

**FACTORS INFLUENCING IMPLEMENTATION OF HEALTH  
MANAGEMENT INFORMATION SYSTEM IN PUBLIC  
HOSPITALS: A CASE OF MERU TEACHING AND REFERRAL  
HOSPITAL, MERU COUNTY, KENYA.**

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**DECLARATION**

This is my original work and has not been submitted for a degree or any other award in any university.

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## **DEDICATION**

This research project is dedicated to my daughter Hadassah and my family for their wonderful support, prayers, patience and encouragement throughout the period I was undertaking this course. I am deeply grateful.

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## **ABBREVIATIONS AND ACRONYMS**

**E-Health-** Electronic Health

**ERP-** Enterprise Resource Planning

**HIS** – Health Information System

**HMIS** – Hospital Management Information System

**ICT-** Information Communication Technology

**IQ Care-** International Patient Monitoring System and Quality Care

**ISS-** Information System Strategies

**MIS** – Management Information System

**MoH** – Ministry of Health

**MTRH** – Meru Teaching and Referral Hospital

**SEM-** Structural Equation Model

**TTF-** Task Technology Fit

## ABSTRACT

An efficient and effective Health Management Information System (HMIS) is critical to both the healthcare system and to people's health by providing the system and data central for policy planning, setting of targets and policy implementation challenges. For sustainability, HMIS must consider local settings when being designed. The significance of a Health Management Information System (HMIS) cannot be neglected because health policies and planning in any country generally depend on the accurate and timely information on various health issues. Health information is information about people's health and what they, government, and others are doing about it. It explains the occurrence, frequency, and reasons of major diseases, as well as accessibility and efficiency of curative activities. The purpose of this study was to investigate the factors that influence the implementation of the Health Management Information System (HMIS) in Public hospitals in Kenya with a case study of Meru Teaching and Referral Hospital. The target population of the study was 245 of whom 152 were interviewed. A total of 125 questionnaires were returned with 1 poorly filled and 26 others not returned. The objectives were: to determine the influence of technological factors on the implementation of HMIS at MTRH, to determine the influence of managerial factors on the implementation of HMIS at MTRH, to determine the influence of operational factors on the implementation of HMIS at MTRH and lastly to determine the influence of organizational factors on the implementation of HMIS at MTRH. The study was carried out in Meru Teaching and Referral Hospital where the Health Management Information System (IQ Care) was rolled out in 2015 to enhance Health care delivery. The research study adopted a descriptive research design with the use of questionnaires and interviews as primary tools for data collection. The research questions were generated from the objectives. The findings of the study indicated a positive correlation between the independent variables which are; technological factors, managerial factors and operational factors and the dependent variable which was HMIS implementation. The data collected was coded and analyzed using SPSS version 20.0 and inferential analysis carried out. This study recommended to the national and county government to ensure that they follow due process on System analysis and design, engage highly experienced project managers to spearhead HMIS projects, engage key stakeholders during system requirements definition who will more likely interact with the system on a regular basis and finally pull together all necessary resources that may be required to ensure implementation process.

# CHAPTER ONE

## INTRODUCTION

### 1.1 Background of the Study

The use of modern information technology offers tremendous opportunities in health care delivery as it reduces clinical errors, supports healthcare professionals, to increase efficiency of care or even to improve quality of patient care (Magutu, *et al.*, 2010). According to Ogunsola & Aboyade (2005) Information and Communication Technology (ICT) is defined as a set of activities which facilitate through electronic means the processing, transmission and display of information. Hospitals have gradually embraced the need for Health Management Information Systems (HMIS) with constant impulses from institutional bodies such as the National Government, Insurance companies and The National Hospital Insurance Fund (NHIF). The overall advantage of using Health Management Information Systems far outweighs the limitations. Systems help streamline functions carried out at the hospital thereby greatly improving efficiency and effectiveness in health delivery.

According to USAID, Health Management Information System is one of the six building blocks essential for health system strengthening. A Health Information System (HIS) refers to any organized effort to systematically collect, maintain and disseminate data relevant to the performance of a health system or any of its component parts. The health system provides the underpinnings for decision making and has four functions namely; data generation, compilation, analysis and synthesis, and communication and use (WHO, 2008). As such, any health system has potentially many health applications functioning within it. They are also integrated reporting systems used by the Ministry of Health (MoH), Development Partners and stakeholders to collect relevant and functional information on a routine basis to monitor the Health Sector Strategic Plan (HSSP) Indicators to enable planning, decision making, monitoring and evaluation of the Health care delivery system.

The advent of electronic money transfers has also pushed health facilities to embrace provider payment methods and systems to ease payment processes at the facility level

and to promote financial accountability (Kimama, 2008). These payment systems are linked to HMIS. A provider payment method may be defined simply as the mechanism used to transfer funds from the purchaser of health care services to the providers, and a provider payment system may be defined as the payment method combined with all supporting systems, such as management information systems and accountability mechanisms that accompany the payment method (Cheryl Cashin, 2008). It further posits that only payment systems that advance health systems objectives should be brought on board which encourage access to necessary health services for patients, high quality of care, and improved equity, while at the same time promoting the effective and efficient use of resources and, where appropriate, cost containment.

Further, the utilization of digital applications and solutions is becoming increasingly present in our lives offering opportunities such as Electronic Health (e-health) to tackle some of the factors the society faces. E-health is the application of Internet and other related technologies such as mobile phones in the healthcare industry to improve the access, efficiency, effectiveness, and quality of clinical and business processes utilized by healthcare organizations, practitioners and patients in an effort to improve the health status of patients (Rodrigues, 2003). Hence, E-health is the use of ICT in healthcare provision.

In the global sphere, India has a nationwide initiative of the National Rural Health Mission to introduce a Health Management Information System (HMIS) developed with the aim of improving the quality of health data in India and understanding the effectiveness and impact of recently-launched programs. The HMIS deployment took place on a massive scale, involving thousands of health facilities and hundreds of thousands of health workers, and its success or failure will likely have a far-reaching impact on HIS development in India for years to come (Rohit, 2012). In Brazil, advanced HIS was explicitly designed to manage resources in a public health system serving a very large population of urban poor. With many features of an Enterprise Resource Management system, there is a chance to understand the potential of a complex, operational system that generates indicator data from routine business operations, while

at the same time using system data to improve specific aspects of health-system performance.

On the other hand, in Zambia there were three significant health information management efforts supported by the European Union- HMIS project, SmartCare, and ZEPRS. SmartCare was of particular interest because it represented a significant, nationwide initiative to improve patient health outcomes by providing frontline health care providers with relevant, timely patient information, which is housed in electronic medical records (Vital Wave Consulting, 2005). Furthermore, this effort was taking place alongside national efforts to reform the basic health information system, offering an opportunity to understand the challenges faced by countries coping with multiple HIS initiatives. It is designed to assist managers carry out evidence based decision making at all levels of the health care delivery (Ministry of Health Zambia, 2013).

Information system implementation entails a collection of activities that are aimed at operationalizing a new system in an organization. Implementation as those activities that are carried out after the system design has been completed and end when the project has been accepted by the user. Also, that implementation stage is the longest phase on the project and the most labour intensive. It involves a number of activities that include; the management must approve to implement the new system. Before the implementation stage commences, management approval is crucial since managers control resources including staff needed to implement the system (Yeates & Wakefield (2003).

Managers can hinder the successful implementation of an information system if they feel that the process does not involve them. It is therefore important that they are involved at every stage of the system development. Second, Acquisition of hardware and software. This involves procurement and installation of hardware and software needed to implement the system. The procurement process is tedious where bidders are invited to bid and consequently the supplier with the highest bids will be selected. In some cases, benchmark is done on previous projects the supplier has undertaken. Third, System testing. This is a precautionary measure undertaken to ensure that the new system has no errors before it is rolled out. A system has to be tested to ensure that it meets the user

requirements. Any errors identified are debugged (corrected). Testing should involve system end users as their input is vital to the testing process and system (Kimama 2008).

Fourth, file conversion and database creation. This ensures that data files in the old system are compatible with the new system. In some cases the old files are modified to fit the format of the new system. Fifth, use of agents of change. These represent influential leaders in the organization who have capability to easily influence members of staff on issues pertaining to a new system. They are identified and trained to spearhead the implementation of new system. They are usually influential people with high integrity. Sixth, selecting and training the users. Users of the new system must be conversant with the system in order to reduce errors and increase productivity and acceptance (Kimama, 2008). Therefore users must be trained on how to use the system and the benefits of the new system. Training can be conducted through practical demos, lectures and video presentation. User manuals and system documentation are also very important in training.

Finally, going live or launching the new system. Once the system has been tested and found to be fully working as required, it is launched and rolled out for use (Kimama, 2008). This stage mainly involves 3 activities namely; installation, commissioning and system change-over. Various techniques are used to change over and they include; direct, parallel, phased or pilot. Once the system is live new errors might arise and need the support of software developers. Therefore a post Implementation team can be set up to provide solutions to errors and problems as they arise. According to Dawson (2005) implementation is the last stage of SDLC and represents the final handover of the system to the user. It includes acceptance testing by the user; training; formal hand over, the setting up of data files; implementing work procedures and documentation.

## **1.2 Statement of the Problem**

ICT has been an integral part of human life and has led to rapid processing of mass information. It has enabled people to share, distribute, gather information and communicate through computers and their networks. Over 80 percent of public hospitals in Kenya have in the past traditionally managed health records manually. With the rise of the Technological and Information age, there has been increased need to shift their focus



to Health Management Information Systems as a more sustainable solution to management and record keeping in major health facilities. Meru Teaching and Referral Hospital (MTRH) is one of the county hospital referral equipped with modern integrated ICT facilities.

Meru Teaching and Referral Hospital (MTRH) is a Level 5 public health facility in Meru County located at the heart of Meru Town. MTRH is under the Department of Health in the County Government of Meru. It serves as the referral hospital in Upper Eastern Region. It offers both Outpatient and Inpatient Services to patients, including two main theatres for major and minor operations. MTRH had for a long time been using the Paper Method of Patient Monitoring. It was becoming more of an uphill task monitoring patients and ensuring sustainability in financial accountability.

MTRH has fully fledged departments that run day to day activities of the hospital which include; Records, Finance, Information Communication Technology (ICT), Stores, Laundry, Human Resource, Transport, Public Health, Social Work, Kitchen, Security and Maintenance Departments. The hospital has a workforce consisting of various professions who ensure the hospital activities run smoothly. In 2015, the County Government sought to roll out a Health Management Information System which was to be customized accordingly to suit the hospital needs. The HMIS was customized by the support of a Non-Profit Organization (NGO) known as Palladium Group which deployed programmers to work on the system. This was a pilot programme which if proven successful, would be rolled out to other health facilities in the County. However, it was not long before cracks began to emerge and it was evident that due implementation process had not been followed. Factors that were crucial during implementation had not been keenly considered. This study therefore is conducted to determine the factors affecting the implementation of Health Management Information Systems in Referral Hospitals in Kenya with a case study of Meru Teaching and Referral Hospital.

The facility has embraced a successful technology strategy as recommended by the central government. The county health strategy adopts four main commitments: a willingness to invest in Information Technology, Working with physicians and others to customize an information system to meet specific needs and culture of the institution; nurturing and encouraging buy-in so new systems which if utilized, their benefits will be realized and devising information technology systems that provide real-time feedback to providers as they are caring for patients.

With a devolved health sector to the county governments in Kenya, evidence-based decision making is critically important for the appropriate use of scarce resources. This is because most of devolved units including Meru County are faced with huge problem of under reporting and is linked to lack of knowledge and practice among the health workers characterized by insufficient analysis skills, training and lack of initiative for using information. The conception of technology at the county teaching and referral hospital was based on the concerns about the poor quality data and inadequate integration of the HMIS at the facility despite a number of significant changes it has undergone (in terms of better staffing and infrastructural) since inception to teaching and referral hospital in 2015. Nevertheless, the preliminary report reveals a state of poor health data collection, lack of informed decision - making and the factors for change in the HMIS at the facility. The transition, however, is not easy for MTRH as the facility grapples with a myriad of challenges from management to users that greatly hampers successful implementation of International Patient Monitoring and Quality Care system. This research study therefore seeks to identify factors influencing the implementation of Health Management Information Systems in Public Hospitals with reference to Meru Teaching and Referral Hospital.

### **1.3 Purpose of the study**

The purpose of the study was to determine the factors influencing the implementation of the Health Management Information Systems in Public Hospitals: A Case of Meru Teaching and Referral Hospital, Meru County, Kenya.

## **1.4 Objectives of the Study**

In this study, the objectives were;

- i. To determine the influence of technological factors on the implementation of Health Management Information Systems in Meru Teaching and Referral Hospital.
- ii. To determine the influence of managerial factors on the implementation of Health Management Information Systems in Meru Teaching and Referral Hospital.
- iii. To determine the influence of operational factors on the implementation of Health Management Information Systems in Meru Teaching and Referral Hospital.
- iv. To determine the influence of organizational factors on the implementation of Health Management Information Systems in Meru Teaching and Referral Hospital.

## **1.5 Research Hypotheses**

The following hypotheses were tested:

- i.  $H_{01}$ : There was no relationship between technological factors and implementation of Health Management Information Systems in Meru Teaching and Referral Hospital.
- ii.  $H_{02}$ : There was no relationship between managerial factors and implementation of Health Management Information Systems in Meru Teaching and Referral Hospital.
- iii.  $H_{03}$ : There was no relationship between operational factors and implementation of Health Management Information Systems in Meru Teaching and Referral Hospital.
- iv.  $H_{04}$ : There was no relationship between organizational factors and implementation of Health Management Information Systems in Meru Teaching and Referral Hospital.

## **1.6 Significance of the Study**

E-health is the latest technology handling healthcare related issues. On the other hand, successful adoption and use of e-health systems depends on the suitable infrastructure (Khoja et al., 2012). The ability of health institutions to effectively implement health information management systems remains critically fundamental to enable sustainability in health care delivery. The integration of all resources to realize an effective health management information management system is key, hence the greater need to identify and assess factors that may impede successful implementation of HMIS in health institutions.

This research study will therefor assist ICT officers and project managers to effectively implement Health Management Systems with the awareness of the most prevalent factors. It will further allow them to avoid and or navigate challenges that may emanate in the course of HMIS implementation. For researchers, this study will provide a reference point as they seek to research more on this area. The study will also assist the government during drafting of policies that revolve around Health Management Systems Implementation.

## **1.7 Basic Assumptions of the Study**

The study relied on the assumptions that factors associated with HMIS implementation at Meru Teaching and Referral Hospitals are similar to other public hospitals. It also assumed that respondents who would take part in the study would be available and would give truthful and accurate information to the researcher without being forced. Moreover, it assumed that the instruments which were used for the study would appropriately measure factors linked to the implementation of HMIS at MTRH. Lastly, it assumed that the sample which would be chosen would represent the entire targeted population.

## **1.8 Limitations of the Study**

The study encountered limitations such as; some respondents were likely to give inaccurate information and secondly, it would be hard to trace some respondents such as the consultant doctors who were rarely found in their offices.

## **1.9 Delimitation of the Study**

The study was confined to Meru Teaching and Referral Hospital focusing on factors being faced at the hospital. The study assessed the major factors that influence implementation of the health management information system. Also, the study was limited to one of the HMIS system amid many other systems such as payment systems. This is because the HMIS has succeeded in some private healthcare facilities whereas in Meru Teaching and Referral Hospital, it has stagnated with little progress in implementation since its introduction in 2015.

## **1.10 Definition of Significant Terms**

**System:** A collection of components that work together to achieve a common objective.

**Information System:** A system that provides information support to the decision-making process at each level of an organization.

**Health Information System:** A system that integrates data collection, processing, reporting, and use of the information necessary for improving health service effectiveness and efficiency through better management at all levels of health services

**Health Management Information System:** An information system specially designed to assist in the management and planning of health programs as opposed to delivery of patient care.

**Technological factor:** A technological factor is a variable that is used for evaluating available alternatives with respect to technological capabilities.

**Managerial factor:** A managerial factor is a determinant linked to organizational coaching policies.

**Operational factor:** An operational factor is a variable that is used to evaluate capabilities with regard to meeting the capabilities of any given job.

**Organizational factor:** An organizational factor is a variable which contributes to the success of an information system according to users.

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

This study was organized into three chapters. Chapter one, comprises of introduction, background of the study, statement of the problem, purpose of the study, research objectives, significance of the study, the basic assumptions of the study, delimitation of the study, limitation of the study and definition of significant terms used in the study. Chapter two examined literature review of related studies and publication to Implementation of Health systems as well as the theoretical and perceived conceptual framework between the variables. Chapter three contained the methodology which would be used in conducting the study include; research design, area of study, target population, sample size and sampling procedures, research instruments, validity and reliability of the instruments, the operational definition of variables which associated research objectives with the methodology, data collection procedures and this chapter concluded with data analysis techniques. Chapter four presents data analysis, presentation and interpretation of the study findings using descriptive and inferential statistics while chapter five presents the summary of findings, discussions, conclusions, recommendations and areas for further studies.

## **CHAPTER TWO**

### **LITERATURE REVIEW**

#### **2.1 Introduction**

This chapter presents concepts, theoretical and empirical literature review on studies that have been done in the past on health management information system implementation. Lastly, it presents the conceptual framework, knowledge gaps and summary of the literature.

#### **2.2 An Overview of Health Management Information Systems**

Health Management Information System is an integration of healthcare, business management, and information systems (WHO, 2008). As the healthcare delivery system is held to greater accountability, healthcare providers and entities must demonstrate quality outcomes, fiscal responsibility, efficient and effective practices. To do this, health management information systems professionals collect and analyze data, incorporate innovative management techniques, and utilize new technologies to reengineer healthcare.

HMIS as a sociotechnical subsystem of a hospital that comprises all information processing actions, human and technical actors in their respective roles within the system. According to Tan (2005) HMIS automates routine management reporting to support administrative and patient care applications. Hayajneh et al., (2006) states that HMIS is used for: Master patient index- provides a record of all patients registered in a hospital through a unique patient number. It holds demographic, financial and medical details of the patient. Patient management helps in tracking patient folders across wards, clinics and other locations in the hospital; inpatient and outpatient scheduling- allows flexible scheduling of patients to their respective clinics and doctors. It manages bookings, generation of appointment slips, rescheduling and cancellation of appointments.

Inpatient management helps in patient admission, transfer and discharge processes including beds. It has provisions for ward and bed management and produces bar code

labels and admission forms to ensure proper identification of patients. Billing provides a flexible and comprehensive means of tracking and consolidating patient charges from the time of patient registration to the time of discharges and also helps in generating real-time bills for the patients when requested by them or their relatives. Insurance Management is used in managing the insurance of patients for approvals, payments, deductibles, coverage and exclusions. Pharmacy handles drug information, prescription, dispensing functions and maintains complete drug dosage details and supports various drug classifications and indexes. Radiology supports resource scheduling, and request registration with examination details, reporting, post examination registration, film tracking and management information.

Accounts Management is used in tracking of receivables from debtors, receipt management, journal entries, automatic production of reminders and statements. Order Entry maintains requests made from wards and clinics for various services. Operation Theatre maintains theatre reservation details, performs on-line scheduling of theatres for any present or future dates, accommodates emergency operation, and generates pre-operation, checklists including instrument lists and personnel assignment sheets (Kimama, 2008).

## **2.3 Determinants of health management Information Systems**

A number of factors could possibly prevent successful implementation of any Health Management Information Systems. This ranges from technological to non-technological factors.

### **2.3.1 Technological Factors**

Technological factors mainly emanate from hardware and software issues of information technologies. They can be subdivided into two categories; Interface Usability and Information fragmentation. Interface usability is where two systems meet and interact, a device or program enabling a user to communicate intelligence. Usability refers to the ability of a product to be used by specified users to meet specified goals with effectiveness, efficiency and satisfaction in a given context of use (Bondarenko, et al., 2010). The level of complexity of a user interface highly determines utilization of any



given system. A complex user interface is likely to demoralize users from accessing the system. Thus, there is a necessity for a system to comply with the 'Least Effort Principle'. This conclusion relates to different studies that have demonstrated how the work tasks in digital work environments are disparate, frequently interrupted and fragmented leading to the need for a system that would integrate and facilitate their realization (Boardman & Sasse, 2004; Dabbish & Kraut, 2006; Barreau, 2008; and Karr-Wisniewski & Lu, 2010). Consistency is one of the most desirable attributes of user interfaces in software, websites and information appliances (Nielsen, 2001). Lack of consistency due to numerous interfaces within a pool of devices one uses adds to frustration, errors and learning problems. Often this consistency is maintained within a line of products produced by the same manufacturer/vendor. Manufacturers should therefore maintain a consistent interface for operation.

Moreover, information fragmentation which links data growth at a great speed, may make it easy for organizations to ignore and overlook the fundamental requirement of information governance, where data can be easily and consistently located from data repositories. Information fragmentation is a core difficulty for personal information management (PIM) practices and a direct consequence of the availability of a wide range of tools and technologies to the end-user (Jones, 2007). System integration is an important issue, leading to the fragmentation of different sources such as paper documents, email, office productivity software, storage supports, mobile devices and web pages. The lack of interoperability between different formats of documents or versions is also increasing the challenges pertaining to this fragmentation (Bondarenko et al., 2010).

Health facilities have traditionally used the filing system of keeping records. A shift from traditional filing system to health management information system presents a myriad of challenges mainly as a result of information fragmentation. In the workplace, the challenges related to information fragmentation entail labor-intensive information search, task interruptions and complicated data backup procedures and continuous switching between paper and digital information (Ravasio et al., 2004, Jones 2007, Bondarenko et al, 2010). For Boardman and Sasse (2004), synergies between tools should be better

leveraged to facilitate not only the integration of different information pieces, but also to better support individual users in their specific tasks.

Also, technological overload factors contribute as well. Technological overload is defined as device proliferation and information overload that causes cognitive and physical burdens on human beings due to the use of multiple gadgets with multiple functions to accomplish multiple tasks in everyday activities. Technologists have acknowledged what psychologists have recognized for years as the limited capacity of humans to store and process information (Jones, et al., 2004). However the tools and devices meant to ease the load on human cognition are not only inadequate but have actually added to overload. With increasing obligations and the need to keep up with information, multiple multitasking has become a way of life (Kirsh, 2001).

Constant technologically mediated interruptions have become a regular occurrence, resulting in incomplete and inadequate actions that may be either deliberate (e.g. postponing a task) or unintentional (e.g. unable to cope). Either way this leads to a breakdown in human capability to retrieve and respond to information in an appropriate manner, which in turn may manifest as errors and frustration (Noyes and Thomas, 1995). Thus while advances in technology have brought us to a higher level of information handling as compared to a few decades ago, they have also brought along distractions and obstacles that impede focused time on tasks at hand.

### **2.3.2 Managerial factors**

The information system has to provide an approach to work with the different issues and awareness of all information management aspects. Sometimes senior management may lack to understand the purpose or may not trust of the Information System Strategies (ISS) capability to carry it out. Therefore, recommends that executives should examine its responsibility in implementing the plan while also confirming the time and budget required to develop the ISS. Some of the challenges facing management today are the need to align its information systems strategy and business strategy (Barreau, 2008). This can be done by identifying the IS gap between where the organization is and where it wants to be in the future.

Management challenges may emanate and include; lack of top management commitment to the strategy implementation; weak management roles in implementation; lack of top management support in creation and implementation of the system; changes that replace senior management; and poor coordination and sharing of responsibilities. Coordination is the process of establishing harmony between different activities, so that desired objectives can be achieved (Hatch, 2010). This therefore ensures that tasks can run in parallel, without interrupting or obstructing one another. The underlying principle is that all parts of the system are interdependent. Coordination should be pervasive, but it does require deliberate effort, and should therefore form part of each manager’s responsibility. When done well, coordination builds team spirit, gives staff clear direction and optimizes the use of resources. All of this helps organizations to achieve their objectives, and increase efficiency (Akrani, 2001).



**Figure 1: Coordination Framework**

On the other hand, poor workplace communication creates a negative feedback loop. When the project team does not understand what's expected of them, their morale declines and this makes it even more difficult to communicate. The solutions to poor

workplace communication are rooted in creating a more open and constructive workplace culture, which will benefit the project in more ways than simply improving communication. To address the sources of poor workplace communication resulting from conflicting objectives, hold regular meetings and focus on clearly defining the desired outcomes, so that all managers and workers are moving toward the same goals (Hatch, 2010).

### **2.3.3 Operational factors**

These entails factors such as length of time which is the average length of a typical software implementation process varies widely. For a robust, integrated solution like an Enterprise Resource Planning (ERP) system for example, the average implementation can last from 11 to 18 months. Database-centered ERPs often encompass financials, sales, service, customer relationship management and human resources, among other areas, across an entire organization. These solutions, unlike simpler out-of-the-box software, require longer implementation periods due to the integration of information across the business.

Financial and accounting, timekeeping and scheduling, human resources, payroll, inventory, compliance and equipment tracking, job costing and customer and employee self-service are just some of the functionality associated with operational activities offers. Moreover, conducting business as usual while learning, training and migrating to a new system encompasses operational factors. Compounding the issues that go along with a lengthy implementation process is the fact that the company still has to conduct business as usual on a daily basis. Often due to a lack of funding, a lack of staff resources, or both, employees are asked to tend to the tasks of their core job and contribute to the software project. This practice can be detrimental to the effort, causing the implementation period to take a longer time than the initial plan (Salazar, 2004).

Therefore, inconsistent or inadequate training; lack of a detailed, comprehensive training approach can be a major setback for any software implementation project. Implementation can go awry or even stall altogether if clear goals and timelines are not laid out from the beginning. It is important to set up a plan that makes sense for your

needs and resources and to ensure agreed-upon milestones are met along the way. Also, time-consuming data entry; it is argued that the most time-consuming part of any software implementation is the migration of data from the legacy system to the new solution. Unfortunately, it's a necessary part of the process, so finding ways to make it easier and more accurate can keep your implementation timeline on track and minimize data errors and issues at go-live. Moreover, focusing on this part early in the process can help with training efforts and reduce risk. According to advice in an article from Sanitary Maintenance, converting the data ahead of time can ease the training process because end-users are using familiar data during the testing phase.

Finally, another factor may include availability of support beyond the implementation phase. When researching software solutions, it's smart to consider how the vendor will continue to support you once your go-live date has come and gone. Chances are, even with the most successful of implementations, end-users will run into some kind of roadblock during daily operations. The resources and service after the sale provided by your software vendor can be the defining factor in your company's ability to realize a solid return on investment after a software implementation. When selecting software, companies should also look at the business behind the software product and consider the implementation program and long-term support options as factors in the decision (Kimama, 2008).

#### **2.3.4 Organization Factors**

In the current age, organizations are performing in a highly competitive space which therefore requires an organization to be highly adaptable in order to maintain competitive market conditions, increase market productivity and re-configure due to changing workforce, the global business environment and e-commerce development. Studies indicate that what differentiates organizations from one another is the degree of application of information technology in their organizational activities. Organizations that use optimized information technology have sustainable competitive advantages and are more distinguished than other organizations. Organizational factors play a significant role in the implementation of Health Management Information Systems in ensuring the process runs seamlessly without organizational factors getting in the way. Information

Technology application in health systems is associated with a variety of factors namely organizational resources, organizational knowledge, organizational processes, managerial structure, values and goals of the organization (Hatch, 2010).

Organizational knowledge is the collective knowledge and abilities possessed by the people who belong to an organization. When employees pool their knowledge within an organization, that knowledge can give the organization advantage over others in the same field. Hatch (2010) defines it as: ‘When group knowledge from several subunits or groups is combined and used to create new knowledge, the resulting tacit and explicit knowledge can be called organizational knowledge. Therefore, organization knowledge is a key resource to drive implementation of health management information systems in an institution.

Organization processes involves determining what work is needed to accomplish the goal, assigning those tasks to individuals and arranging those individuals in a decision making framework. The outcome of an organizing process is an organization that works in harmony in order to achieve goals both effectively and efficiently. Managerial structure is developed to establish how an organization operates and assists the organization in obtaining its goals to allow for future growth. Values and goals of the organization list principles and ethics that guide the behavior of organization members towards achievement of organization goals. Therefore, organizational factors are significant for implementation of health management information systems (Hatch, 2010).

## **2.4 Theoretical Framework**

A theory is set of assumptions, propositions or accepted facts that attempt to provide a plausible or rational explanation of cause-and-effect (causal) relationships among a group of observed phenomenon. A theoretical framework on the other hand is a group of related ideas that provides guidance to a research project or business endeavor. In this section, the focus is on the various theories under which the study is underpinned. It specifically focuses on structuration theory and Task-Technology Misfit Theory.

### **2.4.1 Structuration theory**

Structuration theory, is a concept in sociology that offers perspectives on human behavior based on a synthesis of structure and agency effects known as the “duality of structure.” Instead of describing the capacity of human action as being constrained by powerful stable societal structures (such as educational, religious, or political institutions) or as a function of the individual expression of will (i.e., agency), structuration theory acknowledges the interaction of meaning, standards and values, and power and postulates a dynamic relationship between these different facets of society. The theory was proposed by sociologist Anthony Giddens. Giddens argues that just as an individual’s autonomy is influenced by structure, structures are maintained and adapted through the exercise of agency. The interface at which an actor meets a structure is termed “structuration.” He further states that structuration is a continuous process of the social systems and expounds on the structure as rules and resources needed by the social system and the system refers to the interactions between the actors. Thus, structuration theory attempts to understand human social behavior by resolving the competing views of structure-agency and macro-micro perspectives. This is achieved by studying the processes that take place at the interface between the actor and the structure. Structuration theory takes the position that social action cannot be fully explained by the structure or agency theories alone. Instead, it recognizes that actors operate within the context of rules produced by social structures, and only by acting in a compliant manner to ensure this structures reinforced. As a result, social structures have no inherent stability outside human action because they are socially constructed. Alternatively, through the exercise of reflexivity, agents modify social structures by acting outside the constraints the structures place on them. In a HMIS, the human agents use the rules and resources, the properties of the social system in their everyday activities. The Rules and resources mediate HMIS user’s actions and in their use they are continuously changed by the human agents. Kouroubali (2002) states that for successful implementation of HMIS there needs to be a duality approach in terms of the actors and the structure and that the actor enacts change in the structure as they perform their routine activities. For instance, a doctor may start collecting detailed patient information when there is no such structure which will then

necessitate that the change of existing structure for other clinicians to also keep the same information.

#### **2.4.2 Task-Technology Misfit Theory**

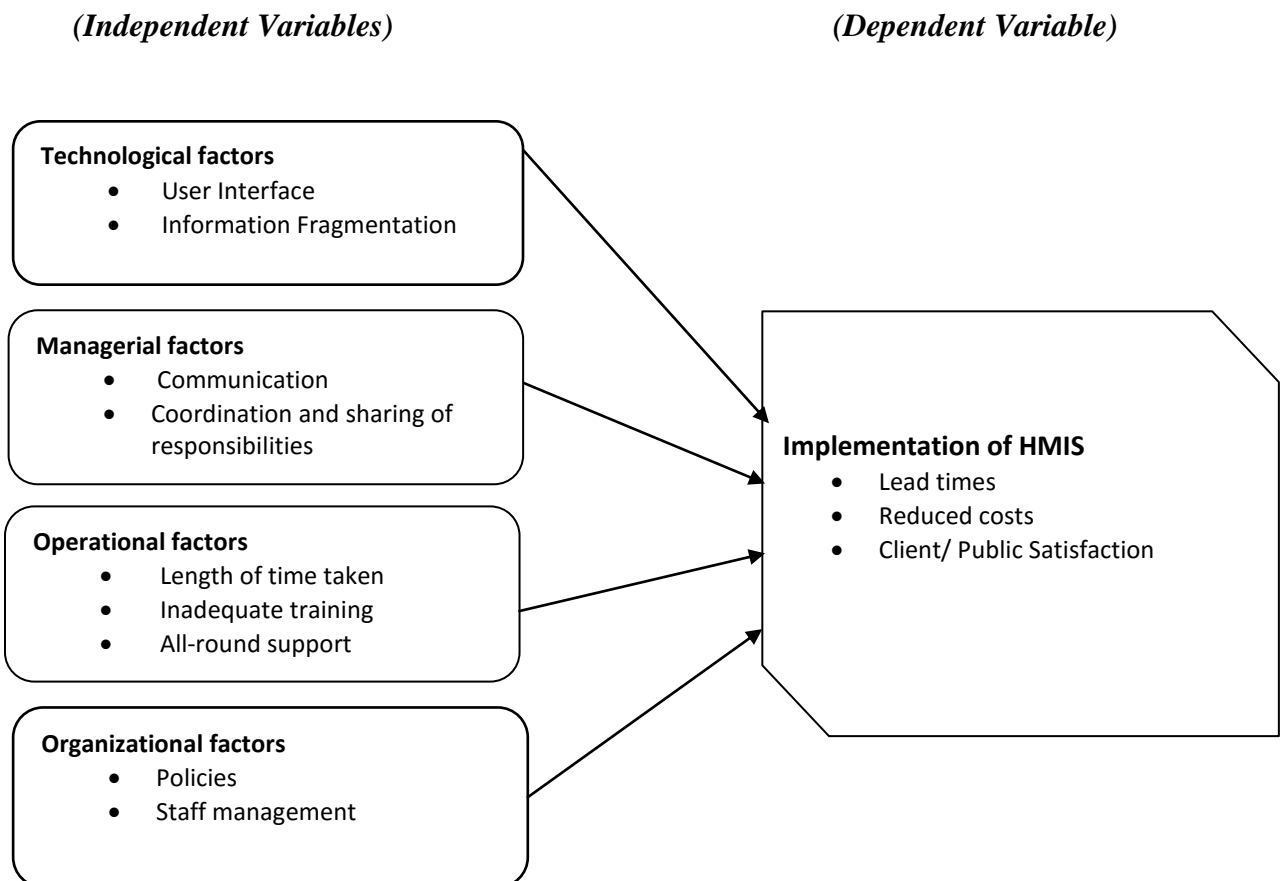
Task Management and information management presents a huge challenge in any health institution. This is because employees are required to use a system to perform work related tasks rather than perform information practices. These discrepancies between tasks and available technologies become an impediment to organizational performance. According to (Boardman & Sasse, 2004; Dabbish & Kraut, 2006; Bondarenko et al., 2010; Karr-Wisniewski & Lu, 2010) several studies have examined problems arising when employees try to accomplish their work with systems having poorly adapted functions to the requirements of the job.

Goodhue and Thompson (1995) came up with a theory to examine how a system would contribute to an employee's poorer performance if the technology was not well adapted to the employee's specific task requirements. The Task-Technology Fit (TTF) theory holds that IT is more likely to have a positive impact on individual performance and be used if the capabilities of the IT match the tasks that the user must perform. Goodhue and Thompson (1995) developed a measure of task-technology fit that consists of 8 factors: quality, location, authorization, and compatibility, ease of use/training, production timeliness, systems reliability, and relationship with users. Each factor is measured using between two and ten questions with responses on a seven-point scale ranging from strongly disagree to strongly agree. Goodhue and Thompson (1995) found the TTF measure, in conjunction with utilization, to be a significant predictor of user reports of improved job performance and effectiveness that was attributable to their use of the system under investigation. The task-technology misfit becomes a key challenge to health facilities once health management information systems are not able to perform the work related tasks and generate the relevant reports. As a result of this, a key analysis of employee task requirements is critical in order for them to be factored in during system development/customization phase.



## 2.5 Conceptual Framework

A conceptual framework is a scheme of variables a researcher operationalizes in order to achieve the set objectives (Oso & Onen, 2000). This implies that a conceptual framework is basically a diagrammatic presentation of a theory. This study was guided by the following conceptual framework, which is used to explain the interrelationship between dependent and independent variables. The dependent variable was implementation of Health management information system whereas the Independent variables included technological, managerial, operational and organizational factors.



## **Figure 2: Conceptual Framework**

### **2.6 Discussion of Conceptual Framework**

To implement a Health Management Information System, technological, managerial, operational and organizational factors are integral to ensure a seamless process. The dependent variable, that is, HMIS implementation was operationalized through lead times, reduced costs and client/ public satisfaction. On the hand, there were four independent variables namely; technological, managerial, operational and organizational factors. Technological factors were operationalized through user interface and information fragmentation while managerial factors were operationalized through communication, coordination and sharing of responsibilities. Additionally, operational factors were operationalized through length of time taken, inadequate training and all round support while organizational factors were operationalized through policies and staff management.

### **2.7 Knowledge gaps**

Little research has been done to highlight major challenges, to estimate the influence towards successful system implementation and recommend viable solutions for public hospitals in Kenya. This study was different from other studies done because it focused on the factors that influence the implementation of health management information systems which was more specific to the public health sector. Previous studies focused on general implementation of information systems. For instance, Otieno (2008) dealt with the Challenges faced in the Implementation of Mobile banking information systems in commercial banks in Kenya, Kimama (2008) concentrated on Challenges facing the implementation of Hospital Information Systems in Hospitals in Nairobi while Magutu et al. (2010) focused on the implementation of Information systems in state corporations in Kenya. This study aimed to determine the factors that influence implementation of Health Management Information systems in public hospitals

### **2.8 Summary of the Literature Review**

With the advanced use of HMIS, both theoretical and empirical literature supports the fact that health management information systems increases efficiency as well as encourages accountability. This study relied on two major theories that is structuration and task technology misfit. Acquisition of technology that is HMIS was found to hold demographic, financial and medical details of the patient. Better and advanced information systems were associated with patient management where it manages bookings, generation of appointment slips, rescheduling and cancellation of appointments (Hayajneh *et al.*, 2006). Further, systems led to improved insurance management especially in approvals, payments, deductibles, coverage and exclusions. Also it can control accounts in tracking of receivables from debtors, receipt management, journal entries, automatic production of reminders and statements. Among the factors associated with implementation of HMISs, technological, managerial, operational and organizational challenges were conspicuous.

## CHAPTER THREE

### RESEARCH METHODOLOGY

#### 3.1 Introduction

This chapter entails description of the methods and procedures the researcher applied in conducting the research. It presents research design, target population, sample size and sampling procedure, data collection instruments, validity and reliability of the research instruments, data collection procedures, method of data analysis used in the research study, and lastly ethical issues.

#### 3.2 Research Design

The research design that was used was descriptive research survey design. Mugenda and Mugenda (2003), describes a survey design as an attempt to collect data from members of a population in order to determine the current status of that population with respect to one or more variables. The design was used because it would enable the researcher to qualitatively assess the challenges faced in the implementation of the HMIS in Meru Teaching and Referral Hospital.

#### 3.3 Target Population

A target population refers to the available population from where a study sample is drawn and upon which the result will be analyzed Okombo and Orodho (2002). In this study, the researcher targeted the Health workers, ICT officers, Hospital Management Officers, and patients at the hospital.

**Table 3.1: Data on target population**

<b>Study Population</b>	<b>Total Population</b>
Management Officers	62
Doctors	12
Nurses	112
ICT Officers	10
Support staff	56
<b>Total</b>	<b>245</b>

### 3.4 Sampling Size

According to Cooper and Schindler (2003), the ultimate target of a sample design is a characteristic of the population it represents. In its measurement term, the sample must be valid. Survey sample size is defined by the minimum required number of sampling units needed to build sound statistical conclusion and references. A sample is defined as a subset of the total population drawn from a targeted population (Uprichard, 2013). The target population of 245 staff working at MTRH involved in day to day operation of HMIS will be considered. The researcher will use Yamane's formula (Yamane, 1967) to calculate the sample size as shown below.

$$n = N \div 1 + N(\epsilon)^2$$

Where, n = Sample size N= the size of the population e= the error of 5 percentage points.

$$n = 245 \div 1 + 245(0.05)^2$$

$$n = 152$$

By using Yamane's formula of sample size with an error of 5% and with a confidence coefficient of 95% (Yamane, 1967) the calculation from an estimated population of 245 staff working at MTRH has led to a sample of 152 respondents.

**Table 3.2: Sample Size**

<b>Study Population</b>	<b>Total Population</b>	<b>Sample Size</b>
Management Officers	62	38
Doctors	12	4
Nurses	112	69
ICT Officers	10	6
Support staff	56	35
<b>Total</b>	<b>245</b>	<b>152</b>

### 3.5 Sampling Procedure

Sample procedure is the process of selecting individuals or objects from a target group so that the group contains characteristics reflective of those found in the entire

group Mugenda and Mugenda (2003). More than one sampling technique was used to determine sample size. First, stratified sampling was used because it included representative survey units with specific characteristics of the predetermined size to be obtained from the strata. Then, simple random sampling was used to determine sample size in each stratum.

### **3.6 Data Collection Instruments**

These are devices for obtaining information relevant to your research project, Wilkinson and Birmingham (2003). This study used questionnaires and key informant interviews. A set of questionnaires containing both structured and instrumental questions which were used for the study to collect primary data. The study targeted all departments as in Table 3.2 above and was administered by use of random sampling of members. The simplicity of the questionnaires made it most preferred by the researcher due to easy administration of data that was collected. Questionnaires were divided into sections and were developed based on research objectives which would allow it to capture the required information. The questionnaires had both close ended and open ended questions which allowed respondents to give insight of the research problem and enable consistency of responses. Face to face interaction was used to allow the researcher to prop for more responses.

#### **3.6.1 Pilot testing of the instruments**

The researcher had to carry out a pilot study of pre testing the data collection instruments before the main and actual process of collecting data, this was done to clarify variables and be able to check the validity and reliability of the said instruments (Mugenda and Mugenda, 2003). This pretest process was carried out on 10% of the total population of 245 respondents; the sample size for the pilot study was 25 respondents. These respondents were selected randomly and were not part of the actual data collection. The testing helps to establish the content validity of the instruments which will be used to make improvements on the questions, format and scales. The purpose of pilot testing is to refine the questionnaires so as to give respondents an easy time when responding to the questions. Content validity of instruments will be improved through an expert's judgment, Bory and Gall (1989). In order to enable this in this study, the content related validity on the questionnaire was determined with the assistance of experts especially the research supervisor. This was

to ensure that the instruments were well constructed and that it addressed the information being sought by the objectives of the research.

### 3.7 Instruments Validity and Reliability

A research is said to be valid only if it studied what is set out to study and only if the findings were verifiable, Sanders (2002). Validity is hence the degree to which a test measures what it was intended to measure. The validity of the content allows a researcher to measure intended domains of indicators. It has to do with the accuracy of the data obtained in study prior to using the questionnaires and ensures that they are pilot tested.

On the other hand, a study is said to be reliable only if another researcher using same procedures and studying same phenomenon arrives at similar or comparable findings, Sekeran (2003). Reliability in research is influenced by random error (Mugenda and Mugenda, 2003). To measure internal consistent, the study employed the Cronbach's Coefficient Alpha (Cronbach & Shavelson, 2004) to estimate each construct. The resulting  $\alpha$  coefficient of reliability ranges from 0 to 1 in providing an overall assessment of a measure's reliability. If all of the scale items are entirely independent from one another (i.e., are not correlated or share no covariance), then  $\alpha = 0$ ; and, if all of the items have high covariance's, then  $\alpha$  will approach 1. A Cronbach Alpha reliability coefficient above 0.7 is an acceptable reliability coefficient. As shown in table 3.3, all values for scale reliability were between 0.71 and 0.91 implying that the items instrument met reliability test.

**Table 3.3: Scale Reliability Coefficients**

Variables	Number of items	Scale reliability coefficient
HMIS implementation	5	0.8328
Technological factors	5	0.7656
Managerial factors	5	0.8061
Operational factors	5	0.7059
Organizational factors	5	0.7922
All	25	0.9293

### 3.8 Procedure for Data Collection

This started with preparation of research proposal, presented for assessment by a panel of assessors from the University of Nairobi. Upon correction, the research permit was obtained authorizing commencement of the data collection process. By displaying the research permit to the relevant authorities, data collection then commenced.

### 3.9 Methods of Data Analysis

After collection of the questionnaires from the respondents, the raw data which was collected was organized systematically so as to facilitate analysis. Descriptive statistics was used to analyze the data. Data collected will be analyzed according to the research questions. A statistical tally system was used to generate frequency count of which percentage was calculated. Hence, the descriptive statistics which was used was frequencies percentage and mean values while the questionnaire items were of the five point Likert rating scale rates of (1, 2, 3, 4, and 5). Both factor and linear regression were used to analyze the relationship between various factors and implementation of HMIS. The following equation will be estimated;

$$Y = \beta_0 + \beta_1X1 + \beta_2X2 + \beta_3X3 + \beta_4X4 + \varepsilon$$

Where;

Y is the implementation of Health Management Information System,

X1= Technological factors,

X2= Managerial factors

X3= Operational factors

X4= Organizational factors with  $\beta_1 - \beta_4$  are the respective variables

$\beta_0$  =The constant with  $\varepsilon$  representing the error term.

### 3.10 Ethical Issues

Ethics involves the study of right and wrong conduct (Dooley, 2007). Ethical review becomes necessary where the research involves participation of human subjects



(participants) or their data. Ethical considerations across the research community have come to the fore front in recent years. This is due to legislative change in human rights and data protection, as well as increased public concern about the limits of inquiry. This study ensured that the respondents were assured of confidentiality of the information they provided where permission was sought from the relevant authorities prior to commencement of the study. The study informed the respondents of the purpose of the study and gave them a written assurance that data collected would be used for research purpose and that confidentiality would be observed. No personal identification details were required for the purpose of the questionnaires as this would increase the degree of confidence among respondents.

### **3.11 Operational Definition of variables**

This dependent and independent variables were operationalized as shown in table 3.3 which also indicated how they would be measured. The data collection instruments were outlined and scales of measures represented techniques.

**Table 3.4: Variable Operationalization**

<b>Objective</b>	<b>Variables</b>	<b>Indicators</b>	<b>Data Collection Method</b>	<b>Measurement Scale</b>	<b>Type of Analysis/</b>
Implementation of Health Management Information System	Dependent Variable	-Lead times -Reduced costs -Client/ Public Satisfaction	Questionnaire Questionnaire Questionnaire	Likert Scale	Descriptive / Inferential statistics
To determine Technological factors that influence HMIS implementation	Independent Variable	-User interface -Information fragmentation	Questionnaire Questionnaire	Likert Scale	Descriptive / Inferential statistics
To determine Managerial factors that influence HMIS implementation	Independent Variable	-Poor communication -Lack of coordination and sharing of responsibilities	Questionnaire Questionnaire	Likert Scale	Descriptive / Inferential statistics
To determine Operational factors that influence HMIS implementation	Independent Variable	-Length of time -Inadequate training -Lack of all-round support	Questionnaire Questionnaire Questionnaire	Likert Scale	Descriptive/ Inferential statistics
Organizational Factors	Independent Variable	-Staff Management -Policies	Questionnaire Questionnaire Questionnaire	Likert Scale	Descriptive / Inferential statistics

## CHAPTER FOUR

### DATA ANALYSIS, PRESENTATION AND INTERPRETATION

#### 4.1 Introduction

This chapter presents the results of to determine the factors influencing the implementation of the Health Management Information Systems in Public Hospitals: A Case of Meru Teaching and Referral Hospital. Descriptive statistics such as frequency, percentage, mean and standard deviation were used. The proposed hypotheses of the study were tested using multiple SEMs. Correlations were also conducted among various pairs of observed and latent variables.

#### 4.2: Response rate

A total of 152 questionnaires were distributed to Health workers at Meru Teaching and Referral Hospital. Of the questionnaires distributed, 125 were duly filled and returned leading to a representation of 82.3%. The findings are as presented in table 4.1.

**Table 4.1: Response Rate**

<b>Response</b>	<b>Freq.</b>	<b>Percent</b>
Returned	126	82.3%
Unreturned	26	17.1%
Poorly filled	1	0.66
<b>Total</b>	<b>152</b>	<b>100</b>

According to Mugenda and Mugenda (2003), a response rate of 50% or more is adequate. Babbie (2015) also asserted that return rates of 50% are acceptable to analyze and publish, 60% is good and 70% is very good.

#### 4.3: Demographic Characteristics

This section consists of information that describes basic respondent's characteristics. They include age category, gender, and marital status, level of education, duration of

work and whether or not the hospital has implemented the health management information system.

#### 4.3.1 Age of the respondents

The respondents were asked to indicate their age bracket. The results are as shown in table 4.2.

**Table 4.2: Age of the respondents**

<b>Age Bracket</b>	<b>Freq.</b>	<b>Percent</b>
30 years and below	7	5.60
31-40 years	59	47.20
41-50 years	50	40.00
Over 50 years	9	7.20
<b>Total</b>	<b>125</b>	<b>100.00</b>

The results indicated that majority of the respondents that is 40 % were between the ages of 41-50 years, followed by 40 % of the respondents who were between the ages 31-40 years. The rest that is 7.2 % were mainly from over 50 years of age category where 5.6 % were of age 30 years and below.

#### 4.3.2 Marital Status

The respondents were asked to state their Marital Status. The findings are as shown in table 4.3.

**Table 4.3: Marital status**

<b>Marital Status</b>	<b>Freq.</b>	<b>Percent</b>
Not married	49	39.20
Married	76	60.80
<b>Total</b>	<b>125</b>	<b>100.00</b>

Results indicated that majority of the respondents 60.8% were married while the remaining 39.2% were not married. Actually those who indicated as not married were single, divorced, separated, or widowed.

#### 4.3.3 Gender

Concerning the gender of the respondent, the findings are as shown in table 4.4.

**Table 4.4: Gender of the Respondent**

<b>Gender</b>	<b>Freq.</b>	<b>Percent</b>
Male	85	68.00
Female	40	32.00
<b>Total</b>	<b>125</b>	<b>100.00</b>

Findings indicated that majority of the respondents 68% were male while the remaining 32% were female.

#### 4.3.4 Level of Education

The respondents were asked to indicate their highest level of education. The results are as shown in table 4.5.

**Table 4.5: Level of education**

<b>Educational qualification</b>	<b>Freq.</b>	<b>Percent</b>
Secondary (Certificate)	..	..
Tertiary college (Diploma)	77	61.60
University (Bachelors)	31	24.80
Post graduate (Masters/ Phd)	17	13.60
<b>Total</b>	<b>125</b>	<b>100.00</b>

Results revealed that 24.8% of the respondents had attained university level of education (Bachelors) whereas 61.6% had diploma or college level of education. The

minority that is 13.6% as established were of postgraduate (Masters/Phd) level. However, there was no respondent with secondary level of education as lowest level of education. This implies that the respondents have advanced knowledge and are more likely to participate productively in this survey.

#### **4.3.5 Duration of work at MTRH**

The respondents were asked to indicate the duration they have worked at MTRH in order to establish the experience they have had on the general hospital operations.

**Table 4.6: Working Experience**

Experience	Freq.	Percent
1-5 years	12	9.60
6-10 years	60	48.00
over 10 years	53	42.40
<b>Total</b>	<b>125</b>	<b>100.00</b>

Findings recorded in table 4.6 showed that majority of the respondents, that is, 48% had worked at least for a period of 6-10 years, followed by 42.4% who had worked for a period of over 10 years. This response helped the researcher further to know how much experience the respondents had in their respective careers.

#### **4.3.6 Adoption Levels of HMIS**

On further inquiry on whether or not the hospital has adopted HMIS, most of the respondents that is 82.4 % agreed that HMIS had been adopted. On the other hand, only 17.6% did not agree. The results are as indicated in table 4.7.

**Table 4.7: Adoption Levels of HMIS**

<b>Adoption</b>	<b>Freq.</b>	<b>Percent</b>
Yes	(103)	82.40
No	(22)	17.60
<b>Total</b>	<b>(125)</b>	<b>100.00</b>

Findings recorded in table 4.7 showed that majority of the respondents, that is, 82.4% agreed that the Health Management Information System at MTRH had been adopted, while 17.6% disagreed. This response helped the researcher to get the general opinion of the workers on the HMIS.

#### **4.4 Descriptive Statistics**

This section presents the descriptive results of the adoption levels and factors influencing the implementation of the Health Management Information Systems in Public Hospitals: A Case of Meru Teaching and Referral Hospital. The factors considered include technological factors, managerial factors, operational factors and organizational factors. Means and standard deviations are presented.

##### **4.4.1 Technological Factors and HMIS Implementation**

The study sought to determine the influence of technological factors on the implementation of the health management information system. The responses were rated on a Likert scale and the results are as presented in table 4.8. The study results on the HMIS user interface is friendly to the end user had 49.6% of the respondent just agreeing with this statement whereas 35.2% strongly agreeing with the same. Only 12% disagreed with that statement. The mean of 4.1 implies that most of the respondents just agreed with these statement. Also the standard deviation of 0.97 showed that there was less variation.

Also the study asked respondents to give their opinion on whether File conversion of all digital data files is effective and this files and easily be retrieved, it was revealed that majority of them that is 28.8% and 55.2% just agreed and strongly agreed

respectively with this statement leading to a mean of 4.3 and a standard deviation of 1.0.

**Table 4.8: Technological Factors**

Statements	Percentage (%)						
	SD	D	N	A	SA	Mean	STD
The system user interface is friendly to the end user	1.6	10.4	3.2	49.6	35.2	4.06	0.97
File conversion of all digital files is effective	1.6	8	6.4	28.8	55.2	4.28	1.00
Adequate hardware and software evaluation is periodically done	5.6	16	9.6	36	32.8	3.74	1.23
There is stable ICT infrastructure to support running of the HMIS	3.2	12.8	4.8	41.6	37.6	3.98	1.11
System testing is continually done to match employee tasks and HMIS functionalities	1.6	15.2	11.2	36.8	35.2	3.89	1.10
<b>Overall Mean</b>						<b>3.99</b>	<b>1.08</b>

This implies that there was little variation in responses although it was clear that this statement was strongly supported. On the other hand, approximately 36% and 32.8%, of the respondents just agreed and strongly agreed with the fact that adequate hardware and software evaluation is done. Only 21.6% disagreed with that statement. This made the mean for the statement to be 3.7 with a standard deviation 1.2 indicating some variation in responses. Similarly, the majority of the respondents, 79.2%, supported the fact that there is stable ICT infrastructure to support effective running of the HMIS. The mean and the standard deviation for this statement was 4.0 while the standard deviation was 1.1.



Further, the study established that the majority, 72% of the respondents concurred that adequate system testing is done to ensure employee tasks match HMIS functionalities. Their mean was also 3.9 while the standard deviation was 1.1 indicating variation in responses. The average mean for the constructs was 4.0, indicating that majority of the respondents just agreed that technological factors influenced HMIS implementation in one way or another. The standard deviation was 1.1, indicating that there was some variation in all of the responses.

#### 4.4.2 Managerial Factors and HMIS Implementation

The study sought to determine the influence of managerial factors on the implementation of HMIS.

**Table 4.9: Managerial Factors**

Statements	Percentage (%)					Mean	STD
	SD	D	N	A	SA		
Departmental in-charges support implementation of the HMIS	9.6	35.2	12	23.2	20	3.09	1.33
There is a proper strategic framework to guide health management information system strategy	7.2	2.4	12.8	44.8	32.8	3.94	1.10
There is proper communication during system implementation	8.8	7.2	20	37.6	26.4	3.66	1.20
Managers are fully involved in the implementation of the HMIS	8	10.4	20	29.6	32	3.67	1.25
There is effective sharing of responsibilities among managers	4.8	19.2	15.2	32.8	28	3.60	1.22
<b>Overall Mean</b>						<b>3.59</b>	<b>1.22</b>

The responses were rated on a Likert scale and the results presented in table 4.9 which showed that the responses were well distributed between 9.6% and 35.2% across the scale considering the fact that managers support implementation of the HMIS. The mean for this statement was 3.1 indicating that most respondents were neutral on this

statement while the standard deviation was 1.3 showed presence of variation in their responses. Similarly, the results indicated that majority that is about 44.8% and 32.8% of the respondents just agreed and strongly agreed respectively with the fact that there is a proper health management information strategy. The mean for the construct was 3.9 while the standard deviation was 1.1 indicating variation in responses.

Over 64% of the respondents supported the statement that there is proper communication during system implementation. Secondly, they highly agreed at 61.6% that managers are fully involved in the implementation of the HMIS. The mean for these statement however was 3.7 (for both) with respective standard deviations of 1.2 and 1.3 respectively. This implies that respondents just agreed on these facts with some variation in their responses. Also in either case, those who were neutral were also a considerable proportion (see table 4.9).

Lastly, most of the respondents 60.8% supported the statement that Managers are fully involved in the implementation of the HMIS. The rest strongly disagreed, disagreed or were neutral. The mean for the statement was 3.6, while the standard deviation was 1.2 also implying that most respondents just agreed despite doing so with some variation. Considering the overall mean responses, 3.6, it could be deduced that the majority of the respondents just agreed with albeit with some variation of 1.2 that there is effective sharing of responsibilities among managers

#### 4.4.3 Operational Factors and HMIS Implementation

The study sought to determine the influence of operational factors on the implementation of HMIS.

**Table 4.10: Operational Factors**

Statements	Percentage (%)					Mean	STD
	SD	D	N	A	SA		
There are interoperability/ compatibility issues	6.4	16	9.6	22.4	45.6	3.85	1.33
There is adequate support beyond the implementation phase	12.8	15.2	5.6	35.2	31.2	3.57	1.40

There is adequate hardware and software acquisition	12.8	12.8	8.8	32	33.6	3.61	1.40
There is adequate ICT infrastructure to implement the HMIS	3.2	13.6	2.4	37.6	43.2	4.04	1.14
Long procurement processes have hampered smooth HMIS Implementation	7.2	22.4	5.6	26.4	38.4	3.66	1.37
<b>Overall Mean</b>						<b>3.75</b>	<b>1.33</b>

Following the findings, majority of the respondents 68% concurred with the statement that there are interoperability/ compatibility issues. Only 22.4% disagreed with that statement. The mean for the statement was 3.9, indicating that majority of the respondents actually agreed with the statement, while the standard deviation was 1.3 implying presence of variation in responses. The study found out that a majority of the respondents 66.4% supported the statement that there is adequate support beyond the implementation phase with only 5.6% being neutral on that statement. The mean response was 3.6, indicating that the majority of the respondents just agreed with the statement, while the standard deviation of 1.4 indicating variance in responses.

Despite portraying almost equal distribution in responses ranging between 8.8% and 33.6%, it was further established that approximately 65.6% of the respondents supported the statement that there is adequate hardware and software acquisition. The mean response to the statement 3.6, showing that majority of the respondents were neutral on that particular statement. The variation was 1.4, which was among the highest compared to other statements implied increased variations in responses. On the other hand, about 80.8% of the respondents agreed with the statement that there is adequate ICT infrastructure to implement the HMIS. Only 16.8% of the respondents disagreed with this statement. The mean response for the statement was 4.0, showing that majority of the respondents just agreed with the information. The standard deviation was 1.1 show some variation in responses.

Lastly, the study established that approximately 64.8% of the respondents supported the statement that long procurement processes have hampered smooth HMIS Implementation whereas about 29.6% disagreed with this statement. About 5.6% on

the other hand were neutral on this statement. The mean response for this statement was thus 3.7 indicating that majority of the respondents just agreed with the statement. However, there was some variation in responses on this statement given the standard deviation of 1.4. The overall mean for all the variable constructs was 3.8, indicating that most of the respondents were in support of operational factors as key ingredient in implementation of HMIS. The responses were highly varied, as shown by an overall standard deviation of 1.3.

#### 4.4.4 Organizational factors and HMIS Implementation

The study sought to determine the influence of organizational factors on the implementation of HMIS. The responses were also rated on a Likert scale and the results presented in table 4.11.

**Table 4.11: Organizational Factors**

Statements	Percentage (%)						Mean	STD
	SD	D	N	A	SA			
There is an institutional policy on HMIS Implementation	16.88	30.40	10.40	20.00	22.40	3.01	1.45	
Institution encourages accountability to enable gathering information that helps in systems improvement	12.00	25.60	13.60	24.80	24.00	3.23	1.38	
The institution sponsors all employees managing IQ Care for advanced professional training	14.40	35.20	4.80	28.00	17.60	2.99	1.39	
There are laid down policies on institutional IQ Care operations	7.20	2.40	12.80	44.80	32.80	3.94	1.20	
IQ Care has promoted institutional financial accountability	8.80	7.20	20.00	37.60	26.40	3.66	1.21	
<b>Overall Mean</b>						<b>3.37</b>	<b>1.63</b>	

Following the findings, majority of the respondents 50.28 % disagreed with the statement that there is an institutional policy on HMIS Implementation. Only 42.4% agreed with that statement. The mean for the statement was 3.01, indicating that majority of the respondents actually disagreed with the statement, while the standard deviation was 1.08 implying presence of variation in responses. The study found out

that a majority of the respondents 48.8 % supported the statement that the institution encourages accountability to enable gathering information that helps in systems improvement with only 13.6% being neutral on that statement. The mean response was 3.23, indicating that the majority of the respondents just agreed with the statement, while the standard deviation of 1.4 indicating variance in responses.

Despite portraying almost equal distribution in responses ranging between 4.8% and 35.2%, it was further established that approximately 45.6% of the respondents supported the statement that there is adequate hardware and software acquisition. The mean response to the statement 3.94, showing that majority of the respondents were neutral on that particular statement. The variation was 1.20, which was among the highest compared to other statements implied increased variations in responses. On the other hand, about 77.6 % of the respondents agreed with the statement that there is adequate ICT infrastructure to implement the HMIS. Only 9.6% of the respondents disagreed with this statement. The mean response for the statement was 4.0, showing that majority of the respondents just agreed with the information. The standard deviation was 1.1 show some variation in responses.

Lastly, the study established that approximately 64% of the respondents supported the statement that long procurement processes have hampered smooth HMIS Implementation whereas about 16 % disagreed with this statement. About 20 % on the other hand were neutral on this statement. The mean response for this statement was thus 3.7 indicating that majority of the respondents just agreed with the statement. However, there was some variation in responses on this statement given the standard deviation of 1.21. The overall mean for all the variable constructs was 3.37, indicating that most of the respondents were in support of organizational factors as key considerations of HMIS implementation. The responses were highly varied, as shown by an overall standard deviation of 1.63.

#### **4.5 Correlation Analysis of Structural Variables**

Correlation analysis was used to determine both the significance and degree of association of the structural variables. The correlation technique is used to analyze the degree or extent of association between two structural variables as measured by the observed variables. The results of the correlation analysis are summarized in table 4.12. The correlation ranges from 1 to -1 where 1 indicates a strong positive

correlation and a -1 indicates a strong negative correlation and a zero indicates lack of association between the two structural variables.

**Table 4.11: Correlation Matrix**

Correlating Pairs	Coefficients	OIM Std. Err	T	P>t	95% Conf. interval	
Technological, Managerial	0.2160	0.0704	3.07	0.002	0.0780	0.3541
Technological, Operational	0.1977	0.0629	3.15	0.002	0.0746	0.3209
Technological, Implementation	0.2330	0.0676	3.45	0.001	0.1004	0.3655
Managerial, Operational	0.3899	0.1081	3.61	0.000	0.1781	0.6017
Managerial, Implementation	0.4864	0.1173	4.15	0.000	0.2565	0.7163
Operational, Implementation	0.4237	0.1132	3.74	0.000	0.2018	0.6456

LR test of model vs. saturated:  $\chi^2(164) = 486.65$ , Prob >  $\chi^2 = 0.000$

The correlation analysis was conducted as shown in table 4.12 to determine the association between HMIS implementation, and other variables. The results in unison indicated that there is a positive association between all pairs of variables considered in the study. This is indicated by all positive correlation coefficients. The correlation coefficients were all found to be statistically significant at 5% level. All pairs of the variables were fairly correlated that is there was no coefficient that was above 0.5 hence the association as indicated by correlation coefficients was considered moderate.

The correlation between technological factors and managerial factors was 0.2160 whereas the correlation between technological factors and operational factors was 0.1977 while technological factors and HMIS implementation being 0.233. Secondly, the correlation between managerial factors and operational factors was 0.3899 whereas for managerial factors and HMIS implementation was 0.4864. Lastly, operational factors and HMIS implementation had a correlation coefficient of 0.4237.

#### 4.6 Hypothesis Testing of the Structural Variables

A Structural Equation Modeling (SEM) was undertaken to assess the influence of various determinants on HMIS. This model was suitable since both the dependent and independent variables were structural in nature. SEM characterizes the links between the concepts or the unobservable variables as well as defining latent factors that are either directly or indirectly causing modifications in the values of other latent factors in the prescribed model. The study thereafter estimated standardized SEM. Table 4.13 shows the goodness of fit of the estimated model.

**Table 4.12: Goodness of Fit of the Model**

Fit Statistic	Value	Description
Likelihood Ratio		
chi2_ms(167)	630.503	Model versus Saturated
p > chi2	0.000	
chi2_bs(190)	1460.588	Baseline vs. Saturated
p > chi2	0.000	
Population error		
RMSEA	0.149	Root Mean Squared Error of Approximation
90% CI, Lower Bound	0.137	
Upper bound	0.161	
P-close	0.000	Probability; RMSEA <= 0.05
Size of Residuals		
SRMR	0.230	Standardized Root Mean Squared Residual
CD	0.997	Coefficient of Determination

The model goodness of fit indicates the overall influence of the predictor variable on the dependent variable. The results indicate that the estimating goodness of fit of the model was satisfactory. All the four structural factors were subjected to a modeling and from the goodness of fit of the model as indicated in table 4.13, it was found that all variables fitted the data well given that the overall p value of 0.000 in the likelihood ratio test implied the variables had a joint significance in explaining the dependent variable that is HMIS implementation. This was also confirmed by other criteria for model fitness such as Root Mean Squared Error of approximation.

Further, table 4.14 shows the analysis of the relationship between the structural variables. The output of the structural modeling of the predictor variables are displayed. Results indicate that two out of the four variables were statistically significant at the 5% level. The beta coefficient indicates the direction and degree of influence of the predictor variable on the dependent variable. Technological factors and organizational factors were the only variables that were not statistically significant. Nevertheless, all variables had a positive influence on HMIS implementation.

**Table 4.13: Structural Equation Model (SEM for HMIS Implementation)**

Structural Equation Model						
Number of observations = 125						
Estimation method = ml (maximum likelihood)						
Log likelihood = -5665.2936						
Structural	Coefficients.	OIM	t	P>t	[95% Conf. Interval]	
Implementation		Std. Err				
Technological factors	0.1964	0.1306	1.50	0.133	-0.0595	0.4523
Managerial factors	0.4534**	0.1766	2.57	0.010	0.1072	0.7996
Operational factors	0.6566**	0.1892	3.47	0.001	0.2857	1.027
Organizational factors	0.0045	0.1032	0.04	0.965	0.1977	0.2068

\*\* Significant at 5% level

In particular, the study established that technological factors influenced HMIS implementation by 0.1964 holding other factors constant. However, the influence was not significant. This is because the p value of 0.133 is more than 0.05 level of significance. Managerial factors significantly influenced implementation of HMIS at 0.05 level by 0.4534 holding other factors constant. The p value was 0.001 which is less than 0.05. On the other hand, operational factors also influenced HMIS implementation by 0.6566 holding other factors constant. The effect was also found to be statistically significant at 0.05 level. This is because the p value of 0.001 was less



than 0.05 level. Lastly, organizational factors influenced implementation of HMIS insignificantly by 0.0045 holding other factors constant.

## **CHAPTER FIVE**

### **SUMMARY OF FINDINGS, DISCUSSIONS, CONCLUSIONS AND RECOMMENDATIONS**

#### **5.1 Introduction**

The chapter provides the summary of the findings from Chapter Four and gives conclusions and recommendations based on the objectives of the study. The purpose of the study was to establish the factors that influence the implementation of Health Management Information Systems in Public hospitals, a case of Meru Teaching and Referral Hospital, Meru County. The findings related to modeling are discussed. It further blends the findings to the reviewed literature. Later recommendations and further areas of study are provided.

#### **5.2 Summary of Findings**

The study population comprised of workers in different professions at Meru Teaching and Referral Hospital who interact with the Health Management Information System on a daily basis. Questionnaires were used to collect primary data from the various professional workers including management officers, doctors, nurses, ICT officers and various support staff at the health facility. Of the 152 questionnaires that were issued, 125 were returned; hence the response rate was 82.9%.

On demographic information, the results indicated that majority of the respondents that is 46.4% were between the ages of 41-50 years, followed by 37.6% of the respondents who were between the ages 31-40 years. The rest that is 11(8.8%) were mainly from over 50 years of age category where 7.2% were of age 30 years and below. Findings also indicated that majority of the respondents 68% were male while the remaining 32% were female. Results on level of education revealed that 24.8% of the respondents had attained university level of education (Bachelors) whereas 61.6% had diploma or college level of education. The minority that is 13.6% as established were of postgraduate (Masters/Phd) level. However, there was no respondent with secondary level of education as lowest level of education. Findings on work experience recorded in table 4.6 showed that

majority of the respondents 48% had worked at least for a period of 6-10 years, followed by 42.4% who had worked for a period of over 10 years.

On adoption levels, findings indicated that majority of the respondents, 39.2%, just agreed and 24% strongly agreed that the hospital had successfully adopted IQ Care. Approximately 38.4% and 28%, just agreed and strongly agreed respectively with the statement that management has set clear objectives and targets. Moreover, about 65.6% supported the statement that data in IQ Care is constantly collected and acted upon. On whether IQ Care processes are efficient and effective, majority that is 40.8% and 19.2% just agreed and strongly agreed respectively with that statement. Lastly, considering whether challenges arose due to IQ Care adoption, the distribution of responses leaned on those who supported this statement in general with over 65.5% agreeing that fact.

On technological factors, the study results on the system user interface is friendly to the end user had 49.6% of the respondent just agreeing with this statement whereas 35.2% strongly agreeing with the same. Only 12% disagreed with that statement. Also the study asked respondents to give their opinion on whether File conversion and system design is effective, it was revealed that majority of them that is 28.8% and 55.2% just agreed and strongly agreed respectively with this statement leading to a mean of 4.3 and a standard deviation of 1.0. On the other hand, approximately 36% and 32.8%, of the respondents just agreed and strongly agreed with the fact that adequate hardware and software evaluation is established. Only 21.6% disagreed with that statement. Similarly, the majority of the respondents, 79.2%, supported the fact that there is adequate ICT infrastructure to implement the HMIS. The mean for this statement was 4.0 while the standard deviation was 1.1. Further, the study established that the majority, 72% of the respondents concurred that adequate system testing is done.

On managerial factors, results presented in table 4.10 shows that the responses were well distributed between 9.6% and 35.2% across the scale considering the fact that managers support implementation of the HMIS. Similarly, the results indicated that majority that is about 44.8% and 32.8% of the respondents just agreed and strongly agreed respectively with the fact that there is proper health management information system strategy. Over 64% of the respondents supported the statement that there is proper communication

during system implementation. Secondly, they highly agreed at 61.6% that managers are fully involved in the implementation of the HMIS. Lastly, most of the respondents 60.8% supported the statement that Managers are fully involved in the implementation of the HMIS.

On operational factors, majority of the respondents 68% concurred with the statement that there are interoperability/ compatibility issues. Only 22.4% disagreed with that statement. The study found out that a majority of the respondents 66.4% supported the statement that there is adequate support beyond the implementation phase with only 5.6% being neutral on that statement. Despite portraying almost equal distribution in responses ranging between 8.8% and 33.6%, it was further established that approximately 65.6% of the respondents supported the statement that there is adequate hardware and software acquisition. On the other hand, about 80.8% of the respondents agreed with the statement that there is adequate ICT infrastructure to implement the HMIS. Only 16.8% of the respondents disagreed with this statement. Further, the study established that approximately 64.8% of the respondents supported the statement that long procurement processes have hampered smooth HMIS Implementation whereas about 29.6% disagreed with this statement.

Lastly, in seeking to establish the influence of organizational factors on the implementation of HMIS, majority of the respondents 50.28 % disagreed with the statement that there is an institutional policy on HMIS Implementation. The study also found out that a majority of the respondents 48.8 % supported the fact that the institution encourages accountability to enable gathering information that helps in systems improvement. The mean response was 3.23, indicating that the majority of the respondents just agreed with the statement. On the other hand, about 77.6 % of the respondents agreed with the statement that there is adequate ICT infrastructure to implement the HMIS. Approximately 64% of the respondents supported the aspect of a long procurement processes that have hampered smooth HMIS Implementation. The mean response for this statement was thus 3.7 indicating that majority of the respondents just agreed. The overall mean for majority of the variable constructs was 3.37, indicating

that most of the respondents were in support of organizational factors as key considerations of HMIS implementation.

### **5.3 Discussion**

The study was carried out with the main objective of establishing the determinants of HMIS implementation in public hospitals. The following discussion ensues on the basis of direction and significance of the respective factors on HMIS implementation. From the findings, most of the respondents just agreed on most of the statements regarding HMIS implementation given the overall mean response of 3.6 with some variation in the responses. The technological factors, managerial factors and operational factors regarding HMIS implementation are explored.

#### **5.3.1: Technological Factors and HMIS Implementation**

HMIS implementation is significantly influenced by technological factors. Information technology can greatly increase health outcomes if adequately utilized. Similarly, from the study results majority of the respondents argued that technological factors significantly influence successful adoption of HMIS. The average mean for the variable was 4.0, indicating that majority of the respondents just agreed that technological factors influence HMIS implementation in MTRH.

It was further shown that there was a strong positive association between HMIS implementation and technological factors ( $r^2=0.2330$ ). The correlation coefficient was found to be statistically significant at 5% level given a p value of 0.001. On estimation, the study established that technological factors influenced HMIS implementation. This is because the p value of 13.3% was more than 5% level of significance.

#### **5.3.2 Managerial Factors and HMIS Implementation**

Managerial factors greatly influence HMIS implementation. Results for example showed that most of the respondents that is 77.6% agreed that managerial factors possess a strong influence which may lead to successful implementation of HMIS. Considering the overall mean responses that is 3.6, it could be deduced that the majority of the respondents just agreed albeit with some variation of 1.2 that managerial factors have a role to play in

Health management information system at MTRH. The following were some of the observed measures on managerial factors, that; HMIS implementation would be positively influenced if managers maintain proper communication, effective sharing, monitoring and evaluation of system activities among managers and active involvement of managers in HMIS implementation.

On correlation, it was found out that HMIS implementation was positively and significantly correlated ( $r^2=0.4864$ ) with managerial factors at 5% levels. Moreover, the study established that managerial factors positively influenced HMIS implementation. The p value of 0.001 was far less than 0.05 level implying that managerial factors are significant determinants of HMIS implementation.

### **5.3.3 Operational Factors and HMIS Implementation**

As demonstrated earlier, operational factors influence HMIS implementation. On operational factors, the overall mean for the variable constructs was 3.6, showed that majority of the respondents agreed on most statements. The responses were highly varied, as shown by an overall standard deviation of 1.3. The correlation coefficient of ( $r^2=0.4237$ ) between HMIS Implementation and Operational factors was found to be positive and significant since with the p value of 0.000 which was less than 0.05 level. The observed measurement under operational factors include adequate training should be carried out on end users during system implementation, adequate support should be offered beyond the implementation phase, there should be a robust ICT infrastructure to support the system and hardware and software acquired must be compatible with the systems already in place.

Similarly, estimation established that operational factors greatly influenced successful implementation of HMIS at MTRH. The influence was significant once the p value of 0.1% was less than 5% level.

### **5.3.4 Organizational Factors and HMIS Implementation**

Organizational factors play an important role in health systems in the application of information technology. This requires changes in work duties and processes before application of new technology. This organizational change can only be driven by

employees and managers who are committed to make systems work efficiently. However, factors such as workplace politics, legal issues, employee resistance, and uncooperative management etc. may greatly hamper smooth HMIS implementation. As noted in the previous chapter, organizational factors were not a significant variable. This is because the p value of 0.965 is greater than 0.05. This study revealed that organizational factors may not be as crucial for effective HMIS implementation.

#### **5.4 Conclusions**

This section basically reviewed the findings from analysis of the structural constructs meant to establish the relationship existing between explanatory variables (determinants) and HMIS implementation. Regarding HMIS implementation, the overall mean response meant that respondents agreed on most of the statements while a standard deviation denoted that there was some variation in the responses on the same statements. Secondly, the average means for the constructs associated with technological factors showed that majority of the respondents also agreed that the technological factors significantly influenced HMIS implementation. The standard deviation obtained indicated that there was some variation in responses.

On the other hand, the study established that the majority of the respondents strongly agreed that the managerial and operational factors greatly influenced HMIS implementation at MTRH. The overall means for all the variable(s) constructs linked to managerial and operational factors indicate that majority of the respondents agreed on most items implying that managerial factors possess a strong influence as well variability in operational factors inevitably influenced HMIS implementation. On structural modeling, the study established that managerial and operational factors had a positive and significant influence HMIS implementation at MTRH. The study thus suggests that for major recommendations focusing on these significant determinants could help moderate or even inform HMIS implementation. The findings show that, hospitals experience difficulties in drawing the line between changing business process to suit the HMIS's. Instead of changing the way people work, they work towards modifying the system which ends up taking more time and increase implementation costs. In addition, Health

Management Information Systems ends up documenting inefficiencies and redundancies because of poor process definition. Bureaucracies were noted in procurement process.

### **5.5 Policy Recommendations**

HMIS implementation is a critical process for any health institution wanting to incorporate health systems. This section presents practical implications with regard to the conclusions drawn from the relationship between the determinants and HMIS implementation. The study makes the recommendation on controlling the implementation process in a health institution. These recommendations are anchored on two key areas, that is, managerial and operational factors that had statistical significance influence on HMIS implementation.

Having theoretically considered the role of different agents as described by Goodhue and Thompson (1995) where they developed a measure of task-technology fit that consists of 8 factors: quality, location, authorization, and compatibility, ease of use/training, production timeliness, systems reliability, and relationship with users. Based on the study findings, first, the study recommends to the national and county government to ensure that they follow due process on System analysis and design, engage experienced project managers to drive the process, engage key stakeholders who will more likely interact with the system on a regular basis and lastly pull together all necessary resources that may be required to ensure implementation process. Additionally, capacity building should be embraced through training of users, involvement of all level managers, comprehensive hardware and software evaluation and improving planning and management of HMIS projects. Lastly, the government at national or county level should come up with a framework to guide the Health Systems implementation process which can be used by all public hospitals during implementation of Health Management Information Systems.

### **5.6 Recommendations for further areas of the study**

This study was to determine the factors influencing the implementation of the Health Management Information Systems in Public Hospitals. A similar study is required considering other aspects of HMIS implementation. Also, there is need to consider other



facilities apart from MTRH so as to give a clear and exact estimates and for easier generalizability to health facilities. This is because hospitals have different dynamics in terms of operations. Main factors that were suggested in other relevant theories such as system quality could as well be considered in future studies to examine how they influence HMIS implementation. Similar studies are also required showing comparison in different sectors and even across the counties in Kenya given that the system of governance is decentralized.

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## APPENDICES

### APPENDIX 1: LETTER OF TRANSMITTAL

Abigail Kathambi Kithinji

University of Nairobi

P.O.BOX 2386-60200

Meru.

The Respondent Meru County

Dear Sir/Madam,

#### **RE: LETTER OF TRANSMITTAL**

I am a student at University of Nairobi. I am taking a Master of Arts Degree in Project Planning and Management. In order for me to meet all the requirements to be awarded this degree, I am required to undertake a research by writing a thesis. Currently I am carrying out the following study *“Assessment of the factors influencing implementation of health management information systems in public hospitals. A case of Meru Teaching and Referral hospital, Meru County, Kenya.”* All information you give will be treated with utmost confidentiality. The information you provide will be used only for academic purposes. Your response will be highly appreciated.

Yours Faithfully,

Abigail Kathambi Kithinji

Tel: 0717 181 703.

Email: [abbykithinji@gmail.com](mailto:abbykithinji@gmail.com)

## APPENDIX 2: QUESTIONNAIRE

Kindly answer the following questions as accurately as possible. Information given will be treated in total confidence. Where alternative is given, tick the correct answer in the blank space as appropriate as possible.

What is the name of your department.....?

### PART A: PERSONAL DETAILS

1. What is your Gender?

Male  Female

2. What is your Age Bracket?

30 years and above  31-40 years   
41-50 years  Over 50 years

3. What is your Level of Education?

Certificate  Diploma   
Bachelors  Post graduate

4. How long have you been working in this facility?

1-5 years  6-10 years  Over 10 years

5. Has the hospital adopted IQ-Care system?

Yes  No

**FACTORS AFFECTING HMIS IMPLEMENTATION**

**PART B: TECHNOLOGICAL FACTORS**

6. Please indicate the extent to which you agree with the following statements on Technological factors where SD=strongly disagree, D= disagree N= Neutral, A= Agree, SA= strongly agree

<b>Statement</b>	<b>SD</b>	<b>D</b>		<b>A</b>	<b>SA</b>
B1. The health management information system user interface is friendly to the user making it easy to manipulate					
B2. File conversion of all digital data files is effective and this files and easily be retrieved					
B3. There is adequate hardware and software evaluation that is periodically done					
B4. There is a stable ICT infrastructure to support effective running of the system					
B5. System testing is continually done to ensure employee tasks match the health management system functionalities					

**PART C: MANAGERIAL FACTORS**

7. Please indicate the extent to which you agree with the following statements on managerial factors where SD=strongly disagree, D= disagree N= Neutral, A= Agree, SA= strongly agree



<b>Statement</b>	<b>SD</b>	<b>D</b>	<b>N</b>	<b>A</b>	<b>SA</b>
B6.All departmental in-charges support implementation of the health management information system					
B7. There is a proper strategic framework to guide health management implementation of the health management information system					
B8. There is constant communication between departmental in-charges and workers to ensure an effective process					
B9.Departmental in-charges are aware and are fully involved in all the system operations					
B10. There is effective sharing of responsibilities among departmental in-charges to monitor system operations					

**PART D: OPERATIONAL FACTORS**

8. Please indicate the extent to which you agree with the following statements on Operational factors where SD=strongly disagree, D= disagree N= Neutral, A= Agree, SA= strongly agree

<b>Statement</b>	<b>SD</b>	<b>D</b>	<b>N</b>	<b>A</b>	<b>SA</b>
B11. During system operations, interoperability/ compatibility issues come up and are resolved quickly					
B12. All operations in my department/unit are automated and computerized.					
B13. One must have the technological know-how to be able to manipulate the health management information system					

Statement	SD	D	N	A	SA
B14. In my department/unit, every staff member has access to a working computer					
B15. The health department spends a lot of money in setting up gadgets to ensure technological demands are met					

**PART E: ORGANIZATIONAL FACTORS**

9. Please indicate the extent to which you agree with the following statements on Organizational factors where SD=strongly disagree, D= disagree N= Neutral, A= Agree, SA= strongly agree

Statement	SD	D	N	A	SA
B16. There is an institutional policy guiding implementation of the health management information system					
B17. The institution encourages accountability to enable gathering of information that helps in system improvement					
B18. The institution sponsors all employees managing IQ Care for advanced professional training					
B19. There are laid down policies on institutional IQ Care operations					
B20. The health management information system has promoted institutional financial accountability					

**PART F: HMIS IMPLEMENTATION**

10. Please indicate the extent to which you agree with the following statements on HMIS Implementation where SD=strongly disagree, D= disagree N= Neutral, A= Agree, SA= strongly agree.

<b>Statement</b>	<b>SD</b>	<b>D</b>	<b>N</b>	<b>A</b>	<b>SA</b>
B21. Adequate system requirements definition has been done prior to system implementation					
B22. Employees have negative attitude towards change brought about by the health management information system					
B23. The health management information system has greatly improved service deliver to patients					
B24. The health management information system has enhanced faster retrieval of data					
B25. Users have strong skillsets to manipulate the health management information system					

**THE END**

**THANK YOU FOR YOUR TIME.**