

**INFLUENCE OF HEALTH INFORMATION SYSTEM (HIS) ON SERVICE
DELIVERY IN PUBLIC HEALTH FACILITIES IN KENYA: A CASE OF IMENTI
NORTH SUB-COUNTY, MERU COUNTY**

BY

JANERITA RUGURU MWANIKI

**A RESEARCH PROJECT REPORT SUBMITTED IN FULFILMENT OF THE
REQUIREMENTS FOR THE AWARD OF THE DEGREE OF MASTER OF ARTS
IN PROJECT PLANNING AND MANAGEMENT OF THE UNIVERSITY OF
NAIROBI**

2017

DECLARATION

This Research project is my original work and has not been submitted for an award of any other degree in any university or college.

Signature:**Date:**.....

JANERITA RUGURU MWANIKI

L50/83249/2015

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

Signed..... **Date**

Dr Mercy M. Mugambi

School of Education

University of Nairobi.

DEDICATION

I dedicate this work to my late son Arnold Njeru who never had a chance to reach this level as he had wished.

ACKNOWLEDGEMENT

I wish to thank my supervisor Dr. Mercy Mugambi for her support and guidance while writing this project as well as other lecturers who have been very supportive throughout my learning period. I also recognize UON Meru extra mural Centre fraternity for their support as well as the Kenya national library staff (Meru branch).

I recognize my employer for allowing and granting me leave to advance my education, the Meru teaching and referral hospital administration and their administrative secretaries for their cooperation during data collection and also my colleagues in dental department for their words of encouragement. I acknowledge the respondents for sparing their time in offering valuable information which enabled me to compile this document.

Finally i appreciate Mr. Ezekiah Kimani for his contribution as a proof reader of the project document and lastly Fridah Karimi and Benard Owino for standing by me in times of difficulties. Finally I appreciate Purity for her work of printing the document.

TABLE OF CONTENTS

DECLARATION	ii
DEDICATION	iii
ACKNOWLEDGEMENT	iv
TABLE OF CONTENTS	v
LIST OF FIGURES	viii
LIST OF TABLES	ix
ABBREVIATIONS AND ACRONYMS	x
ABSTRACT	xi
CHAPTER ONE	1
INTRODUCTION	1
1.1 Background to the Study.....	1
1.2 Statement of the Problem.....	4
1.3 Purpose of the Study	5
1.4 Objectives of the Study.....	5
1.5 Research Questions	6
1.6 Significance of the Study	6
1.7 Delimitation of the Study.....	7
1.8 Limitations of the Study.....	7
1.9 Basic Assumptions of the Study	7
1.10 Definition of Significant Terms Used In the Study	7
1.11 Organization of the Study	9
CHAPTER TWO	10
LITERATURE REVIEW	10
2.1 Introduction.....	10
2.2 Record Keeping Systems and Service Delivery in Medical Health Facilities.....	10
2.3 Disease Management Systems and Service Delivery in Medical Health Facilities.....	13
2.4 Financial Management Systems and Service Delivery in Medical Facilities.....	17
2.5 Human Resource Management Technology and Service Delivery in Medical Health Facilities.....	19
2.6 Theoretical Framework.....	23
2.6.1 Technology Acceptance Model	23

2.6.2 Change Theory.....	24
2.6.3 Theory of Professions	25
2.7 Conceptual Framework.....	26
2.8 Summary of Literature.....	27
2.9 Research gaps.....	28
CHAPTER THREE	30
RESEARCH METHODOLOGY	30
3.1 Introduction.....	30
3.2 Research Design.....	30
3.3 Target Population.....	30
3.4 Sample Size and Sampling procedures	31
3.4.1 Sample size	31
3.4.2 Sampling procedures.....	32
3.5 Methods of Data Collection	32
3.6 Pilot Testing	33
3.7 Validity of Research Instruments.....	33
3.8 Reliability of Research Instruments	33
3.9 Data Analysis Techniques.....	34
3.10 Ethical Considerations	35
3.11 Operational Definition of Variables.....	36
CHAPTER FOUR.....	39
DATA ANALYSIS AND INTERPRETATION OF FINDINGS.....	39
4.1 Introduction.....	39
4.2 Response rate	39
4.4 Demographic Information.....	39
4.4.1 Gender of the Respondent.....	39
4.4.2 Respondents Period Worked in their Respective Institution	40
4.4.3 Respondents Highest Level of Education	41
4.4.4 Respondents Age Bracket	41
4.4.5 Respondents Area of Specialization	42
4.5 Influence of Health Information System.....	42
4.5.1 Record Keeping Systems and Service Delivery	42

4.5.2 Disease Management Systems and Service Delivery	44
4.5.3 Financial Management Systems and Service Delivery	45
4.5.4 Human Resource Management Systems Factors and Service Delivery	47
4.5.5 Service Delivery in Health Institutions in Kenya	48
4.6 Multiple Regression Analysis	49
CHAPTER FIVE	52
SUMMARY, DISCUSSION, CONCLUSION AND RECOMMENDATIONS	52
5.1 Introduction.....	52
5.2 Summary of the Findings.....	52
5.3 Discussion	53
5.3.1 Record Keeping Systems and Service Delivery	53
5.3.2 Disease Management Systems and Service Delivery	53
5.3.3 Financial Management Systems and Service Delivery.....	54
5.3.4 Human Resource Management Systems and Service Delivery	54
5.4 Conclusion	55
5.5 Recommendations.....	56
5.6 suggestions for Further Studies.....	56
REFERENCES.....	58
APPENDICES	63
Appendix I: Letter of Transmittal	63
Appendix II: Research Questionnaire for medical staff	64

LIST OF FIGURES

Figure 1: Conceptual Framework	27
--------------------------------------	----

LIST OF TABLES

Table 3. 1: Target Population.....	31
Table 3. 2: Sample Size	32
Table 3. 3: Reliability of Measurement Scales	34
Table 3. 4: Operationalization of variables.....	37
Table 4. 1: Response Rate.....	39
Table 4.2: Gender of the Respondent	40
Table 4.3: Respondents Period Worked in their Respective Institution	40
Table 4. 4: Level of Education.....	41
Table 4. 5: Respondents Age Bracket.....	41
Table 4. 6: Respondents Area of Specialization	42
Table 4. 7: Record Keeping Systems and Service Delivery	43
Table 4. 8: Various Aspects of Record Keeping Systems and Service Delivery	43
Table 4. 9: Disease Management Systems and Service Delivery	44
Table 4. 10: Disease Management Systems Factors and Service Delivery.	45
Table 4. 11: Financial Management Systems Factors and Service Delivery.....	46
Table 4. 12: Financial Management Systems Factors and Service Delivery.....	46
Table 4. 13: Human Resource Management Systems and Service Delivery.....	47
Table 4. 14: Human Resource Management Systems Parameters and Service Delivery.....	47
Table 4. 15: Service Delivery in Health Institutions in Kenya	49
Table 4. 16: Model Summary	49
Table 4. 17: ANOVA results	50
Table 4. 18: Regression Coefficients	50

ABBREVIATIONS AND ACRONYMS

AHRQ	-	Agency for Healthcare Research and Quality
AIDS	-	Acquired Immune Deficiency Syndrome
EHR	-	Electronic Health Records
EMR	-	Electronic Medical Records
FBO	-	Faith Based Organization
HIV	-	Human Immunodeficiency Virus
ICT	-	Information and Communication Technology
IOS	-	International Organization for Standardization
ISO	-	International Organization for Standardization
KEMSA	-	Kenya Medical supplies
KNH	-	Kenyatta National Hospital
MAMA	-	Mobile Alliance for Maternal Action
MEDS	-	Mission for Essential Drugs
MRI	-	Magnetic Resonance Imaging
NEA	-	Netherlands Enterprise Agency
NGO	-	Non Governmental Organization
POE	-	Physician Order Entry
SPSS	-	Statistical Package for Social Sciences
TAM	-	Technology Acceptance Model
TRA	-	Theory of Reasoned Action
USA	-	United States of America

ABSTRACT

Kenyan healthcare system can be categorized into three in relation to where the funding for the facilities is acquired. Public hospitals are mainly funded by the Government of Kenya with minimal input from copay by the patients. Previous experience in these facilities revealed a slow pace of service delivery in public hospitals which was not witnessed in other categories of the hospital. A delay in offering services, frequent disputes between management and staff in relation to delayed payment of dues, inadequate working equipment and poor working environment formed part of disruptions of service delivery. These disruptions were not witnessed in private facilities as their operations were smoother and the process from admission to discharge had very minimal disruptions. This prompted the researcher to investigate what might be the reasons behind slow service delivery in public hospitals. Despite government efforts of bringing quality medical services closer to the people through devolution, the level of public health service delivery is still wanting. The purpose of this study was to investigate the influence of HIS on service delivery in government health centers in Kenya: a case of Imenti North sub-county, Meru County. Specifically, the study sought to determine the influence of record keeping systems, disease management systems, financial management systems and human resource management systems on service delivery in public medical health facilities in Imenti north sub-county. A descriptive survey research design was used. This research has employed stratified random sampling where a sample of 206 respondents was selected. The target population was 445 staff in the 25 health facilities in Imenti North Sub-County and these included medical and dental doctors, pharmacists, nurses, and laboratory technologists. A questionnaire was employed to collect data from the hospital staff. Data was analyzed using descriptive statistics such as frequencies, percentages, mean score and standard deviation with aid of SPSS version 22.0. The qualitative data from the open-ended questions was analyzed using conceptual content analysis and presented in prose form. Multiple regression analysis was used to establish the relationship between the independent and dependent variables. The data was presented using tables. This study found that there is a great influence brought about by record keeping systems on health service delivery in Imenti North sub-county. Under this, the study revealed that disease management systems greatly influence health service delivery. Concerning financial management systems, the study found that they greatly influenced health service delivery in Imenti North sub-county. Human resource management systems factors were found to greatly influence health service delivery. The study also concluded that record keeping systems, disease management systems, financial management systems and human resource management systems greatly and positively influences health service delivery. This study recommends the following; that patients' health records to be made available to health providers to aid in timely interventions, health personnel to be provided with continuous trainings in technology to keep up with new technological advances, central government to increase budgetary allocations to the counties as well as keep financial surveillance and health workers to be motivated to improve service delivery. Finally a further research is recommended to include other sub-counties in Meru County.

CHAPTER ONE

INTRODUCTION

1.1 Background to the Study

Health information system is an umbrella framework that describes the overall management of health information, its secure exchange between consumers and providers among others. It can be used to manage records, manage diseases especially in public health. It can be referred to as a tool that can improve overall quality of health care system (Sinha, 2010). Quality is when the inherent characteristics of a product meets the customer's requirements, and then the product can be rated as high and that is according to the International Organization for Standardization. The experience of the patient defines quality. Other aspects of quality in the health sector are affordability, newer medical technology and newer and effective medication (Housego & O'Brien, 2012). Quality service delivery can only be achieved if mechanisms are put in place to allow equal access to correct, relevant and timely health information regardless of distance to the health facilities. According to WHO (2014) health systems are fundamental in ensuring improved citizens' welfare and of nations as well.

Etoundi *et al* (2012), defines quality service into two groups namely; technical and functional. Technical quality relates to the technical accuracy of the medical procedures and medical diagnoses carried out. In addition, it also includes the conformance to the medical profession's guidelines. Functional quality refers to the way that the services in the health care industry are delivered to the patients.

Management style is important in service delivery in public hospitals and these calls for realistic view of the demands of employees as well as wellbeing of the patients who rely on these services. The basic infrastructure required to achieve the best out of the public hospitals need to incorporate implementation of information systems to aid on online admissions and discharges, however these systems are only utilized in registration in most public hospitals. Information systems have not been utilized to capture diagnosis and treatment of patients using modern technologies, admission and movement of patients, document management and record keeping, financial services including inline, mobile and card payments to achieve its full potential to reduce bureaucratic paperwork and enhance efficient service delivery (Housego & O'Brien, 2012).

Public hospitals have one of the best trained personnel but lack the necessary tools and equipment for regular update of the skills as there is a faster change in technology and treatment and diagnostic methods. A flexible and adaptable workforce is required to match the changing healthcare field through regular trainings. For efficient services, the hospitals also need to recruit and train highly specialized and talented team and regularly update their skills through training and development (Cordella & Tempini, 2015). There is inadequacy supply of drugs in public making the relatives of the patients to purchase the items from private pharmaceutical companies, worsening the already existing inefficiency (Saxena & Sharma, 2012).

Due to poor service delivery in south Africa the municipal government made an initiative ;the People First discourse aimed at positively transforming public (Radnor *et al*, 2014). It also lays emphasis on the significance of the citizen focused ethos especially in public service delivery and monitoring. The *Batho Pele* (People First) sets crucial benchmarks for monitoring service delivery in all state entities and departments. It aims at achieving this ideal by establishing a baseline for customers to express their discontent when service standards are not met. The seventh principle, for instance, is quite clear about the nature of reparation customers are eligible to. It further states that if the standards of service promised are not provided, citizens should be offered an effective and speedy remedy, and when the citizens complain about poor quality in the services, citizens should receive a positive, sympathetic response (Radnor *et al*, 2014).

The whole idea of *Batho Pele* stresses on the establishment of a new style of handling citizens and customers; many public servants more often than not perceive complaints as an intrusion and irritation to their working lives. When complaints procedures are not instituted, they regularly tend to justify or defend a department's shortcomings. By offering redress, *Batho Pele* appeases unhappy or irate customers and also aims at changing the attitude of service providers from a fixation with the processes of service delivery to a focus on outcomes and deliverables. It therefore initiates a process of improving service delivery and in the long run continuous enhancement and quality service delivery (Akinboade, Kinfack & Mokwena, 2012).

In Kenya, there are over 4,700 health facilities however public sector only accounts for 51% of these institutions. Health sector is classified in levels starting from national, provincial,

district hospitals and finally the dispensaries and health centers. There is integration of all these hospital levels as the hierarchy goes down from the national level (Chodzaza & Gombachika, 2013). Moi Referral and Teaching hospital in Eldoret and Kenyatta National Hospital in Nairobi are the two main national level hospitals in Kenya. The provincial level is the intermediary between the districts and the national central level. They are charged with the responsibility of maintaining quality standards, implementation of health policy at the district level and control all district health activities (Njuru, 2011).

In Kenya, like in most developing countries in Africa, premature deaths and preventable diseases still inflict a high toll in communities and its people because there inadequacy in access to basic health services is affecting distinct regions, areas, communities, and social groups in these countries. Most public hospitals in the recent past have witnessed employee dissatisfaction presented in terms of refusal to offer services due to failure of payment of dues, poor working environment, inadequate infrastructure and lack of commitment by the management to engage with employees. This gap in service delivery in public hospitals has led to unwarranted suffering by the patients who lay their hopes on the services offered by these hospitals (Ajayi & Tokon, 2009).

Medical professionals need updated information if they are to keep pace with new medical information and use of HIS becomes useful. There is little if any evidence that the majority of healthcare professionals in Kenya have better access to adequate and reliable information hence Kenya continues to be ravaged by preventable communicable diseases such as HIV/Aids, tuberculosis, child mortality, nutritional deficiency, deteriorating health facilities among others (Gatero, 2010). Health care providers include nurses, doctors, and pharmacists among other categories. Health care providers at different levels influence hospital strategy and plan nursing activities in order to provide a competitive environment. For example, administrative tasks (such as filling out forms and processing billing requests) represent a significant fraction of healthcare costs. Health Information Systems could streamline these tasks and significantly decrease costs, as well as reduce personal visits to doctors (Odiwour *et al*, 2015). In developing countries recording has been done on paper. This method of recording has limitations; among them illegibility, ambiguity, incomplete data, poor availability and data fragmentation and this impedes the continuity and quality of care of patients (Mugo & Nzuki, 2014).

Therefore the already existing systems must be strengthened as health systems that are not well developed not only hamper individual's social and economic development but also they may cause detrimental effect on national economic prospects (WHO 2014). This can be evidenced by 2014-2016 Ebola out-break in West African countries that caused economic downturn and almost brought to halt economic activities in the affected areas. Many of the affected countries could hardly contain the outbreak due to inadequate health care services. The Ebola outbreak thus calls for improved health systems if African countries can register the required economic, social and political development (Mimbi & Bankole, 2015).

1.2 Statement of the Problem

Though the Kenyan government has been trying to build an effective health care system to meet the millennium development goals and vision 2030, quality health care has been below par. It is estimated that 60% of Kenyan populations live below poverty line, living on less than 1.25 dollars a day (Mohajan 2014). There was an increase of people living with HIV as well as mother-to-child transmissions between the years 2012 to 2015. The incidences of tuberculosis took an upward trend during the same period (Meru County, 2015).

Meru county set up a committee to look into what ails the health sector and the findings were that there was poor remuneration of staffs and delayed salaries in public health sector due to delayed reimbursement of funds from central government, inadequate and late delivery of drugs from KEMSA and MEDS, inadequate health personnel both skilled and support staff (Meru County Government, 2014). Also there are frequent health workers strikes, demonstrations and picketing that disrupt service delivery. The just concluded health workers strike (2016-2017) in the entire country (Meru sub-County included) which had paralyzed health services in public health facilities for 100 days has affected the health delivery services to a great extent. This is an indicator of poor performance of the health sector and service delivery is wanting. Banda (2006) discovered that public health institutions were facing challenges and competition from the private health institutions. It has also been observed that the total government spending (per capital) in health has declined since 2012 (Meru county, 2015). This is according to county expenditure books 2014/2015.

Some patients have not been able to receive health services in Imenti North public hospitals due to malfunctioning and un-improved disease management technological facilities and staff level of incompetence and skills in the health service delivery technology. This prompts

patient being referred to private hospitals for some procedures. Cases such as MRI are referred to private clinics though the machines are available in the referral hospital. There are no skilled personnel to operate and interpret the results. Biopsies are also sent to private hospitals for lack of equipment prompting long stay for patients while waiting for results. It also digs deep into the patients' finances. This delays the treatment and at times can result to loss of life.

Despite government efforts of bringing quality medical services closer to the people through devolution, the level of public health service delivery is still wanting (Meru sub-county is no exception). Githua (2006) noted that hospitals should have a specialized human resource unit which can coordinate all human resource practices. There is little information on influence of HIS on service delivery in medical health in Imenti North sub-county hence prompting the researcher to undertake this project.

According to Ahmad (2014), poor financial management skills, lack of transparency, ICT inefficiency despite high adoption mainly due to lack of skilled workers to use the machines well and finally, increase in under-qualified officers resulting to low efficiency in dealing with sicknesses, have led to poor service delivery in the health sector. The staff is also not well prepared for technological change judging by the usage of patients' paper files in Meru Teaching and Referral hospital. As such, it is clear that the problem that the Kenyan health sector mainly originates from within the medial institutions.

1.3 Purpose of the Study

The purpose of this study was to investigate the influence of HIS on service delivery in government health centers in Kenya: a case of Imenti north sub-county, Meru County.

1.4 Objectives of the Study

The study aimed to achieve the following objectives:

- i. To determine the influence of record keeping systems on service delivery in public medical health facilities in Imenti North sub-county.
- ii. To assess how disease management systems influence service delivery in public medical health facilities in Imenti North sub-county.
- iii. To determine the influence of financial management systems on service delivery in public medical health facilities in Imenti North sub-county.

- iv. To examine the influence of human resource management systems on service delivery in public medical health facilities in Imenti North sub- county.

1.5 Research Questions

The study was guided by the following research questions:

- i. To what extent do record keeping systems influence service delivery in public medical health facilities in Imenti North sub-county?
- ii. How do disease management systems influence service delivery in public medical health facilities in Imenti North sub-county?
- iii. What is the influence of financial management systems on service delivery in public medical health facilities in Imenti North sub-county?
- iv. To what extent do human resource management systems influence service delivery in public medical health facilities in Imenti North sub-county?

1.6 Significance of the Study

The study offers valuable contributions from both a theoretical and practical standpoint. From a theoretical standpoint, it contributes to the general understanding on the factors affecting health service delivery in public institutions. In addition, to academicians and researchers, the study would provide information that formed a basis for further research on the factors affecting service delivery in public institutions.

To the administrators of the health facilities in Kenya, the study may provide information on how to remedy the poor service delivery in the health sector in Kenya. Further, the study will provide valuable information regarding the planning of the health sector to improve on service delivery.

To the government and policymakers the study might provide vital information that can assist the government to formulate policies in relation to the use of medical information systems, and as well as disease management systems to improve on health service delivery. Further, the study may also provide vital information that can be used to improve the employees' capacity in the health sector and come up with ways of monitoring financial resources in the health sector to improve service delivery.

1.7 Delimitation of the Study

This study on the influence of HIS on service delivery in public medical health facilities in Kenya was done in Imenti North sub-county, Meru County. Imenti North sub-county had been chosen as the study area since it is one of the areas where public health sector is performing poorly. The professional staff working in the public health institutions formed the population for the study however the study only covered level 5 and level 4 hospitals where adoption of ICT is operational. The study did not cover the aspect of patients as respondents.

1.8 Limitations of the Study

The study encountered some limitations that hindered access to information that the study was seeking. Some of the respondents were unavailable necessitating the researcher to wait a little longer in gathering information. The respondents targeted in this study were reluctant in giving the information. The researcher carried an introductory letter from the University to assure them that their identity was to be held confidential and information they provided was treated with confidentiality and was used purely for academic purposes. On the other hand the respondents were asked not to indicate their identities on the questionnaire.

In addition, the findings of this study were limited to the extent to which the respondents provided accurate, objective and reliable information. The researcher checked for consistency and test the reliability of the data collected.

1.9 Basic Assumptions of the Study

It was assumed that during the study the respondents filled in accurately and completely the questionnaires and answers the questions truthfully. Since a specific research sample used, it was assumed that it was a representative of the staff and other hospital representatives in the Imenti north sub-County.

1.10 Definition of Significant Terms Used In the Study

Disease management- This is defined as "a system of coordinated healthcare interventions and communications for populations with conditions in which patient self-care efforts are significant." It also means to stop the disease from getting worse.

Financial management- Refers to the efficient and effective management of money (funds) in such a manner as to accomplish the objectives of the organization.

Health care - As used in this study refers to the work done in providing primary care (prevention), secondary care (treatment and curative), and tertiary care (palliative), as well as in public health. It is delivered by practitioners in health profession.

Human resource - is the term used to describe formal systems devised for the management of people within an organization. The responsibilities of a human resource manager fall into three major areas: staffing, employee compensation and benefits, and defining/designing work.

Human resource management- This is the management of human resources. It is designed to maximize employee performance in service of an employer's strategic objectives.

Information communication and technology services (ICT) - in this study's perspective are services, offered mostly via computer based devices, applications and systems used to increase efficiency of services delivered in public hospitals.

Public Hospital- A public hospital or Government Hospital is a facility that is funded by government for its daily operations. They provide medical care either free of charge or at subsidized rates, the cost which is covered by financing from the National or County Governments.

Record-keeping- This is the process of recording transactions and events in an accounting system. Since the principles of accounting rely on accurate and thorough records.

Service delivery- Service delivery in this study context means the process of offering needed assistance to the patient from admission until discharge, both in and outpatient services including the process of discharge from hospital as per the opinion of service providers and the patients. It also includes follow up of a patient to monitor the progress after discharge.

Technology- This is the collection of techniques, skills, methods and processes used in the production of goods or services or in the accomplishment of objectives, such as scientific investigation.

Health information system- it is an umbrella body that regulates how information is generated and used safely to improve service delivery.

1.11 Organization of the Study

This study is organized into five chapters. Chapter one contains the introduction to the study. It presents background to the study, statement of the problem, purpose of the study, objectives of the study, research questions, significance of the Study, delimitations of the study, limitations of the Study and the definition of significant terms. Chapter two reviews the literature based on the objectives of the study, theoretical and conceptual framework and finally the summary and research gap. Chapter three covers the research methodology of the study. The chapter describes the research design, target population, sample size and sampling procedure, procedure for data collection, pilot-testing, data analysis techniques, ethical considerations and finally the operational definition of variables. Chapter four presents data analysis and presentation of findings. The study closes with chapter five which presents the summary, discussion, conclusion, and recommendations. Finally suggestions for further research are also presented.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

This chapter provides an extensive literature and research related to influence of HIS on service delivery in public health sector. This literature review summarizes a diverse spectrum of views about HIS and public health sector. The chapter is thus structured into conceptual and empirical review based on the study variables; research gap and summary of literature are also presented. The last part of the chapter covers theoretical base and conceptual framework.

Health service delivery is the immediate output of inputs into the health system. This includes workforce, procurement, supplies and financing among others. For any nation to achieve millennium development goals and vision 2030 delivery systems must be strengthened. A nation should record low mortality rates as well as reduction in the burden of communicable diseases such as HIV/Aids, reduction in malnutrition cases among other things if it needs to record meaningful economic growth.

2.2 Record Keeping Systems and Service Delivery in Medical Health Facilities

Health record management practice is imperative in any health service providing institution in ensuring quality service delivery. Health records are among the vital tools that hospitals require in order to attain the missions and visions of the respective hospitals. The purpose of health record management is to ensure quality, accuracy, accessibility, authenticity and security of information in both paper and electronic systems (Akinboade, Kinfack & Mokwena, 2012). Effective medical service delivery does not only depend on the knowledge of doctors and nurses but also records-keeping processes in the hospital. Health records are of different types depending on the size and activities of the given hospital. Records managed in hospitals include patient case notes, x-rays, pathological specimens and preparations, patient indexes and registers, pharmacy and drug records, nursing and ward records.

Most hospitals have embraced the aspect of implementing electronic health record management system. Chodzaza and Gombachika (2013) reported that many hospitals are incorporating ICT into health record management due to the high level of the shortcomings of manual health records management, such as misfiling of patients health records, enormous amounts of space, legibility of clinicians' handwriting, transfer of medical records or files from one department to another which requires involvement of more personnel. Automation

of health records is a vital step in any health institution. The choice of a record management system depends on quite a number of factors. The system of choice determines the safety and availability of records when needed. ISO 15489 (2001) gives criteria for auditing a record management system. The system must ensure authenticity, reliability, integrity, and usability.

Maintaining records for as long as the records are required, records must be retained for a period of time that is in accordance with authorized legislative and jurisdictional requirements. Decisions about how long records must be retained are defined in disposition or disposal policies and rules. There will be some records that must be retained permanently while others will be required to be retained for varying periods or have a maximum retention period. Automation of health record management program comes with other obligations. Ajayi and Tokon (2009) state that staff training on new record management systems is imminent if the system is expected to cause positive change in the record management program. Prakash (2016) stated that automation of record management practice is a gradual process.

There are two major means of keeping medical or health records of patients in any healthcare delivery facility. These are paper-based record keeping systems and EHR keeping systems. The healthcare industry has widely made use of paper based record system as a means of keeping patient's medical information for the past two hundred decades (Abuya, 2016). Although, it has helped the entire healthcare delivery system a great deal from antiquity to date. Kilonzo and Ikamari (2015) observe that, paper based record inherently pose some corporeal and informational challenges that makes it difficult for it to be sustained as a proper means of record keeping in healthcare delivery.

According to Saxena and Sharma (2012), EHRs should be construed as comprising of retrospective, concurrent as well as prospective information which has the primary objective of supporting continuous, efficient and quality integrated healthcare delivery. Mohamed and Xavier (2016) assert that EHRs go beyond just the electronic version of the paper based record to encompass the whole management of data required for patients' care. Thus, Hasan (2015) agreed to the point that EHRs play a many-sided role in healthcare delivery than just being a computer system. Ahmad (2014) has noted that an effective EHR system: should have the capacity of storing patient health information and data longitudinally and should enable results generated from the systems to be managed properly. This enables the

facilitation of electronic communication and connectivity and thus should provide patient support and help in administrative processes and report.

USA adopted electronic health records in all their hospitals by 2014 according to Stacy & Ulku (2012) to increase health information exchange, and maintaining countrywide network. This allows all stakeholders to exchange information electronically and in turn lowers the cost of health care and improves quality. Löbel, Paulowitsch and Schuppan (2016) also states that the EHR can be used in clinical documentation whereby health professionals are facilitated to better handle progress notes of their patients either as free text directly entered into the system or by predefined structured notes. Also, the system can be used in Physician Order Entry (POE) which allows for ordering diagnostic tests and medication in a standardized and formalized way. Other EHR systems provide for checking drug interactions and alert for patient allergy and booking service where patients can book appointments with their medical professionals either face to face or online. Additionally, the EHR system facilitates communication and messaging in that it facilitates the exchange communication between various hospitals, general practitioners, pharmacies, and laboratories.

Paper health records cannot be integrated with other paper forms or information. The ability to integrate health records with a variety of other services and information and to share the information is critical to the future of healthcare reform. The system should be able to show some warnings to abnormal results. The system should also depict trends of a particular result. Charge Capture/Billing is another application of the EHR which makes it easier to track expenses owed to the facility by virtue of the health service provided to the patient. As well, the EHR can be used in disease management of chronic diseases by allowing health professionals to access data to assess whether or not disease is been managed properly. Management of security issues is also facilitated through EHR through the special features that help manage authentication and authorization of users.

In Africa specifically in South Africa, record management is a practiced phenomenon, in spite of the standards of the practice being not as expected. Liu and Yuan (2015) noted that there is need for all the health care professionals to appreciate the value of keeping records accurately. The only vast undoing is that many doctors are unaware of the record management practice and therefore at times the records are disposed prematurely. Institute for safe medication (2000) reported a calculated 39% in medication error due to eligibility of

handwritten prescriptions. Acquash-Swanzy (2015) in her thesis in Effia Nkwanta Regional Hospital in Ghana found out that use of electronic health recording greatly reduces the following: errors and missing files, work task, expenditure on paper logistics and retrieval of absconded bills. A study done by DesRoches et al (2015) found out that 97% of the respondents reported that electronic health records add to timely access to health records while 82% said that electronic health records positively influenced the quality of clinical decisions. This therefore shows that electronic health records increases efficiency, safety, authenticity and effectiveness in health care delivery. However for an effective electronic health recording the institutions must ensure technology is acceptable by the staffs and engages them in regular trainings to keep up with new technology advancements And in a study done in Uganda the participants acknowledged that use of ICT resulted in benefits such as management of medical records and other medical documents as well as easiness in accessing information on patients (Yagos *et al*, 2017). However they pointed out that there is lack of skills in the use of ICT that hinder their operations

In Kenya, it is a requirement by the government that records are properly created and preserved for use. According to laws of Kenya, public archives and documentation service act, chapter 19, the government recognizes the need for record keeping for the public. This includes health records since the records carry information that concerns the Kenyan citizens. Health record management system has faced constraints like lack of a written health information policy to ensure compliance and enforcement in reporting, low reporting rates (under 60% for most of the sub systems), making the data unrepresentative for management, planning and budgeting at all levels, un-timeliness/late reporting; resulting in delays in data processing, analysis, utilization and outbreak response, inadequate health records and information personnel and inadequate capacity for data analysis and management skills among others (Chepkonga, 2015).

2.3 Disease Management Systems and Service Delivery in Medical Health Facilities

Verbeke, Karara and Nyssen (2013) agree that under the right circumstances ICTs are capable of inducing development in terms of health care, improved education, employment, agriculture and trade. Harris (2004) believes that to make this possible, the learning on the part of the promoters of the technology as on the part of its users is crucial. The priority of enhancing healthcare in Africa is reducing the cost, while improving delivery. Cost reduction of health care can be facilitated by remote consultations; diagnoses and treatment advices

delivered by ICTs, while delivery can be improved by connecting community health volunteers to skilled health practitioners (Andreassen, Kjekshus & Tjora, 2015).

Information is the most powerful tool of combating diseases today. Give people adequate information on how to avert maladies and the number of people getting sick will reduce. This is according to a study by Ondari-Okemwa and Smith (2009). In this regard, mobile phones have been at the center of ICT driven methods of managing diseases. Recognizing the growing penetration of mobile phones among health workers and the population at large, many of the recent ICT initiatives in health have been in m-health. Examples of mobile technology in the health sector for administration and care delivery are well documented (El-Nour, Elnimeiri & Abbas, 2016).

Interestingly, such initiatives have focused on empowering the field health worker by providing mobile phone-based aids to collect and manage client data efficiently, so as to spend less time on generating reports and enable systematic planning of field activities. That improvement in these areas could vastly improve the outcomes of public health programs had been recognized three decades earlier. However, the computational tools necessary for implementing the ideas were not available. Computers, desktops and laptops became less expensive therefore many pilots have been launched to improve the management information system and activity planning of health workers. Mobile phones are becoming less expensive and are easy to maintain, and are also non-dependence on electricity so they are ideal computational devices that can assist health workers. The fact that mobile phones allow health workers to communicate with their supervisors in case of emergencies improves the outcomes of many health activities.

Mobile phones have been used in public health programs in many Asian countries. Although Bangladesh has made significant progress in health care; still it is recorded that one woman dies every hour due to pregnancy-related complications while 15 infants die every hour due to complications within 2 days of birth. Interestingly, 80% of these deaths are preventable. Most of these deaths are due to lack of information and knowledge. The MAMA Bangladesh mobile information program known as Aponjon hopes to create mass awareness about good practices to contribute to the efforts of reducing maternal and child mortality. The messages delivered on a registered mobile phone will reach not only the expectant and new mothers,

but also gatekeepers like husbands, mothers-in-laws, mothers, and other relatives (Li *et al.*, 2012).

During the project's pilot phase, Aponjon reached almost 1,500 mothers and household decision-makers within their families. The information is delivered twice a week in one of two forms: SMS; or short 60-second "mini-skit" voice messages, with local actors playing the roles of a doctor, pregnant woman, mother, and mother-in-law. The actors enact scenarios in an entertaining and educational format. Dialogues range from the doctor explaining the importance of balanced diets to reminding the pregnant character that it is time for her medical checkup. In December 2012, Aponjon launched its service nationwide in Bangladesh, and women across the country are able to register. As of May 2013, 59,520 subscribed to the service and the program hopes to reach 3 million subscribers. To achieve this target, the program is being advertised in print, radio, and television media. The service costs 2 taka (approximately 2.5 cents) per message and will provide the messages free of charge to at least 20% of the poorest subscribers (Li *et al.*, 2012).

There are significant challenges in scaling up such projects. Often, the mobile devices that have been used in the pilots are high-end and expensive: the kind of devices that health workers do not use in the normal course. To provide the functionality and speed in the application software using inexpensive devices is one challenge. Most of the pilots have not been systematically assessed for the resulting benefits. In training programs, novelty may generate interest in the short run but would the interest sustain? Will the basic human resource practices need to be changed to effectively reward those who use the mobile-based tools to achieve better outcomes? To begin with, every pilot needs to be systematically assessed after it has attained some stability. Finally, one lesson that is evident from many projects discussed in this paper is that ICT cannot be seen merely as a technology solution. It will often have to be a part of other changes that will make the entire system work more effectively (Osei-Frimpong, Wilson & Lemke, 2016).

While poverty is typically the root cause of illness, and health-related information provided to clients may not produce the desired behavior change, there are some areas in which focused education can improve or even save lives. Mobile phones are an extremely attractive channel for social messaging, because they offer a way to easily deliver an individualized educational session to billions of people. The sheer effort required to distribute information using paper

or billboards as is done in many public health systems is a substantial obstacle, and updating the information or receiving feedback is prohibitively difficult and costly. In contrast, deploying and updating automated messages on a massive scale can be fast and simple on mobile phones (Juma *et al*, 2015).

In Kenya and other developing countries the component of HMIS is weak and therefore there is often a lack of good quality data and inefficient utilization of resources. As in many developing countries, lack of reliable data and grossly inadequate appreciation and use of available information in planning and management of health services are the main weaknesses of the health information systems in Kenya. In absence of computerized HMIS, health sector hospitals face various problems such as problems in detection and control of emerging and endemic health problems, monitoring progress towards health goals, empowering the hospitals with timely and understandable health related information, and driving improvements in quality of services (Ogalo, 2012).

Disease management technologies also involve communication with the patients in the comfort of their homes through telemedicine especially in chronic conditions. This involves the patient in his/her own health care, provides continuous monitoring by health care worker and identifies early symptoms for timely interventions. The benefits include reductions in use of service: hospital admissions/re-admissions, length of hospital stay, and emergency department visits typically declined. It is important that there often were reductions in mortality (Bashuk *et al*, 2014). There is little literature that suggest there is cost effectiveness in telemedicine therefore demonstration of cost effectiveness (or lack of it) remains in the future.

Though ICT has a potential to improve the quality of health care, the evidence that it improves health related outcomes is limited (Ortiz & Clanzy 2003). Although the potential benefits of IT are compelling, the evidence in support of these benefits varies greatly by type of application. And a recent study funded by AHRQ validates this assertion. As part of its Evidence-based Practice Center (EPC) program, AHRQ sponsored a systematic review to evaluate the evidence on interventions to reduce medical errors and improve patient safety. The report, *Making Health Care Safer: A Critical Analysis of Patient Safety Practices*, found that there was relatively little evidence that computerized physician order entry (CPOE) with clinical decision support or other ICT innovations improved important outcomes across

diverse practice settings. The lack of evidence was notable especially when compared to the strength of evidence regarding non-technological safety practices such as prophylaxis for venous thromboembolism, use of sterile barriers during catheter insertion, or use of prophylactic antibiotics during surgery (Ortiz & Clancy 2003). Kaehny *et al*, also found out that there is scarcity of published literature to assess the utility of telemedicine vis a vis convectional care.

Focusing in Africa, in 2017 there was an outbreak of bird flu in Uganda. This showed the usefulness of ICT in surveillance and control of diseases. The information helped many to stop the disease from spreading. Yagos *et al*, (2017) found out that ICT can help monitor surgical operations, accessing knowledge of disease management and managing medical records among others.

2.4 Financial Management Systems and Service Delivery in Medical Health Facilities

Controlling escalation of costs and improving the healthcare of citizens is what every nation seeks to achieve. In 2010 alone, the size of ICT enabled healthcare services was estimated to be about \$ 3.1 billion worldwide, and out of this, 80 per cent were in developed countries (Fico *et al*, 2016). Consultations which are done online by patients and doctors using websites and emails, distance referrals, emergency evacuations, and advance transmission of images and data of patients from ambulances is known to reduce lead times of intervention in emergency wards of most hospitals. This level of ICT in health has not been reached in developing countries by most professional and community users. Due to insufficient studies aimed at establishing relevance, applicability or cost effectiveness, most of these approaches are still at their relatively new stage of implementation (Chepkonga, 2015). The Governments in these nations therefore find it complex to determine their investment priorities especially in ICT (Prakash, 2016).

Expectations in health have risen due to the advancement of information and communication technologies (Liu & Yuan, 2015). ICT impacts in almost every aspect of the healthcare sector. Information management and communication especially in Public Health Sector is important and can be improved by the available system (Gosford, 2011). The emergence of electronic health, which is ICT supported health provision, has reduced the cost of healthcare thereby increasing efficiency by data management and transfer, disease management and quality transfer of knowledge (Singh *et al*, 2010).

In Africa, South Africa emerges as one of the nations where e-health has found its wide applications. The success of e-health in South Africa has been attributed to highly developed ICT infrastructure, huge investments in ICT particularly by the public hospitals, well trained public health personnel, well developed training and health institutions and belief in the ICT solutions to the health problems (Ahmad, 2014). Currently, technology plays a critical role in the healthcare services delivery in South Africa. However, like most developing countries, innovative approach to e-Health remains significant. One of the successes of such innovations is the application of Cell-life and Mindset health models. Cell life is a system which was started by two universities in South Africa in 2003 for the therapeutic and logistics management of HIV/AIDS population. It is built on mobile devices with 3G/GPRS/SMS networks mostly on mobile phones for health solutions. It is mainly used by community health volunteers to assist their fellows on HIV positive management and also assists in organizational planning for drug supply and emergency situations in the community (Hasan, 2015). Emphasis of health solution exists in Nigeria where rural communities trying by using ICT to solve various challenges of health services delivery (Fico *et al*, 2016). Development of innovative solutions that require less infrastructure provision is essential in such communities to reduce cost of operation (Abuya, 2016).

EHR, as a record-keeping system can also be used to enhance financial management in the health sector. The general cost of providing healthcare is on the increase partly because of the inefficiencies of paper-based work. Manual processes such as expenses incurred for the transcription of physicians dictated notes, pulling, filing, and maintaining charts together with the cost of maintaining the storage of health records are some of the identified cost associated with the paper-based records (Ondari-Okemwa & Smith, 2009). The introduction of EHR in many health facilities has however resulted in the reduction of supply and printing cost (Prakash, 2016). Hence the cost incurred in initiating and maintaining paper health records including clerical supplies, cost of paper, and printing costs are squashed or reduced when EHRs are used (Chodzaza & Gombachika, 2013). In a work done by Ajayi and Tokon, (2009), a health facility reported a sketchy 90% reduction in the paper backlog after a few months of implementing an EHR system (Njuru, 2011), which resulted in the reduction in paper and supply costs. Remlex (2007) has also agreed that using ICT in health sector largely reduces the cost of running hospitals. The implementation of EHRs does not only help reduce cost but also lead to increased revenues by ensuring timely and accurate capture of charges

for medications, medical supplies, and clinical services. EHR is hence seen as a measure to increase the cash flow of health facilities (Radnor *et al*, 2014). Incorrect coding of health records according to Omotoso (2014) results in a loss of between 3–15% of the total estimated revenues of healthcare providers. Furthermore, a study by Etoundi *et al*, (2012) pointed to the role played by EHRs is increasing the cash flows of health facilities that implement them.

The high penetration of mobile phones among the poor remains largely unexploited. The Kenyan M-PESA initiative showed how mobile technology was leveraged by a profit-making enterprise to enhance the incomes of the poor. Mobile-based service delivery can also be popularized by creating freely downloadable applications from a public store and providing a mobile service delivery gateway for any service provider serving rural populations. In Karnataka, a mobile-based service has been launched to offer services that are currently available via the internet (Housego & O'Brien, 2012). According to Ahmad (2014), poor financial management skills, lack of transparency, ICT inefficiency despite high adoption mainly due to lack of skilled workers to use the machines well and finally, increase in under-qualified officers resulting to low efficiency in dealing with sicknesses, have led to poor service delivery in the health sector. As such, it is clear that the problem that the Kenyan health sector mainly originates from within the medial institutions.

2.5 Human Resource Management Systems and Service Delivery in Medical Health Facilities

Technology has made organizations grow beyond what was known before. It is easier to manage the workforce through mobile telephony, cloud applications and much more. This allows the management to monitor and communicate to the employees in real time. The employees are able to request for leave, off-duty, and check salaries among others through organization's managed portals.

To meet the current and future performances, training and development becomes a continuous process for improving the caliber and competence of employees. In addition to imparting requisite skills by training to all levels of employees, management also aims at changing the behavioral patterns of the employees in a direction which is in line to achieve the organizational effectiveness, sustainability and growth (Chodzaza & Gombachika, 2013).

In this era of fast changing scenario, solid financial foundation is not enough for any public health care organization nor is state of the art technology, automated systems, because the cutting edge now remains the quality of the human resources, which at the end of the day decides whether the public organizations would ultimately survive in the long-run (Ajayi & Tokon, 2009). As a service sector, health care remains an important sub set, whose growth is forecasted to be the most rapid in the changing economic scenario of the country.

The past years have witnessed several problems emerge in the area of training. The focus has been on urban curative care in tertiary care settings concerning basic medical education hence less preparation for doctors in roles in rural primary health systems with barely no or less system for induction when these medical officers join government system in primary health care. This compounded by the fact that they do not have a basic training in management and public health yet they are expected to supervise staff under them in the cadre (Osei-Frimpong, Wilson & Lemke, 2016).

Nurses training either way in the lower level is also mostly technical in operation with a very limited component of social aspects of health care, community involvement and participation, mobilization and health education. Public and Private healthcare organization therefore need to revamp their entire organizational strategy in view of the above, in respect of procuring, retaining, developing and grooming their human resources in a manner that they are not only useful and valuable but most important human assets for the present, and vital with uniqueness for the future (Juma *et al*, 2015).

Within the public hospital's setting, various personnel both in the management and lower cadre of hospital employees are in one way or the other involved in the healthcare service delivery. The hospital staff includes physicians, nurses, administrators, and ancillary staff. Studies indicate a positive relationship between highly skilled personnel and improved health services delivery outcomes (Fico *et al*, 2016). Establishing the health training framework and programs, appropriate recruitment methods and continuous training and development of the health staff remains critical for the attainment of highly skilled personnel within public hospitals that are geared towards attaining the desired outcome. The phenomenon is common in developed countries and is one of the reasons why such countries attain greater services in public hospitals need to implement human resource strategies like selective hiring, retention,

monitoring performance to meet standards and retain credentials for them to offer quality services and growth (Whyle & Olivier, 2016).

Within the health care organizations the public viewed customer service as an independent, non-critical function which was best left to professional judgment of physicians where necessary. But today there is a shift to this model which is organizational, so the patients have influence on every function (Ichoku & Ifelunini, 2016). Organizations operating in public health continuously take up challenge of huge restructuring and are still experiencing difficulties in full and proper implementation of these services (Whyle & Olivier, 2016). The difficulties have so far been the slow ability of the workforce to cope with rapidity in change, which ends up eroding established power patterns thereby leading to tensions and mistrust among middle and senior management (Lazarus *et al*, 2014). Restructuring can also sometimes be derailed and delayed due to unforeseen secondary system mishaps like breakdown in information technology resources.

The difficulties have so far been the slow ability of the workforce to cope with rapidity in change, which ends up eroding established power patterns thereby leading to tensions and mistrust among middle and senior management (Tey & Lai, 2013). Restructuring can also sometimes be derailed and delayed due to unforeseen secondary system mishaps like breakdown in information technology resources (Schriver *et al*, 2014). Senior management must demonstrate commitment to service quality and middle managers should also show their commitment, and ensure that they communicate principles, strategies and benefits of their services to the people for whom they have responsibility. When management fail to address the culture of an organization more likely its initiatives will fail.

Like in most developed countries, managing public health in USA is characterized by emphasis on performance and improving quality of healthcare. In order to attain these critical indicators, public health management is fully equipped with the necessary resources and management skills. The hospitals personnel are more equipped with the management skills that enable them to efficiently manage resources and provide evidentiary basis for determining patient, clinician, and organizational outcomes (Akinboade, Kinfack & Mokwena, 2012). In other words, the health professionals are well capacitated to enable them improve the patient services health outcomes.

Effective management is cited as a vital enabler of quality from the providers' perspective, managers, policy-makers and equally the payers. Management affects everything within the hospital environment (Andreassen, Kjekshus & Tjora, 2015). Good ideas remain useless if people have them for quality improvement, where the management is not good. Most studies have cited lack of professional managers in public healthcare organizations. Most managers are not qualified, rather are hospital physicians, nurses, doctors or are healthcare professionals (Osei-Frimpong, Wilson & Lemke, 2016). In fact, in most Public Hospitals, the managers have no experience and knowledge in management. According to Verbeke, Karara and Nyssen, in their study done in 2013 the authors determined that majority of public health managers were trying to resolve problems as short term measures. Besides, there were no criteria and objectives which were in place used to appoint and select managers in healthcare facilities. National policies were considered prescriptive and did not allow for sufficient flexibility which was needed to adapt to local circumstances. Mostly, public healthcare managers were demanding more power in order to identify and recruit the most appropriate personnel needed to provide quality services to patients (Chepkonga, 2015). Further, managers are not in a position to control physicians as they do to other employees. For example, medical doctors expected their colleagues or co-workers to have been more responsible empowered enough to perform the job well.

Studies in Kenya have observed a very low standard of teaching and in-training schools for auxiliary nurses is very low in comparison with training standards in developed countries around the world thereby explaining the substandard patient and community care (Argote, 2010). Lack of proper training systems and inadequate reorientation courses has led to this substandard training, especially in general hospital management as there is still evidence of reliance on conservative training programs by health training colleges which have been taken over by events and time (Argote & Ingram, 2010). This screams of a clear neglect of training in the health sector.

Previous studies done in this area identified poor state of healthcare services in most of the public healthcare institutions including major hospitals in Kenya which resulted in discontent among majority of the patients, high staff turnover and low morale among staff, which made it difficult to offer a 24-hour clinical service resulting in challenges with patients care and ballooning cost of operations due to inadequacies and inefficiencies according to Njuru (2011). It is also observed that Kenya has a high health worker shortage and it usually affects

the rural areas (Netherlands Enterprise Agency, 2016). The situation is further complicated due to patients' perception of managerial and functional issues, which is perceived and interrelated with when seeking treatment such as internal processes, physical facilities, interactions with nurses, doctors and other support staff as somehow poor and not responsive in their study on the relationship between service quality, customer satisfaction and buying intentions which was done in private hospital industry and attitude to the service quality; the gap in expectation. This challenge has therefore been the focus of many researchers. Ondari-Okemwa and Smith (2009) conducted a study on the role of knowledge management in enhancing government service-delivery in Kenya focusing on administrative agencies

2.6 Theoretical Framework

A theory is a set of statements or principles devised to explain a group of facts or phenomena, especially one that has been repeatedly tested or is widely accepted and can be used to make predictions about natural phenomena. This study is based on the technology acceptance model, change theory and the theory of professions.

2.6.1 Technology Acceptance Model

One of the famous models connected to technology approval and utilization is the technology acceptance model (TAM) which was proposed by Davis in 1986. TAM has demonstrated to be a theoretical model in enabling explanation and prediction of user conduct of information technology (Yoon, 2016). TAM is regarded as a significant expansion of theory of reasoned action (TRA). Ashraf, Narongsak (Tek) and Seigyoung (2014), proposed TAM to elucidate why a user agrees to or discards information technology by acclimatizing to TRA. TAM offers a foundation with which a person traces the way external variables affect the principle, thoughts, and objective to use. Two cognitive principles are posited by TAM. These are apparent usefulness and ease of use (Holden *et al*, 2016).

In accordance to TAM, individual's real utilization of a technology system is affected directly or in some way by the user's behavioral objectives, thoughts, apparent usefulness of the system, and apparent ease of the system. In addition, TAM suggests that external aspects influence objective and real use through mediated consequences on apparent usefulness and apparent ease of use (Mortenson & Vidgen, 2016). This study will assume this model to give details on the adoption of information technology in Kenya's health sector, therefore it gives a theoretical understanding on how ICT through record keeping, disease management,

financial management and human resource management technologies can enhance service delivery in health sector.

A study done Japan found out that the respondents need expanded EMR capability to include decision support systems and that diffusion of EMR is influenced by attitudes of health care workers (Ochieng & Hosoi 2005). Therefore this theory is relevant to this study in helping understand adoption of disease management technology that is focused in this study.

2.6.2 Change Theory

This study was informed by the change theory of Kurt Lewin (Orr & Davenport, 2015). It is based around the process unfreeze, change and freeze, providing a higher level approach to the change process. With this theory, a manager or other change agents have a chance on a framework for implementing change effort however sensitive but seamless as possible. It follows three steps namely implementing a radical change; reduce disruption of operations structure and permanent adoption of change.

The change theory can be well adopted by a variety of change agents to ensure that the devolution of health services to the lowest levels is well executed, operational and function to the greater good of the people. The changes will come with resistance due to the initial centralized system but with good understanding of the process of change, most administrators will be able to pass this through to their team members in terms of change in management, implementation of ICT, regular training and streamlining the procurement process (Leach *et al*, 2016).

Habits and routine naturally settled in where structures have been in place for a while. People in an organization may staff off course in as much as the organization may be headed in the right direction. Unfreezing is simply a means of getting people to understand a perspective on their daily activities, reject their undesirable habits, and be open to new ways of achieving the objectives. It sets the wheels of change in motion. With open minds, change can then start. The process is very dynamic and for effectiveness, it has to take time which involves a transition period. People take new tasks and responsibilities so as to gain efficiency, but has to be gradual and sometimes bring slowness to the organization before it can steady. In refreeze, making change permanent can then reach the full desired effect. The new organization become standard after the change has been cemented and all effort should be made to ensure that it succeeds (Orr & Davenport, 2015).

Lewin's force field analysis is a model that describes restructuring and making decision between driving and restraining forces and finally equilibrium where the forces match. The analysis investigates where power concentrates, decision makers, those for and against change and finally ways to influence dissenting voices. In an organization, driving forces are looking for opportunity to improve while resisting (restraining) forces are pro status-quo. The goal is to achieve equilibrium. This theory is relevant to this study as it will tend to understand the relationship between management and junior staff in terms of handling of disputes and conflict resolution and it will give guidelines on how best to introduce and manage the use of technological change in health institutions for quality health care.

This will also determine the factors at play that usually fail to reach a consensus leading to labor unrest in these hospitals and how they can best be understood. Finally, the theory will assist the researcher to best understand how implementation of change and consider challenges that the management may face in the processes (Leach, 2016). Therefore this theory is relevant to this study because it involves information technology system that brings change to the operation of the organization through financial management technologies that are addressed in this study.

2.6.3 Theory of Professions

A profession is a disciplined crowd of people who heed to increased moral principles and support of themselves to, and are acknowledged by the public as having particular understanding and abilities in an extensively accepted, organized body of learning. This body of learning is derived from a high level of training, and is equipped to exercise this understanding and these abilities in the interest of others. Part of this explanation is the concept that the duty for the wellbeing, health and security of the society shall take priority over other deliberations (Leach *et al*, 2016).

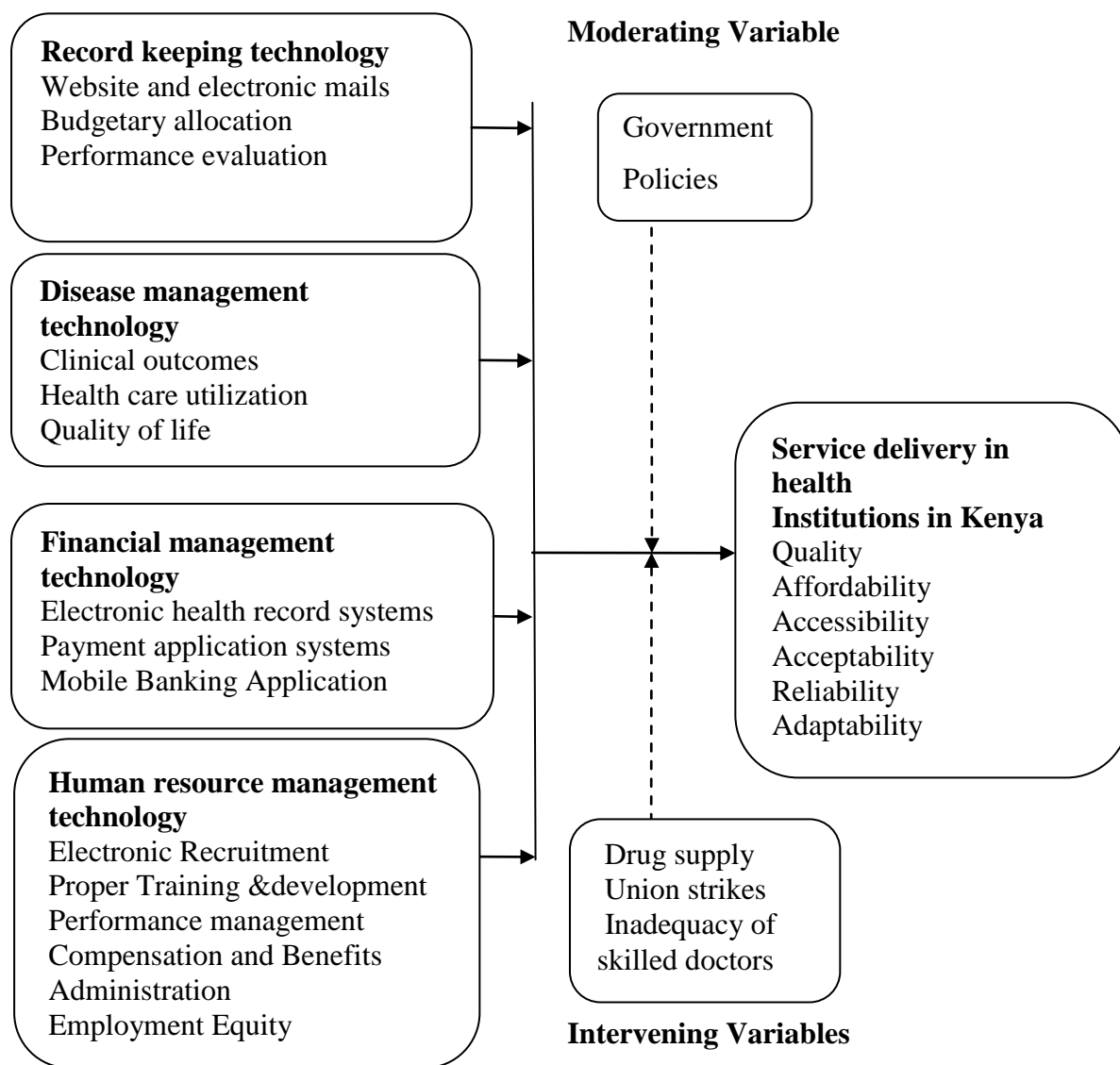
All through the 20th century, a practice of theory of professions has been built and applied in the social sciences, principally in sociology. This improvement should be understood in the case of the rising specialization in operational life in conjunction with the hastening of institutionalized proficiency in society (Chepkonga, 2015). Theory of professions concentrates on the relationships between professional groups, theoretical understanding and the probabilities for practitioners to completely use such understanding in their professional practice.

Until the 1970's theorists of experts held frequently a well-built interest in contrasting the characteristics of professional groups so as to differentiate professions from other professional groups (Lazarus *et al*, 2014). This trend has been illustrated as significant as it assumes a certain core in these professions. A number of the distinguishing characteristics are that proficient practice should be carried out with a basis in systematic theory, that the anticipated professional group is acknowledged as an authority in its domain, that community endorses the venture in question, that the practitioners operates according to moral system and that the professional body manages its own training agenda (Whyle & Olivier, 2016). The significant approach has been condemned, among other issues, for its view of community as rationalistic and liberated from quarrel, where professionals operate unselfishly without group interests, exclusively for the good of their customers and thus for the greatest interest of community (Holden *et al*, 2016).

In line with the theory, professionals have special understanding and expertise in an extensively renowned, organized body of education derived from a high level training (Yoon, 2016). Therefore this theory is relevant to this study because it involves doctors and other medical professionals giving a theoretical understanding and expertise connected to healthcare in terms of record keeping and human resource management technologies.

2.7 Conceptual Framework

A conceptual framework considers the theoretical and conceptual issues surrounding research work and form a coherent and consistent foundation that will underpin the development and identification of existing variables. This study will be on the influence of HIS on service delivery in medical health facilities in Imenti North sub-county, Meru County. The independent variables in this study are record keeping technology, disease management technology, financial management technology and human resource management technology. This study will therefore establish the influence of the independent variables on the dependent variable which will be service delivery in medical health facilities in Imenti sub-County.



Independent Variables

Dependent Variable

Figure 2. 1: Conceptual Framework

2.8 Summary of Literature

The purpose of this study is to determine the influence of HIS on service delivery in government health centers in Kenya: a case of Imenti north sub-county, Meru County. Service delivery is a continuous, cyclic process for developing and delivering user focused services. Quality service delivery involves a comparison of expectations with performance (Mohamed & Xavier, 2016). To be effective, services should possess these attributes like: available and timely at time and space scales that the user needs. Kenyan healthcare system can be categorized into three in relation to where the funding for the facilities is acquired.

Public Hospitals are mainly funded by the Government of Kenya with minimal input from copay by the patients. Health record management practice is imperative in any health service providing institution in ensuring quality service delivery.

Health records are among the vital tools that hospitals require in order to attain the missions and visions of the respective hospitals. The priority of enhancing healthcare in Africa is reducing the cost, while improving delivery. Cost reduction of health care can be facilitated by remote consultations; diagnoses and treatment advices delivered by ICTs. Controlling escalation of costs and improving the healthcare of citizens is what every nation seeks to achieve. In this era of fast changing scenario, solid financial foundation is not enough for any public health care organization nor is state of the art technology, automated systems, because the cutting edge now remains the quality of the human resources, which at the end of the day decides whether the public organizations would ultimately survive in the long-run (Argote & Ingram, 2010).

One of the famous models connected to technology approval and utilization is the technology acceptance model (TAM), initially proposed by Davis in 1986. This study will assume this model to give details on the adoption of information technology in Kenya's health sector. This study was also informed by the change theory of Kurt Lewin. It is based around the process unfreeze, change and freeze, providing a higher level approach to the change process. In line with the theory of professionals, professionals have special understanding and expertise in an extensively renowned, organized body of education derived from a high level training (Chodzaza & Gombachika, 2013). In connection to this research, doctors and other medical professionals should possess understanding and expertise connected to healthcare. It has been demonstrated, there is a shortage of literature on the influence that HIS has on service delivery in the health sector of Kenya. This is gap that this study seeks to fill.

2.9 Research gaps

Many studies have been done in relation to this study that include; Verbeke et al (2013) who dwelt on evaluating the impact of ICT-tools on health care delivery in sub-saharan hospitals, Bukachi and Pakenham-Walsh (2007) who studied on information technology for health in developing countries. Mimbi & Bankole in their study on ICT health systems performance in Africa: a Multi-Approach only focused on life expectancy and child mortality and therefore did not cover all aspects of health. Njau (2012) who established the challenges facing human

resource management function at Kenyatta National Hospital. Muoki (2009) studied on the challenges of human resource planning at the ministry of public health and sanitation, Rajula (2016) explored the level of use of ICT in medical education in Kenyan public universities, Nyaggah (2015) did a study on factors influencing adoption of information and communications technology in public hospitals in Nairobi county, Kenya while Wasonga (2015) researched on Information and Communication Technologies and performance of electronic health projects in Kenya. Odiwuor *et al*, (2015) researched on utilization of ICT among health workers in Gatundu North- kiambu while Mugo & Nzuki (2014) did a research on determinants of electronic health in developing countries. Gatero (2010) researched on utilization of ICT's for accessing health information by medical professions: a case of KNH. And Salte (2014) in her researched dwelt on ICT's and access to health care in Kenya.

Most of the reviewed studies in this chapter have been conducted in developed countries whose approach to ICT in health sector could be different from that of Kenya. Further, the studies have been conducted on other types of projects other than the public health sector. Again, most of the studies have focused generally on the factors affecting the service delivery on both the internal and external factors while this study narrows down to the ICT factors. Therefore there is scarce information regarding the influence of ICT in delivery of health services especially in Imenti north sub-county. This study therefore seeks to fill all these literature gaps by establishing the influence of ICT on service delivery in medical health facilities Imenti North sub-county, Meru County in Kenya.

CHAPTER THREE

RESEARCH METHODOLOGY

3.1 Introduction

This chapter presents the procedures and techniques that were used in the collection, processing and analysis of data. Specifically the following subsections are included; research design, target population, sample size and sampling procedures, methods of data collection procedures, pilot testing, data analysis techniques, ethical considerations and finally operational definition of variables.

3.2 Research Design

This research employed descriptive survey research design that describes the phenomena in its natural setting without interferences. Kothari (2004) noted that study design is an outline which enhances the smooth running of the different research operations, thereby making it as effective as possible and therefore producing maximum data with minimum expenses in endeavor, time and funds. Bryman and Bell (2011) assert that a descriptive survey design seeks to get information that describes existing phenomena by asking questions relating to individual perceptions and attitudes. It entails gathering information that describes happenings and then categorizes, tabulates, represents and describes the information. A descriptive research shows the variables by giving response on what, how and who responds to questions (Babbie, 2002). Since this research was to determine the influence of HIS on service delivery in government health centers in Kenya: a case of Imenti north sub-county, Meru County, descriptive research was then be the most excellent design to employ.

3.3 Target Population

Mugenda and Mugenda (2003) defined population as the whole group of people or items under reflection in any field of investigation and have a common element. In the year 2016, staff in the following categories; doctors, nurses, clinical officers, laboratory technologists and pharmacists in the entire sub-County of Imenti totaled to 445. The target population under the study was 445 staff working in the 25 outpatient public health institutions as shown in table 3.1.

Table 3. 1: Target Population

Category	Target population	Percentage
Doctors	57	13
Nurses	300	67.4
Clinical Officers	50	11.2
Laboratory Technologists	20	4.4
Pharmacists	18	4
Total	445	100

3.4 Sample Size and Sampling procedures

Two facilities were captured in this study namely Meru Teaching and Referral Hospital and Giaki sub district hospital because they have functional ICT systems in place. This section included the sample size determination and sampling procedures.

3.4.1 Sample size

A sample population of 206 was used in this study and it was calculated by using a target population of 445 medics with a 95% confidence level and an error of 0.05 using the below formula taken from Kothari (2004).

$$n = \frac{z^2 \cdot N \cdot \sigma_p^2}{(N - 1)e^2 + z^2 \sigma_p^2}$$

Where; n = Size of the sample,

N = Size of the population and given as 445,

e = Acceptable error and given as 0.05,

σ_p = The standard deviation of the population and given as 0.5 where not known,

Z = Standard variance at a confidence level given as 1.96 at 95% confidence level.

Table 3. 2: Sample Size

Category	Target population	Percentage	Sample
Doctors	57	13	27
Nurses	300	67.4	139
Clinical Officers	50	11.2	23
Laboratory Technologists	20	4.4	9
Pharmacists	18	4	8
Total	445	100	206

3.4.2 Sampling procedures

Stratified proportionate random sampling method was applied to choose the respondents. Stratified random sampling is an impartial sampling way of grouping varied population into homogenous subsets then creating a choice within the individual subset to make sure representativeness. The objective of stratified random sampling is to realize the desired representation from different sub-groups in the populace (Garg & Kothari, 2014). In stratified random sampling subjects were selected in such a manner that the existing sub-groups in the populace are more or less represented in the sample. The method as well involved dividing the populace into a series of applicable strata, which means that the sample is expected to be more representative (Saunders *et al*, 2009).

3.5 Methods of Data Collection

This research used primary data meaning that it's collected for the first time. Primary data as defined by Creswell (2005) is the data gathered for the first time whereas secondary data is the data which has previously been gathered and taken through statistical procedure. A questionnaire was employed to collect data from the hospital staff. The use of questionnaires was the generally applied approach when respondents are accessible and are ready to respond appropriately. Cooper and Schindler (2003) noted that the questionnaire design states the problem and the specific research objectives. In this study, the questionnaires consisted of open ended as well as closed ended questions. The open-ended questions allowed the respondents to communicate their thoughts and behavior in line with the research questions.

The questionnaires were distributed by use of drop-and-pick later method to the hospital staff. This method was applied where the respondents are away or are not in a position to fill the questionnaire right away due to limitation of time

3.6 Pilot Testing

Pilot testing refers to putting of the research questions into test to a different study population but with similar characteristics as the study population to be studied (Kumar, 2005). Pilot testing of the research instruments were conducted using staff from Tigania East Sub- County outpatient hospitals since it has a similar setting. According to Mugenda & Mugenda (2003) a pilot study comprises of 10% of the actual sample size. In this study therefore the respondents were 20. After one day, the same participants were requested to respond to the same questionnaires but without prior notification in order to ascertain any variation in responses of the first and the second test. This is very important in the research process because it assists in identification and correction of vague questions and unclear instructions. It is also a great opportunity to capture the important comments and suggestions from the participants. This will help to improve on the efficiency of the instrument. This process was repeated until the researcher was satisfied that the instrument does not have variations or vagueness.

3.7 Validity of Research Instruments

According to Golafshani (2012), validity is the accuracy and meaningfulness of inferences, based on the research results. One of the main reasons for conducting the pilot study is to ascertain the validity of the questionnaire. The study used content validity which draws an inference from test scores to a large domain of items similar to those on the test. Content validity is concerned with sample-population representativeness. Gillham (2011) stated that the knowledge and skills covered by the test items should be representative to the larger domain of knowledge and skills. Expert opinion was requested from the supervisors from the university to comment on the representativeness and suitability of questions and gave suggestions of corrections to be made to the structure of the research tools. This helped to improve the content validity of the data that was collected. Content validity was obtained by asking for the opinion of the supervisor, lecturers and other professionals on whether the questionnaire was adequate.

3.8 Reliability of Research Instruments

Instrument reliability on the other hand is the extent to which a research instrument produces similar results on different occasions under similar conditions. It's the degree of consistency with which it measures whatever it is meant to measure (Bell, 2010). Reliability is concerned with the question of whether the results of a study are repeatable. The questionnaires were

administered to a pilot group of 20 randomly selected respondents from the sample population and their responses used to check the reliability of the tool. This comprised 10% of the sample size. A construct composite reliability co-efficient (Cronbach alpha) of 0.7 or above, for all the constructs, is considered to be adequate for this study (Rousson, Gasser and Seifer, 2012). Reliability coefficient of the research instrument was assessed using Cronbach's alpha (α) which is computed as follows:

$$A = k/k-1 \times [1 - \sum (S^2) / \sum S^2_{sum}]$$

Where:

α = Cronbach's alpha

k = Number of responses

$\sum (S^2)$ = Variance of individual items summed up

$\sum S^2_{sum}$ = Variance of summed up scores

Table 3. 3: Reliability of Measurement Scales

	Cronbach's Alpha	Decision
Record keeping technology	.808	Reliable
Disease management technology	.792	Reliable
Financial management technology	.852	Reliable
Human Resource management technology	.892	Reliable

The results showed that the Cronbach Alpha associated with the variables of the study were above the 0.70 threshold as recommended by Leach (2016). The results of the reliability analysis are presented in the table 3.3.

3.9 Data Analysis Techniques

Data was analyzed using Statistical Package for Social Sciences (SPSS Version 22.0). All the questionnaires received were referenced and items in the questionnaire were coded to facilitate data entry. After data cleaning, which entailed checking for errors in entry, descriptive statistics such as frequencies, percentages, mean score and standard deviation

were estimated for all the quantitative variables and information presented in form of frequency tables. The qualitative data from the open-ended questions was analyzed using conceptual content analysis and presented in a prose form.

Inferential data analysis was done using multiple regression analysis. Multiple regression analysis was used to establish the relationship between the independent and dependent variables. Multiple regressions were used because it is the procedure that uses two or more independent variables to predict a dependent variable. Since there were four independent variables in this study the multiple regression model generally assumed the following equation;

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \varepsilon$$

Where:-

Y= Influence of ICT on health service delivery

β_0 =constant

$\beta_1, \beta_2, \beta_3$ and β_4 = regression coefficients

X_1 = Record keeping technology

X_2 = Disease management technology

X_3 = Financial management technology

X_4 = Human Resource management technology

ε =Error Term

3.10 Ethical Considerations

In accordance to Kothari (2004), morals entail making a decision on moral and immoral behavior. Morals as indicated by Robinson (2002) are described as standards leading human behavior which have a considerable effect on human wellbeing. Morals are related to the choice between right and wrong. In this research, privacy was of concern as the data significant to the research is of strategic significance. Incidentally, the respondents' names were not revealed and any other information given was held confidential. In addition, the researcher sought the informed consent of the respondents before administering the

questionnaires. The questions were only administered to respondents who had consent to participate in the study.

3.11 Operational Definition of Variables

The operationalization of variables is shown in Table 3.4.

Table 3. 4: Operationalization of variables

Objectives	Type of Variable	Indicator	Measuring of Indicators	Scale	Tools of analysis	Type of analysis
To determine the influence of record keeping technology on health service delivery in Imenti North sub- county	Independent	Record keeping technology	<ul style="list-style-type: none"> • Website and electronic mails • Budgetary allocation • Performance evaluation 	Nominal interval ordinal	Percentages Mean score	Descriptive statistics Regression analysis
To assess disease management technology on health service delivery in Imenti North sub-county	Independent	Disease management technology	<ul style="list-style-type: none"> • Clinical outcomes • Health care utilization • Quality of life • Economic outcomes 	Nominal Interval Interval ordinal	Percentages Mean score	Descriptive statistics Regression analysis
To determine influence of financial management technology on health service delivery in Imenti North sub-county	Independent	Financial management technology	<ul style="list-style-type: none"> • Electronic health records systems • Payment application systems • Mobile Banking Application 	Nominal Nominal Nominal	Percentages Mean score	Descriptive statistics Regression analysis
To examine the influence of human resource management technology on health service delivery	Independent	Human resource management	<ul style="list-style-type: none"> • Electronic recruitment • Training and development 	Interval Ordinal	Percentages Mean score	Descriptive statistics Regression

in Imenti North sub-county		technology	<ul style="list-style-type: none"> • Performance management • Compensation and Benefits Administration • Employment Equity • Pension Administration 	Interval Ordinal Ratio		analysis
	Dependent	Service delivery in health institutions in Kenya	<ul style="list-style-type: none"> • Quality • Affordable • Accessible • Relevant • Acceptable • Reliability • Adaptability 	Nominal Nominal Nominal Nominal	Mean score	Descriptive statistics Regression analysis

CHAPTER FOUR

DATA ANALYSIS AND INTERPRETATION OF FINDINGS

4.1 Introduction

This chapter has covered the presentation, interpretation and analysis of the data collected on the influence of HIS on service delivery in government health centers in Kenya based on a case of Imenti north sub-county, Meru County. The researcher made use of frequency tables and percentages to present data.

4.2 Response rate

The researcher disbursed a total of 206 questionnaires to sampled doctors, nurses, clinical officers, laboratory technologists and pharmacists. The participants later returned only 146 questionnaires which gave a response rate of 70.87%. According to Kothari (2004), a response rate of 50 percent or more is acceptable for analyses implying that response rate for this study were even better.

Table 4. 1: Response Rate

Response	Frequency	Percentage
Response	146	70.87
No response	60	29.13
Total	206	100.0

4.3 Demographic Information

In this study, data was collected from different groups of respondents based on their gender, how long they have been working in their respective institution, their highest level of education, their age bracket as well as their area of specialization.

4.3.1 Gender of the Respondent

Data was collected based on the respondents' gender. This data was then summarized and presented in table 4.2.

Table 4.2: Gender of the Respondent

	Frequency	Percent
Male	40	34.2
Female	96	65.8
Total	146	100

According to the results in table 4.2, most of the respondents were revealed to be female as shown by 65.8% (96) while the rest were male as illustrated by 34.2 % (40). This infers that majority of the respondents were females due to the nature of the job since it's mostly preferred by the female. However the respondents could understand the subject being researched on and gave valid information.

4.3.2 Respondents Period Worked in their Respective Institution

The researcher further explored how long the respondents have been working in their respective institution. The results are in table 4.3.

Table 4.3: Respondents Period Worked in their Respective Institution

	Frequency	Percent
Less than 3 years	20	13.7
3 to 9 years	59	40.4
9 to 12 years	52	35.6
Above 12 years	15	10.3
Total	146	100

Majority of the respondents indicated that they had have been working in their respective institution for a period of 3 to 9 years as shown by 40.4% (59). The remainder indicated they had have been working in their respective institution for a period of 9 to 12 years as shown by 35.6% (52), less than 3 years as shown by 13.7% (20) and above 12 years as illustrated by 10.3% (15). This shows that many of the respondents were familiar with what researcher was studying and were more reliable to obtain information from.

4.3.3 Respondents Highest Level of Education

Enquiry on the respondents' highest level of education was done by asking the respondents questions based on their highest level of education. Table 4.4 is a summary of their responses.

Table 4. 4: Level of Education

	Frequency	Percent
Certificate	29	19.9
Diploma	48	32.9
Degree	57	39
Masters	8	5.5
PhD	4	2.7
Total	146	100

On the respondents' highest level of education, majority of the respondents indicated to have a degree as illustrated by 39% (57). Other respondents indicated to have a diploma as shown by 32.9% (48), certificate as shown by 19.9% (29), masters as illustrated by 5.5% (8) while those who had PhD were 2.7% (4). The findings present respondents with a familiarity with the subject under research.

4.3.4 Respondents Age Bracket

Respondents age bracket was also explored in this study where the respondents indicated to which age bracket do they belong. Table 4.5 shows the results.

Table 4. 5: Respondents Age Bracket

	Frequency	Percent
20-30 years	20	13.7
31-40 years	56	38.4
41-50 years	62	42.5
51 – 60 years	8	5.5
Total	146	100

On the age of the respondents, the study found that the majority of the respondents were between 41-50 years as shown by 42.5% (62), 38.4% (56) were aged between 31-40 years, 13.7% (20) were aged between 20-30 years while 5.5% (8) were aged between 51-60 years. This infers that majority of respondents interviewed are in between 41 to 50 years.

4.3.5 Respondents Area of Specialization

The researcher was interested in knowing the respondent’s area of specialization and therefore requested the respondent to indicate their area of specialization.

Table 4. 6: Respondents Area of Specialization

	Frequency	Percent
Doctor	21	14.4
Nurse	98	67.1
Clinical Officer	18	12.3
Laboratory Technologists	5	3.4
Pharmacists	4	2.7
Total	146	100

On the respondents’ area of specialization, most of the respondents indicated to be nurses as shown by 67.1% (98). Doctors were 14.45 (21), Clinical Officer were 12.3% (18), laboratory technologists 3.4% (5) while pharmacists were 2.7% (4). This reveals that the researcher obtained most of the information for the study from the nurses.

4.4 Influence of Health Information System on service delivery

This section presents the influence of various health information systems on the health service delivery in Imenti North sub-county.

4.4.1 Record Keeping Systems and Service Delivery

The study sought to determine the influence of record keeping systems on service delivery in public medical health facilities in Imenti North sub-county. Respondents therefore indicated the extent of influence of record keeping systems on health service delivery in Imenti North sub-county.

Table 4. 7: Record Keeping Systems and Service Delivery

	Frequency	Percent
Low extent	2	1.4
Moderate extent	28	19.2
Great extent	100	68.5
Very great extent	16	11
Total	146	100

Majority of the respondents indicated that record keeping systems influence health service delivery in Imenti North sub-county to a great extent as shown by a percentage of 68.5. It was also indicated that record keeping systems moderately influence health service delivery in Imenti North sub-county as illustrated by 19.2%, while 11% indicated that record keeping systems influenced service delivery to a very great extent and to a low extent 1.4%. Therefore record keeping systems were indicated to positively influence health service delivery in Imenti North sub-county. This infers that there is a great influence brought about by record keeping systems on health service delivery in Imenti North sub-county.

The respondents were also asked to indicate the extent to which various aspects of record keeping technology influence health service delivery in Imenti North sub-county.

Table 4. 8: Various Aspects of Record Keeping Systems and Service Delivery

	Mean	Std. Dev.
Website and electronic mails	4.151	0.817
Budgetary allocation	4.021	0.851
Performance evaluation	3.014	0.770

On the extent of influence of various aspects of record keeping systems, majority of the respondents indicated that website and electronic mails (Mean=4.151) and budgetary allocation (Mean=4.02) influence health service delivery in a great extent. Performance evaluation (Mean=3.014) was also indicated to moderately influence health service delivery.

On the respondents view on how record keeping systems factors influence, the respondents indicated that they assist in having access to critical patient information from multiple providers allowing for better coordinated care and that they increase the security of confidential healthcare information and eliminate the costs of managing lost passwords.

The respondents concluded that record keeping systems positively influenced service delivery; however some respondents indicated that the some aspects of the systems are slow and tedious necessitating taking longer on a single patient. This can decrease efficiency.

4.4.2 Disease Management Systems and Service Delivery

The study further sought to assess how disease management systems influence service delivery in public medical health facilities in Imenti North sub-county. The researcher therefore enquired on the extent to which disease management systems influence health service delivery in Imenti North sub-county. Respondents gave their opinions on the same.

Table 4. 9: Disease Management Systems and Service Delivery

	Frequency	Percent
Moderate extent	47	32.2
Great extent	71	48.6
Very great extent	28	19.2
Total	146	100

Majority of the respondents indicated that disease management systems influence health service delivery in a great extent as shown by 48.6%, in a moderate extent as shown by 32.2% and in a very great extent as shown by 19.2%. This implies that disease management systems greatly and positively influence health service delivery.

The study also sought know the extent to which various disease management systems factors influence health service delivery in Imenti North sub-county.

Table 4. 10: Disease Management systems Factors and Service Delivery.

	Mean	Std. Dev.
Clinical outcomes	4.021	0.859
Health care utilization	4.212	0.798
Quality of life	3.788	0.815
Economic outcomes	3.014	0.770

To a great extent, clinical outcomes (Mean=4.021) and health care utilization (Mean=4.212) were found to influence health service delivery in Imenti North sub-county. Also quality of life (Mean=3.788) was revealed to greatly influence health service delivery in Imenti North sub-county while economic outcomes (Mean=3.014) were indicated to influence health service delivery in Imenti North sub-county moderately.

Concerning the view on how disease management systems factors influence health service delivery in Imenti North sub-county the respondents said that they facilitate better continuity of care, provide clinicians with access to knowledge about effective interventions, provide patients and caregivers with access to information to support choice, self-management and self-care, encourage patient engagement and place an emphasis on prevention, rather than cure. Although the respondents indicated that disease management systems positively influenced service delivery, some respondents pointed out that they have limited knowledge of disease management systems due to lack of exposure and its dynamics. ICT literacy levels were found out to be low.

4.4.3 Financial Management Systems and Service Delivery

The study also sought to determine the influence of financial management systems on service delivery in public medical health facilities in Imenti North sub-county. Therefore it required the respondents to indicate the extent to which financial management systems factors influence health service delivery in Imenti North sub-county.

Table 4. 11: Financial Management systems Factors and Service Delivery

	Frequency	Percent
Low extent	7	4.8
Moderate extent	41	28.1
Great extent	70	47.9
Very great extent	28	19.2
Total	146	100

Table 4.11 shows that majority of the respondents indicated that financial management systems factors greatly influences health service delivery (47.9%). Financial management systems factors in a moderate extent (28.1%), in a very great extent (19.2%) and in a low extent (4.8%) influenced the health service delivery. This made it clear that financial management systems factors greatly and positively influence health service delivery in Imenti North sub-county.

The respondents were asked to give opinion on the extent to which various financial management system factors influence health service delivery in Imenti North sub-county.

Table 4. 12: Financial Management Systems Factors and Service Delivery

	Mean	Std. Dev.
Electronic health records systems	4.199	0.776
Payment application systems	3.829	0.825
Mobile Banking Application	2.911	0.787

Electronic health records systems (Mean=4.199) and payment application systems (Mean=3.829) were indicated to influence health service delivery in Imenti North sub-county in a great extent. Mobile banking application (Mean=2.911) however was indicated to influence health service delivery in Imenti North sub-county in a moderate extent.

In regard to respondents view on how financial management technology factors influence health service delivery, they indicated that it assists in generating sufficient profits to continue to

provide its current range of healthcare services to the community, helps in replacing buildings and equipment when as they become obsolete and it helps health centres to generate sufficient profits to invest in new medical technologies and services as they are developed and needed as well as providing services to the community as inexpensively as possible. Some respondents pointed out that finances can be misappropriated by use of these systems.

4.4.4 Human Resource Management Systems Factors and Service Delivery

The study further examined the influence of human resource management systems on service delivery in public medical health facilities in Imenti North sub-County. Respondents were asked to tell the extent to which human resource management systems factors influence health service delivery in Imenti North sub-county.

Table 4. 13: Human Resource Management Systems and Service Delivery

	Frequency	Percent
Low extent	3	2.1
Moderate extent	36	24.7
Great extent	88	60.3
Very great extent	19	13
Total	146	100

Most of the respondents indicated that human resource management Systems factors influence health service delivery in a great extent as shown by 60.3% (88). Further the respondents indicated that human resource management systems factors influence health service delivery in a moderate extent as shown by 24.7% (36), in a very great extent as shown by 13% (19) and in low extent as shown by 2.1% (3). This infers that human resource management systems factors greatly influence health service delivery. On the same note, enquiries were made on the extent of influence of various human resource management systems factors on health service delivery in Imenti North sub-county.

Table 4. 14: Human Resource Management Systems Parameters and Service Delivery

	Mean	Std. Dev.
--	------	-----------

Electronic recruitment	3.616	0.578
Training and development	4.075	0.839
Performance management	3.884	0.867
Compensation and Benefits Administration	4.199	0.776
Employment Equity	3.740	0.814
Pension Administration	2.438	0.621

From table 4.14, compensation and benefits Administration as shown by an average of 4.199, training and development as illustrated by a mean of 4.075 and performance management as shown by a mean of 3.884 greatly influenced health service delivery. Further in a great extent, employment equity as shown by a mean score of 3.740 and electronic recruitment as illustrated by a mean of 3.616 was revealed to have influenced health service delivery. Pension administration however was found to have lowly influenced health service delivery as shown by an average of 2.438.

Concerning the view of the respondent on how human resource management systems factors influence health service delivery the respondent said that they influence by helping the health Employers to have an obligation to provide safe working conditions, by assisting in conducting extensive wage and salary surveys to maintain the compensation costs, by determining the most effective methods for recruiting applicants, including assessing which applicant tracking systems are best suited for the organization's needs and guiding the managers who aren't familiar with HR or standard hiring processes to ensure that the company extends offers to suitable candidates. Though the respondents said that human resource management systems positively influenced service delivery they also pointed out that the health sector does not recognize their efforts in delivery of health services so there is no motivation and there is the problem of understaffing.

4.4.5 Service Delivery in Health Institutions in Kenya

Finally, the respondents were to indicate the trend for the last 5 years of the various aspects of service delivery in health institutions in Kenya.

Table 4. 15: Service Delivery in Health Institutions in Kenya

	Mean	Std. Deviation
Quality	2.473	0.578
Affordability	4.089	0.609
Accessibility	4.075	0.806
Relevance	3.890	0.856
Acceptability	4.171	0.782
Reliability	4.000	0.855
Adaptability	3.014	0.770

In table 4.15, the respondents indicated that over the last 5 years acceptability (Mean=4.171), affordability (Mean=4.089), accessibility (Mean=4.075) and reliability (Mean=4.000) had improved in health institutions in Kenya. Again relevance (Mean=3.890) and adaptability (Mean=3.014) were also revealed to have improved over the last 5 years. Quality (Mean=2.473) was however showed to have decreased over the last 5 years in in health institutions in Kenya. This infers that majority of service delivery aspects in health institutions in Kenya have been improving for the last 5 years.

4.5 Multiple Regression Analysis

In addition, the researcher conducted a multiple regression analysis so as to test relationship among variables (independent) on influence of health information system (HIS) on service delivery in public health facilities in Kenya. The researcher applied the statistical package for social sciences (SPSS V 22.0) to code, enter and compute the measurements of the multiple regressions for the study.

Table 4. 16: Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	0.834	0.696	0.687	0.958

The adjusted R^2 was found to be 0.687 inferring that variations on influence of health information system (HIS) on service delivery in public health facilities which are explained by record keeping, disease management, financial management and human resource management systems were 68.7%.

Table 4. 17: ANOVA results

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	302.34	4	75.585	80.665	1.79E-35
	Residual	132.12	141	0.937		
Total		434.4	145			

6

In predicting the effects of record keeping, disease management, financial management and human resource management systems on health service delivery, the regression model test was found to be significant since p-value was less than 0.005 and the calculated F (80.665) was larger than the critical value of F=2.345.

Table 4. 18: Regression Coefficients

Model	Unstandardized		Standardized	t	Sig.
	Coefficients		Coefficients		
	B	Std. Error	Beta		
(Constant)	0.904	0.223		4.054	0.000
Record keeping technology	0.864	0.302	0.606	2.861	0.006
Disease management technology	0.594	0.116	0.445	5.121	0.000
Financial management technology	0.716	0.217	0.543	3.300	0.002
Human Resource management technology	0.654	0.236	0.531	2.771	0.008

The established model for the study was:

$$Y = 0.904 + 0.864X_1 + 0.594X_2 + 0.716X_3 + 0.654X_4$$

The results reveal that influence of HIS on-health service delivery will be 0.904 if all other factors are held constant. The study results also show that an increase in record keeping technology will lead to a 0.864 increase the influence of HIS on the health service delivery if all other factors are held constant. Again as shown by $r=0.594$, the study reveals that increase in disease management technology would lead to an increase in the influence of HIS on health service delivery if all other factors are held constant. Further the study showed that if there was a unit change in financial management technology, a 0.716 increase in the influence of HIS on the health service delivery would be realized if all other factors are held constant. Also a unit change in human resource management technology would lead to 0.654 increases in the influence of HIS on health service delivery if other factors were constant. Finally the study showed that all variables were significant since p-values were less than 0.005 with record keeping technology having the greatest effect and disease management technology having the least effect on influence of HIS on health service delivery.

CHAPTER FIVE

SUMMARY, DISCUSSION, CONCLUSION AND RECOMMENDATIONS

5.1 Introduction

This chapter presents summary, discussion, conclusion and recommendations on the influence of health information system (HIS) on service delivery in public health facilities in Kenya based on a case of Imenti North Sub-county, Meru County.

5.2 Summary of the Findings

This study found that there is a great influence brought about by record keeping technology on health service delivery in Imenti North sub-county. In this case, website and electronic mails and budgetary allocation were found to have influenced health service delivery greatly. Performance evaluation was also indicated to moderately influence health service delivery.

Under this, the study revealed that disease management technology greatly influences health service delivery. On the same note, clinical outcomes and health care utilization were found to greatly influence health service delivery in Imenti North sub-county. Also quality of life was revealed to greatly influence health service delivery in Imenti North sub-county while economic outcomes were indicated to influence health service delivery in Imenti North sub-county moderately.

Concerning financial management technology, the study found that they greatly influence health service delivery in Imenti North sub-county. This contributed by electronic health records systems and payment application systems great influence on health service delivery in Imenti North sub-county. Mobile banking application moderate influence on health service delivery in Imenti North sub-county also contributed to the influence of financial management technology.

Human resource management technology factors were found to greatly influence health service delivery. This influence was as a result of compensation and benefits Administration, training and development and performance management great influence on health service delivery. Again employment equity and electronic recruitment great influence on health service delivery as well as pension administration low influence on health service delivery made a contribution to the influence.

5.3 Discussion

5.3.1 Record Keeping Systems and Service Delivery

This study found that there is a great influence brought about by record keeping systems on health service delivery in Imenti North sub-county. This conforms to Akinboade, Kinfaek and Mokwena (2012) who said that the purpose of health record management is to ensure quality, accuracy, accessibility, authenticity and security of information in both paper and electronic systems.

Website and electronic mails and budgetary allocation were found to have influenced health service delivery greatly. These are in line with Chodzaza and Gombachika (2013) who report that many hospitals are incorporating ICT into health record management due to the high level of the shortcomings of manual health records management, such as misfiling of patients health records, enormous amounts of space, legibility of clinicians' handwriting, transfer of medical records or files from one department to another which requires involvement of more personnel.

Performance evaluation was also indicated to moderately influence health service delivery. This correlates with Saxena and Sharma (2012) who argue that EHRs should be construed as comprising of retrospective, concurrent as well as prospective information which has the primary objective of supporting continuous, efficient and quality integrated healthcare delivery.

5.3.2 Disease Management Systems and Service Delivery

Under this, the study revealed that disease management systems greatly influence positively on health service delivery. On the same note, clinical outcomes and health care utilization were found to greatly influence health service delivery in Imenti North sub-county. These concur with Ortiz and Clanzy (2003) who claim that though HIS has a potential to improve the quality of health care, the evidence that it improves health related outcomes is limited.

Also quality of life was revealed to greatly influence positively health service delivery in Imenti North sub-county. This was similar to Yagos et al (2017) who found out that ICT can help monitor surgical operations, accessing knowledge of disease management and managing medical records among others.

Economic outcomes were indicated to influence health service delivery in Imenti North sub-county moderately. This corresponds to Ogalo (2012) who argue that in absence of computerized HMIS, health sector hospitals face various problems such as problems in detection and control of emerging and endemic health problems, monitoring progress towards health goals, empowering the hospitals with timely and understandable health related information, and driving improvements in quality of services.

5.3.3 Financial Management Systems and Service Delivery

Concerning financial management systems, the study found that they greatly influence health service delivery in Imenti North sub-county. This contributed by electronic health records systems and payment application systems great influence on health service delivery in Imenti North sub-county. These were similar to Remlex (2007) who also agreed that using ICT in health sector largely reduces the cost of running hospitals.

Mobile banking application moderate influence on health service delivery in Imenti North sub-county also contributed to the influence of financial management systems. This was in line with Singh *et al.*, (2010) who say that the emergence of electronic health, which is ICT supported health provision, has reduced the cost of healthcare thereby increasing efficiency by data management and transfer, disease management and quality transfer of knowledge.

5.3.4 Human Resource Management Systems and Service Delivery

Human resource management systems factors were found to greatly influence health service delivery. This influence was as a result of compensation and benefits administration, training and development and performance management great influence on health service delivery. These correspond to Chodzaza and Gombachika (2013) who said that in addition to imparting requisite skills by training to all levels of employees, management also aims at changing the behavioral patterns of the employees in a direction which is in line to achieve the organizational effectiveness, sustainability and growth.

Again, employment equity and electronic recruitment greatly influence on health service delivery as well as pension administration low influence on health service delivery made a contribution to the influence. They all influence service delivery positively. This concurs with Juma *et al.* (2015)

who argue that public and private healthcare organization therefore need to revamp their entire organizational strategy in view of the above, in respect of procuring, retaining, developing and grooming their human resources in a manner that they are not only useful and valuable but most important human assets for the present, and vital with uniqueness for the future.

5.4 Conclusion

This study concluded that there was a great and positive influence brought about by record keeping systems on health service delivery in Imenti North sub-county. In this case, the study deduced that website and electronic mails and budgetary allocation have influenced health service delivery greatly. Performance evaluation was also indicated to moderately influence health service delivery.

The study also concluded that disease management systems greatly and positively influence health service delivery. On the same note, the study deduced that clinical outcomes and health care utilization greatly influence health service delivery in Imenti North sub-county. Also it was deduced that economic outcomes had a moderate influence on health service delivery in Imenti North sub-county.

Concerning financial management systems, the study concluded that they greatly and significantly influence health service delivery in Imenti North sub-county. The study deduced that electronic health records systems and payment application systems greatly influence health service delivery in Imenti North sub-county.

Human resource management system factors were concluded to greatly and positively influence health service delivery. This influence was deduced to be as a result of compensation and benefits Administration, training and development and performance management great influence on health service delivery. Again it was deduced that pension administration low influence on health service delivery made a contribution to the influence.

Service delivery can be made efficient, timely, affordable as well as acceptable if there is full adoption of technology in the operations within the health care system. This can be realized if there is a holistic approach to these operations.

5.5 Recommendations

In view of the findings this study recommends that:

1. Patients' records should be made available to health workers to aid in timely interventions to improve service delivery while safeguarding privacy. The county government should ensure that all the people handling records at the health units should be trained and motivated. The staff registrars should also be trained to know importance of HIS. Community leaders should be aware of the situation because they are "our eyes in the community". They should be mobilized to appreciate and utilize the system.
2. Healthcare providers should be given access to continuous and regular healthcare training to cope with new technological advances in disease management. Programs should be put in place where patients are trained in self health care in collaboration with health providers to increase easy accessibility in order to improve service delivery.
3. The central government should increase budgetary allocations to the respective counties to cater for maintenance and expansion of all aspects of health care. To maximize profits and avoid payment defaults the government should strengthen and emphasize the use of technology in their financial operations.
4. The health sector should address issues pertaining to recruitment, employment equities and motivation among others to their employees to increase job performance and reduce employee turnover. The health management should ensure that there is interconnection of various databases for easy overall forecasting by program heads and decision making. This will make HIS to access online users in an authenticated manner (read only) hence allowing monitoring and evaluation for program data and commodity tracking.

5.6 suggestions for Further Studies

The researcher suggests the following further areas of research

1. A similar research should be carried out in a different institution to determine if the health information system still influences service delivery to patients.

2. A research should be carried on the influence of other elements of health information system on service delivery to patients.
3. A research should also be carried on the entire health institution in the country to determine the effects of health information system on service delivery to patients in Kenya.
4. Further research should be done on the mediating effects on the relationship between health information system and service delivery to patients.

REFERENCES

- Abuya, O. (2016). Development Projects as Mechanisms for Delivery of Public Services in Kenya. *PM World Journal*, 5(5), 1-10.
- Ahmad, T. (2014). Improving Public Service Delivery Through Better Information Management. *Review Of Information & Communications Technology & Development In The Arab Region*, (20), 26-22.
- Ajayi, O., Tokon, W. (2009). *The advantage Project: Utilizing SMS to support evidence based medicine for health practitioners in complex settings*. Baltimore, John Hopkins University.
- Akinboade, A., Kinpack, C., Mokwena, P. (2012). An analysis of citizen satisfaction with public service delivery in the Sedibeng district municipality of South Africa. *International Journal of Social Economics*, 39(3), 182-199.
- Andreassen, K., Kjekshus, E., Tjora, A. (2015). Survival of the project: a case study of ICT innovation in health care. *Social Science & Medicine*, 132, 62-69.
- Argote, L. (2010). *Organizational learning: creating, retaining, and transferring knowledge*. New York: Springer.
- Argote, L., Ingram, P. (2010). *Knowledge Transfer in Organizations: A basis for competitive advantage in firms: Organizational behavior and human decision processes*. New York: Springer.
- Ashraf, R., Narongsak, T., Seigyoung, A. (2014). The Application of the Technology Acceptance Model Under Different Cultural Contexts: The Case of Online Shopping Adoption. *Journal Of International Marketing*, 22(3), 68-93.
- Babbie, R. (2002). *Survey research methods* (2nd ed.). Belmont: Wodsworth.
- Berland, K. Elliott, N., Morales, S. (2010). Health information on the Internet: accessibility, quality, and readability in English and Spanish. *Journal of the American Medical Association*, 285(20), 2612-2621.
- Chepkonga, S. (2015). An Investigation of the Relationship of ICT Training of Principals in ICT Integration in Management Public Secondary Schools: A Case of Nairobi County, Kenya. *Journal of Education And Practice*, 6(18), 194-200.
- Chodzaza, E., Gombachika, S. (2013). Service quality, customer satisfaction and loyalty among industrial customers of a public electricity utility in Malawi, *International Journal of Energy Sector Management*, 7(2), 269 - 282.
- Cholo, O., Jackson, O., Fransisca, M. (2015). Utilization of Information Communication Technology (ICT) Among Health Care Providers in Gatundu North District of Kiambu County, Kenya. *International Journal of Applied Research*, 1(11): 1025-1029
- Cooper, D., Schindler, S. (2003). *Business research methods* (8th ed). New Delhi: Tata McGraw-Hill Publishing Company.

- Cordella, A., Tempini, N. (2015). E-government and organizational change: Reappraising the role of ICT and bureaucracy in public service delivery. *Government Information Quarterly*, 32(3), 279-286.
- Creswell, W. (2005). *Research design: Qualitative and quantitative approaches*. Thousand Oaks: CA Sage.
- El-Nour, M., Elnimeiri, K., Abbas, O. (2016). Towards a Digitized and Integrated Health Information System in Sudan: Assessment of Readiness at State Level. *Sudan Journal Of Medical Sciences*, 11(2), 55-59.
- Etoundi, A., Ndjodo, F., Ndedi, P., Alo'o, G. (2012). Improving the Quality of Service Delivery in a Public Service Workflow Based on the Ant Theory: A Case Study in Cameroon. *The Electronic Journal of Information Systems in Developing Countries*, 2(7), 98-106.
- Fico, G., Fioravanti, A., Arredondo, T., Gorman, J., Diazzi, C., Arcuri, G. & Pirini, G. (2016). Integration of Personalized Healthcare Pathways in an ICT Platform for Diabetes Managements: A Small-Scale Exploratory Study. *IEEE Journal Of Biomedical And Health Informatics*, 20(1), 29-38.
- Gatero, G. (2010). Utilization of ICT's for Accessing Health Information by Medical Professions: A case Study of Kenyatta National Hospital. *Journal of Health Informatics in Developing Countries*, 42(6), 687-693.
- Gosford, L. (2011). The World Bank's ICT Innovations For Accountability And Service Delivery. *International Trade Forum*, 1, 32-33.
- Hasan, S. (2015). A Perception Study On Public Response To E-Service Delivery In Bangladesh. *Information Studies*, 21(2/3), 151-166.
- Holden, J., Asan, O., Wozniak, M., Flynn, E., Scanlon, C. (2016). Nurses' perceptions, acceptance, and use of a novel in-room pediatric ICU technology: testing an expanded technology acceptance model. *BMC Medical Informatics & Decision Making*, 16, 1-10
- Housego, A., O'Brien, T. (2012). Delivery of Public Services by Non-Government Organisations¹ Delivery of Public Services by Non-Government Organizations. *Australian Journal Of Public Administration*, 71(2), 211-220.
- Ichoku, E., Ifelunini, I. (2016). The Changing Political Undercurrents in Health Services Delivery in Sub-Saharan Africa. *International Journal of Health Services: Planning, Administration, Evaluation*, 71(2), 211-220.
- Juma, C., Sundsmo, A., Maket, B., Powell, R., Aluoch, G. (2015). Using information communication technologies to increase the institutional capacity of local health organisations in Africa: a case study of the Kenya Civil Society Portal for Health. *The Pan African Medical Journal*, 21(1), 23-61.
- Kilonzo, M., Ikamari, L. (2015). Impact of Affirmative Action on Quality of Service Delivery in the Public Service Sector of Kenya: A Comparative Case Study of the Ministry of State

- in the Office of the President and Ministry of Higher Education. *Journal of Education And Practice*, 6(3), 113-125.
- Kothari, R. (2004). *Research methodology: Methods and techniques*. New Delhi: New Age International (P) Limited Publishers.
- Lazarus, V., Safreed-Harmon, K., Nicholson, J., Jaffar, S. (2014). Health service delivery models for the provision of antiretroviral therapy in sub-Saharan Africa: a systematic review. *Tropical Medicine & International Health*, 19(10), 1198-1215.
- Leach, V., Tonkin, E., Lancaster, D., Kirk, M. (2016). A strategy for implementing genomics into nursing practice informed by three behaviour change theories. *International Journal Of Nursing Practice*, 22(3), 307-315.
- Li, J., Westbrook, J., Callen, J., Georgiou, A. (2012). The role of ICT in supporting disruptive innovation: a multi-site qualitative study of nurse practitioners in emergency departments. *BMC Medical Informatics And Decision Making*, 12, 27.
- Liu, M., Yuan, Q. (2015). The Evolution of Information and Communication Technology in Public Administration. *Public Administration & Development*, 35(2), 140-151.
- Löbel, S., Paulowitsch, B., Schuppan, T. (2016). Intermediaries in the public sector and the role of information technology. *Information Polity: The International Journal Of Government & Democracy In The Information Age*, 21(4), 335.
- Meru County (2015). *Health at a Glance*. Retrieved from <https://www.healthpolicyproject.com/pubs/291/Meru%20County-FINAL.pdf>
- Meru County Government (2014). *Report on status of health facilities*, Meru County.
- Mimbi, L., Bankole, F. (2015). *ICT and health performance in Africa: a multi-method approach*. 26th Australian conference on information systems; Adelaide, Australia.
- Mohajan H (2014). Improvement of Health Sector in Kenya. *American Journal of Public Research* 2.4(2014): 159-169
- Mohamed, Z., Xavier, J. (2016). Transforming Public Service Delivery In Malaysia. *Journal Of Contemporary Management Research*, 10(1), 39-57.
- Mortenson, J., Vidgen, R. (2016). A computational literature review of the technology acceptance model. *International Journal Of Information Management*, 36, 1248-1259.
- Mugenda, M., Mugenda, G. (2003). *Research methods: Quantitative and qualitative approaches*. Nairobi: Acts Press.
- Mugo, D., Nzuki, D. (2014). Determinants of Electronic Health in Developing Countries. *International journal of arts and commerce* 3(3), 61-84.
- NEA (2016). *Kenya Health Sector: Opportunities for the Dutch Life Sciences and Health Sector*. Retrieved from https://www.rvo.nl/sites/default/files/2016/10/2016_Kenyan_Healthcare_Sector_Report_Compleet.pdf.

- Njuru, W. (2011). Implications of E-Government on Public Policy and Challenges of Adopting Technology: The case of Kenya. *Journal of Global Affairs and Public Policy*, 1(1), 276-311.
- Omotoso, F. (2014). Public-Service Ethics and Accountability for Effective Service Delivery in Nigeria. *Africa Today*, 60(3), 119-139.
- Ondari-Okemwa, E., Smith, G. (2009). The role of knowledge management in enhancing government service-delivery in Kenya. *South African Journal Of Libraries & Information Science*, 75(1), 28-39.
- Orr, P., Davenport, D. (2015). Embracing change. *The Nursing Clinics Of North America*, 50(1), 1-18.
- Osei-Frimpong, K., Wilson, A., Lemke, F. (2016). An Examination of the Influence of ICT on Patient Co-Creation in Healthcare Service Delivery at the Micro Level. *AMA Winter Educators' Conference Proceedings*, 27, 45-46.
- Owino, W., Korir, J. (2000). *Public Health Sector Efficiency in Kenya: Estimation and Policy Implications*. Nairobi: Institute of Policy Analysis and Research.
- Prakash, A. (2016). E-Governance and Public Service Delivery at the Grassroots: A Study of ICT Use in Health and Nutrition Programs in India. *Information Technology For Development*, 22(2), 306-319.
- Radnor, Z., Osborne, P., Kinder, T., Mutton, J. (2014). Operationalizing Co-Production in Public Services Delivery: The contribution of service blueprinting. *Public Management Review*, 16(3), 402-423.
- Robinson, S. (2002). *Research methodology*. Washington D.C.: National Academies Press.
- Salte T (2014). *ICT's and access to Health Care in Kenya*. Retrieved from https://www.duo.uio.no/bitstream/handle/10852/39794/SALTE_MT_2014final.pdf?sequence=7
- Saxena, A., Sharma, A. (2012). Challenges in converting to ICT-Based Public Service Delivery System from Manual Service Delivery System in Bilaspur city, India. *Journal Of E-Governance*, 35(2), 91-95.
- Schrivver, B., Meagley, K., Norris, S., Geary, R., Stein, A. (2014). Young people's perceptions of youth-oriented health services in urban Soweto, South Africa: a qualitative investigation. *BMC Health Services Research*, 14(1), 195-207.
- Singh, G., Pathak, D., Naz, R., Belwal, R. (2010). E-governance for improved public sector service delivery in India, Ethiopia and Fiji. *International Journal Of Public Sector Management*, 23(3), 254-275.
- Sinha , R. (2010). Impact of Health Information Technology in Public Health. *Sri Lanka Journal of Bio-medical informatics* 2010:1(4).

- Tey, N., Lai, S. (2013). Correlates of and barriers to the utilization of health services for delivery in South Asia and Sub-Saharan Africa. *The scientific world journal*, 21,423-403.
- Verbeke, F., Karara, G., Nyssen, M. (2013). Evaluating the impact of ICT-tools on health care delivery in sub-Saharan hospitals. *Studies In Health Technology And Informatics*, 192 520-523.
- WHO (2014). *The health of the people: what works: the African Regional Health Report 2014*. World Health Organization.
- WHO. (2014). *Health Service Delivery*. Retrieved from [http://www.who.int/healthinfo/systems/WHO MBHSS 2010 section1 web.pdf?ua=1](http://www.who.int/healthinfo/systems/WHO_MBHSS_2010_section1_web.pdf?ua=1).
- Whyte, B., Olivier, J. (2016). Models of public-private engagement for health services delivery and financing in Southern Africa: a systematic review. *Health Policy & Planning*, 31(10), 1515-1529.
- Yegos, W., Olok, G., Ovuga, E. (2017). *Use of Information and Communication Technology and retention of health workers in Rural Post-war Conflict Northern Uganda: Findings from a Qualitative Study*. BMC Medical Informatics and Decision Making. Pdf
- Yoon, H. (2016). User Acceptance of Mobile Library Applications in Academic Libraries: An Application of the Technology Acceptance Model. *Journal Of Academic Librarianship*, 42(6), 687-693.

APPENDICES

Appendix I: Letter of Transmittal

JANERITA RUGURU MWANIKI

P.O BOX 8-60200

MERU.

Dear Sir/ Madam,

RE: ACADEMIC RESEARCH PROJECT

I am a Master of Arts student in Project Planning and Management student at University Of Nairobi. I wish to conduct a research entitled influence of HIS on service delivery in government health centers in Kenya: a case of Imenti North sub-county, Meru County. A questionnaire has been designed and will be used to gather relevant information to address the research objective of the study. The purpose of writing to you is to kindly request you to grant me permission to collect information on this important subject from your organization.

Strict ethical principles will be observed to ensure confidentiality and the study outcomes and reports will not include reference to any individuals.

Your acceptance will be highly appreciated.

Yours faithfully,

JANERITA RUGURU MWANIKI

Reg. No. L50/83249/2015

Appendix II: Research Questionnaire for medical staff

Pleas tick (√) appropriate answer or write in the provided spaces

SECTION A: DEMOGRAPHIC INFORMATION

- 1) Please indicate your gender: Female [] Male []

- 2) For how long have you been working/visiting with your respective institution?
Less than 3 years [] 3 to 9 years [] 9 to 12 years [] Above 12 years []

- 3) State your highest level of education
Certificate [] Diploma [] Degree [] Masters [] PhD []

- 4) Please Indicate your age bracket 20-30 yrs. [] 31-40 yrs. []
41-50 yrs. [] 51 – 60 []

- 5) Please indicate your area of specialization
Doctor [] Nurse [] Clinical Officer [] Laboratory Technologists [] Pharmacists []

SECTION B: RECORD KEEPING TECHNOLOGY

- 6) To what extent do record keeping technology influence health service delivery in Imenti North sub-county?
Not at all [] Low extent []
Moderate extent [] Great extent [] Very great extent []

- 7) To what extent do the following influence health service delivery in Imenti North sub-county?

	Very great extent	Great extent	Moderate extent	Low extent	Not at all
Website and electronic mails					
Budgetary allocation					
Performance evaluation					

8) In your view how do the above record keeping technological factors influence health service delivery in Imenti North sub-county?

SECTION C: DISEASE MANAGEMENT TECHNOLOGY

9) To what extent do disease management technology influence health service delivery in Imenti North sub-county?

Not at all [] Low extent []
 Moderate extent [] Great extent [] Very great extent []

10) To what extent do the following disease management technology factors influence health service delivery in Imenti North sub-county?

	Very great extent	Great extent	Moderate extent	Low extent	Not at all
Clinical outcomes					
Health care utilization					
Quality of life					
Economic outcomes					

11) In your view how do the above disease management technology factors influence health service delivery in Imenti North sub-county?

.....

SECTION D: FINANCIAL MANAGEMENT TECHNOLOGY

12) To what extent do financial management technology factors influence health service delivery in Imenti North sub-county?

Not at all [] Low extent []
 Moderate extent [] Great extent [] Very great extent []

13) To what extent do the following financial management technology factors influence health service delivery in Imenti North sub-county?

	Very great extent	Great extent	Moderate extent	Low extent	Not at all
Electronic health records systems					
Payment application systems					
Mobile Banking Application					

14) In your view how do the above financial management technology factors influence health service delivery in Imenti North sub-county?

SECTION E: HUMAN RESOURCE MANAGEMENT TECHNOLOGY

15) To what extent do human resource management technology factors influence health service delivery in Imenti North sub-county?

Not at all Low extent

Moderate extent Great extent Very great extent

16) To what extent do the following human resource management technology factors influence health service delivery in Imenti North sub-county?

	Very great extent	Great extent	Moderate extent	Low extent	Not at all
Electronic recruitment					
Training and development					
Performance management					
Compensation and Benefits Administration					
Employment Equity					
Pension Administration					

17) In your view how do the above human resource management technology factors influence health service delivery in Imenti North sub-county?

SECTION F: SERVICE DELIVERY IN HEALTH INSTITUTIONS IN KENYA

12) What is the trend of the following aspects of service delivery in health institutions in Kenya for the last 5 years? Where, 5 = greatly improved, 4= improved, 3= constant, 2= decreased, 1 = greatly decreased

	1	2	3	4	5
Quality					
Affordability					
Accessibility					
Relevance					
Acceptability					
Reliability					
Adaptability					

THANK YOU