems management. There is therefore need to redress the healthcare imbalances (Harrison, 2009). Against this result, there is a tension that surrounds the decision to introduce a compulsory National Health Insurance Fund (NHI) for all South Africans. The pending national election in 2014 also brings increased political pressure to focus on the deliverables, outcomes and progress to date (Kahn, 2011). Due to the problems in high-costs and inflexibility associated with the proprietary health information systems, most of the available EHR systems are open sourced. Despite the high failure rate experienced in the implementation and usage of EHR systems, South Africa’s National

health department made a strategic decision to initialize a national EHR system in 2002 starting with their public health sector.

Rwanda has been a pioneer in the national initiatives for integration of technology into its expanding health care system. The Rwandan Government has been one of the countries in the Sub-Sahara that is most committed to ICT development. As at 2005, the available information system was managed on a Microsoft Access Database and faces important limitations e.g. not designed to easily pass information from one area/system to another can have duplicate entries and the data entries are limited, among many others. The Partners in Health (PIH) implemented an EHR system to help support and improve HIV and TB patients care. An automated data quality improvement system reduced the known medical errors by 92% and by 2008, the Health industry started appreciating and recognizing the importance of Electronic health records (Amoroso CL, Akimana B, and Wise B, Fraser HS, 2010)

Leaders of the National AIDS control programme (NACP) in Tanzania expressed interest in participating in the EHR systems demonstration in the year 2005. They had already implemented the paper –based HIV/AIDS registry and had since collected a core set of data on enrollment and at each visit, including vital signs, lab data, and treatments .Despite the presence of an electronic database for this registry, few of these forms had been entered into the database or analyzed, hence, there was scant information to support program management and strategic planning (Tierney, 2010). NACP leaders in 2008,selected three sites varied in size, location, and experience with electronic data: a large referral hospital, - that had prior experience with an electronic national hospital data system, a district hospital located on the outskirts of Dar es Salaam, and the site of care for AIDS-related malignancies located near the NACP offices in Dar es Salaam. Neither of the latter two sites had any experience with electronic records of any kind. The United Nations Development Program provided computers and net-work hardware for all Tanzanian sites, The NACP supported data entry and management, aided by an epidemiologic research grant to Indiana University. Because of high printing costs the desire for consistency with past data collection efforts, NACP leaders decided to forego the encounter forms developed

by the Tanzanian clinicians and instead use their existing HIV registry forms. The computing consultants created a Patient Summary Report containing identifying data, diagnoses (HIV-related and others), drug allergies, HIV-relevant lab test results, and HIV/AIDS treatment data. (Smith, Madon, Anifalaje, Malecela, Michael -2008)

Uganda also participated in the demonstration project in 2007, choosing three sites differing in size, location, and university affiliation: Mbarara Regional Hospital, Masaka Regional Hospital and Mbale Regional Hospital. Mbarara already had an MS-Access database -for data copied from patients' clinic notes,to support collaborative research with the University of California, San Francisco (UCSF). Mbarara was first to initiate the EHR system in January of 2007 employing seven Ugandan data entry technicians, a data manager, and one technologist, all with prior experience with their electronic chart abstracting database (Smith, Madon, Anifalaje, Malecela, Michael -2008).

In Kenya, since 1994, the health sector development agenda has been guided by the Kenya Health Policy Framework Paper (KHPFP) (up to 2010). KHPFP explicitly states the underlying vision for health development and reform to provide “Quality health care that is acceptable, affordable and accessible to all.”The government also identified decentralization as the “key management strategy.”With this in mind the implementation strategy for health policy was devised in a series of two five-year documents called the National Health Sector Strategic Plan (NHSSP). NHSSP-I (1999 to 2004) and NHSSP-II (2005-2010) emphasized on the need to better coordinate health activities across the country and adopts a Sector Wide Approach which would bring together all stakeholders (the government, donors and non-governmental organizations both for-profit and non-profit) on a common platform that supports critical health priorities in a coordinated fashion (Standards and guidelines for electronic medical systems in Kenya, Ministry of medical services, 2010).

The use EHR systems in was introduced in Kenya's Hospitals in 2005. However, though the adoption of electronic health records use has increased with the years, the patterns are still inconsistent and the adoption rate has been slow in comparison to what the ministry of health anticipated despite the highlighting of benefits and only about 7% of health care

practitioners use them. Reporting from NGO's and small private health facilities is far lower than their share of health service (WHO 2011). The biggest question in the health care sector should be, how is data collected from these clinics and how is it integrated into the national health care system for proper planning. With reference to the advantages given for having a digitized health system, the large private and some government hospitals have integrated the EHR systems into their work schedule but the big gap still lies in the trend of adoption of these systems by the small private health facilities and what challenges could they be facing in this adoption process (WHO, 2011)

1.2 Statement of the problem

According to the World Health Organization (WHO,2011), an efficiently working health care system requires; reliable and valid information on which to base decisions and policies; well maintained health provision facilities ; proper logistics to deliver quality medicines and technologies and a robust financing mechanism. Traditionally, patients' data was recorded in files that are stored in a file room while patients are issued with small cards to carry home. Patients have to produce these cards every time they visit the hospitals in order for their files to be retrieved. This is not an efficient way to record data since there are many disadvantages associated: loss of cards, loss of files, untraceable file, and time wasted trying to retrieve files. This method of data storage also hinders ease of sharing of information among health care practitioners, and repetition of archiving of patient's information every time they visit a hospital .If the patient visits a different hospital, then they have to be questioned again about their historical background and other ailments. This has caused medical errors and has handicapped the government in having consolidated health records that can help them to curb epidemics that could spread or occur.

The private health care practitioners carry the biggest chunk of health care practitioners and they are in touch with the common man. They assist a big population of the people hence have a lot of data on the existing health situation at the grass root. However their methods of collecting and recording this data are not cohesive with the current technological advances where data recording is moving from the paper recording system to the electronic platform appreciating the power of technology.

1.3. Purpose of the Study

This study intended to investigate the factors influencing the adoption of electronic health record systems in the small private health facilities: a case of Ruiru District, Kiambu County, Kenya.

1.4 Objectives of the Study

The study was guided by the following objectives

- i. To assess how financial implications influence the adoption of Electronic Health Record systems in small private health facilities in Ruiru district, Kiambu County.
- ii. To examine the extent to which level of ICT knowledge influences the adoption of Electronic Health Record systems in small private health facilities in Ruiru district, Kiambu County.
- iii. To determine how access to ICT infrastructure influences the adoption of Electronic Health Record systems in small private health facilities in Ruiru district, Kiambu County.
- iv. To establish how the perception of practicing health care practitioners influences the adoption of Electronic Health Record systems in small private health facilities in Ruiru district, Kiambu County.

1.5 Research Questions.

The study sought to answer the following questions:-

- i. How do financial implications influence the adoption of EHR systems in small private health facilities in Ruiru district, Kiambu County.?
- ii. To what extent does level of ICT knowledge influence the adoption of EHR systems in small private health facilities in Ruiru district, Kiambu County.?
- iii. How does access to ICT infrastructure influence adoption of EHR systems in small private health facilities in Ruiru district, Kiambu County.?
- iv. How does the perception of practicing health care practitioners influence the adoption of EHR systems in small private health facilities in systems in Ruiru district, Kiambu County.?

1.6 Significance of the study.

It is hoped that by having an understanding on the perception of health care practitioners practicing in small private health facilities and the factors influencing the adoption of the EHR records, that the Ministry of Medical services may be able to analyze how to come up with solutions that can assist ensure consolidation of health data from the grass root level. In the health sector, it is of utmost importance for data collection to start from the community and the health facility level. This involves data collection on the delivered health services, the health needs of the community, any disease outbreaks and the prevention and curative steps taken. This data is mainly registered on the patient cards and files that are kept in the file room. Converted data is highly essential in the effective management of any organization and this comes in the form of merged and summarized information. Information on the quality of delivered service, available medical resources and on the problems encountered is vitally important in monitoring the progress of the delivery of health services and in planning future action.

In the technologically advanced era, there are a few way that have been introduced to improve data collection e.g. Electronic Health Records systems. A properly organized health information system is an essential tool needed to provide summative, relevant and timely information in order to ensure quality service is offered. Large institutions and hospitals have implemented the EHR systems in large percentages (Mwangi, 2013). However the small private health facilities have not really adopted their use. The ministry of Health will therefore be in a position to collect and analyze more data from the grass root level on the health status in the country and plan on future better and quality provision of health.

1.7 Delimitation of the study

The scope of the study included the small private health facilities registered in Ruiru District, Kiambu County. The target population was based on respondents from 76 registered facilities under the ehealth-Kenya facilities run by the division of Health Information Systems. Ruiru district in Kiambu County was considered due to ease of accessibility and also taking into consideration the time limit for this research. Also no other

research of this kind has been done in the district. Respondents to be selected for the study were all small private health facilities that included those that have partially or fully adopted the EHR systems and those that have not. The patient to physician ratio was not a criterion used in selecting the respondents.

The study was also delimited to the factors influencing adoption of electronic health records in small private health facilities with critical examination on the variables namely: financial implications and adoption of EHR systems, level of ICT knowledge and adoption of EHR systems, access to ICT infrastructure and adoption of EHR systems and health providers' perception and adoption of EHR systems.

1.8 Limitations of the study

Some of the pertinent issues that this study encountered included: The study focused on the perceived factors that might be affecting EHR adoption rate. Any other barriers that were brought up during the study were recommended for further research due to time and financial constraints. Different health care practitioners have different operating environments and hence there was need to generalize the findings of this research with caution.

The health care practitioners are busy people and due to the time constraint it was a challenge during data collection especially in the engagement of the staff to fill the questionnaires. This was overcome through a drop and pick later method of the questionnaires to allow the staff complete the questionnaires during their free time. The results of this study were therefore only used to depict the picture of Ruiru district, Kiambu County.

1.9 Assumptions of the Study

The first assumption of this study is that health care practitioners will be available to answer the questions that will guide this study. The second assumption is that the respondents will be willing to participate and will be honest and unrestricted with their responses. The third assumption is assumes that all the respondents are conversant with the English language for ease of communication.

1.10 Definitions of Significant Terms used in the study.

Adoption of Electronic Health record system.	Acceptance the benefits and implementation of digitized patients' record systems that are acceptable and use the technology for effective delivery
Customizability of the system:	Ability to modify the system according to the health care practitioners' requirement in order to achieve their goal with the system.
Electronic Health Records (EHR)	A real-time digital version of a patient's paper chart with applications that can be manipulated to analyze information of a patient's history and derive information instantly and securely to authorize users.
Financial implication:	Positive or negative financial impact on the business.
Health Care:	The maintenance and improvement of physical and mental health, especially through the provision of medical services
Health care practitioners' Perception:	Mental impression of how the physician understands interprets or regards technology.
Health care systems:	The organization of people, institutions, and resources that deliver health care services to meet the health needs of target populations
ICT infrastructure:	ICT (information and communications technology - or technologies) is an umbrella term that includes any communication device or application, encompassing: radio, television, cellular phones, computer, printers and network hardware and software.
ICT knowledge:	Having the understanding of basic computer skills and the capability of utilizing these skills efficiently.

Patient Record:	The systematic documentation of a single patient's medical history across time within one particular health care practitioner's jurisdiction. Includes observations and administration of drugs and therapies, orders for the administration of drugs and therapies, test results, x-rays, reports, etc.
Provision of health services.	Administration of health care services that meet the needs of the people satisfactorily.
Small Private Health facilities:	These are the facilities that provide health based services and they are run by up to ten health care practitioners.

1.11 Organization of the Study

This study was organized into five chapters where chapter one covered the background to the study, statement of the problem, purpose and objectives of the study ,research questions, the significance, assumptions, limitations and delimitations of the study, and definition of significant terms. Chapter two covered the literature review of the study with outlook on theoretical framework, conceptual framework and the scholarly works on EHR adoption in general and in Kenya. Themes to be studied: financial implications, ICT knowledge, Access to ICT infrastructure and the perception of the health care practitioners and their influence on EHR adoption. Chapter three outlined the research methodology that will be employed by the study; the research design, target population, sample size and sampling procedures, data collection and analysis methods and the ethical considerations and operational definitions of variables. Chapter four presented the data analysis of the findings, presentation, interpretation and discussion under thematic areas and sub-sections in line with the study objectives. Finally chapter five has the summary of findings, discussions, conclusions, recommendations and suggestions for further study.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

This chapter reviews literature which is related to the study based on the following thematic areas: The concept of the EHR systems, the financial implications, level of ICT knowledge, access to ICT infrastructure, Health care practitioners' perception and their influence on the adoption of HER systems by small private health facilities.

2.2 The concept of EHR systems in the provision of health services.

Electronic health record systems have the potential to provide substantial benefits to all health care practitioners in clinical practices. These systems can facilitate efficient workflow and improve the quality of patient care and patient safety. Application of information technology has been identified as one of the principal ways to improve the quality of health care. There are some barriers that have been identified that could have affected the adoption and usage of these systems. Electronic Health Records date back from the mid 1960's when a clinical data management system was unveiled by Lockheed at the El Camino Hospital in Mountain View California. This spanned over to the move of the national library of Medicines to the computer system. In the 1980's, a health information system was legally declared available for unrestricted use by both the public and private sector in the USA. The EHR system has continuously evolved over the years and has been implemented in most large hospitals (McCann, 2013).

In 1972, representatives from the Ministry of Health, World Health Organization, Central Bureau of Statistics and the Attorney General Chambers formed a committee with an agenda of designing a Health Information System (HIS) for Kenya. Their pilot project was designed and tested in three Districts where analysis was done until 1976 when the suggestions and recommendations were adopted. A different Committee of professionals was formed in 1982 to audit the accuracy and efficiency of all health data collection forms and their report suggested a number of changes. The Ministry of Health in response to the national policy on District focus for Rural Development decentralized its reporting activities by establishing Health Information Systems offices in all districts in 1984. EHR's

all Health data from all health facilities would be processed. (Standards and guidelines for electronic medical systems in Kenya, Ministry of medical services, 2010).

The previous Kenya's National Health Sector Strategic Plan (1999 – 2004) articulated the ministry's strategy to strengthen its co-ordination function with the private sector and non-governmental organizations in health care delivery, proper design and implementation of integrated health information systems was critical. The Health Policy Framework Paper (1994 - 2010), implementation plans (1996), HMIS Needs assessment report (2003) and the current National Health Sector Strategic Plan II (NHSSPII) (2005 – 2010) outlined the areas that require immediate attention: provision of integrated data collection and reporting tools need for improvement of data flow mechanisms, districts supportive supervision, clear policy guidelines on HIS to be provided and improve feedback mechanisms at all levels.

The investment in the development of effective health information systems would have multiple benefits and would enable; Early detection and control of emerging and endemic health problems; monitoring and evaluating the progress towards health goals; promote equity in distribution of health resources; Empowering of individuals and communities by providing them with timely and understandable health related information; With data available in real time, the evidence –based would be strengthened and help decision makers in effective health policies formulation and monitor MDGs; enable innovation through research; Improve governance in the health industry; mobilize new resources and ensure accountability in their use; Strengthening national and health information systems will also require a collaborative effort. (HMIS Needs assessment report, 2003)

There are different health care practitioners depending on the areas they are located, their availability of resources and facilities, the capacity that they can hold etc. In comparison between the number of large hospitals and the small clinics, there are evidently a significantly large number of small clinics that serve the people living in rural areas, densely populated areas and the suburbs. These clinics are accessible and affordable and most people seek health care services from large hospitals mainly on referral basis or if it is

a serious and complicated ailment. In a bid to improve efficiency, most of the large hospitals and institutions have adopted the implementation and usage of electronic health records while a significantly low percentage of these small clinics do not have any proper data documentation of their patients in order to follow a proper system of providing health care. Information on these patients is lost or hard to find if it is all on paperwork making efficiency negligible. (Standards and guidelines for electronic medical systems in Kenya, Ministry of medical services, 2010).

2.3 Financial implications and adoption of EHR Systems.

This category of barriers involves those related to monetary issues that are involved in the implementation of the EHR systems. The overall cost of implementation is often cited as a barrier to their use. The major question among many health care practitioners is whether they have the required money for start up and implementation of the systems and also the ongoing maintenance costs. Very few of small health care practitioners have enough cash on hand to make an upfront capital investment in an EHR system. Most do not budget it even as a startup requirement for operation. To operate efficiently, the minimum and correct amount of resources behind it need to be available so that the health care practitioners can reach a return of investment, Soumerai (2010). The UK governments made a mistake of not considering this and invested hugely into the project that ultimately failed and dint have any return on investment. There are three categories of costs associated with electronic health record implementation:

2.3.1: Initial adoption costs

These include the cost needed to purchase and get an EHR system working in the health care practitioners practice e.g. the software and hardware (computers, printers and network installation).annual operating license fees; maintenance and support costs of both hardware and software e.g. support staff. Many industries adopted use of electronics-based technologies during the 1970's and 80's. Brynjolfsson and Hitt (2000) after review on the impact of computers found out that complimentary organizational investment could be much more than investing on the computer itself. Hornstein and Krusell (1996), Greenwood and Yorukoglu (1997) and Greenwood and Jovanovic (1998) presented

models where adoption costs account for the productivity slowdown of the 70's, where adoption costs are assumed to increase with the rate of embodied technical change.

2.3.2: Ongoing costs

Robert (2000) and Kiley (1999, 2000) Have explored the pattern emerging after adoption and found that there was a rise in organizational costs in the 70's: changes in wages, and the skill premium. Once the system is installed and running, there are other costs that are involved in the maintenance and support of the running of the system. In order to have an EHR system working efficiently and effectively, there is long term costs that are going to be incurred e.g. annual licence fees, training, technical support staff employment, monitoring of the system outcomes, modifying, upgrading and maintaining EHRs. These require proper financial planning and extensive commitment in order to avoid system failure. Vendors charge a lot of money for after-sales service.

2.3.3: Induced costs

These are the costs that are involved in the transition from a paper to electronic system, such as the temporary work of data entry from papers to electronic systems. Such technology transition could pose as a hindrance to productivity management especially large adoption costs incurred. This could include costs like hiring data entry clerks, proof reading the entered data that take time and time is money, hiring a system administrator to take care of the system when technical issues arise, learning new skills, implementing new forms of organization etc. ICT often involves customization and custom-software, some of which remains unmeasured in official statistics. Because such complementary investments appear in official productivity statistics only as resource costs without the corresponding contribution to investment (and hence output), productivity may be mis-measured (Brynjolfsson and Hitt, 2000). These hidden costs that can occur with time could make the health care practitioners worry that their practices will face substantial financial risks and that it could take years before they see a return on the investment.

2.4: Level of ICT knowledge and adoption of EHR Systems.

A digital divide exists between high, medium, low and non-users. As the disadvantaged users are playing catch up, the advantaged ICT users are always adopting newer technology and services. Electronic Health Records are hi-tech systems and complex hardware and software; therefore a certain level of computer knowledge is required for its effective use. There are inadequate information personnel with capable capacity for management and data analysis. The technical problems with EHRs experienced as they are being used need to be improved as development progresses. Therefore, there are some barriers that exist and are related to the technical issues of the systems, the technical capabilities of the health care practitioners and of the suppliers which are: The health care practitioners must show a willingness to invest in Information Technology for enhanced quality assurance (Cibulskis and Hiawalyer, 2002).

2.4.1: Knowledge on computer skills

With the hardware in place, another major stumbling block that might hinder the adoption of EHR systems by health care practitioners could be the insufficient technical knowledge and skills that they have in order to feel well equipped to deal with EHRs, and that this results in resistance. Computer systems cannot improve organizational performance if they are not used and unfortunately resistance by the professional and managers is such a wide spread problem. The standard technology adoption curve (“diffusion” curve) is S-shaped—very rapid adoption after a long, slow initial period. Moreover, with “general purpose technologies” many different industries may adopt new technologies at once (Helpman, 1998).

According to Flanagan and Jacobsen (2003), technology integration is meant to be cross-curricular rather than become a separate course or topic in itself. Observed in this context is that most of the current generation of experienced health care practitioners received their qualifications before IT programmes were introduced and for those still in study don’t have that much concentration on studying IT related courses. EHR developers overlook the level of computer skills required from health care practitioners to efficiently operate the system

.e.g. good typing skills to enter patient medical information, notes and prescriptions into the EHRs, general knowledge on how database systems work etc could be lacking and could lead to typos. This general lack of skills could hinder the wide adoption of EHRs.

2.4.2: Complexity and limitations of the system

As technology advances, systems become more and more complex due to the amount of data that they need to store, refine and give a comprehensive report. For those with limited ICT knowledge, they might have a problem with catching up on the usability of some ICT functions and systems. In general the systems might not have the appropriate graphical user interface that is easy to manoeuvre around. The lack or limited computer skills could lead the health care practitioners to regard the EHR system as extremely complicated. Miller and Sim, (2005) argue that “EHRs could be challenging to use because of the multiplicity of screens, many unclear options and navigational aids”. The complexity and usability problem could result in wrong system feeds, wrong interpretation etc. Further health care practitioners have to allocate time and effort to master the systems so that they can handle the system effectively and efficiently. There could also be the concern of the ever changing face of technology. The machine –based systems could become obsolete as time passes and not be valid to use any more as the systems reach their limitations.

2.4.3: Customizability of the systems

As discussed the lack of ICT knowledge and the complexity of the systems could be a barrier to adoption of EHR systems. However according to Miller and Sim (2005), the health care practitioners might have some ICT knowledge but the systems available cannot meet their special needs or requirements. Some health care practitioners could also use the excuse that the systems are not “customised” for them but for large hospitals. According to Randeree (2007), "customizability refers to the ability to be adapted of the technology system that fails to conform to specific needs of the user applications"

2.5: Access to ICT infrastructure and adoption of EHR Systems

ICT Infrastructure offers a range of technologies and services that are essential to the everyday efficient service delivery of an organization. These include hardware, software, networking and implementation. Access to these infrastructures would determine the pattern of adoption and usage of technology. This can be determined by:

2.5.1: Local access to ICT equipments and facilities.

For a basic EHR system to work, they are some minimum specifications of hardware that are needed e.g. computer, printer, network connectivity, phone lines etc. The start-up costs associated with setting up EHRs vary with the quantity of resources needed and the number of users/organization size. System developers also give the minimum required specification for computer for the system to run efficiently-the higher the specifications, the harder to find the hardware and the higher the costs. Also if the system is to be accessed over the internet, there has to be an existing infrastructure that can aid in its access (Miller, 2005).

2.5.2: Access to ICT professional technical training and support

Health care practitioners are not technical nor ICT experts, hence for them to operate the systems they need as much training and support for the systems and they might be reluctant to adopt the systems if they are not given adequate support. Ludwick *et al*, (2008, 2010) And Simon *et al* (2007) similarly noted that “health care practitioners struggle to get appropriate technical training and support for the systems from the vendor and if they do get this support it comes at a cost”. Health care practitioners could struggle to have a positive attitude towards the EHR’s due to the poor or No after sale services that are provided by the vendor.

Vendors can at times be crooked and give the users a raw deal promising to guide the users through the adoption process until the user is comfortable with the usage of the EHR systems. Further, some vendors just develop and roll out their systems without having gone through the proper research process and satisfactorily vetted the problems on the ground in order to gather enough information, hence, not so sure of what applications need to be included in the system or the situation at hand e.g. level of ICT knowledge of the users (Torda, 2010). Knowledgeable vendors develop quality EHR systems and guide their

clients through the adoption and usage process to ensure that their systems remain relevant to the user which is a crucial aspect for the acceptance of EHR systems. The main concern could be that these vendors can become a one chance show , do not give the appropriate support and training ,and disappear when the risks and maintenance costs get too high leaving the health care practitioners with an obsolete system

2.6: Perception of Health care practitioners and adoption of EHR Systems

Perception is the awareness and the willingness to implement something. On the other hand, Technological self-efficacy (TSE) is the belief that someone has that they have the ability to successfully perform a new task that is technologically sophisticated. Self efficacy does not focus on the skills one has, but rather the judgments of what one can do with his or her skills. Judgments are limited to certain types of performances as compared to an overall evaluation of one's potential. Perception can be viewed in the following dimensions:

2.6.1: Time to install and learn the system

Loomis's (2002) analysed that an efficient workflow is very important to the work of health care practitioners. Change is always good and necessary, but change that will eat into the time of the user could be seen as a barrier to the adoption of EHR systems. The selection process is a daunting one and EHRs need time to be selected in order to analyse if they suit the needs required to be fulfilled, implemented, tested and have the system fully working. Depending on the level of ICT knowledge and complexity of the system, time is needed to learn the system and ensure that the health care practitioners are confident to use the system. Further, additional time is required to convert the paper systems to the paperless systems in order to have a continuous flow of history from the past to the present. This involves accurate transferring of data and information between the two systems. This should be the responsibility of the health care practitioners as they can easily read and interpret their own notes and summaries. In case a third party is used for data entry, there is also the daunting task of proofreading.

Loomis's (2002) research cited more than half of the EHR users agreed to the fact that data entry is both cumbersome and time-consuming. As a result, during the transition process, their productivity might reduce and workload increased until the system is fully running.

The main point of concern would be how much time these health care practitioners are willing to spare to ensure that the systems are fully implemented and still juggle with the provision of service delivery without having a backlog. This could slow the implementation process, decrease productivity, increase workload e.t.c.

2.6.2 System stability

This can be viewed in the context of the security and privacy credentials given to the authorised users. Electronic Health Records deal with sensitive medical information on patients which should be treated as private and confidential. It is of utmost importance to keep such information safe because if otherwise revealed to unauthorised party then it could create legal issues. However, with the lack of clear security standards which can be followed by those who are involved in the use of EHRs and with the advancement in technology, many ICT ethical issues are likely to arise. Systems can get hacked into and information altered by unauthorised users or sensitive information retrieved etc. Health care practitioners would therefore have doubts whether EHRs are a secure safe for patients' information and records and fear that data in the system may be accessible to those who are not authorized to obtain it. The consequent inappropriate disclosure of patient information might lead to legal problems. According to Simon *et al* (2007), health care practitioners are more concerned about this issue than the patients themselves since they are more aware of their ethics and codes in their profession.

2.6.3: Reliability of the systems

“Reliability - probability that a device will perform its intended function during a specified period of time under stated conditions”. A system dealing with patient information should be highly reliable in order to give the health care practitioners some confidence that the system will always be available when needed. It can be viewed in the following aspect: *Technical aspect*: A major concern would be inaccessibility to patient records if there are some technical hitches with the Systems hardware and software .e.g. Computers crash, power fail, viruses attack, and other unethical IT concerns. *Financial aspect*: The concern is the ongoing costs that are to be incurred from time to time e.g. is licences annual or one

time, repair and preventive maintenance cost, what is the warranty and guarantee period of the hardware etc (Bowman, 2013).

Over the years what the health care practitioners have been using could be very reliable for them since they have already grown accustomed to their way of functioning. Health care practitioners might be apprehensive to do away with functional systems to have EHR systems that they are not used to. Since the EHR systems are still under development, there are many unique types of EHR software being used and they are being developed under different platforms since there are no stipulated data standards in the industry making these systems incompatible and data exchange becomes difficult if not impossible between systems. This could also mean that if a system becomes obsolete then they have to go back to the drawing board and start from purchase to training etc (Boonstra, 2010)

2.6.4: Organizational culture

Some health providers have worked so long in a paper world that the transition to a paperless system or the digital format could prove daunting to them. The contribution of new technology to economic growth can only be realized when new technology is accepted and widely diffused and used and this take place when a series of individuals make a strategic decision to begin using the new technology after a comparison of the uncertain benefits of the new invention with the uncertain costs of adopting it.

In any new project implementation, Workflows and work practices have to change and technology skills have to improve. Using an EHR software means that all the participants in that system-pharmacists, lab technicians, doctors, nurses, and others adapt their tasks to daily and real-time electronic recordkeeping. Randeree, (2007) mentions that the change of culture required to accompany a switch from the use of paper to an EHR system does not occur, and that this leads to slow adoption of EHR systems. Some attitudes need to be changed while others need to be reaffirmed. A positive attitude of the system outcomes needs to be cultivated in all the stakeholders so that the transition can be more bearable and there can be team support. Rosenberg (1972) said that until many users adopt a new technology, it may contribute little to our well-being.

2.6.5: Lack of Leadership

Project leader/champion- Person who voluntarily takes extraordinary interest in the adoption, implementation, and success of a project, or product. From the project management perspective, the project leaders play a crucial role in the success of a project implementation and continuous monitoring in an EHR implementation project. They can only play an encouraging role if they strongly believe that EHRs will bring benefits and quality improvement hence is willing to bear the risks and costs in order to generate the benefits. They also play the role of motivating other members of a practice to participate in the change process. Miller and Sim, (2005) argue that practices without champions, other users may struggle to improve quality or see financial benefits from EHRs. Hall and Khan (2002) also argue that with proper leadership, the most important decision is that at any point in time the choice being made is not a choice between adopting and not adopting but a choice between adopting now and deferring the decision until later.

2.7: Change Process on the adoption of EHR Systems

Change process is a challenge in every project and of change management has to apply for a smooth change process to take place. Implementing EHRs by health care practitioners in their daily medical practices amounts to a major change, bearing that, they already have their own unique working styles that they have developed over years. There will always be that resistance to change especially if one is already in their comfort zone. This can make them be unwilling to make or adapt to changes in their work. Uncertainties that occur during the change process could include: lack of a proper organizational culture, lack of incentives, resistance, and lack of leadership (Randaree, 2007):

2.8: Organizational structure influence on the adoption EHR systems.

Health care practitioners work in different sizes and structures of medical practices and hospitals, and the characteristics of individual practices could be a factor in the adoption of EHRs. An analysis of surveys by Miller *et al.*, Simon *et al.* (2005), and Burt *et al.* (2010) portrayed that health care practitioners in larger medical practices have a higher EHR adoption rate than those in smaller practices since they are more likely to use available

functions in their EHRs than those in smaller practices”. Randeree (2007) depicts the problems associated with the costs of EHRs are due to the lack of IT budgets to support the implementation and running of the system. Health care practitioners work together and cooperate with other parties in the healthcare industry, such as medical equipment suppliers, insurance companies, pharmaceuticals and laboratories, who play a large role in the decision-making process over EHR implementation by health care practitioners. A support system is vital to any project to boost confidence and give morale, but there are barriers as earlier discussed that could lead to lack of support from colleagues e.g. if they also don't have the knowledge in computer skills, they also could have the attitude that there will be a lot of work and time taken to convert to the digital systems, have negative perceptions about the use of EHRs etc. with these negative attitudes then further adoption of EHR systems could be impeded.

2.9 Theoretical Framework

This study will be based on the Technological Acceptance Model –TAM .It was derived from the Theory of Reasoned Action (TRA) by Davis in 1989; TAM was chosen as the ideal model for this study since it has been widely used in studies related to technology acceptance and it offers a powerful explanation for user acceptance and usage behaviour of information technology. TAM model is more applicable in predicting intention to use (adoption) and usage for users than non users of a particular technological innovation. This assists in understanding of the important elements that determine the acceptance of IT and helps in effective planning since benefits of IT are hidden and intangible (En Mao & Palvia, 2001). Davis et al.'s TAM model will be used to describe two key attributes: perceived usefulness (PU) and perceived ease of use (PEOU) of the technology to the health care practitioners'. These attributes influence the behavioural intentions of accepting and adopting a technology system. Perceived usefulness is the degree to which an individual believes that by using a particular system they would enhance their productivity, while perceived ease of use is the degree an individual believes that using a particular system would be free of effort (Davis, 1989). Between these two, perceived ease of use has a direct effect on both perceived usefulness and technology usage (Adams et al., 1992; Davis, 1989). Davis (1989) also found that there is a relationship between the beliefs that

users have about a technology's usefulness and the attitude and the intention to use the technology. In his study he found perceived usefulness to exhibit a stronger and more consistent relationship with usage than other variables.

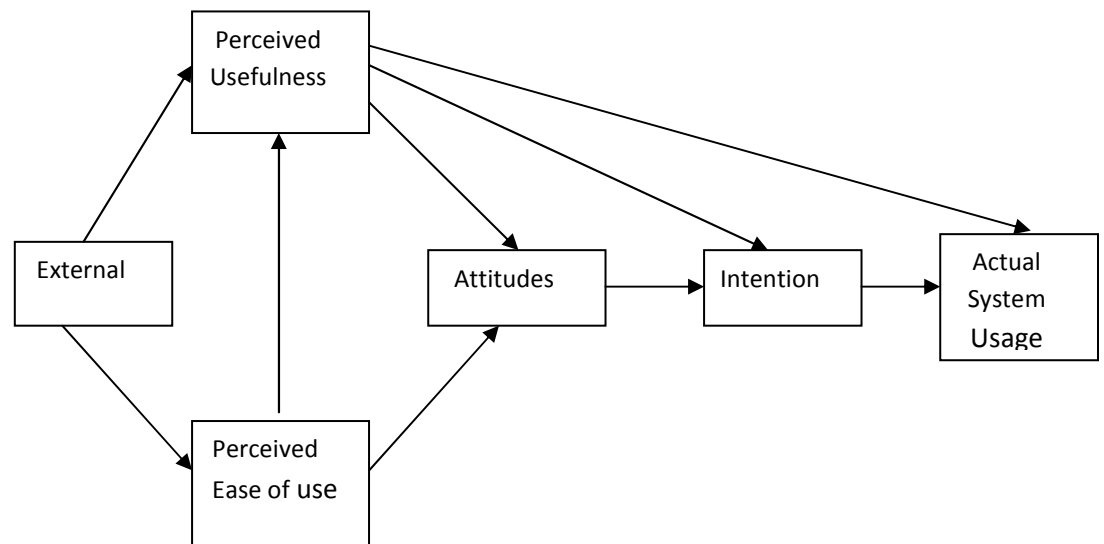


Figure 1: Technology Acceptance Model

(Saga & Zmud, 1994) reported that if an individual perceives a technology to be convenient and useful, they may adopt it even though they do not enjoy using the technology. Thus, there might be a possibility of a direct relationship between beliefs and intentions. In contrast to this a research by Venkatesh (1996) refined the TAM suggesting that the mediating effect of attitude could be excluded as empirical evidence found that the attitude element did not fully mediate the effect of perceived usefulness on intention to use.

In their study using the Tam model, Nov and Ye (2008) explained that the characteristics of the technology and the difference in the personality traits influenced PEOU. Resistance to change is a constraint in the acceptance of an innovation and it had a significant influence on PEOU in the acceptance of a system. The magnitude of change- significant alteration of tasks drives the behavior of an individual. Nov and Ye concluded that domain-specific resistance to change was a determinant of PEOU of a technology. There are other factors that may be attributed to organizational influences and system characteristics.

Tulu et al. (2006) explained that in the medical practices, the acceptance models need to explain PU and PEOU within the context of the work practice of the health care practitioners in order to make the clinical information system more effective. In Malaysia, the refined TAM model was used by Jantan, Ramayah & Chin (2001) to study the various factors influencing personal computer acceptance by small and medium sized companies.

Seeman and Gibson (2009) and Walter and Lopez (2008) studies looked into effects of different personal traits between health care practitioners and other knowledge workers in information technology acceptance. They reported that the differences were present due to specialized training, autonomous practices, and professional work arrangements and the perceived threat to the professional autonomy of information technology had a significant negative effect on perceived usefulness. Functionality of the system alone does not relate to PU and other attributes contribute to PU e.g. personal traits, characteristics of the system and resistance to change. Therefore this study aims to test the applicability of TAM in predicting intention to use EHR systems among current users and future users.

2.10 Conceptual Framework

The variables in this study are inter-related as shown in the conceptual framework in figure 2.

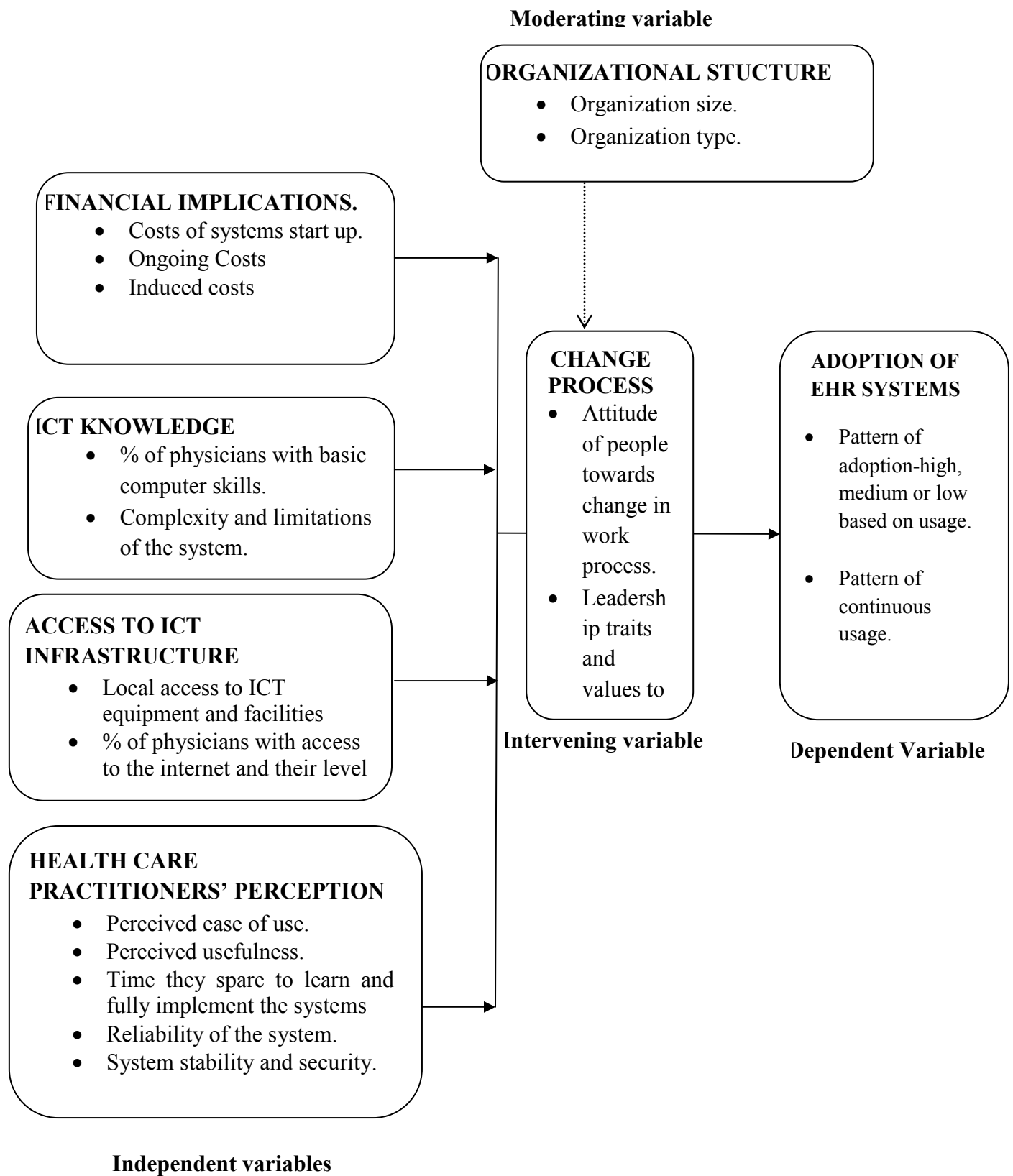


Figure 2: Conceptual framework

2.11 Knowledge gaps

The following observations were made from the literature. Much of the empirical studies carried out have been done in the developed countries and have been conducted on the national integration of Electronic health Records and the barriers they have faced so far. There is still a big task of consolidating collected data regarding the health status in Kenya. Most of the health units run by the government and the large hospital can adequately account for their patients' records but there is still an information gap created by data collected by the private hospitals that is not consolidated into the national systems. Hence, this study sought to fill the existing research gap by conducting a study to examine the factors that influence the adoption of Electronic Health Records by small private health facilities in Kenya which is a developing country. In specific, it addressed the factors that affect technology adoption in the healthcare system for effective service delivery.

Table 2.1: Knowledge gaps

Variable	Author and year	Focus of study	Findings	Knowledge gap
Financial implication	Nir Menachemi (2006)	Predicting the adoption of electronic health records by health care practitioners: when will health care be paperless?	Found out that Financial barrier issues have been examined from a general perspective of adopter type.	There is need to explore if financial factors affect both the adopter and the non adopter.
Level of ICT Knowledge	Loomis GA, Ries S, Saywell RM, Thakker NR(2002)	If Electronic Medical Records Are So Great, Why Aren't Family Health-care providers Using them?	The study found out that despite computer skills being taught in the present day and becoming part of everybody's everyday life, its adoption for service delivery has been met with a number of challenges.	There was need to focus on the complexity and limitations of the system that could lead to even those who have ICT knowledge find it difficult to adopt.

<p>Access to ICT infrastructure</p>	<p>Vishwanath A, Scamurra SD(2007)</p> <p>Laerum H, Ellingsen G, Faxvaag A: (2001)</p>	<p>Barriers to the Adoption of Electronic Health Records.</p> <p>Doctors' Use of Electronic Medical Records Systems in Hospitals: Cross Sectional Survey.</p>	<p>The studies found out that that accessibility to ICT infrastructure could be a barrier to adoption. The use of EHR systems requires a sufficient quantity of hardware in practices, including computers, phone lines and internet connections. Some researchers state that some practices lack these 'basic' facilities/hardware needed to support EHR implementation.</p>	<p>In such practices, the researcher sought to find if accessibility to ICT infrastructure is linked to the financial implications since computers and printers are in the market.</p>
<p>Health care practitioners' Perception</p>	<p>Chau, P.Y.K. (2001).</p>	<p>Influence of computer attitude and self-efficacy on IT usage behavior.</p>	<p>The study found possible differences in attitudes and beliefs about electronic health records systems between current users (early market) and nonusers</p>	<p>The study sought to depict the possible attitudes and how to enhance or counter these attitudes in order for adoption to take place.</p>

CHAPTER THREE

RESEARCH METHODOLOGY

3.1 Introduction

This chapter described the methodology that was used to conduct the study. This included project's research design, target population, sample size and sampling procedure and techniques, source of data, data collection instruments, data collection procedures, data analysis techniques and ethical considerations.

3.2 Research Design

This study employed the descriptive survey research design where self-administered questionnaires were used for data collection. Kothari (2004) describes descriptive surveys as formalized and typically structured fact-finding enquiries, involving asking questions (often in the form of a questionnaire) of a group of individuals, adding that the major purpose is description of the state of affairs as it exists at present and represent the findings/information statistically. Mugenda and Mugenda (1999) states that a descriptive survey design determines and reports the way things are or answers questions concerning the current status of the subjects in the study. Adoption of an EHR system is a complex issue and the factors that are involved begin their influence at individual, organizational, system, and other macro policy levels dictated by external agencies. This survey design therefore enabled the researcher to report a more comprehensive and holistic finding on the factors influencing the adoption and usage of EHR systems by small private health care practitioners in Ruiru district.

3.3 Target Population

According to e-Health Kenya- Masters Facility list, Ruiru district in Kiambu County comprise of 76 registered health facilities that are owned by private institutions .These comprise of 55 medical clinics,5 nursing homes, 2 health centers and 14 dispensaries. The respondents targeted to assist were the health care practitioners in charge in each facility

and only one respondent was to fill the questionnaire in each facility. The distribution of the target population is as shown in Table 3.1

Table 3.1: *Composition of Target Population*

Target Group	Total
Medical Clinics	55
Maternity and nursing home	5
Health centers	2
Dispensaries	14
Total	76

3.4 Sample size and Sampling Procedure

3.4.1 Sample Size

The sample size used for this study was 63 Based on the Krejcie and Morgan table of 1970 selected from a target population of 76.

3.4.2 Sampling procedure.

Stratified random sampling was used in carrying out the study as per the different health facilities. Further, simple random sampling was undertaken in each stratum. Stratified random sampling involved dividing the population into homogeneous subgroups (stratum) and then taking a simple random sample from each stratum independently of each other. According to Mugenda and Mugenda (2003), the goal of stratified random sampling is to achieve desired representation from various subgroups with homogeneous characteristics in the population. This would help the researcher focus on particular variables of interest to the researcher to help in answering the research questions. The group was divided into three strata as shown in table 3. The sample size was achieved based on the Krejcie and Morgan table of 1970 .Proportionate method was used to further calculate the sample size for each stratum.

Let: Total Target population be N. Total target population in each stratum be R. Total Sample size according to the Krejcie and Morgan table of 1970 be n. Sample size in each stratum be X.

Therefore: $X = [R/N] \times n$

This gave a distribution as in the table 3.

Table 3.2: Sampling frame

Target Group	Total	Sample size
Medical Clinics	55	45
Maternity and nursing home	5	4
Health centers	2	2
Dispensaries	14	12
Total	76	63

3.5 Research Instruments

This study utilized a questionnaire as a primary tool for data collection due to its advantage of allowing the researcher to get firsthand information from the correspondents. The questionnaire contained both structured (close-ended questions) and unstructured questions (open-ended). The questionnaire contained 6 sections. Section 1 captured information on the demographic characteristics and profiles of the respondents such as gender, age, level of education, type of practice, years of experience, as well as current level of information technology adopted. Section 2 contained questions relating to financial implications in EHR adoption. Section 3 contained questions on the level of ICT knowledge and other support functionalities in regards to the health care practitioners. Section 4 contained questions relating to access to ICT infrastructure by the health care practitioners. Section 5 contained questions relating to the perception of the health care practitioners towards the adoption of EHR systems as well as to technology adoption in general and finally section six checked the ranking of the factors influencing the general adoption

For the closed-ended questions, a Five-point Likert Scale was used which included: (5) strongly agree, (4) Agree, (3), Neutral (2) Disagree and (1) strongly disagree. The strongly

agreed responses was scored at 5 for direct positive while those of strongly disagree were scored at 1 for direct negative responses. Closed ended questions were included because they are easier to administer and to analyze. The questionnaires facilitated the evaluation of factors influencing adoption of EHR systems by small private health care facilities in Kiambu County.

3.5.1 Piloting of the Research Instrument

Test re-test method was used to pilot the research instrument prior to the main study. The research instrument was administered to a group of respondents with similar characteristics as the final respondents, for purposes of checking if the results given by the respondents were consistent, and also checks for ambiguous questions. Respondents used in the pilot study were not included in the final study. Based on Gay (1992) and Mugenda and Mugenda, (2003) recommendation that a minimum sample of 10-20% is adequate for educational research of less than a thousand participants,6 respondents were used for piloting the instrument. Once the researcher was satisfied with the results that the instrument was relaying then they proceeded to use it for the actual study.

3.5.2 Validity of the instrument

The validity of the instrument was checked in terms of two aspects: construct aspect-whether the questions were structured in a way that the responses would help answer the research questions: and the content aspect-whether the questions were constructed in an understandable way that was clear to all and respondents interpret all questions in the same way, and whether there was researcher bias. According to Mugenda and Mugenda (2003), Validity is the accuracy and meaningfulness of inferences, which are based on the research results. For a data collection instrument to be considered valid, the content selected and included must be relevant to the need or gap established. According to Orodho (2004) piloting helps to establish whether the questions measure what they are supposed to measure: The results obtained from the analysis of the data actually should actually represent the variables of the study .this will ensure internal consistency and final review of the questionnaire

3.5.3 Reliability of the instrument.

To ensure reliability, the researcher used the split-half technique to calculate reliability coefficient (Spearman coefficient) which should be within the recommended reliability coefficient of 0.7-1 (Nachmias & Nachmias 1996). However, reliability in research is affected by random errors, and the pre-test study assisted the researcher identify the most likely source of errors and hence responded to them before the actual study.

Mugenda and Mugenda (1999) define reliability as a measure of the degree to which a research instrument yields stable and consistent results or data on repeated trials. An instrument can be said to be reliable when it can accurately measure a variable and provide the same consistent results over a period of time to the same group of identified respondents (Best and Kahn, 2006). Although unreliability is always present to a certain extent, there will generally be a good deal of consistency in the results of a quality instrument gathered at different times.

This involved scoring two-halves of the tests separately for each person and then calculating a correlation coefficient for the two sets of scores. The instrument was split into the odd items and the even items.

The Spearman Brown prophecy formula is:

$$P_{xx'} = 2 P_{yy} / 1 + P_{yy}$$

Where $P_{xx'}$ is the reliability projected for the full-length test/scale, and P_{yy} is the correlation between the half-tests. P_{yy} is also an estimate of the reliability of the test/scale if it contains the same number of items as that contained in the half-test. If the two halves of test/scale are not parallel, the reliability of the full-length test/scale is calculated using the formula for coefficient α for split halves:

$$\alpha = 2 [\sigma^2_x - (\sigma^2_{y1} + \sigma^2_{y2})] / \sigma^2_x$$

Where σ^2_{y1} and σ^2_{y2} are the variances of scores on the two halves of the test, and σ^2_x is the variance of the scores on the whole test, with $X = Y_1 + Y_2$.

3.6 Data Collection Procedure

Prior to the commencement of data collection, the researcher sent an introductory letter to the identified respondents and requested them to participate in the study. Once the respondents agreed to undertake the study, the questionnaire was dropped for the respondent to fill at their own convenient time. Ethical considerations were clearly communicated and adhered to before commencement on the data collection process. The research instruments were clearly communicated to the assistants in order to gather the required data.

The researcher intended to collect data from 63 registered health facilities in Ruiru district, Kiambu county .The entire data collection and analysis exercise was expected to take approximately 1-2 weeks. After the data collection, clean up, coding and removal of errors and inconsistencies was undertaken. The data from the field was coded according to the themes researched on the research. The responses were then summarized with percentages, frequency counts and means. Inferences were drawn about a particular population from the responses of the sample population.

3.7 Data Analysis Technique

This study used descriptive statistics in analyzing data collected. While data collection is the systematic recording of information, data analysis according to Best and Kahn (2006) involves working to uncover patterns and trends in data sets. By publishing data and techniques used to analyze and interpret the data, scientists give the community the opportunity to both review the data and use it in future research. The data collected will be coded according to the themes researched entered and analyzed as per the research

Quantitative data analysis was done using Statistical Package for Social Scientists (SPSS) version 20 which summarized data using- measures of central tendency (mean) , frequency distribution tables and percentages.

Qualitative data was analyzed by making inferences from the expressions and opinions of the respondents around the variables and was presented descriptively to make inferences.

3.8 Ethical Considerations

The researcher wrote an introductory letter to respondents which assured the respondents that the research was purely for academic purposes. Accordingly, the researcher ensured that respect, courtesy, privacy and justice were adhered to ensure that the research process was conducted in a manner that was fairly administered and collect as much qualitative data in order to minimize analysis errors. The research processes and procedures used were based on a voluntary informed consent and employed a valid research design with a sample selection that was appropriate for the purpose of the study. In addition the researcher went to the field with no biasness so as to give the respondent a fair ground and get to the root of the issues in order to understand the research questions objectively.

3.9 Operationalization of variables

This is the description of variables, term or object in a manner that is accessible and measurable by other persons independently (Kish, 2011).Operationalization refers to the translation of concepts into tangible indicators of their existence (Saunders et al, 2009).

Table 3.3: summarizes the operational definitions of variables that were used in this study.

Table 3.3: Operationalization of variables

Research Objective	Variable	Indicator(S)	Measurement	scale	Tools of analysis	Type of analysis
To assess how financial implications influence the adoption of EHR systems in small private health facilities in Ruiru district, Kiambu County.	Independent Variable	-Start up costs. -Ongoing costs. -Induced costs.	-How various costs to be incurred would influence the adoption?	Ordinal	Mean, Percentage, frequency distribution	Qualitative Quantitative
To examine the extent to which ICT knowledge influences the adoption of EHR systems small private health facilities in Ruiru district, Kiambu County.	Independent Variable	-Level of ICT knowledge. -Complexity and limitations of the system.	- No. of health care practitioners who have basic knowledge on computer skills. -How do they find the ease of use of ICT equipment?	Ordinal	Mean, Percentage, frequency distribution	Qualitative Quantitative
To determine how access to ICT infrastructure influences the adoption of EHR systems in small private health facilities in Ruiru district, Kiambu County.	Independent Variable	-No. of health care practitioners who have access to internet. -Type of ICT infrastructure in place. -Technical training and support.	-Usage of internet. -Availability of ICT infrastructure and facilities. -Availability of technical support and training.	Ordinal	Mean, Percentage, frequency distribution	Qualitative Quantitative

<p>To establish how the perception of practicing health care practitioners' influences the adoption of EHR systems in small private health facilities in Ruiru district, Kiambu County.</p>	<p>Independent Variable</p>	<ul style="list-style-type: none"> -Perceived ease of system use. -Perceived usefulness -Time availability. -System Reliability -System stability 	<ul style="list-style-type: none"> -How the health care practitioners rate usability of the system -Does the use the system help the health care practitioners provide quality services? -Time they are willing to spare. -Pattern of continuous usage. 	<p>Ordinal</p>	<p>Mean, Percentage, frequency distribution</p>	<p>Qualitative Quantitative</p>
<p>To investigate the factors influencing the adoption of electronic health record systems in small private health facilities in Ruiru district, Kiambu County.</p>	<p>Dependent Variable</p>	<ul style="list-style-type: none"> -Pattern of adoption. -Pattern of continuous usage. 	<ul style="list-style-type: none"> -Number of health care practitioners using EHR systems. - Affordability of the systems by the health care practitioners. 	<p>Ordinal</p>	<p>Mean, Percentage, frequency distribution</p>	<p>Qualitative Quantitative</p>

CHAPTER FOUR

DATA ANALYSIS, PRESENTATION, INTERPRETATION AND DISCUSSION

4.1 Introduction

This chapter presents the study results based on thematic and sub thematic areas as per the study objectives: financial implications-Cost of system start up, ongoing costs and induced costs; Level of ICT knowledge-Number of Health care practitioners with basic computer skills, complexity and limitations of the systems; Access to ICT infrastructure-local access to ICT equipment and facilities, number of health care practitioners with access to internet, access to professional technical training; Perception of Health care practitioners-perceived usefulness, perceived ease of use, time allocated for system learning, reliability of the system, stability of the system. The results are based on a response rate of 75% (n=63).

4.2 Questionnaire Response Rate

This study targeted a sample size of 63 respondents out of which 47 filled in and returned the questionnaires, making a total response rate of 75% as shown on Table 4.1.

Table 4.1 Questionnaire Response Rate

Category	Frequency	Percentage
Medical Clinics	39	61.9
Maternity and nursing home	2	3.17
Health centers	1	1.59
Dispensaries	5	7.94
Total	47	75

The response rate was generally good and conforms to Mugenda and Mugenda (2003) stipulation, that a response rate of 50% is adequate for analysis and reporting; a rate of 60% is good while a response rate above 70% is excellent. In this case, the response rate obtained from this study can be classified as excellent and was sufficiently representative of the target population. This response rate was highly capable of producing useful results and make meaningful inferences. The study therefore proceeded.

4.3 Demographic Characteristics of the Respondents

Demographic studies were important for this study since Electronic Health Record systems are a new technology and it is believed that the populations' demographics may have significant influence on their adoption. These include: Gender, Age, level of education, organization size, status of ownership, years of experience and the current system under use. These are further discussed in the following subsequent themes.

4.3.1 Distribution of Respondents by Gender

The study sought to establish the gender of the respondents in order to find out if all genders were well represented. The results are as shown in Table 4.2

Table 4.2: Distribution of Respondents by Gender

Category	Frequency	Percentage
Male	24	51.1
Female	23	48.9
Total	47	100

The resulting gender distribution out of the 47 respondents who participated in the study, 24 (51.1%) were males and 23 (48.9%) were females. The gender distribution conformed to the Kenya government affirmative action policy that at least 30% representation should be of either gender. This showed that all gender will be well represented in the study.

4.3.2 Distribution of Respondents by Age

The study sought to establish the age of the respondents in order to find out if age characteristics are important for the study and if age of respondents would influence adoption. This being a new technology, it is believed that the younger population would be more receptive to technology hence the need for age analysis. The results are as shown in Table 4.3

Table 4.3: Distribution of Respondents by Age

Category	Frequency	Percentage
Between 30 and 40	6	12.77
Between 41 and 50	21	44.68
Between 51 and 60	11	23.40
Above 60	9	19.15
Total	47	100

Out of the 47 respondents, 27 (57.45%) are 50 years and below. This shows that the majority of the respondents are in the age group that is viewed as being technology receptive.

4.3.3 Distribution of Respondents by Levels of Education

The study sought to establish the level of education of the respondents in order to find out if the academic qualifications of the health care practitioners would influence adoption. This being a new technology, it is believed that the learned population would be more receptive to technology the results are as shown in Table 4.4

Table 4.4: Distribution of Respondents by Levels of Education

Category	Frequency	Percentage
Post graduate	5	10.64
Graduate	30	63.83
Diploma	12	25.53
Certificate	0	0
Total	47	100

Out of 47 respondents, 12 (25%) had diploma qualifications as their highest level of education, 30 (63.80%) had graduate as their highest level of education whereas 5 (11.2%) had post graduate as their highest level of education. This shows that the target population comprised of learned people.

4.3.4 Distribution of Respondents by organization size

The study sought to find out the number of health care practitioners who practiced in the health facilities. Health care practitioners work in different sizes and structures of medical

practices and hospitals, and the characteristics of individual practices could be a factor in the adoption of EHRs. The results are as shown in table 4.5

Table 4.5 Distribution of Respondents by organization size

Category	Frequency	Percentage
1-2	37	80
3-5	8	16
6-10	2	4
Total	47	100

Out of the 47 respondents 37(80%) of the health care practitioners practice in solo or two-health care practitioners' facilities. Further, the researched showed that and 8(16%) were in three- to five-physician health facilities. The other 2(4%) operated in six-to-ten physician health facilities. Therefore the target population comprised of small private health facilities.

4.3.5 Distribution of respondents by years of experience

The study also sought to establish the number of years of health care provision that the respondents had; therefore the respondents were asked to state the length of years of service. The results are presented in Table 4.6 below.

Table 4.6: Years of Experience of health care practitioners

Category	Frequency	Percentage
Below 1 year	0	0
Between 1-5 years	11	23.40
Between 6-10 years	9	19.15
Over 10 years	27	57.45
Total	47	100

Out of the 47 respondents 11 (23.40 %) of the health care practitioners have worked for between one to five years, 9 (19.15 %) between 6 and 10 years, and 27(57.45 %) had over ten years of experience. There were no health care practitioners who have a working experience of less than one year.

From this analysis, majority of the healthcare providers have more than five years of experience. This showed that all the health care practitioners had a knowledge basis of patient interaction.

4.3.6 Distribution of respondents by Current type of practice

The study also sought to establish the current type of health facility practice i.e. the hours of operation; therefore the respondents were asked to state if the health facility was full time or part time. The results are presented in Table 4.7 below.

Table 4.7 Current type of practice

Category	Frequency	Percentage
Full Time	39	83
Part time	8	17
Total	47	100

Out of the 47 respondents 39 (83%) of the health care facilities were operational full time i.e. at least eight hours a day, while 8 (17%) of the health care facilities were operational part time.

4.4 Distribution of Respondents by current systems for record keeping

The study sought to establish the current systems being used by the health care facilities to record patients' data. This was done to determine the current status of adoption by the small private health facilities. The distribution results are as shown in table 4.8

Table 4.8 Distribution of respondents by current systems for record keeping

Category	Frequency	Percentage
Fully electronic	1	2
Partially electronic and partially paper	11	24
No EHR system	35	74
Total	47	100

Out of the 47 respondents 1(2%) reported that they had fully implemented and integrated EHR systems in their practice, 11 (24%) are currently using both paper and electronic systems while 35 (74%) are not using any electronic record system. This results show a very low adoption status of the EHR systems.

Table 4.9 Distribution of respondents by plans to upgrade

Category	Plans to upgrade	Percentage	Plans not to upgrade	Percentage
Fully electronic	0	0	1	100
Partially electronic and partially paper	4	37	7	63
No EHR system	8	23	27	77
Total	12	26	35	74

Out of the 47 respondents 35 (74%) plan not to upgrade from the current systems they are using while 12 (26%) plan to upgrade. 34 (97%) of the health care facilities not planning to upgrade have not fully implemented the system showing that there will be a continuous slow rate of adoption of the EHR systems.

The facilities using partially electronic and partially paper recorded they had a computer at the reception to mainly record the notes on the patient card and for billing purposes. Otherwise all other information was recorded on paper and stored in files. About 30% of those not using EHR system discontinued their use after facing challenges.

4.5 Financial Implications and the adoption of EHR systems.

The study sought to find out if financial implications influence the adoption of EHR systems. The respondents were requested to indicate if the implementation of EHR systems was in their initial budget. The results are as shown in Table 4.10, Table 4.11 and Table 4.12.

Table 4.10 Distribution of respondents according to budget plans

Category	Frequency	Percentage
EHR implementation in initial budget plans	5	10
EHR implementation not in initial budget plans	42	90
Total	47	100

Out of 47 respondents 42 (90%) of the health facilities said that they had not budgeted for the EHR systems before they started operation of their facilities .These would show that for them to implement, they had to weigh the costs of creating and supporting their own IT structure and applications. These costs included hardware and software purchase price, coordination costs, support costs and upgrade costs. 5 (10%) had ICT budget in their initial budget however only 2% have full implemented the EHR systems as earlier seen.

Table 4.11 Responses of respondents concerning financial implications

	To a great extent	High extent	Moderate extent	Small extent	Not at all	Total	Mean
Hardware purchase costs	15.34	76.69	7.98	0.00	0.00	47	4.07
Annual Software license fee	67.48	27.61	4.91	0.00	0.00	47	4.22
Training and consultation fee	30.67	30.67	23.31	15.34	0.00	47	3.61
System maintenance costs	46.01	30.67	15.34	7.98	0.00	47	3.53
Data entry costs	38.65	30.67	24.54	6.13	0.00	47	3.75

Out of 47 respondents, 92% felt that hardware costs would influence their adoption while 95% felt that the annual license fees would influence their adoption.61 % felt that the training cost would greatly influence their adoption while 76% were concerned about the system maintenance costs .68% were concerned about the data entry costs that they would incur in order to change their clinical workflows.

Table 4.12 Responses of respondents on cost recovering after EHR systems implementation

Category	Frequency	Percentage
Recover	13	28
Won't recover	5	10
Not sure	29	62
Total	47	100

As shown in table 4.12, Out of the 47 respondents, 13 (28%) said that in the course of their operations, they will recover their initial investment while 5 (10%) foresee that they will never recover the cost while 29 (62%) are not sure if they will recover. This shows that 34 (72%) of the felt that the cost would be too high for their small organizations and they wouldn't recover the cost benefit in their operations.

These findings are in consonance with Soumerai's literature which sites most small facilities do not budget it even as a startup requirement for operation, Soumerai (2010). Also the financial implications that are depicted from the study -Initial and ongoing cost are in consonance with Robert and kiley (2000) literature that after adoption, there emerges other organizational costs becoming a big issue that small facilities have to weigh before implementation. All these financial implications have a very big impact in the decision to implement the EHR systems.

4.6 Level of ICT Knowledge and the adoption of EHR systems

The study sought to find out the level of ICT knowledge that the health care practitioner have. The respondents were requested to indicate their comfortably in use of some computer applications. The results were as shown in Table 4.13

Table 4.13 Respondents confidence in use of computer applications.

	can use it very well	can use it well	can use it satisfactorily	can use it to a small extent	cannot use it	Total	Mean
Word processor, data base systems, spreadsheets e.t.c.	6.14	61.35	18.40	7.98	6.13	47	3.77
Internet e.g. search engines like google.com	4.91	3.07	76.69	15.34	0.00	47	4.02
E-mailing communication e.g. yahoo/Gmail	18.6	30.67	30.67	15.34	4.71	47	3.61

Out of 47 respondents 94 % of the respondents have basic knowledge in computer skills and can satisfactorily perform basic computer operations e.g. use of word and excel and navigating the internet however 1.3% of them could not communicate via email. From this analysis it shows that majority of the population could understand technology based systems faster due to their basic knowledge in computer skills.

Table 4.14 Ease of use of the system

Responses	Frequency	Percentage
Very easy to use	0	0
Easy to use	0	0
Neutral	13	28
Easy to use to a small extent	10	21
Not easy to use	24	51
Total	47	100.0

As shown in Table 4.14, Out of 47 respondents 72% felt that the systems were complex to use while 28% felt that they could handle the systems usage. No respondent felt that the systems were easy to use. The findings of the study augers with Miller and Sim (2005) Literature which sites that some health providers might have some ICT knowledge

but the systems available are too complex and cannot meet their requirements. The health care practitioners felt that the navigation of multidisciplinary screens especially for documenting progress notes caused them to spend extra work time to learn effective ways to use the EHR. Further the findings also auger with Flagan and Jacobsen (2003) literature which analyzed that good typing skills are needed to enter patient medical information, notes and prescriptions into the EHRs, and some Health care practitioners lack them. The skills needed to listen to patients' complaints, assess medical relevance, contemplate interventions as well as type notes all at the same time would require a significant level of concentration, typing skills, and familiarity with the application's user interface. Some Health providers felt that they didn't have the ability to type quickly enough for them to use computers for their daily use.

4.7 Access to ICT infrastructure and the adoption of EHR systems

The study sought to find the accessibility of ICT infrastructure by the respondents. The respondents were requested to state their accessibility to computers, printers, local area network and to the internet. The results are as shown in Table 4.15

Table 4.15 Respondents access to ICT hardware and internet.

	To a great extent	High extent	Moderate extent	Small extent	Not at all	Total	Mean
Have computers and use them daily	2	0	8.5	15.04	74.46	47	4.02
Have a printer and use it daily	2	0	7.1	4.91	85.99	47	4.11
Local area network	2	0	3.1	4.5	90.4	47	4.23
Internet accessibility	2	0	0	18.2	79.8	47	4.07

Table shows that 74.46% and 79.8 % of the respondents agree that they have no computers nor internet access in their health facilities respectively. 25.54 % have

computers while 20.2% have access internet.85.99% of them don't have printers. Most respondents commented that computers were used at the reception area for billing purposes hence no local area network present. The low level of electronic health records system use could be explained by a lack of available computers. The findings of the study correspond with. Further Millers' literature shows that for there to be an efficient working electronic system, there have to be presence of some ICT infrastructure of which minimum specifications are given by the system developers. The higher the specifications, the harder to find the hardware and the higher the costs of purchase (Miller, 2005).

Table 4.16 Respondents access to training and support from vendors

Category	Frequency	Percentage
Easily accessible	9	19
Very difficult to access	30	64
Not sure	8	17
Total	47	100

Training and after-sale experiences with their vendor: The 30% of the non adopters who had implemented the systems then stopped using them complained about their training and post-sale experience with their vendors. This is in consonance with Ludwick (2008, 2010) and Simon (2010) literature that healthcare providers struggle to get appropriate technical training and support from the vendors, and if they get it comes at an extra cost .They reported that their vendors simply offered few training sessions after implementation. The Health care practitioners had not developed sufficient experience with their new EHR to ask relevant questions or appreciate the answers. Health care practitioners reported that they could not always access vendor technical support and when they accessed then it would come at extra cost.

4.8 Perception of health care practitioner and the adoption of EHR systems

The study sought to find the beliefs and perception of health care practitioners concerning adoption of EHR systems. The results are as shown in table 4.17

Table 4.17 Perception of health care practitioner concerning adoption of EHR systems

	To a great extent	High extent	Moderate extent	Small extent	Not at all	Total	Mean
Comfort in using computer as a tool to aid operations	4	12.10	40.67	32.63	10.6	47	4.45
Can fix system errors	0.00	24.54	6.13	7.98	61.35	47	4.02
Have time for system use and learning	0.00	3.07	4.91	24.54	67.48	47	4.11
Reliability	27.61	61.02	4.91	6.46	0.00	27.61	4.22
Security concerns	15.34	30.67	46.01	7.98	0.00	47	3.53
A lot of work in data entry	30.67	38.65	6.13	24.54	0.00	326	3.75

Out of 47 respondents 89.4% felt that they could use computers as a tool to aid their operation while 88.63% felt that the use of computers was reliable.61 % of the respondents said that they cannot fix system errors once they are faced with this challenge.67% reported that they don't have the time required to learn the system proficiently. This can be attributed to the busy schedules of the health care practitioners and also concerns about the time for redesigning of their workflows.75% of the Health care practitioners reported concerns about data entry workload: These findings correspond to Loomis's literature which cited that data entry is cumbersome, increase their workload and hence consumes a lot of time and might reduce their productivity.

(Loomis, 2002). Providing health care requires varied skills, a fast pace, treating patients from multiple age groups, diagnosing conditions from a myriad of potentially unrelated complaints, and keeping a comprehensive record from multiple sources.

4.9 Ranking of Factor influencing adoption of EHR systems

The study sought to find out how some factors affected the implementation of EHR systems .Results from the respondents are as shown in Table 4.18

Table 4.18 Ranking of Factors influencing adoption of EHR systems

	Not a problem	Minor impact on implementa tion	Complicate to some degree	Make implementat ion difficult	Makes extremely difficult	Rank
Lack of capital resources to invest in an EHR	0	2	0	0	98	1
Security and privacy concerns	14	25	32	24	5	6
Available EHR software does not meet the practice’s needs	6	4	15	19	56	4
Practice staff does not have skills/training to use an EHR system	1	3	7	25	64	3
Insufficient time to select, contract, install and implement an EHR	2.5	8.8	6.7	8	74	2
Inability to evaluate, compare and select the appropriate EHR system	6	4	77	9	4	5

Out of the response by 47 respondents, 98 % felt that lack of capital resources was the number one factor that influenced the slow adoption of electronic records.74% felt that the time to select, implement and learn the system was the number two factor.

The Table also indicates that there was a highly significant relationship between financial implications and adoption of EHR systems being ranked as the number one factor influencing. Again, from the same Table, there exists a highly significant relationship between access to ICT infrastructure and facilities and the adoption of EHR systems. There is also a significant relationship between the perception of the health care

practitioners in terms of time availability and ease of use and the adoption of HER systems.

However there exists no significant relationship between Level of ICT knowledge and the adoption of EHR systems.

CHAPTER FIVE
SUMMARY OF FINDINGS, CONCLUSIONS AND RECOMMENDATIONS

5.1 Introduction

This chapter presents a summary of the study findings, conclusions and recommendations. The findings are summarized in line with the objectives of the study which financial implications, level of ICT knowledge of health care practitioners, access to ICT infrastructure and the perception of the health care practitioners. These independent variables were studied against the dependent variable which is adoption of electronic Health Records by small private health facilities

5.2 Summary of Findings

Table 5.1 Summary of findings

Objective	Data collection instrument	Type of analysis	Main findings.
Financial implications and adoption of EHR systems	Questionnaire	Descriptive	The study established that 90% of the small health facilities don't have an ICT budget in their conception of operation. Approximately 92 % of the population is concerned about the high costs of purchasing, running and maintaining the EHR systems. Approximately 72 % of the population is not certain that their costs from EHR implementation will be recovered.
Level of ICT knowledge and adoption of EHR systems	Questionnaire	Descriptive	The study showed that though 57% of the target population was of the age group that is technology receptive, 100% had satisfactory academic qualifications, .Despite the fact that 94% had basic computer skills, 72 % still felt that the EHR systems were still very complex to use.

Access to ICT infrastructure and adoption of EHR systems	Questionnaire	Descriptive	<p>The study showed that 74% of the population does not use computers in their practice. Out of the 26% with computers, 6% of them have no internet access.</p> <p>81% had concerns about accessibility to training and support while 30% of the non adopters who had implemented the systems then stopped using them complained about their training and post-sale experience with their vendors.</p>
Perception of health care practitioners and adoption of EHR systems	Questionnaire	Descriptive	<p>The study showed that 89.4% of the population could use computers as a tool to aid their operation while 88.63% felt that the use of computers was reliable. 61% cannot fix system errors once they are faced with this challenge while 67% don't have the time required to learn the system proficiently. 75% reported concerns about data entry workload:</p>

5.3 Conclusions

The review of identified factors that influence adoption of EHR systems in small private health facilities in Ruiru district shows the low adoption pattern implementing EHRs. Despite the positive effects from using EHRs in healthcare practices, the adoption rate of such systems is still low and they meet resistance from healthcare providers. By considering the factors identified in this study, it should be possible to improve the ability of health care practitioners to easily and effectively use the EHR systems. Electronic health record use requires the presence of certain users and system attributes, support from others, and numerous organizational and environment facilitators.

5.3.1 Demographic factors

From review of the demographic factors in this study, it was found that the demography of the population did not influence technology adoption. It is believed that the younger

generation would be more receptive to use of technology but this did not influence adoption. Also the healthcare providers have good academic qualifications and had a good number of years of experience but this also dint influence adoption. Also the healthcare providers have good academic qualifications and had a good number of years of experience but this also dint influence adoption.

5.3.2 Financial implications and the adoption of EHR systems

The study established that financial implications are a big factor in the adoption of EHR systems; small health facilities are less likely to adopt EHRs due to the lack of an ICT budget. This makes them find the investment costs being too high and they don't have surety that they will recover their financial costs after implementation. This echoes Soumerai literature which sites most small facilities do not budget it even as a startup requirement for operation. To operate efficiently, the minimum and correct amount of resources behind it need to be available so that the health care practitioners can reach a return of investment (ROI), Soumerai (2010). Further, the different financial considerations existing -Initial and ongoing maintenance cost are in consonance with Robert and kiley (2000) literature that after adoption, there emerges other organizational costs becoming a big issue that small facilities have to weigh before implementation. Financial costs therefore have to be reviewed by the vendor in order to have affordable systems.

5.3.3 Level of ICT knowledge and the adoption of EHR systems

From the study ,it shown that a higher percentage of the population find the systems complex to use .This augers with Miller and Sim (2005) Literature that some health providers might have some ICT knowledge but the systems available are too complex and cannot meet their requirements.EHR providers appear to underestimate the level of computer skills required from healthcare providers to run the system and perceive it to be very easy to use, while the system actually is very complex to use by these Health care practitioners. In addition, difficulty of using EHRs and the non-use of specific functions result from the complexity of the systems. Further, good typing skills are needed to enter

patient medical information, notes and prescriptions into the EMRs, and some Health care practitioners lack them.

Customizability of the system should also be enhanced to ensure that user needs are met. Some systems have too many functionality and multiple screens making the system seem to be so hard to use. Further Flagan and Jacobsen (2003) analyzed that good typing skills are needed to enter patient medical information, notes and prescriptions into the EHRs, and some Health care practitioners lack them. For the EHR systems to have a positive impact on patient safety, health care practitioners must be able to use these systems effectively after they are made available. That, in turn, will increase the probability of quality and safety improvements through the EHR systems.

5.3.4 Access to ICT infrastructure and adoption of EHR systems

The findings of the study correspond with Ludwick (2008, 2010) and Simon (2010) literature that healthcare practitioners struggle to get appropriate technical training and support from the vendors, and if they get it comes at an extra cost. Further Millers' literature shows that for there to be an efficient working electronic system, there have to be presence of some ICT infrastructure of which minimum specifications are given by the system developers. The higher the specifications, the harder to find the hardware and the higher the costs of purchase (Miller, 2005). For people to embrace technology, there must be availability of minimum requirements e.g. access to training and ICT hardware should be affordable and easy to access or acquire.

5.3.5 Perception of practitioners and the adoption of EHR systems

The findings of the study correspond to Loomis's literature which cited that data entry is cumbersome, increase their workload and hence consumes a lot of time and might reduce their productivity. (Loomis, 2002). There is few concerns about the security and stability of the system. The systems become too cumbersome and costly especially when data entry has to be done. This can also be looked at from the perspective that most health care practitioners would prefer to do their own data entry since they understand their notes well.

5.4 Recommendations

On the basis of the findings obtained, this study recommends that vendors should look at the factors that are influencing adoption of their systems. Reliability refers to the dependability of the technology systems that comprise the EHR. As more vendors develop systems for the lucrative healthcare market, the number of competing systems will increase. Vendors should seek to differentiate themselves from their competitors by supplying quality, affordable and reliability EHR systems as evidence of their superiority. They should also offer sustainable after-sale service to the health care practitioners.

Secondly, Medical schools should adapt using of EHRs in training their students. Training medical students to use computer aided programs as their decision support tools can only serve to accelerate the EHR adoption. This will also give them confidence to use the technology once they join the practicing field.

Finally The Ministry of Public Health should come up with standardization of the development of the EHR systems so that they can easily be integrated with each other and friendly to use. Currently they are many systems in the market and one can battle with which one to concentrate on.

5.6 Suggestions for Further Research

On the basis of what has been found out from this study, the researcher makes the following suggestions for further research;

- i. A comprehensive study to be undertaken to find out the comparison between the attitudes of the EHR Adopters vs. Non-adopters in small health care facilities. This information can be useful for determining the most important factors influencing EHR adoption, as perceived by non-adopters.
- ii. A detailed study be undertaken to establish if the Location of the healthcare facility has an influence in the adoption. This information can be useful for determining if facilities in urban settings are more likely to adopt EHRs that those in the rural setting hence establish if there is a digital divide.

REFERENCES

- Albert Boonstra and Manda Broekhuis (2010): Barriers to the acceptance of electronic medical records by physicians from systematic review to taxonomy and interventions
- Amoroso CL, Akimana B, and Wise B, Fraser HS (2010): Using electronic medical records for HIV care in rural Rwanda -Studies in Health Technology Information.
- Andreas Hornstein, Per Krusell(1996): Can Technology Improvements Cause Productivity slowdowns? MIT press
- Brynjolfsson, Erik and Lorin M. Hitt. 2000. "Beyond Computation: Information Technology ,Organizational Transformation and Business Performance," Journal of Economic Perspectives, v. 14, p. 23-48
- Canada health infoway 2010: An overview of federal and provincial audit reports: Electronic health records in Canada. Minister of Public Works and Government Services Canada 2010.
- Chau, P.Y.K. (2001). Influence of computer attitude and self-efficacy on IT usage behavior. *Journal of End User Computing*, 13(1), 26-33.
- Cibulskis, R. E and Hiawalyer, G (2002): Information systems for health sector monitoring in Papua New Guinea : Bulletin of the World Health Organization : the International Journal of Public Health 2002
- Davis, F.D. (1986). *A Technology Acceptance Model for empirically testing new end-users information systems: Theory and results*. Doctoral dissertation, Sloan School of Management, Massachusetts Institute of Technology.
- Davis, F.D. (1989). Perceived usefulness, perceived ease of use, and user acceptance of information technology. *MIS Quarterly*, 13(3), 331-340.
- Davis, F.D., Bagozzi, R.P., & Warshaw, P.R. (1989). User acceptance of computer technology: A comparison of two theoretical models. *Management Science*, 35(8), 982-1003.
- Farmer, R., Miller, D. and Lawrenson, R., 1996. *Epidemiology and Public Health Medicine* (4th ed.), Blackwell Science, Oxford.

- Flanagan, L. & Jacobsen, M. (2003). Technology leadership for the twenty-first century principal. *Journal of Educational Administration*, 41(2), 124-142.
- Flinders, 2014: *Factors to Consider when Planning an Electronic Health Record (EHR) System Implementation: Global Lessons for South Africa*: Practice Manager Orthohealth Orthopedics and Rehabilitation University of Oregon, Applied Information Management Program
- George, D. and Mallery, P. (2003). *SPSS for Windows step by step: A simple guide and reference*. (4th ed.). Boston: Allyn and Bacon.
- Greenwood, J., Hercowitz, Z., Krusell, P., 1997. Long-run implications of investment-specific technological change. *American Economic Review* 87, 342–362.
- Greenwood, Jeremy and Boyan Jovanovic. 1998. “Accounting for Growth,” in C. Hulten, ed. *Studies in Income and Wealth: New Directions in Productivity Analysis*. Chicago: University of Chicago Press for NBER.
- Greenwood, J., Yorukoglu, M., 1997. “1974” Carnegie–Rochester Conference Series on Public Policy 46,49–95.
- Harrison, D. (2009). *An overview of health and health care in South Africa 1994 –2010: Priorities progress and prospects for new gains a discussion document commissioned by the Henry J. Kaiser Family Foundation to help inform the national health leaders’ retreat -Muldersdrift, January 24-26 2010*. Retrieved from <http://www.doh.gov.za/docs/reports/2010/overview1994-2010.pdf>
- Helpman, Elhanan, ed. 1998. *General Purpose Technologies and Economic Growth*. Cambridge, Massachusetts: MIT Press
- Jamoom, Beatty, Bercovitz, Woodwell, Palso, & Rechtsteiner, (2012); *Physician adoption of electronic health record systems: United States*,
- Josh Taylor (2013). *Australia's 'struggling' e-health records under review*. ZDnet Journals
- Kahn, T. (2011, 07.14). Minister finally gets going with universal health plan. *Business daily*-<http://www.businessday.co.za/articles/Content.aspx?id=148319>
- Kim, B., & Han, I. (2009). The role of trust belief in community-driven knowledge and its antecedents. *Journal of the American Society for Information Science & Technology*, 60(5), 1012-1026.

- Kerlinger, F. N. (1973). *Foundation of behavioral science*. New York: Holt, Rinehart and Winston.
- Kiley, Michael T. 1999. "Computers and Growth with Costs of Adjustment: Will the Future Look Like the Past?," Board of Governors of the Federal Reserve System.
- Loomis GA (2002), Ries S, Saywell RM, Thakker NR: If Electronic Medical Records Are So Great, Why Aren't Family Health care practitioners using them? *Journal of Family Practice*
- Ludwick DA, Doucette (2009). Primary Care Physicians' Experience with Electronic Medical Records: Barriers to Implementation in a Fee-for-Service Environment. *International Journal of Telemedicine and Applications*.
- Miller RH, Sim I. (2005) Physicians' Use of Electronic Medical Records: Barriers and Solutions: *Health Affairs*.
- Ministry of Medical services-Kenya 2010: Standards and guidelines for electronic medical systems in Kenya.
- Mwangi Caroline ,2013: *Computerization of the Kenyan Health Care Records*: Helsinki Metropolia University of Applied Sciences.
- Mugenda, O. M. and Mugenda, A. G. (1999). *Research Methods: Quantitative and Qualitative Approaches*. Nairobi: Acts Press.
- Nachmias, F (1996): *Research Methods in the Social Sciences* Oaks: Sage publications
- Phyllis Torda, 2010: *Easing the Adoption and Use Of Electronic Health Records In Small Practices*. *American health affairs journal*.
- Randeree E: Exploring Physician Adoption of EMRs: A Multi-Case Analysis. *Journal of Medical System* 2007, **31**(6):489-496
- Reinartz, W. J. (2004). „The customer management process: Its measurement and impact on performance..*Journal of Marketing Research.Management Information Systems* Vol.
- Simon SR, Kalshal R, Cleary PD, Jenter CA, Volk LA, Oray EJ, Burdick E, Poon EG, Bates DW (2007). Physicians and Electronic Health Records: A Statewide Survey. *Archives of Internal Medicine*.
- Smith, madon, anifalaje, malecela, Michael -2008): integrated health information systems in tanzania: experience and challenges: the electronic journal on information systems in developing countries

Stephen soumerai (2010):*Don't repeat the uk's Electronic Health Records Failure*. The huffingtonpost.

Tam, J. L. M. (2005). Examining the Dynamics of Consumer Expectations in a Chinese Technologies.*Journal of Marketing*.Vol. 66.

Terry ,Thorpe, Giles ,brown ,harris (2013):Implementing electronic health records:National library of medicine.

Tierney WM, Rotich JK, Hannan TJ, Siika AM, Biondich PG, Mamlin BW, Nyandiko WM, Kimaiyo S, Wools-Kaloustian K, Sidle JE, Simiyu C, Kigotho E, Musick B, Mamlin JJ, Einterz RM (2007): The AMPATH medical record system: creating, implementing, and sustaining an electronic medical record system to support HIV/AIDS care in western Kenya.

Tierney WM, Beck EJ, Gardner RM, Musick B, Shields M, Shiyonea NM, Spohr M. Viewpoint: A pragmatic approach to constructing a minimum dataset for care of patients with HIV in developing countries. *J Am Med Informat Assoc*. 2006; 13:253-260.

William M. Tierney, Marion Achieng, Elaine Baker, April Bell, Paul Biondich, Paula Braitstein, Daniel Kayiwa, Sylvester Kimaiyo, Burke Mamlin, Brian McKown, Nicholas Musinguzi, Winstone Nyandiko, Joseph Rotich, John Sidle, Abraham Siika, Martin Were, Ben Wolfe, Kara Wools-Kaloustian, Ada Yeung, Constantin Yiannoutsos, and the Tanzania-Uganda OpenMRS Consortium 2010: *Experience Implementing Electronic Health Records in Three East African Countries*

APPENDIX I

LETTER OF TRANSMITTAL OF DATA COLLECTION INSTRUMENTS

CHRISTINE WAITHIRA NJOROGE
P. O. BOX 51202-00200
NAIROBI
Tel: 0720703535

Dear Respondent,

RE: RESEARCH ON FACTORS INFLUENCING THE OF ADOPTION OF ELECTRONIC HEALTH RECORD SYSTEMS IN SMALL PRIVATE HEALTH FACILITIES IN RUIRU DISTRICT, KIAMBU COUNTY, KENYA.

I am a final year Master of Arts student at the University of Nairobi, specializing in Project Planning and Management. As part of my course, I am required to carry out a research on the above topic.

You have been selected as one of the respondents to assist in providing the requisite data and information for this undertaking. I kindly request you to spare a few minutes and answer the attached questionnaire. The information so obtained will be used for academic purposes only, will be treated with utmost confidentiality and will not be shared with anyone whatsoever. Do not write your name anywhere on the questionnaire.

Thank you for your cooperation.

Yours faithfully,

Christine Njoroge

APPENDIX II

QUESTIONNAIRE FOR HEALTH CARE PRACTITIONER

This questionnaire is designed to help explore some of the issues associated with the influence of adoption of Electronic Health Records systems by small private health facilities in Ruiru District. Your cooperation in completing this would be much appreciated. Responses will be anonymous and no comments will be attributable to individuals. Please note that your participation in this study will be voluntary.

SECTION ONE: GENERAL INFORMATION

1. Gender? Male () Female ()
2. Age?.....
3. What is your highest level of education?

Post Graduate	()	Graduate	()
Diploma	()	Certificate	()
4. Number of health care practitioners practicing in the health facility.....
5. Total number of years of experience/operation:
 - a. Less than 1 year
 - b. 1 - 5 years
 - c. 6 – 10 years
 - d. More than 10 years
6. Current Type of practice:
 - a. Full time Private Institution. ()
 - b. Part time Private Institution. ()
7. As of today, what is your degree of electronic health record system implementation?
(Tick only one box)
 Fully implemented for all staff and all practice locations
 Partially electronic and partially paper.
 Not implemented

Any plans to upgrade Yes/ No

8. If using partially electronic and partially paper system, kindly explain the computers' usage in your facility e.g. for billing only e.t.c
9. If not implemented any electronic recording system, have ever used any electronic system before Y/N.....
- If yes, why is it not in use currently.....*

SECTION TWO: Financial Implications and the Adoption of EHR Systems.

10. Was the acquisition of the EHR in your initial budget? Y/N
11. Do you feel that you will recover the costs for implementation of the EHR records?
 Yes
 No
 Not sure
12. To what extent do you agree that the following are cost aspects that influence the adoption of EHR systems: Use the scale of : 5= to a great extent, 4= high extent, 3= moderate extent 2= small extent and 1= Not at all

	1	2	3	4	5
Hardware purchase costs					
Annual Software license fee					
Training and consultation fee					
System maintenance costs					
Data entry costs					

SECTION THREE: Level of ICT knowledge and the adoption of EHR systems.

13. In terms of general use of ICT [e.g. office software] please estimate your level of understanding and operation of the following computer applications. Use the scale of: 5 = I can use it very well, 4 = I can use it well, 3 = I can use it satisfactorily, 2 = I can use it to a small extent, 1 = I cannot use it

	1	2	3	4	5
Word processor, data base systems, spreadsheets e.t.c.					
Internet e.g. search engines like google.com					
E-mailing communication e.g. yahoo/Gmail					

14. Kindly rate the ease of use of EHR systems in your day to day operations. Use the scale of: 5 = very easy to use, 4 = Easy to use, 3 = neutral, 2 = easy to use to a small extent, 1 = not easy to use at all

	1	2	3	4	5
Ease of use					

In your opinion, what comment would you make regarding your answer above.....

.....

15. Any other comments concerning computer usage e.g. typing skills

.....

SECTION FOUR: Access to ICT infrastructure and the adoption of EHR systems.

16. Specify to what extent the health care practitioners have integration of ICT and use the ICT infrastructure in their day to day activities .Use the scale of : 5= to a great extent, 4= high extent, 3= moderate extent 2= small extent and 1= Not at all

	1	2	3	4	5
Have computers and use them every day					
Have a printer and use it every day					
Computers are linked via a local area network					
Computers can access internet					

17. Do you have an advisor who guide you on the system functionality and assists when there is a problem with your system? Y/N Kindly explain

.....

SECTION FIVE: Perception of health care practitioners and the adoption of EHR systems.

18. Rate the following perception towards computer usage. Use the scale of: 5= to a great extent, 4= high extent, 3= moderate extent 2= small extent and 1= Not at all

	1	2	3	4	5

I feel comfortable with the idea of the computer as a tool to aid my day to day operations.					
If something goes wrong I will know how to fix it					
I can spare time to learn the system.					
I am willing to convert the day to day operations to the computerized system only since it is reliable.					
I am skeptical about usage of the system due to security issues that come along with computers e.g. viruses.					
Changing to the computer system will be a lot of work e.g. data entry					

SECTION SIX: Adoption of EHR systems.

19. In your opinion, rate each of the following factors and how they have affected you in the implementation of EHR systems. Use the scale of: 5 = makes implementation extremely difficult, 4 = makes implementation difficult, 3 = complicates implementation to some degree, 2 = minor impact on implementation, 1 = not a problem.

	1	2	3	4	5
Lack of capital resources to invest in an EHR					
Insufficient return on investment (ROI) from an EHR					
Lack of support from practice health care practitioners					
Lack of support from practice non physician providers					
Lack of support from practice clinical staff					
Lack of support from practice administration					
Security and privacy concerns					
Inability to integrate the EHR with practice's billing / claims submission system					
Available EHR software does not meet the practice's needs					
Practice staff does not have skills/training to use an EHR system					
Insufficient time to select, contract, install and implement an EHR					
Inability to easily input historic medical record data into the EHR system					
Inability to evaluate, compare and select the appropriate EHR system					
Concern about loss of productivity during transition to the EHR system					
Concern about ability of health care practitioners to input into a computerized system					

APPENDIX III

KREJCIE AND MORGAN TABLE

Table for Determining Sample Size for a Given Population

N	S	N	S	N	S	N	S	N	S
10	10	100	80	280	162	800	260	2800	338
15	14	110	86	290	165	850	265	3000	341
20	19	120	92	300	169	900	269	3500	246
25	24	130	97	320	175	950	274	4000	351
30	28	140	103	340	181	1000	278	4500	351
35	32	150	108	360	186	1100	285	5000	357
40	36	160	113	380	181	1200	291	6000	361
45	40	180	118	400	196	1300	297	7000	364
50	44	190	123	420	201	1400	302	8000	367
55	48	200	127	440	205	1500	306	9000	368
60	52	210	132	460	210	1600	310	10000	373
65	56	220	136	480	214	1700	313	15000	375
70	59	230	140	500	217	1800	317	20000	377
75	63	240	144	550	225	1900	320	30000	379
80	66	250	148	600	234	2000	322	40000	380
85	70	260	152	650	242	2200	327	50000	381
90	73	270	155	700	248	2400	331	75000	382
95	76	270	159	750	256	2600	335	100000	384

Note: "N" is population size
"S" is sample size.

Source: Krejcie & Morgan, 1970