

**FACTORS INFLUENCING ADOPTION OF HEALTH  
MANAGEMENT INFORMATION SYSTEM: CASE OF KIAMBU  
LEVEL 5 HOSPITAL, KIAMBU COUNTY KENYA**

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**A Research Project Report Submitted in Partial Fulfillment of the Requirement for the  
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of Nairobi**

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## DECLARATION

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

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

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## **DEDICATION**

I dedicate this study to my parents Mr. Alfred Maina and Mrs. Agnes Maina who have been my source of inspiration and strength when I thought I couldn't make it, they continually provided their moral, spiritual, and emotion support.

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## LIST OF ABBREVIATIONS AND ACRONYMS

<b>ACOS</b>	American College of Surgeons
<b>AHIMA</b>	American Health Information Management Association
<b>DOI</b>	Diffusion of innovation
<b>EHR</b>	Electronic health record
<b>GDP</b>	Gross domestic product
<b>HMIS</b>	Health Management Information System
<b>HIV</b>	Human Immunodeficiency Virus.
<b>ICT</b>	Information Communication System
<b>IM</b>	Information Management
<b>ISP</b>	Internet service provider
<b>KHPFP</b>	Kenya health policy framework paper
<b>MOH</b>	Ministry of health
<b>SPSS</b>	Statistical Packages for Social Sciences
<b>TAM</b>	Technology acceptance Theory
<b>TB</b>	Tuberculosis
<b>USA</b>	United States of America
<b>WHO</b>	World health Organization

## ABSTRACT

The purpose of this study was to study factors influencing the adoption of Health management information system (HMIS) in the delivery of health care by focusing on Kiambu level 5 hospital in Kiambu County. Health management Information system is a Secure and cost effective way of using the ICT to support health related field including health literature, surveillance research and training. HMIS improves cost control, timeliness and accurateness of patient data, administration and sharing of information, lessens personnel costs, inventory levels, and improves the quality of patient care. This study was guided by four research objectives: affordability, training on ICT skills, ICT infrastructure and data management. Other variables that were examined were years of experience, gender, training on ICT skills, previous experience in HMIS, internet usage, and the frequency of ICT use among health care practitioners. The study was founded on the Technology Acceptance Model and Diffusion of Innovation theory as the key theoretical models. The web of relationships between the study variables was demonstrated by a conceptual framework. The study adopted a descriptive survey design with a target population of 245 health care practitioners and a sample size of 148 respondents. A questionnaire with both structured and unstructured questions was used. The pilot study was done at Thika level 5 hospital using 10 percent of the total respondents which was 148, using a sample of the 15 respondents that were selected from the sample frame with similar characteristics as the sample population prior to the main research study to verify its validity and reliability. Quantitative data was coded and analyzed using SPSS version 20 using mean, percentage, Variance, correlation coefficient and coefficient of determination. Qualitative data was studied by making inferences from the expressions and opinions of the respondents around the variables. The findings were presented in frequency tables and explanation presented in prose, 148 questionnaires were distributed and the questionnaire return rate was 100 percent. From the analysis 73.0 percent of the respondents agreed that the HMIS had been budgeted for while 27.0 percent disagreed. Training on ICT Skills 81.8 percent of the respondents agreed that they had computer skills and can satisfactorily perform computer operations while 18.9 percent could not perform computer operations. In ICT infrastructure 72.3 percent of the respondents agreed that the system is well connected but not everybody can access the computer since they are not enough whereas 27.7 percent did not agree was connected. In data management 3.4 percent of the respondents agreed there were no backups while 96 percent disagree. This results show a very low adoption status of the HMIS. The main recommendations were for Medical training schools to adapt using of HMIS in training their students, for the Government of Kenya to come up with standardization policies for the developers to follow when designing the HMIS.

## **CHAPTER ONE**

### **INTRODUCTION**

#### **1.1 Background of the Study**

Twenty years ago, Information management (IM) professionals came up with techniques, methodologies and best practices in various disciplines of Information management. As the digital world seeps the business world, traditional ways of handling data have impacted expressively such that methodologies and techniques need an overhaul to support this new digital age data. The digital transformation of enterprises across the world has opened-up new challenges, potentials and opportunities in the (IM) space. The health industry has witnessed significant development worldwide. World Health Organization (WHO) stated that Electronic health uses Information Communication and Technology (ICT) in support of health related fields including healthcare provision, health reconnaissance, health literature and health training, knowledge and research study.

Applications such as Health management system Information (HMIS), is an indispensable tool of (ICT) that advance value of healthcare delivery and decrease healthcare expenditures, (Shekelle, Morton and Keeler, 2006). Health management information system has numerous benefits, that is updated medical records, digitized prescription, and easy to make clinical decision, centralization of information and sharing, and improved administrative system. Developing nations need to benefit from HMIS, they need to address health care issues that are caused by poor policies and lack of modern health care infrastructure. Uluc and Ferman ,(2016) did an analysis on four emergent nations namely, Egypt, Turkey, Saudi Arabia, and United Arab Emirates to investigate the trials faced by clinicians using electronic healthcare. Information Technology Infrastructure, policy principles, clinical variation of users and healthcare funding were recognized as the key challenges encountered by the healthcare professionals.

In South Africans pending national election in 2014, brought increased political pressure that focused on the deliverables, outcomes and progress to date (Kahn, 2011). Due to the difficulties in high-costs and inflexibility related with the proprietary health information systems, most of the available HMIS were open sourced. Regardless of the high letdown rate experienced in the implementation and usage of HMIS, South Africa's National health department made a strategic decision to reset a national HMIS in 2002 starting with their public health sector.

Rwanda has been a frontrunner in the national initiatives for integration of technology into its health care system. The Rwandan Government has been one of the countries in the Sub-Saharan Africa that is most dedicated to ICT advancement. As at 2005, their information system was managed on Microsoft Access Database and it faced various restrictions for example data couldn't be shared by different users, duplication of entries and the database couldn't hold large amounts of data. The Partners in Health (PIH) implemented an HMIS that helped in backing and improvements of HIV and TB patients care, computerized system improved medical errors by 92% and by 2008, the Health industry started appreciating the benefits of Electronic health records (Amoroso CL, Akimana B, and Wise B, Fraser HS, 2010).

Since 1994 in Kenya, the health sector expansion program have existed under the direction of Kenya Health Policy Framework Paper (KHPFP), It openly stated that the fundamental revelation for health and reforms development to deliver "Excellence health care that is suitable, reasonably priced and reachable to all." The regime acknowledged regionalization as a very important management strategy. Execution plan for health policy was invented in a series of two five-year documents called the National Health Sector Strategic Plan (NHSSP). NHSSP-I (1999 to 2004) and NHSSP-II (2005-2010) that stressed on the necessity to better manage health activities all over the nations implements a Sector Wide Approach which would carry all participants (the government, contributors and NGOs both for-profit and nonprofit) on a mutual stand that encourages health significances in a harmonized fashion. The use of HMIS was introduced in Kenya's Hospitals in 2005. Although the adoption is still slow in contrast to what the ministry of health expected despite the highlighting of paybacks and only about 7% of health care practitioners use them. The biggest inquiry in the health care sector ought to be, how data collection is done from these healthcare centers and how is it integrated into the national health care system. There are benefits given for implementing a digitized health system, the large private and some government health care facilities have implemented the HMIS into their working program there still a gap in the tendency of adoption of these systems.

According to Mugo (2014) adoption of (ICT) in Kenya has increased with the years although the adoption rate is slow the awareness is still on the rise. ICT integration can enhanced processes of healthcare in Kenya, (World Health Organization, 2011). Some barriers to ICT adoption strategy in Kenyan healthcare comprise of, sluggish, undependable internet connection, high subscription rates, cost of infrastructure, lack of trained staff, and lack of computer equipment's.

## 1.2 Statement of the Problem

Digital revolution has embedded in many industries among them is the health sector and over the years technology has greatly changed the nature of work. Health care has greatly benefited from manual systems to electronic systems. Examples of use of technology in healthcare comprise of easy access to information and sharing, improved communication, electronic medical records, telemedicine/telehealth, and mobile applications.

Hospitals in Central Kenya have been facing challenges and there is need to invest in technology. It would benefit from having a robust to manage patient's records and improve on the clinical processes. There is a requirement to heighten health infrastructure on which adoption can take place. Lack of proper technology is the key reason hindering access to health system in this region and there are additional pressing issues than lack of available information. Proficient healthcare system requires; reliable and valid information on which to base results, as well sustained health delivery services the right logistics to deliver quality medicines and a strong financial mechanism, WHO (2011).

Kiambu County is found in central of Kenya. It covers an area of 2,543.4km. The county has population of 1,732,689 which is distributed among 12 sub counties. It has a health labor force of 4,025 from medical cadres, out of these 3354 work in public health facilities. It also has 487 non-medical staff this county has a total of 315 health facilities which 85 are public, 53 are Faith Based Organization/ Non-Governmental organization and 177 are private. The ratio between doctor and the population is 1:17,000 and the population between the nurse and the population is 1:2,000 which doesn't meet the WHO standards which states that there should be a health facility in every 5km radius. (Source county health strategic and investment plan).

Challenges facing Kiambu level 5 hospital range from shortage of health workforce, health infrastructure, and erratic supply of health products, health financing and lack of proper records. The health facility still record patients' data in files and patients are issued with patients cards. In every visit patients have to produce the card in order for their files to be retrieved. This is not an effective way to record data since there are many shortcomings associated with it. Loss of cards, loss of files, untraceable file, and time wasted trying to retrieve files. This method of storing data also hampers ease of sharing of information among health care practitioners, and duplication of patient's information every time they visit a hospital and their records are not found. This has

caused medical errors and has handicapped the government in having consolidated health records that can help them to curb epidemics that could spread or occur.

In order to enhance access to health information system in Kiambu level 5 hospital the following recommendations were made, training on ICT and HMIS to help all the users understand how the system works, have a sustainable way of funding the HMIS and its infrastructure, that if system maintenance, upgrades, renewal of licenses made, establishing a hospital library, invention of HMIS and guidelines, reliable internet and supporting HMIS infrastructures, participation of all shareholders and delivery of adequate funding to improve access to health care, (Mugo,2014)

### **1.3 Purpose of the Study**

This study sought to investigate the factors influencing the adoption of HMIS in Kiambu level 5 hospital.

### **1.4 Research Objectives**

The study was directed by the following objectives.

- i. To assess the extent to which affordability influence of adoption of HMIS in Kiambu level 5 hospital.
- ii. To establish how training on ICT skills influence adoption of HMIS in Kiambu level 5 hospital.
- iii. To examine the influence of ICT infrastructure on adoption of HMIS in Kiambu level 5 hospital.
- iv. To assess how data management influence adoption of HMIS in Kiambu level 5 hospital.

### **1.5 Research Questions**

This study sought to answer the following research questions

- i. To what extent does Affordability influence the adoption of HMIS in Kiambu level 5 hospital?
- ii. How does training on ICT skills influence the adoption of HMIS in Kiambu level 5 hospital?
- iii. How does ICT infrastructure influence the adoption of HMIS in Kiambu level 5 hospital?

- iv. How does Data management influence the adoption of HMIS in Kiambu level 5 hospital?

### **1.6 Significance of the Study**

The discoveries of the study were expected to be of significance in the following sectors.

Present changes in government policy and present chances for the information professionals to give more evidence to the provision of quality health care by highlighting the consequence of high-quality information to the achievement of the goals of the health services. The National and County governments can benefit on reduced medical spending following HMIS adoption in hospital in Kenya for example, using HMIS to aid in reduction of medical costs by decreasing the time required to process data and manage paperwork. This study can also be of benefit to researchers who can determine the gaps for improvement in the delivery of HMIS to the health care management in not only Kiambu level 5 hospital, but all health care facilities in Kenya. It could also be used to quantify the benefits to health care facilities adopting HMIS. Despite HMIS adoption being expensive, it is very critical in hospitals. Hospitals are particularly technical places with complex ICT equipment in the laboratories, pharmacies, wards and in the offices. The medical equipment's are large and there is need to communicate to keep everyone up to date. Kiambu level 5 will greatly improve patient treatment by adopting HMIS. Another great advantage of adopting is the availability of information that will always be available and cannot be lost or left sitting on a desk.

Adoption of HMIS will greatly improve monitoring of patients, diagnosis of illnesses, expert systems, patient record management among others. There will also be notable improvement in value of health care since of the far-reaching capabilities of HMIS. In addition, other hospitals will benefit from decreased costs upon adoption of HMIS and will result in improved efficiencies and health care outcomes. The technology will help streamline doctor-doctor and doctor-patient communication.

### **1.7 Delimitation of the Study**

The scope of this study is Kiambu level 5 hospital. The target population is based on respondents from of 245 staff of Kiambu level 5 hospital. This health facility was considered due to ease of convenience and also the time limit for this research, no other research of this kind has been done



in this hospital. The study will also be delimited to the factors influencing adoption of HMIS with critical examination on the variables namely: affordability, training on ICT skills, ICT infrastructure and Data Management and adoption of HMIS.

### **1.8 Limitations of the Study**

This study was limited to Kiambu level 5 hospital. Some of the relevant matters that HMIS study encountered are the health care practitioners were busy people and due to the time constraint the researcher hoped to have a smooth time during data collection especially during the engagement with staff to fill the questionnaires. The questionnaires were dropped, this was to allow the staff time to complete the questionnaires during their free time. Any other barriers that was brought up during the study was recommended for further research. Different health care practitioners had dissimilar operating atmospheres and hence there was need to generalize the findings of this study with caution. The results of this study will therefore only used to depict the picture of Kiambu level 5 hospital.

### **1.9 Assumption of the Study**

The study assumed that all participants were genuine during participation in the research and that they truthful, supportive and will provides reliable responses. There was the assumption all the participants understood english for ease of communication.

### **1.10 Definition of Significant Terms used in the study.**

This section describes the terms that have been used in this

#### **Adoption of health management system**

Acceptance of the benefits and implementation of digitized patients' record in a system that is acceptable by the use the technology for effective delivery.

#### **Affordability**

The degree to which the lifecycle cost of an acquisition of a health management information system is in consonance with the long-range investment and force structure plans.

## **Data Management**

These are protective digital measures that are applied to health management information system that prevent unauthorized access to computers, databases and websites of the health facility and the ability of the hospital to determine data that can be shared with third parties.

## **Health management Information system**

It involves collecting and analyzing of health management information system data to give information for health care decisions making connecting patient care, health facility management, and health policies, and planning.

## **Training on ICT skills**

These are the skills given to users of health management information system to use competently the elementary functions, to retrieve, assess, store, produce, present and exchange health information, and to transfer information and contribute in shared networks through hospital network.

## **ICT Infrastructure**

It's a collection of Health management information system infrastructure that is used to grow, experiment, activate, monitor, manage and backing up Health management information system.

## **ICT Policy**

This is a document with guidelines that describes how a health facility handles a client or information gathered in its operations

### **1.11 Organization of the Study**

This study was ordered into five chapters where chapter one covered the background to the study, statement of the problem, purpose and objectives of the study ,research questions, the significance of the study, assumptions of the study, limitations of the study, delimitations of the study, and definition of significant terms. Chapter two covered the literature review of the study with outlook on theoretical framework, conceptual framework and the scholarly works on adoption on HMIS

in general and in Kenya. Themes to be studied are affordability, Training on ICT skills, ICT infrastructure and Data Management of the HMIS. Chapter three outlined the research methodology that was used by the study; the research design, target population, sample size, sampling procedures, data collection and analysis methods, the ethical considerations and operational definitions of variables. Chapter four covered data analysis of the findings, presentation, interpretation and discussion under thematic areas and sub-sections in line with the study objectives. Finally chapter five covered the summary of findings, discussions, conclusions, recommendations and suggestions for further study.

## **CHAPTER TWO**

### **LITERATURE REVIEW**

#### **2.1 Introduction**

This chapter reviews various studies on factors influencing adoption of HMIS. The sections covered in this chapter are, factors influencing adoption HMIS, theoretical framework, conceptual frame work, and summary of literature review and research gaps.

#### **2.2 Concept of Health Management Information System in the Provision of Health Services**

Comprehensive and precise HMIS records are vital for several reasons. Patient details that are captured from various physicians, labs, clinics, and hospitals not only provide a complete understanding of the patient's healthiness past, but it also offers lots of evidence that can be used to increase patients attention and results. Over time this system has transformed from medical records management to health management information system, tasked have been stretched due to improvement in technology from handling manual records to full scope of processing of amassing and allotment of computer captured information. The first electronic clinical records were inscribed by ancient Greeks astrologers Simon Forman and Richard Napier predicted the accounts to document effective remedies, share opinions about signs, and instill knowledge to those that gave curative guidance using these case studies. While information describing patients' illnesses and diagnoses predated the accounts of information describing patients' illnesses and diagnoses they also recognized clients' treatment and medical questions in their records.

The Central Bureau of Statistics and Attorney General Chambers, WHO and Ministry of Health (MoH), formed a team with a plan to develop and implement Health Information System (HMIS) for Kenya in 1972. The experimental assignment was developed and tried in three Districts where study was done until 1976 then proposals and commendations were adopted. A Committee of professionals was made in 1982 to assess the accurateness and effectiveness of the data collection forms and their report proposed a number of changes. Reacting to the national policy on District focus for Rural Development, MOH centralized its reporting activities by establishing offices in all districts in 1984 .Data from all health amenities would be administered (Standards and guidelines for electronic medical systems in Kenya, Ministry of medical services, 2010).

The investment on design and execution of operative health management information systems would have numerous benefits and would be used for, early detection and control of emerging and endemic health problems; monitoring and evaluating the growth towards health goals; promote fairness in dispersal of health resources; empowering of individuals and communities by providing them with suitable and reasonable health related information; with data available in real time, the evidence based would be strengthened and assist decision makers in effective health policies formulation and monitor Millennium Development Goals; support innovation through research; Improve governance in the health industry.( Needs assessment report, 2003).

There are different health care practitioners depending on the areas they are located, their availability of resources and facilities, and the capacity that they can hold. In comparison between the number of large hospitals and the small clinics, there are evidently a significantly large number of small clinics that serve the people living in rural areas, densely populated areas and the suburbs. These clinics are reachable and inexpensive and most people seek health care services from large hospitals mainly on referral basis or if it is a serious and complicated ailment. In a bid to improve efficiency, most large hospitals and institutions have adopted the implementation and usage of electronic health records while a significantly low percentage of these small clinics do not have any proper records of their patients in order to follow a proper system of providing health care. Information on these patients is lost or hard to find if it is all on paperwork making efficiency negligible (Standards and guidelines for electronic medical systems in Kenya, Ministry of medical services, 2010).

### **2.3 Affordability and adoption of Health Management Information System**

This section covers monetary related issues that are used in the strategy of HMIS and its execution. Monetary resources have adversative effects on the implementation of HMIS. Availability of financial possessions is vital in the adoption decisions, since high cost of procuring technologies have been found to be a main obstacle. Financial resources are required for the procurement, implementation of technologies, training personnel covering operating expenses, and for maintenance of the technology and its enhancements in the future. Information Technology has prospective if well positioned to lessen health care expenses, Arendt, (2013). Information technology deployment rises the convenience to health care particularly for those that are susceptible or in the isolated areas that are in need of health care. Information technology adoption

comes at a cost. Lacking the requisite resources, it is hard to benefit from the full potential of adoption of HMIS (Calman, Kitson, and Hauser, 2010). Public procurement plays a vital purpose of any government, targeting content requirements for goods, works, systems, and services on time. Ideally, public procurement ought to meet the basic ethics of good governance, clearness, answerability, and moreover should ensure value for money (Christensson, 2010). Systems professed as the easiest to practice and the simple have greater prospect of being recognized and used by probable users (Agarwal and Prasad, 2013). Worldwide, the cost of setting up modern computer based health management information system is very high and for that reason healthcare facilities choose manual systems in management of medical information.

Tusubira and Mulira (2009), concluded that the price of electronic equipment's is often unaffordable for most healthcare facilities in developing nations and for individuals who can meet the expense routine maintenance and servicing, is another challenge that is not controllable. South Africa has placed out a planned program to attain widespread healthcare. Its emphasis is on taming HMIS structure, human capacity for health, and procurement. South Africa's regime apportions extra capitals to health as a share of entire government expenditures

The health sector in Kenya depends on numerous sources of funding: that is the private firms, donors, government, households, faith based organizations and NGOs. Unluckily, restrictions in effecting a funding strategies have delayed real scheduling, costing and delivery of health services. The health system has wriggled with immobile and decreasing budgets, system inadequacies, obstinately poor service quality and lack of fairness. In Kenya, the new constitutional dispensation has decentralized the management of health care to County Governments. This way, many counties have encountered numerous challenges in the execution of health care requirements. For a Health management information system work efficiently and effectively, there are long term expenses that are going to be incurred that comprise of annual license fees, training and development, employment of technical support staff ,monitoring of the system results, amending, enhancements and maintenance of the HMIS. These require suitable financial planning and extensive guarantee in order to avoid system failure. Unanticipated costs involves the changeover from a manual to computerized system, like the brief work of data entry from papers to computerized systems. Such changeover might pose a limitation to productivity management especially if large adoption costs are incurred. This could comprise of costs like hiring data entry

clerks, proof-reading data that take time, hiring a system administrator to take care of the system when technical issues arise and who trains new staff that join the organization. These costs that can occur within no time could make the health care professionals have anxiety that their work will face monetary risks and it could take long before they see a return on the investment.

Cost of installation involves the cost of purchasing and implementing HMIS, purchase of the software and hardware (servers, computers, printers, network devices, operating systems, operating license fees). Cost of maintenance include renewal of software licenses, hardware repair and replacement, internet and network fees, and IT support. An institution may decide to hire permanent IT staffs that are familiar with the system to maintain the system and equipment.

#### **2.4 Training on ICT skills and Adoption of Health Management Information System**

Training grows mindfulness and self-assurance, workers that are competent are able to overawed fear of technology while linking usage to projected aids (Sahay and Walsham, 2006). The budget of training healthcare professionals has continual to be a key matter in the adoption HMIS, health care facilities do not develop training plans. In countries that have incorporated ICT training for physicians at the global stage, recognize eHealth and authentic usage as comparatively high (Khan, 2012). Optimum use of technology headed for the revolution of health care requires training on IT skills for the medics. Miller and Sim (2005), noted that some health providers might have some ICT knowledge but the systems available are too complex and cannot meet their requirements. Staff that do not have ICT skills are unable to work with the health systems accurately. That is why organizations are encouraged to hire skilled staffs, and if not they ought to have programs to train them (Calman, Kitson, and Hauser, 2010). Training unqualified staff is expensive; organizations are encouraged to hire qualified staff to avoid extra costs. There is necessity for training in the health practice since it recognizes training needs, the manager in charge of training works with organization, prioritizes the needs grounded on urgency, the number of staffs needing training, and the resources required. Most health care facilities implement the strategy of outsourcing the process of health care information systems. Outsourcing of activities is inexpensive as there are no extra costs associated with the training of staff. Without suitable ICT training, user participation in selection and development of ICT systems turn out to be problematic. This may lead health care systems that are not accepted or used sufficiently. According to IT-Online (2015), though there are numerous ICT solutions accessible they are neither well-known

nor much used, an explanation for this inconsistency is the narrow readiness of appropriate technologies. Computer literacy and technology are the major challenges encountered by the healthcare providers while executing HMIS, Sood, (2008).

Omary (2010) points out low acceptance of ICT among emergent nations to absence of technical skills amongst the clinicians. There is a training gap amongst users and the health care specialists need to show readiness to invest in Information Technology for greater quality assurance Cibulskis and Hiawalyer (2012). Integration of technology intends to be a cross curricular other than a distant course or topic in itself, Flanagan (2003). In the same setting, most of the present generation of experienced health care specialists received their qualifications before IT programs were introduced and for those still in training don't have that much attentiveness on studying IT related courses. Health care system developers overlook the level of computer skills that are necessary from health care professionals to proficiently operate the system, data entry of medical data, prescriptions and notes requires good typing skills and general knowledge on how database systems works.

## **2.5 ICT Infrastructure and Adoption of Health Management Information System**

Infrastructure is critical in embracing HMIS in the public health care sector. Although there are vast paybacks of technology as a way of giving quality health care, the possibility of technology hasn't been completely hitched by clinicians in unindustrialized nations. Difficulties in sluggish and undependable internet connection, lack of gadgets, distance are the root cause of the problems. A noble ICT groundwork is a chance for increasing the well-being of a country. Developing states have great internet saturation but bandwidth may still be faced with challenges, thus restraining acceptance. Non-utilization of ICT amongst the health care segment, is as a result of poor services by ISP, Beckinsale and Ram (2010). ISP provider's incompetent services that are frequently categorized by slight bandwidth, recurrent interruptions and expensive rates. The increasing attentiveness in ICT implementation credited to development of numeral users that use the internet globally, with a higher growth testified from users in emergent states (ITU, 2016).

Deprived ICT infrastructure and internet diffusion in developing nations hinders ICT adoption. Gatero (2010) noted that ICT has advanced over time as a means of overcoming two principle communication barriers: time and distance. It is assumed that arrayed data can be exchanged irrespective of distance by means of technologies over communication. Nevertheless, to transmit



tacit knowledge it requires one to share a mutual work experience through face to face associations. Significantly, geographical nearness seems as essential condition for an effective share of knowledge, specifically in the instance of tacit knowledge as well as intensive activities such as innovation creation and diffusion. Even though information may be transferred across distances, transfer of knowledge involves communication and repeated interactions, therefore, the geographical location of patients will influence adoption of HMIS (Drury, 2015). According to Kenya (2015), several counties in Kenya are inaccessible areas lacking access to electricity. Kenya being an emerging republic the government should ensure that all parts of the country are connected to electricity, this is because most health facilities that fall under this area are disadvantages and they may not be in position to adopt HMIS.

## **2.6 Data Management and Adoption of Health Management Information System**

Even with additional challenges that countries may face in the acceptance of HMIS in the public health care sector; privacy and security are the two most key tests that is, guarding health records from unintentional or deliberate misuse (Maheu, Hitten, and Allen, 2013). System steadiness in the perspective of the data management, authorizations are set for authorized operators, computerized medical records have sensitive medical information and should be treated with privacy. In the USA, Data Management is imposed by use of passwords dependent on sub-routines that check against a hash-code of the password. They have enacted strict privacy laws concerning patient information to advance the security of ICT applications in the U.S. Department of Health and Human Services, Pascale Carayon, (2012). One of the tools for Data Management is by use of audit trails as some of the security breaches might have caused from misuse of access privileges by authorized persons. Many hospitals in Indonesia have faith in that password user protection is sufficient enough to have secured Health management systems. Lack of strong security standards ethical issues are expected to arise. The concealment of the health records could be wrecked either within the health facility, by unintended expose, or from outside intrusion through unauthorized access. It is of paramount importance to keep such material safe because if exposed to unauthorized party then it could create legal issues (Kelly and Unsal, 2002).

Even though privacy risks in design and operation are recognized and recommendations are provided in the Privacy Impact Assessment Report. They are not sure how their sensitive medical information will be protected. Health care specialists have doubts whether the medical information

systems are secure for their patient's data and fear that data in the HMIS may be easily reached by illegal users. Unsuitable disclosure of patient records leads to legal problems. According to Simon (2007) health care specialists are more troubled about legal issues than the patients themselves since they are more aware of their professional work ethics. Reliability of the systems is the prospect that a device performs its proposed function within the set parameters. A system dealing with patient information must offer reliability in order to give the health care professionals confidence that the system will constantly be available when needed. Technically, a major alarm would be accessibility to patient records securely if there are some technical hitches with the systems hardware and software and other unethical IT concerns (Bowman, 2013).

## **2.7 Theoretical Framework**

Accepting the way people respond to occurrence of new technology is great relevance in the field of health informatics. For one reason, low reception of health management information system applications would result into interruptions or even disappointment to successfully implement HMIS, and to accomplish appropriate organizational goals, such as actual data patient management and storage. Moreover, opposition against the use of HMIS applications would involve definite policy actions to grow acceptance and possibly familiarize potential users with the welfares of the debated IT applications. This section observes the different theories used to update the study on the factors influencing adoption of HMIS in Kiambu level 5 hospital. The study was directed by the following theories; diffusion of innovation theory and technology acceptance theory.

### **2.7.1 Technology acceptance Model (TAM)**

This theory deals with the forecast of the acceptability of the information system, it was established by Davis in 1986. This model will be used to predict the acceptability HMIS in Kiambu level 5 and it will also be used to detect the adjustments which are needed to be fetched to the information system to make it suitable to users. The theory proposes that the suitability of a system is resolute by two key features: perceived usefulness and perceived ease of use. Perceived usefulness is when a user believes that his performance will increase by using a system. Perceived ease of use is when the user believes the information system will ease their work. Technology Acceptance Model will be used to find out if the usage of HMIS will determine the behavioral purpose, the interactive

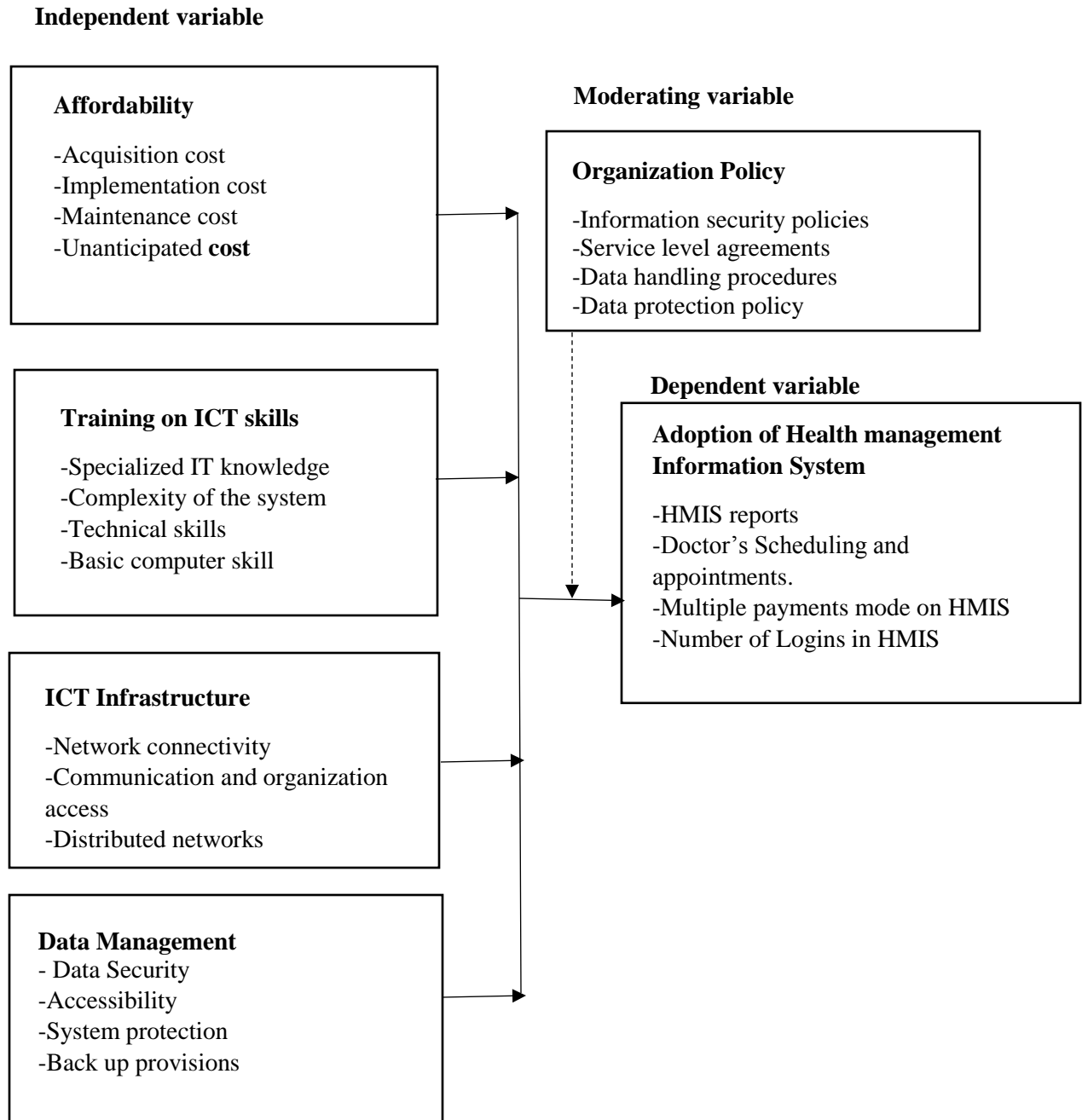
purpose will be resolute by the staff's attitude towards the use of the HMIS. When two systems are given the similar structures, a user will find more beneficial in the one that he finds stress-free to use, (Dillon and Morris, 1996). The technology acceptance theory has also been used by researchers to explain why a certain system may or may not be welcomed by users.

### **2.7.2 Diffusion of innovation theory**

The French sociologist Gabriel Tarde planned the original S-shaped diffusion curve in the diffusion research that was done in 1903. This S-shaped curve is of significance since "most innovations have an S-shaped rate of adoption" (Rogers, 1995). This theory will be used in Kiambu level 5 hospital to check if the adoption of HMIS will increase or decrease the likelihood of being accepted by the members of staff. It will also predicts personal contacts offer information and impact opinion and decision. Learning exactly how origination happens, Rogers (1995) claimed that it's consists of four phases: invention, diffusion (or communication) over the social system, time and significances. The roles opinion leaders play and the nature of networks depicts if the innovation will be adopted, variables are clarified by this theory that encourages how and why users adopt a HMIS.

## **2.8 Conceptual Framework**

This framework demonstrates the interrelationship between adoption of HMIS and the independent variable affordability, training on ICT, ICT infrastructure and data management while the dependent variable is the adoption of Health management Information system.



**Figure 1. Conceptual Framework for adoption of HMIS**

The main concern is to check if health care facilities have the finances for start-up to implement the systems and carry out the on-going maintenance costs. Very few health-care facilities have enough finances on hand to make an upfront capital investment in Health management information system. Many do not budget it even as a start-up requirement for operation. To function efficiently, the minimum and correct amount of resources behind it need to be available so that the health care

facilities can reach a return of investment. Some health care specialists could defend themselves by saying that the systems are not customized for their use due to inadequate technical capacity for them to manage and analyze data. The inadequate in technical knowledge and skills that they have makes them feel they are not well prepared to deal with health information system and that it may results in resistance. ICT infrastructure is very important in public health. Transmission of health information among health establishments and if internet penetration is low or unreliable, patients and health institutions are negatively affected. Deprived internet penetration and poor ICT infrastructure in the developing nations are the challenges which hampers health adoption since they cannot support internet disposition.

Data Management credentials are given to the authorized users. Health management system deals with sensitive information that should be confidential and only authorized users should access it. Lack of strong security standards ethical issues are expected to arise. The concealment of the health records could be wrecked either inside the health facility, by unintended expose, or from outside intrusion through unauthorized access. It is of paramount importance to keep such material safe because if exposed to unauthorized party then it could create legal issues.

## 2.9 Research Gaps

**Table 2.1. Knowledge Gaps**

Variable	Author and Year	Finding	Knowledge Gap
Availability of funds	Tusubira and Mulira, (2009)	The cost of procuring ICT infrastructure is often high-priced for most health facilities in emergent nations and for those who can manage to pay for them, the cost of routine maintenance is another challenge	Procuring inexpensive hospital equipment's whose routine maintenance and servicing will also be cheap improves the quality and expand the access to health services many developing nations.

Training	Khan , (2012)	Countries that have embraced Medical health training for their staff at the global stage, the system acceptance and actual usage is act is comparatively high.	Hospitals should provide their staff with trainings so that approval among users of IT who form part of a firm employee's base will impose encourage impacts on HMIS adoption.
ICT Infrastructure	Quayle ,(2002)	Most healthcare facilities are utilizing ICT technologies for cost cutting, to improve efficiency and to enhanced customer services. Many nations around the world are implementing ICT to enable business environment and to inspire open competition trust and security.	Health care should embrace ICT technologies to advance the quality and proficiency of the health delivery system.
Data Management	(Maheu, Hitten, and Allen, 2013	Lack of strong security standards ethical issues are expected to arise. Health management system deals with sensitive information that should be confidential and only authorized users should access it.	System steadiness, in the context of the rights given to different users are set. Computerized health record systems deal with sensitive medical information on patients which should be treated with privacy.

## 2.10 Summary of Literature Review

Literature review studies have shown that people working in the ICT department help organizations to respond to alterations and provide essential support that encourage quick organizational reaction to alterations. ICT staffs contribute significantly to the extent of system implementation and help users with unfamiliarity with IT and computer operations. Oliveira and Martins (2011), argued that to increases competitiveness development of enterprises, it requires staff that are conversant with ICT.

Employees ability and knowledge on the topic of the use of ICT is important issue both in large companies and health facilities, this considerably encourages the adoption. Not understanding on how to use technology and lack of computer literacy are factors that affect the adoption of HMIS, there is a need for user training to introduce them to the new system. The adoption of HMIS in organizations broadens the scope of analysis hence decreasing bulk of reported data and allows data to get to its users quicker. Computerization of repetitive records can be conveyed to health facility for detection of faults if the HMIS is automated to alerts to the operator on principles that are improbable. Computerization allows broadcast of disaggregated information to the national level, HMIS makes data authentication an easy exercise at each level.

The literature related to the study is reviewed based on the themes identified in the objectives. The first bit deals with how affordability influences adoption of HMIS. The second theme talks about how training on ICT influences adoption of HMIS. The third theme explains how ICT infrastructure influences the rate at which computerized health record systems can be adopted. The fourth theme talked about how data management is essential in safeguarding the data of the patients. The theoretical, conceptual frameworks on which the study was pegged lastly, the knowledge gaps.

## **CHAPTER THREE**

### **RESEARCH METHODOLOGY**

#### **3.1 Introduction**

This chapter covered research design, target population of the study, sample size and sampling procedures, research instruments, validity of the instrument, reliability of instrument, data collection procedures and methods of data analysis which were deployed in carrying out the study and ethical considerations.

#### **3.2 Research Design**

The study used descriptive survey research design to expound on factors influencing adoption of health management system in Kiambu level 5 Hospital. By using the descriptive survey design the researcher studied a wide target population and conclude about the variables. A questionnaire was used to collect data in Kiambu level 5 hospital. The information collected from the respondents was statistically presented for ease of interpretation. The researcher tried to explore the view, conduct and fulfillment level in relation to adoption of Health management information system, she efficiently used the descriptive technique in order to statically analyze the data. The investigator was not considering clarifications of any matters and was not targeting to begin any theories thus the reasons for using the descriptive method. The questions had multiple choices and descriptive method gave the respondents the choices from which they could choose from this enabled the investigator to attach the respondent with the choice of the researcher for this project. Use of descriptive design helped the researcher to measure the conclusion rather than exploring the results

#### **3.3 Target Population**

Target population for this study was the staff at Kiambu Level 5 hospital. This study focused on a target population of 245 which comprised of management, administration, medical officers radiographers, laboratory technologists, nurses, physiotherapists, radiologists and laboratory technologists of different levels in the hospital.



**Table 3.1 Target Population**

<b>Department</b>	<b>No of Workers</b>	<b>Percentage</b>
Management	65	27
Administration	63	25
Doctors and Nurses	45	19
Finance and Accounts	37	15
Pharmacy	23	9
Laboratory	12	5
<b>Total</b>	<b>245</b>	<b>100</b>

(County government of Kiambu, Health Services)

### **3.4 Sample Size and Sampling Procedures**

This section describes sample size and sampling procedures used in conducting the study.

#### **3.4.1 Sample Size**

The sample size used for this study was 148 respondents that were selected based on the Krejcie and Morgan table of 1970, it was selected from a target population of 245.

#### **3.4.2 Sampling Procedure**

Sampling procedure is a technique of picking a trial to symbolize entire population (Creswell, 2010). Simple random technique was used, it comprised of a sample of persons existed in a population that is the persons that were randomly selected from the population and placed into a sample. Krejcie and Morgan table of 1970 was used to determine the sample. Out of 245 staff, 148 were used as sample size. The purpose for using simple random sampling was to choose a sample size that was balanced to represent the population.

The sample size for health workers was calculated based on Yamane's formula of 1967.

$$n = N / [1+N (e)^2]$$

where:

n = sample size

N = population size

e = sampling error

^ = raised to the power of

This will give a distribution as shown in the Table 3.3

**Table 3.2 Sample Size**

<b>Department</b>	<b>No of Workers</b>	<b>Sample size</b>
Management	65	39
Administration	63	38
Doctors and Nurses	45	27
Finance and Accounts	37	23
Pharmacy	23	14
Laboratory	12	7
<b>Total</b>	<b>245</b>	<b>148</b>

### **3.5 Research Instrument**

This study used questionnaire as a tool for collecting data, the questionnaire included both structured and unstructured questions. The questionnaire was preferred for this study because respondents were assumed to be knowledgeable and were able to answer questions that were asked, they were also easy to administer and easy to be analyzed. A Likert scale of one to five was used to measure the extent to which the respondents agreed or disagreed with the questions. The questionnaire was divided into three sections. Section A comprised of demographic information about the respondent and their departments of work within the hospital. Section B Factors influencing adoption HMIS and Section C, Adoption of HMIS.

#### **3.5.1 Piloting of the Study**

Pilot testing was conducted using a sample of the 15 respondents that were selected from the sample frame. Testing was done to detect any errors, vague or unclear items in the questionnaire and it was used to correct any errors before the actual data collection. The pilot study was done at Thika level 5 hospital using 10 percent of the sample based on Hertzog (2008), which states that it should pilot study should be 10.0 percent of the projected sample.

### **3.5.2 Validity of Research Instrument**

Validity is usually determined by asking the respondents a series of questions as the investigators try to look for answers in the research done by others. Original concept, notion, question or hypothesis is governed by the construct by determining which data is to be collected and how it is to be collected. The application of a test actively cause or affect the interplay between construct and data in order to validate their investigation. Validity of a test was greatly be reduced by the involvement of the researchers. To check for completeness of questionnaires, legibility of records and validity of responses, data quality was incorporated in the entire study process especially at the data collection point.

Quality control that involves of data cleaning, validation and confidentiality was done at data processing point. In this study the validity of the instrument was checked by use of construct validity to check if the questions were well structured in order to give responses to the investigation. Content validity to confirm if the questions were constructed in a manner that can be understood by the respondents and interpret the same questions the same way. The research instrument was presented in the faculty forums when the research proposal was defended, there after the questionnaire was administered with approval of the supervisor.

### **3.5.3 Reliability of Research Instruments**

Reliability specifies the degree to which the research instrument is derived from biasness and hence guarantees reliability. In order to advance the consistency of the instrument, a valuation of the uniformity of the replies on the pilot questionnaires were made to make a ruling on their reliability. The idea behind reliability is that any substantial result must be more than a one-off finding and be essentially repeatable. In this study Split-Half Reliability design was used in survey research to establish the divergence of two survey characteristics in data collection and survey instrument. The items were divided into two sets and the instrument issued to a sample of the sample. Total score for each divided half, was calculated to estimate and ensure the split-half reliability.

### **3.6 Data Collection Procedures**

Preceding the commencing of collecting data, the researcher got the essential documentation for the research with the assistance of the University of Nairobi. This formed base of securing the research permit from the National Commission for Science, Technology and Innovation (NACOSTI). A letter of transmittal was sent to the management of Kiambu level 5 hospital to request them to contribute in the study. The respondents agree to undertake the study, the questionnaires were taken to the respondents to fill at their own convenient time. Ethical considerations were clearly communicated and followed before the collection of data. The research instrument was clearly conversed to the researcher assistants in order to gather the required data the right way. The researcher intended to collect data from 148 member of staff from Kiambu level 5 hospital. The whole data collection and analysis exercise was expected to take roughly three weeks. Data entry, coding and clean up was undertaken and remove errors and inconsistencies. The responses were then be summarized and inference drawn about the sample population.

### **3.7 Data Analysis Techniques**

Analysis of data was done by Quantitative technique. The variables were Statistical Packages for Social Sciences (SPSS) computer software was used to analyze the data using descriptive statistics, mainly using tables, percentages, mean and correlation coefficient and coefficient of determination. This enabled more understanding of the results and findings.

### **3.8 Ethical Considerations**

Throughout the study the investigator tried to follow the moral research concerns and professional guidelines. This involved evading acts of transgression in research, such as data fabrication, forgery and plagiarism. The research began by seeking permission from the relevant authorities in the health facilities. The researcher ensured that respect, courtesy, privacy and justice was adhered to. The research processes and procedures used based on a voluntary informed consent employing a valid research design with a sample selection appropriate for the purpose of the study. In addition the researcher went to the field with no biasness so as to give the respondent a fair ground and get to the root of the issues in order to understand the research questions objectively.

### 3.9 Operationalization of Variables

This section will analyze the operationalization of variables, factors influencing adoption of HMIS in Kiambu Level 5 Hospital County. This describes of variables, term or object in a way that is manageable and quantifiable by other persons individually. Operationalization refers to the transformation of concepts into noticeable indicators of their existence Saunders, (2009).

The operation of the variables is as shown on Table 3.3

Objective	Variable	Indicators	Measurement	Scale	Type of analysis	Tool of analysis
To assess the extent to which cost of provision will influence HMS in in Kiambu level 5 hospital.	Cost of provision	Acquisition cost Implementation cost Maintenance cost Hidden cost	How various cost will influence adoption	ratio	Mean percentage Variance Coefficient of correlation Coefficient of determination	Qualitative Quantitative
To establish how training influence the adoption of HMS in Kiambu level 5 hospital	ICT Skills	Specialized IT knowledge -Complexity of the system -Technical skills -Basic computer skill	Level of ICT skill. Complexity and limitations of the system	ratio	Mean percentage Variance Coefficient of correlation Coefficient of determination	Qualitative Quantitative
To examine the influence of ICT infrastructure on the adoption of HMS in Kiambu level 5 hospital.	ICT Infrastructure	Network connectivity  -Communication and organization access  -Distributed networks	Number of health care practitioners who have access to the internet.  Availability of ICT infrastructure.  Availability for emails for office communication	ratio	Mean percentage Variance Coefficient of correlation Coefficient of determination	Qualitative Quantitative
To assess how data Management influence adoption of HMS in Kiambu level 5 hospital	Data Management	Confidentiality  -Accessibility  -System protection  -Back up provisions	Types of backups in use.  Availability of system protection.  Accessibility of the system	ratio	Mean percentage Variance Coefficient of correlation Coefficient of determination	Qualitative Quantitative
To Investigate the factors influencing adoption of health management information system in Kiambu level 5 hospital	Adoption of HMIS	HMS reports  -Doctor's Scheduling and appointments.  -Multiple payments mode on HMS  -Number of Logins in HMS	Number of clinical reports.  Number of appointments on HMS.  Modes of payments  Total logins	ratio	Mean percentage Variance Coefficient of correlation Coefficient of determination	Qualitative Quantitative

## CHAPTER FOUR

### DATA ANALYSIS, PRESENTATION AND INTERPRETATION

#### 4.1 Introduction

This chapter covered data analysis, findings and interpretations of the study as set out in the research methodology. The results that were presented were on the factors influencing adoption of health management information system in Kiambu level 5 hospital, Kiambu County. The specific areas that were presented in this section were questionnaire response rate, demographic information, level of education, year of service, previous experience with HMIS, affordability and adoption of HMIS, level of ICT training, ICT infrastructure, data management.

#### 4.2 Questionnaire return rate

In this research project, 148 questionnaires were distributed to staff of Kiambu level 5 hospital that included the management, administration, doctors, nurses, and finance, pharmacy and laboratory personnel.

**Table 4.1: Questionnaire return rate by Departments**

<b>Department</b>	<b>Target</b>	<b>Return rate</b>	<b>Percentage</b>
Management	65	39	26.4
Administration	63	38	25.7
Doctors and nurses	45	27	18.2
Finance and accounts	37	23	15.5
Pharmacy	23	14	9.5
laboratory	12	7	4.7
<b>Total</b>	<b>245</b>	<b>148</b>	<b>100.0</b>

Table 4.1 presents the questionnaire return rate by departments. All the 148 questionnaires were collected within 2 weeks and they were properly filled and the return rate was 100.0 percent. Based on Mugenda and Mugenda (2003), a questionnaire return rate of over 70.0 percent is acceptable.

### **4.3 Demographic Information for the management, administration, doctors and nurses, pharmacy and laboratory.**

Demographic is the statistical characteristics of human populations and the crucial statistics of interest in a study. This includes but not limited to: gender, education level, year of service and experience in HMIS (Terebessy, A., 2017). This study analyzed and represented response rate by gender, education level and year of service and experience in HMIS.

#### **4.3.1 Gender demographic.**

The study sought to find out if all gender were well represented. Table 4.2 the percentage of the number of workers that are female and those that were male.

**Table 4.2 Gender demographic**

<b>Gender</b>	<b>No of Workers</b>	<b>Percentage</b>
Male	94	63.5
Female	54	36.5
<b>Total</b>	<b>148</b>	<b>100</b>

The gender dispersal out of the 148 respondents who contributed to the study, and 36.5 percent were female and 63.5 percent were male. Gender distribution followed to the Kenya government affirmative action policy that 30.0 percent depiction should be of each gender. This shows that all gender were well represented in the study.

#### **4.3.2 Respondents by level of education**

The study sought to establish if education level the respondents would influence adoption, it also sought to find out the academic qualification of all the respondents in the healthcare facility. Most of the respondents agreed that the healthcare specialists with education would be more interested to technology.

Table 4.3 shows the education demographic for workers with different level of education.

**Table 4.3 Education demographic**

<b>Education Level</b>	<b>No of Workers</b>	<b>Percentage</b>
Certificate	62	42.0
Diploma	48	32.4
Degree	35	23.6
Master	3	2.0
<b>Total</b>	<b>148</b>	<b>100</b>

Out of 148 respondents 42.0 percent had certificates as the highest level of education, 32.4 percent had diplomas followed by 23.6 percent that had degree as their qualification then 2.0 percent had masters as their highest level of education. This illustrates that the hospital has few doctors compared to clinical officers and nurses.

#### **4.3.3 Respondents by year of service**

The study sought to establish the period of service that the respondents had in the healthcare which they were asked to state.

Table 4.4 shows the results of the period of service.

**Table 4.4 Period of service demographic**

<b>Period of service</b>	<b>No of Workers</b>	<b>Percentage</b>
Below 2 years	51	34.5
3-5 years	42	28.4
6-10 years	36	24.3
9 years and above	19	12.8
<b>Total</b>	<b>148</b>	<b>100</b>

Out of 148 respondents 34.5 percent had worked for less than two years, 28.4 percent had worked between 3 and 5 years, 24.3 percent had worked between 6 to 10 years and 12.8 percent had worked for over 9 years. This illustrates that majority of the workers had worked for less than two years while only 19 workers had worked for 9 ears and above.



#### 4.3.4 Respondents by previous HMIS experience.

The study also sought to find out if the health practitioners have previous experience with health management information system.

Table 4.5 shows the results of the previous HMIS service.

**Table 4.5 Previous HMIS experience demographic**

<b>Gender</b>	<b>No of Workers</b>	<b>Percentage</b>
Yes	43	29.1
No	105	70.9
<b>Total</b>	<b>148</b>	<b>100</b>

Out of 148 respondents 2.1 percent had experience with HMIS whereas 70.9 percent did not have prior practice with the HMIS.

#### 4.4 Affordability and the adoption for Health Management Information system.

The study sought to find out if affordability influenced adoption of HMIS. The extent to which the respondent agree that the cost aspects influence the adoption of HMIS: Likert scale ratings are as follows: 5= to a great extent, 4= high extent, 3= moderate extent 2= small extent and 1= Not at all.

Table 4.6 represents the analysis of Affordability and Health management information system.

**Table 4.6. Affordability and Health management information system**

<b>Affordability</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>Mean</b>	<b>Variance</b>
	<b>(%)</b>	<b>(%)</b>	<b>(%)</b>	<b>(%)</b>	<b>(%)</b>		
HMIS Procurement budgeted	3.3	6.8	16.9	21.6	51.4	4.1	1.3
Costs of HMIS will be recovered	52.7	20.3	16.9	8.1	2.0	1.9	1.2
Cost of acquisition influenced adoption of HMIS	2.7	7.4	17.6	22.3	50.0	4.1	1.2
Implementation cost influenced adoption of HMIS	2.0	8.1	17.6	23.0	49.3	4.1	1.2
Cost of maintenance influenced adoption of HMIS	1.4	8.8	16.9	22.1	50.8	4.1	1.1
<b>Mean</b>	<b>2.5</b>	<b>2.0</b>	<b>3.4</b>	<b>3.9</b>	<b>8.1</b>	<b>3.7</b>	<b>1.2*</b>

Composite variance=1.2

From the analysis 73.0 percent of the respondents agreed that the HMIS had been budgeted for while 27.0 percent disagreed it was not budgeted for. Only 3.9 percent of the respondents agreed that the cost of HMIS would be recovered since most payments were done through the system whereas 96.0 percent disagreed that it would not be recovered. Majority of the respondents agreed that cost of acquisition, cost of implementation and cost of maintenance influenced adoption of HMIS with 72.3 percent, 72.3 percent and 72.9 percent respectively. The data was within the mean (normal data), the variation had been explained by the low composite variance of 1.2.

Table 4.7 represents the Relationship between affordability and adoption of HMIS

**Table 4.7 Relationship between affordability and adoption of HMIS**

<b>Relationship</b>	<b>Correlation coefficient</b>	<b>Coefficient of determination</b>
Affordability of HMIS vs. Digitized reports	0.9	80.0
Affordability of HMIS vs. Doctors scheduling	0.7	50.0
Affordability of HMIS vs. automated SMS alerts	0.5	30.0
Affordability of HMIS vs. multiple Payment modes	0.9	80.0
Affordability of HMIS vs. Integration with service providers	0.8	60.0
Affordability of HMIS vs. Daily logins	0.8	60.0
<b>Mean</b>	<b>0.8</b>	<b>60.0</b>

The correlation of coefficient shows the association amid the adoption of HMIS and affordability. The range of correlation of coefficient is from -1 to +1, the multiple correlation of coefficient of the data was 0.8 therefore very strong relationship between the adoption of HMIS and affordability. Correlation of determination was 60.0 percent, this indicate that 60.0 percent of the variations of adoption of HMIS could be explained by the variations in affordability, only 40.0 percent of the variations of adoption of HMIS could be explained by the variations in affordability.

#### 4.5 Level of Training on ICT skills

The study sought to find out the level of ICT skills that the health practitioners have. Respondent's competence in use of computer applications. Likert scale ratings are as follows: 5 = Very well, 4 = well, 3 = Adequately 2 = I Not well, 1 = Not at all.

Table 4.8 represents the analysis of Training on ICT skills

**Table 4.8 Training on ICT skills**

<b>ICT training</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>Mean</b>	<b>Variance</b>
	<b>(%)</b>	<b>(%)</b>	<b>(%)</b>	<b>(%)</b>	<b>(%)</b>		
Competence in use of application software	2.0	3.4	12.8	22.3	59.5	4.3	0.9
Competence in use internet and emails	1.4	2.7	3.4	7.4	85.1	4.7	0.6
Competence in use HMIS	83.0	8.8	4.1	3.4	0.7	1.3	0.6
Trained support staff	82.4	8.8	5.4	2.0	1.4	1.3	0.6
<b>Mean</b>	<b>42.2</b>	<b>5.9</b>	<b>6.4</b>	<b>8.8</b>	<b>36.7</b>	<b>2.9</b>	<b>0.7*</b>

Composite variance=0.7

Training on ICT Skills. 81.8 percent of the respondents agreed that they had computer skills and can satisfactorily perform computer operations like word processors, spread sheets and the can navigate through the internet easily. 91.9 percent of the respondents agreed that the health facility lacks experienced support staff, competence in use of application software is 59.5 percent data is concentrated on the mean and composite variance is 0.7 percent. Majority of the respondents professed training in ICT skills as moderately likely to influence the adoption of information system. This therefore means that training in ICT skills is important in the adoption of information system. For the organization to start realizing the benefits of information systems early, it needs to use users with ICT skills that can easily learn how to work with information system and make execution faster and more reliable.

Table 4.9 represents the relationship between adoption of HMIS and Training of ICT skills.

**Table 4.9 Relationship between adoption of HMIS and Training of ICT skills**

<b>Relationship</b>	<b>Correlation coefficient</b>	<b>Coefficient of determination</b>
Training of ICT skills vs. Digitized reports	0.9	80.0
Training of ICT skills vs. Doctors scheduling	0.9	80.0
Training of ICT skills vs. automated SMS alerts	0.7	50.0
Training of ICT skills vs. multiple Payment modes	0.9	80.0
Training of ICT skills vs. Integration with service providers	0.9	80.0
Training of ICT skills vs. Daily logins	0.9	80.0
<b>Mean</b>	<b>0.88</b>	<b>80.0</b>

Multiple correlation of coefficient of the data was 0.88 whereas coefficient of determination was 80 percent therefore very strong association among the training of ICT skills and adoption of HMIS. Training was important for the users to access digitized reports, doctors scheduling, , multiple payment mode and daily logins with a coefficient correlation of 0.9 whereas automated SMS alerts had a coefficient correlation of 0.7.

#### **4.6 ICT Infrastructure**

The study sought to find out the accessibility of ICT infrastructure by the respondents. Respondents response in use of ICT infrastructure in their daily activities: Likert scale ratings are as follows 5= to a great extent, 4= high extent, 3= moderate extent 2= small extent and 1= Not at all.

Table 4.10 represents the analysis of ICT Infrastructure.

**Table 4.10 ICT Infrastructure**

<b>ICT Infrastructure</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>Mean</b>	<b>Variance</b>
	<b>(%)</b>	<b>(%)</b>	<b>(%)</b>	<b>(%)</b>	<b>(%)</b>		
Computers and other peripherals are in a local area network(LAN)	8.1	10.1	9.5	18.2	54.1	4.3	0.9
Users share information/data concurrently	59.5	22.3	12.8	3.4	2.0	4.7	0.6
There is internet connectivity	84.5	8.0	3.4	2.7	1.4	1.3	0.6
Access to other external networks.	83.8	8.8	4.0	2.7	0.7	1.3	0.6
<b>Mean</b>	<b>59.0</b>	<b>12.3</b>	<b>7.4</b>	<b>6.8</b>	<b>14.5</b>	<b>2.9</b>	<b>0.7</b>

**Composite variance 0.7**

In ICT infrastructure 72.3 percent of the respondents agreed that the system was well connected but not everybody could access the computer since they are not enough, whereas 27.7 percent did not agree. Due to the low adoption only 54.1 percent of the respondents agreed that data can be shared concurrently, Internet connectivity is unstable due to nonpayment. Most respondents commented that computers were used at the reception area for billing purposes hence no local area network present. The low level of HMIS use could be expound by a lack of proper infrastructure. The findings of the study correspond with. Further Millers' literature shows that for there to be an efficient working electronic system, there have to be presence of some ICT infrastructure of which minimum specifications are given by the system developers. The higher the specifications, the harder to find the hardware and the higher the costs of purchase (Miller, 2005).

Table 4.11 shows the Relationship between Adoption of HMIS and ICT Infrastructure

**Table 4.11 Relationship between Adoption of HMIS and ICT Infrastructure**

<b>Relationship</b>	<b>Correlation coefficient</b>	<b>Coefficient of determination</b>
ICT Infrastructure vs. Digitized reports	0.9	80.0
ICT Infrastructure vs. Doctors scheduling	0.9	80.0
ICT Infrastructure vs. automated SMS alerts	0.7	50.0
ICT Infrastructure vs. multiple Payment modes	0.9	80.0
ICT Infrastructure vs. Integration with service providers	0.9	80.0
ICT Infrastructure vs. Daily logins	0.9	80.0
<b>Mean</b>	<b>0.9</b>	<b>80.0</b>

Table 4.8 presents the findings on the relationship between ICT infrastructure and adoption of HMIS. There is strong association with the correlation coefficient of 0.9 in all the indicators except for SMS alerts that has 0.7. Correlation of determination was 80.0 percent.

#### **4.7 Data Management**

The study sought to find out how data management influenced adoption of HMIS. The response from the respondents on the importance of Data Management in the daily use: Likert scale ratings are as follows: 5= strongly agree, 4= Agree, 3= Neutral 2= Disagree 1= strongly disagree.

Table 4.12 shows the results of Data management.

**Table 4.12 Data Management**

<b>Data Management</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>Mean</b>	<b>Variance</b>
	<b>(%)</b>	<b>(%)</b>	<b>(%)</b>	<b>(%)</b>	<b>(%)</b>		
Backup security systems in the hospital	77.7	14.2	4.7	2.0	1.4	1.4	0.6
Daily data back ups	79.1	12.8	5.4	2.0	0.7	1.3	0.5
Different access rights	75.7	16.2	3.4	4.0	0.7	1.4	0.6
Up to date antivirus in the computer server	82.4	9.5	4.7	2.0	1.4	1.3	0.6
Data protection from unauthorized access	83.1	8.1	4.7	3.4	0.7	1.3	0.6
<b>Mean</b>	<b>79.6</b>	<b>12.2</b>	<b>4.6</b>	<b>2.7</b>	<b>0.9</b>	<b>1.3</b>	<b>0.6</b>

Table 4.12 represents the analysis of data management. 3.4 percent of the respondents agreed there were backups while 96.6 percent disagreed and that's the reason why the mean was so low with 1.3 and 0.6 respectively. The adoption is quiet low because the system is only used by a few people. The antivirus is not up to date due to nonpayment of the annual premiums. There was no unauthorized access since there is no data to be accessed. Table 4.13 shows the Relationship between Adoption of HMIS and Data Management.

**Table 4.13 Relationship between Adoption of HMIS and Data Management**

<b>Relationship</b>	<b>Correlation coefficient</b>	<b>Coefficient of determination (%)</b>
Data Management vs. Digitized reports	0.9	80.0
Data Management vs. Doctors scheduling	0.9	80.0
Data Management vs. automated SMS alerts	0.7	50.0
Data Management vs. multiple Payment modes	0.9	80.0
Data Management vs. Integration with service providers	0.9	80.0
Data Management vs. Daily logins	0.9	80.0
<b>Mean</b>	<b>0.9</b>	<b>80.0</b>

Table 4.9 presents the findings on the relationship between data management and adoption of HMIS. There's strong association with the multiple correlation coefficient of 0.9 in all the indicators except for SMS alerts that has 0.7. Correlation of determination was 80.0 percent. This means that 80.0 variations in the adoption of HMIS could be explained by the variations in the data management.

#### **4.8 Adoption of HMIS**

Respondent's approval on success of adoption of HMIS, Likert scale ratings are as follows: 5= strongly agree, 4= Agree, 3= Neutral 2= Disagree 1= strongly disagree

Table 4.14 shows the results of Adoption of HMIS.



**Table 4.14 Adoption of HMIS**

<b>Adoption of HMIS</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>Mean</b>	<b>Variance</b>
	<b>(%)</b>	<b>(%)</b>	<b>(%)</b>	<b>(%)</b>	<b>(%)</b>		
Digitized HMIS reports	46.0	21.0	15.5	12.8	4.7	2.1	1.6
HMIS Doctors 'appointment scheduling	91.2	3.4	2.0	2.0	1.4	1.2	0.5
Automated short messages service(SMS) alerts to Patients	97.3	2.0	0.7	0.0	0.0	1.0	0.0
Multiple payments modes, (Visa card, Mpesa, )	1.4	8.0	17.6	23.0	50.0	4.1	1.1
Integration of other service providers with HMIS	81.8	10.1	5.4	2.0	0.7	1.3	0.5
Daily login by users into the HMIS	80.4	11.5	4.7	3.4	0.0	1.3	0.5
<b>Mean</b>	<b>52.9</b>	<b>7.3</b>	<b>6.8</b>	<b>6.6</b>	<b>9.4</b>	<b>1.8</b>	<b>0.7</b>

Table 4.9 show the various indicators for the adoption of HMIS, from the analysis 82.5 percent disagreed that there are no digitized reports and 17.5 percent agreed there were digitized reports, 94.6 percent did not agree with the fact that doctors' appointments are scheduled through the HMIS. Most of the respondents disagreed that the system was in use and that's the reason why many of the medical activities were being done manual.

**CHAPTER FIVE**  
**SUMMARY OF THE FINDINGS, CONCLUSIONS DISCUSSIONS AND**  
**RECOMMENDATIONS**

**5.1 Introduction**

This chapter focused on the summary of the findings of the study, conclusions, discussions the recommendations and suggestions for further study. The objective of the study was to establish the factors that influenced adoption of HMIS. The guiding objectives of the study were: to assess the extent to which affordability influence of adoption of HMIS in Kiambu level 5 hospital, to establish how training on ICT skills influence the adoption of HMIS in Kiambu level 5 hospital, to examine the influence of ICT infrastructure on the adoption of HMIS in Kiambu level 5 hospital, to assess how data management influence adoption of HMIS in Kiambu level 5 hospital.

**5.2 Summary of the Findings of the Study**

The summary of the findings were made based on the study variables and research questions. The study targeted a population of 245 respondents from Kiambu level 5 hospital in Kiambu County. From the population a sample of 148 respondents was selected and were reached through questionnaires that is 39 respondents from the management, 38 respondents from administration, 27 doctors and Nurses, 23 respondents from finance and accounts, 14 respondents from pharmacy and 7 from the laboratory. All the 148 questionnaires were properly filled and this led to a response rate of 100 percent. Coding was done from 148 questionnaires it was noted that out of 148 respondents who participated in the study, 63.5 percent were male and 36.5 percent were female. Out of 148 respondents 42.0 percent had certificates as the highest level of education, 32.4 percent had diplomas followed by 23.6 percent that had degree as their qualification then 2.0 percent had masters as their highest level of education. This illustrates that the hospital has few doctors compared to clinical officers and nurses.

Out of 148 respondents 34.5 percent had worked for less than two years, 28.4 percent had worked between 3 and 5 years, 24.3 percent had worked between 6 to 10 years and 12.8 percent had worked for over 9 years. This illustrates that majority of the workers had worked for less than two years while only 19 workers had worked for 9 ears and above. Adoption of HMIS and affordability, training of ICT skills, ICT infrastructure and data management had a correlation coefficient of 0.8, 0.9, 0.9, and 0.9 respectively whereas multiple correlation was 0.7. Affordability, training of ICT

skills, ICT infrastructure and data management had a coefficient of determination of 0.6, 0.8, 0.8, and 0.8 respectively whereas multiple coefficient of determination for all the factors was 0.8. This highlighted that training of ICT skills, ICT infrastructure and data management influence adoption of HMIS followed by affordability.

### **5.2.1 Affordability and adoption for Health Management Information system.**

Affordability factors were analyzed and 73% of the respondents believed that the HMIS had been budgeted for while 27% believed it was not budgeted for. Only 3.9% of the respondents believe that the cost of HMIS would be recovered since most payments are done through the system whereas 96% disagreed that it will not be recovered since the manual system is still in use. Majority of the respondents believed that cost of acquisition, cost of implementation and cost of maintenance influence adoption of HMIS with 72.3, 72.3 and 72.9 percent respectively. The data is within the mean (normal data), the variation has been explained by the low composite variance of 1.2. Correlation coefficient shows the relationship amongst adoption of HMIS and affordability, Correlation coefficient of the data was 0.8 therefore very strong relationship. Correlation of determination indicate the percentage of the information that can be predicted from the 90% of the adoption of HMIS could be explained by affordability and only 10% could not be explained.

### **5.2.2 Level of Training and ICT skills and adoption for Health Management Information system**

From the analysis 81.8% have computer skills and can satisfactorily perform computer operations like word processors, spread sheets and the can navigate through the internet easily. 91.9 percent of the respondents feel that the health facility lacks experienced support staff, competence in use of application software is 59.5% data is concentrated on the mean and composite variance is 0.7%. Majority of the respondents professed training in ICT skills as moderately likely to influence the adoption of information system. This therefore means that training in ICT skills is vital in the adoption of health management information system. For the organization to start realizing the benefits of information systems early, it needs to use users with ICT skills that can easily learn how to work with information system and make execution faster and more reliable. Correlation coefficient of the data was 0.88 whereas coefficient of determination was 0.8 therefore very strong

association between the training of ICT skills and adoption of HMIS. Training is important for the users to access digitized reports, doctors scheduling, multiple payment mode and daily logins with a coefficient correlation of 0.9 whereas automated SMS alerts had a coefficient correlation of 0.7.

### **5.2.3 ICT infrastructure and adoption for Health Management Information system**

Many of the respondents believe that the system was well connected but not everybody could access the computer since they are not enough. Due to the low adoption only 5.4% of the respondents know that data could be shared concurrently, Internet connectivity is unstable due to nonpayment. Most respondents said that computers were used at the reception area for billing purposes hence no local area network present. The low level of electronic health records system used could be explained by a lack of available computers. The findings of the study correspond with. Further Millers' literature shows that for there to be an efficient working electronic system, there have to be presence of some ICT infrastructure of which minimum specifications are given by the system developers. The higher the specifications, the harder to find the hardware and the higher the costs of purchase (Miller, 2005). There is a very strong association with the correlation coefficient of 0.9 in all the indicators except for SMS alerts that has 0.7. Correlation of determination was 0.8

### **5.2.4 Data management and adoption for Health Management Information system**

From the analysis 3.4% of the respondents believe that are no backups and that is the reason why the mean and the variance are so low with 1.3 and 0.6 respectively. The adoption is quiet low because the system is only used by a few people. The antivirus is not up to date due to nonpayment of the annual premiums. There is no unauthorized access since there is no data to be accessed. There is a very strong relationship with the correlation coefficient of 0.9 in all the indicators except for SMS alerts that has 0.7. Correlation of determination was 0.8.

## **5.3 Discussions**

Literature review revealed that affordability and adoption of HMIS has adversative effects on its implementation. HMIS adoption comes at a cost, and it has prospective if well installed to lower expenses of health care, while opening up new modalities for patient treatment and welfare Arendt, (2013). Availability of financial possessions is vital in the adoption decisions, since high cost of

procuring technologies have been found to be a main obstacle. Financial resources are required for the procurement, implementation of technologies, training personnel covering operating expenses, and for maintenance of the HMIS and its enhancements in the future. Lack of the requisite resources, it is hard to benefit from the full potential of HMIS adoption (Calman, Kitson, and Hauser, 2010). Worldwide, the cost of setting up modern computer HMIS is very high and for that reason healthcare facilities choose manual systems in management of medical information. . Ideally, public procurement ought to meet the basic ethics of good governance, clearness, answerability, and moreover should ensure value for money Christensson, (2010). Cost of ICT infrastructure is often high-priced for most hospitals in emerging states and for those who can manage to pay, repetitive maintenance and repairing, is yet another problematic area that is not easily controllable, Tusubira and Mulira (2009). Kiambu level 5 hospital has struggled with stationary or deteriorating budgets for health, system inadequacies, persistently and poor service quality. In order to have a Health management information system work efficiently and effectively, there are long term expenses that are going to be incurred that comprise of annual license fees, training and development, employment of technical support staff ,monitoring of the system results, amending, improvement and maintenance of the Health management information system.

Literature review revealed that training growths mindfulness and self-assurance as workers that are competent are able to overawed fear of technology while linking usage to projected aids (Sahay and Walsham, 2006). In countries that have incorporated ICT training for physicians at the initial stage, approval of HMIS and real usage is comparatively high (Khan, 2012). Optimum usage of technology to the conversion of health care requires IT knowledge in the medics. Staff that do not have ICT skills are unable to work with the health systems accurately. That is why organizations are encouraged to hire skilled staffs, and if not they ought to have programs to train them (Calman, Kitson, and Hauser, 2010). Training unqualified staff is expensive; organizations are encouraged to hire qualified staff to avoid extra costs. The necessity for training in the health practice training recognizes other than one training need; the training manager employed by the organization, prioritizes the training grounded on urgency, the number of staffs needing training, and the resources required. Without suitable ICT training, user participation in selection and development of ICT systems turn out to be tough and if it occurs, it is not only to approve the specialists' decisions. This may lead to having health care systems that are not accepted or used appropriately.

According to IT-Online (2015), though there are numerous ICT solutions accessible they are neither well-known nor much used a clarification for this inconsistency is the partial availability of appropriate technologies. The above studies have been confirmed by analysis of Kiambu level 5 hospital. The low adoption of HMIS is due to lack of skills amid the clinicians. There occurs a gap in training between users. The health care specialists need to show readiness to invest in HMIS for greater quality assurance Cibulskis and Hiawalyer (2012).

Infrastructure is critical in embracing of ICT in the public health care sector. Although there are vast paybacks of technology as a way of giving quality health care, the possibility of technology hasn't been completely hitched by clinicians in unindustrialized nations. Infrastructure difficulties sluggish and undependable Internet connection, lack of gadgets, distance are the root cause. A noble ICT groundwork is a chance for increasing the well-being of a country. Developing states that have great internet saturation but bandwidth may still be faced with challenged, thus restraining acceptance. Non-utilization of ICT amongst the health care segment, is as a result of poor services by ISP, Beckinsale and Ram (2010)

ISP provide incompetent services that are frequently are categorized by slight bandwidth, recurrent interruptions and expensive rates. Therefore, the availability of different communication tools. The increasing attentiveness in ICT implementation credited to development of numeral users that use the internet globally, with a higher growth testified from users in emergent states (ITU, 2016). Deprived ICT infrastructure and internet diffusion in developing nations hinders ICT adoption.

Literature review revealed that data management that is security and privacy are the two most key encounters involved in guarding patient's data from unintended or deliberate use, (Maheu, Hitten, and Allen, 2013). System steadiness, in the context of the Data Management credentials set to the authorized users, computerized HMIS deals with delicate medical information that should be treated with privacy. In the USA, Data Management is imposed by use of passwords dependent on sub-routines that check against a hash-code of the password. They have enacted strict privacy laws concerning patient information to advance the security of ICT applications U.S. Department of Health and Human Services. Pascale Carayon, (2012). One of the tools for Data Management is by use of audit trails as some of the security breaches might have caused from misuse of access privileges by authorized persons. Many hospitals in Indonesia have faith in that password user protection is sufficient enough to have secured Health management systems. Lack of strong security standards ethical issues are expected to arise. The concealment of the health records could

be wrecked either inside the health facility, by unintended expose, or from outside intrusion through unauthorized access. It is of paramount importance to keep such material safe because if exposed to unauthorized party then it could create legal issues (Kelly and Unsal, 2002).

## **5.4 Conclusions**

The purpose of this study was to identify factors influencing adoption of Health management information system in Kiambu level 5 hospital. Considering the aspects acknowledged in this research, it should be probable to improve the capability of health care practitioners successfully use HMIS. The HMIS needs the existence of trained user support, system characteristics, backing from the management and plentiful organizational facilitators.

### **5.4.1 Affordability**

The study established that financial implications are a big factor in the adoption of HMIS. Health facilities are not likely to accept HMIS because of lack of an ICT budget. To operate efficiently, the minimum and correct amount of resources behind it need to be available so that the health care practitioners can reach a return of investment (ROI) Availability of financial possessions is vital in the adoption decisions, since high cost of procuring technologies have been found to be a main obstacle.

### **5.4.2 Training on ICT**

From the study, 92.1 percent of the population agrees that the systems complex to use .This augers with Miller and Sim (2005) literature that some health providers might have some ICT knowledge but the systems available are too complex and cannot meet their requirements. HMIS developers appear to undervalue the level of computer skills required from healthcare providers to run the system and perceive it to be very easy to use, while the system actually is very complex to use by these Health care practitioners. In addition, difficulty of using HMIS and the non-use of specific functions result from the complexity of the systems. Further, good typing skills are needed to enter patient medical information, notes and prescriptions into the HMIS, and some health care practitioners lack them. Customizability of the system should also be enhanced to ensure that user needs are met. Some systems have too many functionality and multiple screens making the system seem to be so hard to use. Further Flagan and Jacobsen (2003) analyzed that good typing skills are

needed to enter patient medical information, notes and prescriptions into the HMIS, and some Health care practitioners lack them. For the HMIS to have a positive impact on patient safety, health care practitioners must be able to use these systems effectively after they are made available. That, in turn, will increase the probability of quality and safety improvements through the HMIS.

### **5.4.3 ICT infrastructure**

The staff should have adequate IT equipment that is accessible and in good working condition for the hospital's operations. The organization's management should fully embrace the use of ICT in all functions of the hospital to enhance efficiency in service delivery. This will be of significant help to the patients receiving treatment and in maintaining of their medical records for future.

The organization should also invest in heavy duty power backup generators to ensure seamless continuity of operations during power out rages as this would interfere with productivity and ICT operations in the hospital. The management should look into integrating the use of ICT in more functions of the day to day running of the organization. This will be in addition to the current use of ICT in preparing annual budgets and objectives, sensitization and creation of awareness of vaccines among other uses.

### **5.4.4 Data Management**

System steadiness in the perspective of the data management, authorizations are set for authorized operators, computerized medical records have sensitive medical information and should be treated with privacy. Lack of strong security standards ethical issues are expected to arise. The concealment of the health records could be wrecked either inside the health facility, by unintended expose, or from outside intrusion through unauthorized access. It is of paramount importance to keep such material safe because if exposed to unauthorized party then it could create legal issues. Cybercrime has become a threat to many organizations. Kiambu level 5 hospital should therefore ensure that they have invested in competent information security staff as well as latest information security software to safeguard the confidential data and records they possess.

## **5.5 Recommendations**

On the basis of the findings obtained, this study commends that:

### **5.5.1 Affordability**



Government ought to make sure there are suitable financial planning and extensive guarantee in order to avoid system failure. Public procurement plays a vital purpose of any government, targeting content requirements for goods, works, systems, and services on time. Ideally, public procurement ought to meet the basic ethics of good governance, clearness, answerability, and moreover should ensure value for money

### **5.5.2 Training on ICT skills**

Medical schools should get accustomed to using of HMIS in teaching the learners. To accelerate the HMIS adoption medical students should be trained on how use computer aided programs as their decision support tools, this could give them confidence to use the technology once they join the practicing field.

### **5.5.3 ICT infrastructure**

The Ministry of Public Health should come up with standards of designing HMIS so that it can easily be incorporated with others. Currently they are many systems in the market and one can battle with which one to concentrate on.

### **5.5.4 Data management**

There should be privacy and security in the protection of patient's records from unintended or intended misuse. Data Management is imposed by use of passwords dependent on sub-routines that check against a hash-code of the password. They should enacted strict privacy laws concerning patient information to advance the security of ICT applications

## **5.6 Suggested Areas for Further Research**

The researcher made the following suggestions for further research based on what was found out from the study,

A detailed study be undertaken to establish if the Location of the healthcare facility has an influence in the adoption. This information can be useful for determining if facilities in urban settings are more likely to adopt HMIS that those in the rural setting hence establish if there is a digital divide.

This study was done on Kiambu level 5 hospital in Kiambu County only, therefore this research recommends a research be done on other level 5 hospitals to allow for more generalizability.

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## APPENDICES

### **Appendix 1: Letter of Transmittal for Data collection for the Management, Administration, Doctors and nurses, Pharmacy, laboratory, Finance and accounts**

Naomi Njeri Maina  
P.O. Box 7202-00100  
Nairobi, Kenya  
25<sup>th</sup> September, 2018

Dear Respondent,

#### **RE: RESEARCH ON FACTORS INFLUENCING THE OF ADOPTION OF HEALTH MANAGEMENT SYSTEMS IN KIAMBU LEVEL 5 HOSPITAL.**

I am a final year Master of Arts student at the University of Nairobi, specializing in Project Planning and Management. As part of my course, I am required to carry out a research on the above topic. You have been selected as one of the respondents to help in providing the required data and information for this undertaking. I kindly request you to spare a few minutes and answer the attached questionnaire. The information so obtained will be used for academic purposes only, will be treated with confidentiality and will not be shared with anyone whatsoever. Do not write your name anywhere on the questionnaire.

Thank you for your cooperation

Yours faithfully

**Naomi Njeri Maina**

## Appendix II:

### Questionnaire for Staff of Kiambu Level 5 Hospital

This questionnaire is intended to aid in exploring some of the concerns related with the influence of adoption of Health management information systems in of Kiambu Level 5 hospital. Your assistance in completing this would be much appreciated. Responses will be unidentified and no comments will be attributed to individuals. Please note that your contribution in this study will be voluntary.

#### **Section: A: Demographic Information for the management, administration, doctors and nurses.**

##### 1. Gender

Male ( )

Female ( )

##### 2. Please indicate the highest level of education attained? (Tick as applicable)

Certificate ( )

College Diploma ( )

Undergraduate ( )

Masters ( )

##### 3. Indicate your period of service in this institution

Below 2 years ( )

3 to 5 years ( )

6 to 8 years ( )

9 years and above ( )

##### 4. If there is no system implemented, have you ever used any Hospital management Information system?

Yes ( )

No ( )

#### **Section: B. Affordability and the adoption of Health management Information system.**

5. To what extent do you agree that the following are cost aspects that influence the adoption of HMIS: Use the scale of: 5= to a great extent, 4= high extent, 3= moderate extent 2= small extent and 1= Not at all

<b>Affordability</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>
Procurement of HMIS was in the budget					
Costs for implementation of the HMIS will be recovered					
Cost of acquisition influenced adoption of HMIS					
Implementation cost influenced adoption of HMIS					
Cost of maintenance influenced adoption of HMIS					

### **SECTION C Level of ICT training skills**

6. In terms of general use of ICT [for instant. application software] please indicate your level of use of the following computer applications. Use the scale of: 5 = Very well, 4 = well, 3 = Adequately 2 = I Not well, 1 = Not at all

<b>ICT training</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>
You are competent in using words processors, spreadsheets and databases					
You are competent in using internet and emails					
You are comfortable using HMIS					
There are trained support staff					

### **SECTION D: ICT Infrastructure**

7. Specify to what extent the staff use the ICT infrastructure in their daily activities .Use the scale of: 5= to a great extent, 4= high extent, 3= moderate extent 2= small extent and 1= Not at all

<b>ICT Infrastructure</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>
Computers and other peripherals are connected in a local area network(LAN)					
Users share information/data concurrently					
There is internet connectivity in the hospital					
It is possible to access other networks from the hospital					

8. Specify to what extent the Data Management is important in the daily use .Use the scale of : 5= Strongly agree, 4= Agree, 3= Neutral 2= Disagree 1= Strongly disagree

<b>Data Management</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>
There are backup security systems in the hospital					
Data is backed up on a daily basis					
Users have different access rights					
Up to date antivirus is installed in the computer server					
Data is protected from unauthorized access					

### **Section: E. Adoption of HMIS**

9. To what extent do you agree with the following statements on Adoption of HMIS? Use a scale of 1-5, where (1= strongly disagree, 2= disagree, 3= moderately agree, 4= Agree and 5= strongly Agree)

<b>Adoption of HMIS</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>
HMIS reports are digitized and printed when required					
Doctor's scheduling and appointments is done through HMIS					
Patients get automated short messages service(SMS) alerts for appointment and reminders					
The hospital has multiple payments mode, that is by Visa card, Mpesa, Insurance					
HMIS has been integrated with other service providers like the banks					
I login every time I want to use the HMIS					

**Appendix III:  
Krejcie and Morgan Table**

Table for Determining Sample Size for a Given Population

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

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

Source: Krejcie & Morgan, 1970

**Appendix IV:**

**Recommendation from the University of Nairobi**



**UNIVERSITY OF NAIROBI**  
**OPEN, DISTANCE AND e-LEARNING CAMPUS**  
**SCHOOL OF OPEN AND DISTANCE LEARNING**  
**DEPARTMENT OF OPEN LEARNING**  
**NAIROBI LEARNING CAMPUS**

Your Ref:

Our Ref:

Telephone: 318262 Ext. 120

Main Campus  
Gandhi Wing, Ground Floor  
P.O. Box 30197  
NAIROBI

REF: UON/ODEL/NLC/29/386

24<sup>th</sup> October, 2018

TO WHOM IT MAY CONCERN

**RE: MAINA NAOMI NJERI - REG NO: L50/5618/2017**

This is to confirm that the above named is a student at the University of Nairobi, Open Distance and e-Learning Campus, School of Open and Distance Learning, Department of Open Learning pursuing Masters of Art in Project Planning and Management.

She is proceeding for research entitled "Factors Influencing Adoption of Health Management Information System: Case of Kiambu Level 5 Hospital, Kiambu County, Kenya."

Any assistance given to her will be highly appreciated.



**CAREN AWILA**  
**CENTRE ORGANIZER**  
**NAIROBI LEARNING CENTRE**

## Appendix V:

### Research Authorization from NACOSTI



#### NATIONAL COMMISSION FOR SCIENCE, TECHNOLOGY AND INNOVATION

Telephone: +254-20-2213471,  
2241349,3310571,2219420  
Fax: +254-20-318245,318249  
Email: dg@nacosti.go.ke  
Website: www.nacosti.go.ke  
When replying please quote

NACOSTI, Upper Kabete  
Off Waiyaki Way  
P.O. Box 30623-00100  
NAIROBI-KENYA

Ref. No. **NACOSTI/P/18/64290/26508**

Date: **6<sup>th</sup> November, 2018**

Naomi Njeri Maina  
University of Nairobi  
P.O Box 30197-00100  
**NAIROBI.**

#### **RE: RESEARCH AUTHORIZATION**

Following your application for authority to carry out research on *“Factors influencing adoption of Health Management Information System a case of Kiambu Level 5 Hospital, Kiambu County Kenya,”* I am pleased to inform you that you have been authorized to undertake research in **Kiambu County** for the period ending **6<sup>th</sup> November, 2019.**

You are advised to report to **the County Commissioner and the County Director of Education, Kiambu County** before embarking on the research project.

Kindly note that, as an applicant who has been licensed under the Science, Technology and Innovation Act, 2013 to conduct research in Kenya, you shall deposit a **copy** of the final research report to the Commission within **one year** of completion. The soft copy of the same should be submitted through the Online Research Information System.

**GODFREY P. KALERWA MSc., MBA, MKIM  
FOR: DIRECTOR-GENERAL/CEO**

Copy to:

The County Commissioner  
Kiambu County.


The County Director of Education  
Kiambu County.


*National Commission for Science, Technology and Innovation is ISO9001:2008 Certified*


**Appendix VI:**  
**NACOSTI Permit**

**THIS IS TO CERTIFY THAT:**  
**MS. NAOMI NJERI MAINA**  
**of UNIVERSITY OF NAIROBI, 7202-100**  
**NAIROBI, has been permitted to conduct**  
**research in Kiambu County**  
**on the topic: FACTORS INFLUENCING**  
**ADOPTION OF HEALTH MANAGEMENT**  
**INFORMATION SYSTEM A CASE OF**  
**KIambu LEVEL 5 HOSPITAL, KIambu**  
**COUNTY KENYA**  
**for the period ending:**  
**6th November,2019**

**Permit No : NACOSTI/P/18/64290/26508**  
**Date Of Issue : 6th November,2018**  
**Fee Received :Ksh 1000**



  
.....  
**Applicant's**  
**Signature**

  
.....  
**Director General**  
**National Commission for Science,**  
**Technology & Innovation**