INFLUENCE OF COMPUTERIZED HEALTH MANAGEMENT INFORMATION SYSTEM ON SERVICE DELIVERY: A CASE OF HEALTH INSTITUTIONS WITHIN NAIROBI, KENYA.

BY

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DECLARATION

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

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This research project has been submitted for examination with our approval as the candidate's supervisors.

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DEDICATION

This research project is dedicated to my late Father Mr. Elijah Ongalo who always believed in me, my loving Mum Mariam Ongalo and not forgetting my lovely daughters Verah and Mickey and the entire family and friends whose support was vital.

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LIST OF ABBREVIATIONS AND ACRONYMS

AIDS	Acquired Immune Deficiency Syndrome
AMREF	African Medical & Research Foundation
GOK	Government of Kenya
HIV	Human Immunodeficiency Virus
HMIS	Health Management Information System
HMN	Health Metrics Network
ICT	Information and Communication Technology
IT	Information Technology
MDGs	Millennium Development Goals
MOH	Ministry of Health
PMTCT	Prevention of Mother-to-Child Transmission
WHO	World Health Organization

ABSTRACT

To provide optimal care, healthcare institutions need timely patient information from various sources at the point-of-care, and need a comprehensive, complete and fully functional system to fulfil all these needs. One way to achieve this is through the use of HMIS in health care. With a well-implemented HMIS, the use of health system performance information will ensure that health services reflect the best policies and practices, in addition to community contexts and values. In Kenya and other developing countries the component of HMIS is weak and therefore there is often a lack of good quality data and inefficient utilization of resources. As in many developing countries, lack of reliable data and grossly inadequate appreciation and use of available information in planning and management of health services are the main weaknesses of the health information systems in Kenya. In absence of computerised HMIS, health sector hospitals face various problems such as problems in detection and control of emerging and endemic health problems, monitoring progress towards health goals, empowering the hospitals with timely and understandable health related information, and driving improvements in quality of services. The objectives of this study were to investigate the influence of computerized HMIS on service delivery where the variables were disease tracking, patient tracking services, administration and reporting. This research problem was studied through the use of a descriptive research design. According to the Ministry of Health there are 55 hospitals in Nairobi County. The 55 hospitals are categorized as public and government hospitals, private and mission hospitals and private hospitals. This study utilized a self-administered questionnaire. Data collected was purely quantitative and it was analyzed by descriptive analysis techniques.143 (53.2%) of the respondents indicated that their hospitals had used computerized HMIS to a great extent, 81 (30.1%) of them indicated that their hospitals had been using the computerized health management information system to a very great extent.137 (50.9%) of the respondents indicated that the use of computerized HMIS influenced the service delivery in the hospitals to a great extent. On disease tracking, the study recommends that there is need of training the medical personnel to generate appropriate human resources as well as facilitate research and development activities in various fields of medicine. These will ensure that the health practitioners and other stakeholders are equipped with relevant skills that would ensure that the health institutions are efficient in disease tracking. The study recommends that there is need to engage the relevant stakeholders in patient tracking aspects like training and refresher courses as well as to ensure that the personnel are conversant with the various aspects of computerized HMIS to enhance patient tracking through accurate information, sharing of research findings through e-health, dissemination of health information to different audiences for quality health information and ensuring that health information is used rationally, effectively and efficiently. The study further recommends that since computerized health management information system influences administration of health services within the health institutions, there is need to align the administration function of the health institutions with the computerization of HMIS to enhance service delivery in the health institutions.

CHAPTER ONE

INTRODUCTION

1.1 Background of the Study

Health is defined by the World Health Organization (WHO, 1996) as a state of physical, psychological and spiritual wellbeing, and not merely an absence of diseases. Healthcare is one of the world's largest and fastest-growing industries, consuming a substantial chunk of the labour force and receiving good deal of patronage from customers referred to in the health industry as patients (Dolton and Gerry, 2004). Accompanying this high utilization of medical services has been the concern for measures aimed at safeguarding and promoting patients' right to quality healthcare delivery. As the world focuses towards attaining and meeting the Millennium Development Goal targets, and as resources become available for high burden diseases such as HIV and AIDS, Cancer, Tuberculosis and Malaria, decision-makers need to be able to measure whether policies and programmes are working, and whether progress is being made towards achieving the set goals (WHO, 2006). Health decision-making is critically dependent on the timely availability of sound data (Abou Zahr, 2005).

In the U.S.A, modest improvements in coverage of skilled care have occurred with implementation of HMIS to verify an individual patient's benefits and coverage. In the United Kingdom, HMIS offer the ability to standardize the quality of care provided; streamline business processes related to operations and finances, and to establish some clinical practice guidelines for evaluation and diagnosis. In Finland, health care Finnish providers use electronic patient information systems. As a result, several non-interoperable information systems are often used even within a single health care

organization, which inhibits information exchange within and across provider organizations. This inability to communicate and the lack of information technology standards undermine the ability of information technology to enable value measurement and to restructure care delivery around the integrated care for medical conditions. HMIS is a fast-emerging trend in India, supported by exponential growth in the country's information and communications technology (ICT) sector, and plummeting telecom costs. Several major private hospitals have adopted telemedicine services, and a number of hospitals have developed public-private partnerships.

However, in sub-Saharan Africa, the coverage of HMIS has been stagnated. As such advancing medical science raises a new bar for quality in terms of the outcomes achieved in the treatment of illness. In Uganda in 1994, the ministry of health began improving the HMIS and utilizing the information for the planning and decision making. The health facilities use the HMIS 105 for reporting purposes. In 2000, the ministry undertook to review the HMIS with all the stake holders. This was prompted by the draw backs in the HMIS especially poor reporting, inadequate stationary, supplies, insufficient training and lack of motivation of the health workers to collect quality data. In Ethiopia, the process of introducing computerised HIS in two regional states of Ethiopia has been fraught with challenges and tensions emanating from fragmented structure of existing programs and services as well as infrastructural and human resource constraints. The introduction of HMIS resulted in health workers valuing the data generated by them better; it supported program planning and decision making as well as improved the quality of and access to health care.

According to Mengiste (2010) there has been an intense focus on the quality of healthcare in many countries in the recent years. New and emerging technologies, including drugs, devices, procedures, tests, and imaging machinery, have changed patterns of care and sites where care is provided. To provide optimal care, healthcare institutions need timely patient information from various sources at the point-of-care, and need a comprehensive, complete and fully functional system to fulfil all these needs. One way to achieve this is through the use of ICT in health care. The World Health Organisation (2009) has stated that an effective health care system is the cornerstone of safe practice within a hospital or other health-care organisation (Williams and Prosser, 2006). The health management information systems (HMIS) provide the opportunity for healthcare organizations to improve service quality of care and patient safety.

Health Management Information System (HMIS) is the types and sub-systems of information necessary to effectively manage health services such as record-keeping, reporting, processing, analysis, interpretation, use, and feedback of information. According to WHO (2005) HMIS is a system to collect, process, and store, transmit and disseminate data. HMIS would be primarily concerned with health care delivery issues like - antenatal care, immunization, and disease control programs and administrative issues like reporting, inventory management, financial management, and vehicle and personnel management issues (WHO, 2009). With a well-implemented HMIS, the use of health system performance information will ensure that health services reflect the best policies and practices, in addition to community contexts and values (Mengiste, 2010). Routine service statistics and other data receive little analysis at the receiving levels and are not widely disseminated, thereby leading to deterioration in data quality and

completeness. Reports are not well prepared and feedback to the service levels is rare. As Mengiste (2010) points the perception that the quality and completeness of data is inadequate further inhibits the use of HMIS. Despite significant investment in computers, inadequate and inappropriate use is being made of this rapidly developing technology which can general be much improved for better management and communications of health data.

The goal of a Health Management Information System is to check quality by comparing perceptions of services delivered with the expected standards and to provide timely and accurate information leading to better health care planning and improved diagnosis and more patients getting access to health services for an entire country (Haux *et al*, 2004). Countries where the rates of caesarean deliveries were lowest - and where the needs were greatest - showed the least change. The World Health Organization (WHO, 2009) argues that investing in health management information systems (HMIS) can have multiple benefits, including helping decision makers to detect and control emerging and endemic health problems, monitor progress towards health goals, and promote equity; empowering individuals and communities with timely and understandable health related information, and drive improvements in quality of services; strengthening the evidence base for effective health policies, permitting evaluation of scale-up efforts, and enabling innovation through research; improving governance, mobilizing new resources, and ensuring accountability in the way they are used.

The most successful information systems are those developed at a small scale, where the data needs have been well defined and the end-users closely associated with those doing the data collection (East African Policy Forum, 2006). Developed countries

like the USA, Canada, UK and India have the best HMIS in place which are among very advanced health care system in the world. In Africa, excellent work on health systems strengthening is currently under way, including health worker training by the African Medical & Research Foundation (AMREF) or the drive to capture reliable health data by the Health Metrics Network (HMN) (Haux et al, 2004). However, additional support at the system level is needed for governments in Sub-Saharan African countries to effectively access new and utilizes current funding towards achieving the health-related Millennium Development Goals (MDGs).

In Kenya, with Nairobi being the hub of health institutions in East and Central Africa, the Aga Khan Community Health Department set about supporting the Ministry of Health of Coast Province to revamp the HMIS to make it more useful and relevant. The project was careful to roll out the new system so that District Health Management Teams and clinical staff were adequately trained and supervised. Ownership of data was instilled through defining data needs with health workers and managers alike, while also getting all people involved in the information chain to determine the most appropriate and effective system of data flow. Based on the success of Coast Province, the national Ministry of Health adapted the Coast HMIS for a new national HMIS strategy (Sohani, Kamau and Alidina, 2005).

1.2 Statement of the Problem

Health systems in a centralized system only used to focus on morbidity and mortality reporting from individual health units to the district and national level (Gladwin *et al.* 2003). Through computerized HMIS more freedom and responsibilities are given to each point of care meaning that more skills are demanded of primary health care

managers, concerning the data and information handling at all levels of a health care system on a global level (Gladwin *et al.* 2003). This encompasses the full range of electronic digital and analogue ICT, from radio and television to telephones (fixed and mobile), computers, electronic-based media such as digital text and audio-video recording, and the Internet (WHO, 2004). The major advantage of computerization is in saving of time of health workers in record keeping and report generation (WHO, 2005). Computerizing the HMIS also improves effectiveness, efficiency, saves resources and is a flexible framework. Further, computerization enables implementation of a good system for service delivery, planning, monitoring and supervision. However, some of the challenges that hinder successful utilization of HMIS in health institutions include incompatibility of the infrastructure, inadequate finance for acquiring computers as well as training of the staff.

Health management information systems incorporate all the data needed by policy makers, clinicians and health service users to improve and protect population health. However, few countries in the world today have effective and comprehensive systems in place to gather this data. Yet there has never been a greater need for robust health management health information. A great deal of momentum has been built up over the last few years to improve HMIS, which has included setting up the Health Metrics Network to harness and channel this energy. But many challenges remain at international, national and sub-national levels for developing effective strategies for improving HMIS and then for implementing these strategies. There have been very few scholarly examples globally where a computerized HMIS has been operational in a population based health care service delivery system (Campbell, 1997; Haux *et al*, 2004; WHO, 2004; Mengiste,

2010). Majority of the evaluations have looked at the utility of HMIS as a tool to assist organizational development (Campbell, 1997; Haux *et al*, 2004; Mengiste, 2010).

In Kenya and other developing countries the component of HMIS is weak and therefore there is often a lack of good quality data and inefficient utilization of resources (Odhiambo and Odero, 2005). As in many developing countries, lack of reliable data and grossly inadequate appreciation and use of available information in planning and management of health services are the main weaknesses of the health information systems in Kenya (Odhiambo and Odero, 2005). Health institutions that do not have computerised HMIS are faced with problems of detecting and control of emerging and endemic health problems, monitoring progress towards health goals, untimely and un-understandable health related information and poor quality of health services.

Despite the attempts made by governments and private health care providers in developing countries to equip the health institutions with ICT in form of HMIS, there had been no study that had concentrated in evaluating the influence of computerized Health Management Information Systems on service delivery in such health institutions especially in the local context, hence the research gap. Further, despite marked progress in many areas over the past decades, Kenya continues to grapple with challenging health problems and issues of health service delivery. It was in this light that the study sought to fill the existing gap by carrying out a study on the influence of computerized Health Management Information Systems on service delivery with a special focus on hospitals in Nairobi, Kenya. The study was restricted to health institutions in Nairobi since Nairobi is the hub of health institutions in East and Central Africa therefore would serve as the ideal place to conduct the study as the target population. As such the study aimed to answer the

following broad question: What is the influence of Computerised Health Management Information Systems on service delivery in heath institutions in Kenya.

1.3 Purpose of the Study

The study aimed at examining the influence of computerized health management information systems on service delivery where the focus was on health institutions within Nairobi, Kenya.

1.4 Objectives of the Study

The objectives of this study were:

1. To establish the extent to which computerized health management information system influences disease tracking services within the health institutions within Nairobi;
2. To assess the level at which computerized health management information system influences patient tracking services in the health institutions within Nairobi;
3. To examine how computerized health management information system influences administration of health services within the health institutions within Nairobi;
4. To determine the extent to which computerized health management information system influence reporting of health services in the health institutions within Nairobi;

1.5 Research Questions

This study sought to answer the following research questions:

1. To what extent does computerized health management information system influence disease tracking within the health institutions within Nairobi?

2. To what level does computerized health management information system influence patient tracking services within the health institutions within Nairobi?
3. How does computerized health management information system influence administration of health services in the health institutions within Nairobi?
4. To what extent does computerized health management information system influence reporting of health services in the health institutions within Nairobi?

1.6 Significance of the Study

This study came in handy to provide an insight into the influence of computerized Health Management Information Systems in service delivery in Hospitals in Nairobi, Kenya and as a consequence pave way for possible approaches towards necessitating the realization of the Kenya's Vision 2030. As such this study was hoped to be significant to various stakeholders.

The stakeholders in the health sector in Kenya would be the beneficiary of the findings of this research being carried out in their area of jurisdiction. It is hoped that this study would be useful to all private and public health care providers, insurance companies and government agencies since it would highlight their achievements in fulfilling their mandate and also point out the failures so that they can improve their approach in computerization of health management information systems in Kenya. Further, the study findings are hoped to be important to the management staff of the healthcare providers as it would help them understand the utilization and effects of HMIS in service delivery and how their understanding can help them enhance HMIS in the sector.

It is hoped that the study would be beneficial to policy makers on health care and health service delivery in general since it would help them formulate policies that seek to address the real need of computerization of HMIS in service delivery. The GoK would know on where to improve and put more resource mobilization in this sector. They would also use the findings to formulate future strategies of provision of health care in Kenya.

Nairobi is the Capital City of Kenya where majority of the private and public health institutions are located. Therefore, it is hoped that foreign and local investors would be able to inject more help to the sector thorough the ministry of health/healthcare facilities and sanitation and the ministry of finance since they are sure that there would be no misappropriation of funds issued out. The study would also bring into light the various factors that the investors need to focus on when targeting provision of computerized healthcare in such areas. This would help them on the designing and customization of their products and services to enhance service delivery in the health sector.

It is further hoped that the study would highlight other important relationships that require further research; this would be in the areas of access, utilization and availability of computerized HMIS in developing countries. The results of this study would also be invaluable to researchers and scholars, as it would form a basis for further research. The students and academicians would use this study as a basis for discussions on computerized healthcare facilities in developing countries like Kenya, the challenges faced and the possible solutions. The study would be a source of reference material for future researchers on other related topics; it would also help other academicians who undertake the same topic in their studies.

1.7 Limitations of the Study

The researcher was likely to encounter various limitations that might have hindered access to information sought by the study. The main limitation of study was its inability to include more hospitals in the Country. This was a study focusing on hospitals in Nairobi County. The study could have covered more hospitals across country so as to provide a more broad based analysis. The researcher countered this problem by carrying a study across the hospitals in Nairobi which is the hub of major hospitals in East and Central Africa and serve as a representative.

The respondents approached were likely to be reluctant in giving information fearing that the information sought would be used to intimidate them or print a negative image about them or the Hospital. The researcher handled the problem by carrying an introduction letter from the University and assured them that the information they gave would be treated confidentially and it would be used purely for academic purposes.

1.8 Delimitation of the Study

This study was on the influence of computerized Health Management Information Systems and its outcomes in terms of improving service delivery in health institutions in Kenya. This study was limited to hospitals in Nairobi where special focus was on the health professionals working in the hospitals in Nairobi. This involved collecting information from the medical doctors, nurses, clinical officers and administrators in the hospitals. This was relevant in collecting the data required as time and distance were the limiting factors that inhibited collecting the data from all the hospitals across the country. This study was undertaken between the months of March to June 2012.

1.9 Basic Assumptions of the Study

The researcher assumed that the respondents would be honest, cooperative, factual (objectivity) and trustworthy in their response to the research instruments and would be available to respond to the research instruments in time. It was also the assumption of the researcher that the authorities in the Hospital would grant the required permission to collect data from employees. The study further made the assumptions that there would be no serious changes in the composition of the target population that would affect the effectiveness of the study sample.

1.10 Definition of Key Significant Terms as used in the Study

Disease tracking Services this is the investigation of health status of patients visiting the health institutions.

Patient tracking Services this is the record keeping about patient reactions and progress with various medications and changes with various conditions

Reporting Services this is the production and distribution of various medical conditions in health institutions

Administration Services is the offering of professional support in terms of leadership and management where medical conditions are monitored

Health Management Information System (HMIS): These are computers fitted with software necessary for collecting data to effectively

manage health services and other services in health institutions.

Computerized Heath Management Information Systems this is where the health management information systems are operated in computerised systems where the inputs and the outputs are computer read and processed.

Service Delivery This is the offering of health services in health institutions which include diagnosis of diseases, prescriptions, reporting and laboratory services.

1.11 Organization of the Study

The research is organized in five chapters. Chapter one introduces the research and presents the statement of problem, objectives, and research questions. The chapter also shows the significance, limitations and delimitations of the study. Chapter two encompasses the literature review on the various aspects concerning computerized HMIS and its influence on service delivery. Chapter three discusses the methodology used to collect and analyze data while showing the target population, the sample population and the data collection instrument, while chapter four discusses data analysis, presentation, interpretation and discussions of the results and finally chapter five covers summary of findings, conclusions and recommendations.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

Health management information systems (HMIS) exist to address this need at national scales across Africa but are failing to deliver adequate data because of widespread underreporting by health facilities. Faced with this inadequacy, vital public health decisions often rely on crudely adjusted regional and national estimates of treatment burdens. This chapter deals with the available literature that has been reviewed for the study. The literature is mainly on the influence of computerized health management information systems on service delivery. The specific areas covered include concept of Computerized HMIS, disease tracking, patient tracking services, administration, reporting, theoretical literature, diffusion and innovation theory, conceptual framework and summary of literature review.

2.2 Concept of Computerized Health Management Information System

A health management information system (HMIS) is a process whereby health data (input) are recorded, stored, retrieved and processed for decision-making (output) (Gladwin et al, 2003). There have been very few examples globally where a computerized HMIS has been operational in a population based health care delivery system for a significant duration. East Africa Policy Forum (2006) has advocated a tri-axial framework for HMIS comprising of system dimension, system uses and system sectors/stakeholders in terms of its placement in a system hierarchy. Health management information system incorporates all the data needed by policy makers, clinicians and

health service users to improve and protect population health. Few countries in the world today have effective and comprehensive systems in place to gather this data.

HMIS often fail because such behavioral aspects of organizations are not taken into account. Other reasons include problems that are encountered when trying to apply a system that works in one country to another, and of applying public sector HMIS to the private sector. Almost every country in the world has some form of national health management information system (HMIS), although many do not function well. A tendency for information systems to be rigidly designed because they are seen as isolated entities and their integration into government is seen as only a technical issue. The key success factors center around creating a policy culture that needs accurate information to feed decision makers, while also stimulating the use of health data for lower level decision making at the same time. In evaluation of a Health Management information system in Uganda, based on interviews with doctors and nurses, the authors concluded that introduction of HMIS resulted in health workers valuing the data generated by them better; it supported program planning and decision making as well as improved the quality of and access to health care (Gladwin et al., 2003). Many of the evaluations have also looked at the utility of HMIS as a tool to assist organizational development.

One of the temptations in HMIS has been to get carried away with the technical aspects of data storage and analysis, rather than focusing on the more fundamental issues of making sure the data is correct in the first place. Large investments have been made in improving information technology for ministries of health (Mengiste, 2010). There is no doubt that computerization of data storage and analysis has sped up data handling considerably, but it has also drawn attention away from other more critical, and more

challenging aspects of HMIS, such as coding and personnel capacity. In terms of data use, countries have been consistently poor at supporting health workers who are collecting data to use it locally for planning and management purposes. Some observers speculate that facilitating greater local use of data could improve data quality overall, as those doing the data collection should be more motivated.

South Africa has a well-developed HMIS, whose core is based on the District Health Information System. A World Health Organization (2009) review provides an overview of the DHIS, including how analyzed data is fed into various types of reporting tools for use by managers. In Kenya, for example, the Aga Khan Community Health Department set about supporting the Ministry of Health of Coast Province to revamp the HMIS to make it more useful and relevant. The project was careful to roll out the new system so that District Health Management Teams and clinical staff were adequately trained and supervised. Ownership of data was instilled through defining data needs with health workers and managers alike, while also getting all people involved in the information chain to determine the most appropriate and effective system of data flow. Based on the success of Coast Province, the national Ministry of Health is now adapting the Coast HMIS for a new national HMIS strategy.

Realizing that technology in this case is an enabler and not a driver puts more emphasis on the importance of the people working in these newer information system forms and the impact these systems have on them and therefore the entire organization (Kuhn *et al.* 2001). The goal of a Health Management Information System is to check quality by comparing perceptions of services delivered with the expected standards and to provide timely and accurate information leading to better health care planning and

improved diagnosis and more patients getting access to health services for an entire country (Haux *et al.*, (2004); Tan (2002)). Health management information system incorporates all the data needed by policy makers, clinicians and health service users to improve and protect population health. Few countries in the world today have effective and comprehensive systems in place to gather this data (WHO 2004). A robust Health Information System is the core of any successful public health system (Abou Zahr, 2005;).

In recent years there has been noticeably more attention on building capacity in health systems as a means to improving health outcomes. In addition, development partners including the World Bank and others have stepped up their efforts in this area. However, there have been shortcomings of focusing solely on vertical disease programmes within a health system, at the expense of not addressing the "root causes" of poor health delivery, such as information systems, weak governance, infrastructure, implementation planning or human resource challenges (WHO, 2009). This study is confined to investigating the influence of computerized Health Management Information Systems on service delivery in health institutions where the focus is on disease tracking, patient tracking, administration and reporting.

2.3 Computerized Health Management Information System and Disease Tracking

HMIS would be primarily concerned with health care delivery issues like - antenatal care, immunization, and disease control programs. Disease tracking includes managerial aspects such as the planning, organizing and control of health care facilities at the national, state and institution levels and clinical aspects which can be subdivided into providing optimal patient care, training of medical personnel to generate appropriate

human resources, and facilitate research and development activities in various fields of medicine (Williams and Prosser, 2006). With regard to the patients accurate information can be used for patient monitoring ensuring that information about the patient can be retrieved easily hence improving patient follow up. While policies are launched to grant more resources and decision-making powers to local planning bodies, experience has revealed that the bureaucracy in developing countries has been resistant to enacting these policies with higher levels of the administrative hierarchy reluctant to devolve decision-making powers and resources to lower levels (Rondinelli, 1993).

Ideally, within any healthcare system, all individuals should be afforded; Access: uninterrupted and unhindered access to medically necessary services, Quality: basic quality standards with appropriate monitoring, and Safety: assured levels of services and confidentiality. According to Campbell (1997) to ensure access a healthcare delivery system should provide uninterrupted and unhindered access to medically necessary services. Medical services must be made available to all without regard to age, ethnicity, gender, existing health status, pre-existing conditions, or economic situation. Health promotion and disease prevention should be an integral part of every care plan. Pressures to control costs should never compromise or adversely affect quality of or appropriateness of care (WHO, 2009).

Health decision makers need to agree what diseases and what resource management issues they wish to monitor on a regular basis. There are international requirements with regards to disease surveillance that governments are obliged to adhere to. Each country may also have specific patterns of disease that are worth monitoring as well. However, disease surveillance isn't just a question of agreeing what diseases to

report on, it also requires that clinicians are able to diagnose the diseases accurately and are rigorous about applying correct coding (WHO, 2009). A proper healthcare delivery system contains adequate consumer safeguards and protections. Medically necessary care should not be denied solely on the basis of cost. Other factors, such as health status, prognosis, and medical directives should be taken into consideration in making decisions. Care organizations and providers should be subject to independent reviews on a periodic basis, with performance information available to consumers.

The health management information system should ensure complete confidentiality of medical records, requiring consumer consent for disclosure of personal information. As Bossert (1998) argues, this reluctance to fully engage with computerization of HMIS has afforded little increase in 'decision space' for local-level administrative bodies in terms of planning and implementing development programs. Much depends upon the existing social and political structures in the local planning area. Where there are major inequalities at the village level as in many developing country regions, decentralization of decision-making powers has actually served to reinforce power structures rather than acting to integrate the priorities of all sections of the local community (Bhatt, 1987). These experiences have resulted in caution in adopting decentralization as an end in itself with greater care needed to design and evaluate such a policy for its ability to achieve broader objectives of health reform within local communities. Socio-cultural traditions of administrators have acted as a serious impediment for enabling decision-making at the local level.

2.4 Computerized Health Management Information System and Patient Tracking Services

The aim of a health information system is to improve the ability to collect, store and analyze accurate health data, service delivery efficiency, improve data accuracy, effectiveness of intervention, increase accountability and learn about trends. The objective of the system is to record information on health events and check the quality of services at different levels of health care. Few countries in the world today have effective and comprehensive systems in place to gather this data (Mengiste, 2010). These information systems used in health care, however, lack an unambiguous description of what an HMIS stands for.

According to the found literature a health information management system or clinical information system is used in hospitals to assist the overall management of the health care facility through information about diseases and information about patient care (Haux *et al.*, 2004) in terms of record keeping of patient information, accounting, HR management, asset management, stock management and knowledge management. The task of a hospital information system is to support patient care and associated administration by providing information, primarily about patients, in a way that it is correct, pertinent and up to date, accessible to the right persons at the right location in a usable format. It must be correctly collected, stored, processed, and documented; knowledge, primarily about diseases—but also for example about drug actions and adverse effects-to support diagnosis and therapy; information about the quality of patient care and hospital performance and costs (Haux *et al.* (2004; Winter *et al.*, 2001, 2003).

The other function of a health information system is to bring together data from all these different subsystems, to share and disseminate them to the many different audiences for health information, and to ensure that health information is used rationally, effectively and efficiently to improve health action. A strong health information system is an essential component of sound program development and implementation, and is a requirement for strategic decision making, providing the basis upon which improved health outcomes depend. Haux *et al.* (2004). He states that such complexes or systems of processing data, information and knowledge in health care environments are called health information systems. The first difference is the level where the system is being implemented. A health management information system being on the national level shows that hospital information systems are just one instance or subsystem of health information systems. The aim of health information systems was and is as simple as relevant: to contribute to a high quality, efficient patient care. This aim is primarily centered towards the patient and towards medical and nursing care, the administrative and management tasks are then needed to support such care.

Health decision makers need to agree what diseases and what resource management issues they wish to monitor on a regular basis. It is not only about reporting the diseases but rather the ability of the clinicians to arrive at a correct diagnosis. The WHO has created the International Classification of Disease (ICD) to try and standardize disease reporting across the world. This are internationally accepted codes for main diseases and it is important that this are incorporated into the HMIS right from the source where the data is generated (WHO 2005). One of the most important aspects of improving HMIS is ensuring that the people filling in the forms at clinic level are skilled

enough to report accurately, whether on diseases diagnose or resources used. This should therefore be a priority training area. So as to improve the quality as well as the consistency of the data generated (WHO 2005). Staff directly involved in the generation of the data should be informed of the importance of having accurate information as this will enable proper planning and accountability.

One of the temptations in HMIS has been to get carried away with the technical aspects of data storage and analysis, rather than focusing on the more fundamental issues of making sure the data is correct in the first place. This entails having in place correct tools for capturing data first. There is no doubt that computerization of data storage and analysis has sped up data handling considerably, but it has also drawn attention away from other more critical, and more challenging aspects of HMIS, such as coding and personnel capacity (Haux *et al*, 2004). In terms of data use, countries have been consistently poor at supporting health workers who are collecting data to use it locally for planning and management purposes. Some observers speculate that facilitating greater local use of data could improve data quality overall, as those doing the data collection should. The developing countries and organizations should take action to strengthen the HMIS using the available ICT. Though this due to poor economic and communication infrastructure, have been limited to the national and higher levels, there should be effort to extent this to the lower level health workers and facilities (Simba, 2004).

2.5 Computerized Health Management Information System and Administration Services

A principal goal of HMIS is to optimize the health of individual patients and of the population as a whole in an equitable, efficient and effective manner that is

acceptable to patients, providers and administrators. HMIS will not singlehandedly achieves overarching reforms of service delivery or finance; rather, improvement from the implementation of the HMIS results in incremental changes at all levels of health system. This evolutionary re-iterative change process is contingent upon systematic measurement of health system performance, in conjunction with evidentiary decision-making processes (Gladwin *et al.* 2003). Broad measures of population health are confounded by unmanageable factors within the healthcare system, and composite indices of system-specific performance, which are by nature imprecise. To drive change within the system, one must develop accurate and reliable micro- and macro-level data systems. To avoid information overload, performance indicators should be aligned with expensive, complex, and/or high-priority services, especially those unevenly delivered. Performance indicators can also be implemented to measure simple and inexpensive services, if so desired.

With the introduction of HMIS, eligibility checking becomes simplified for the provider. Adequate eligibility checking HMIS also allow a provider to foresee and resolve issues with coverage before services are rendered (WHO, 2004). Costs related to non-covered services and individuals, many of which go unreported, can be avoided. Thus, eligibility checking not only yields savings for the providers, but to the health system as a whole. Using HMIS technologies claims encounters creation can be automated. Potentially, the healthcare provider can create an electronic encounter record during (or immediately after) the patient visit. Whether prospective or retrospective, once the encounter information is in the HMIS, it may be submitted electronically or printed and submitted manually to the healthcare payer. It is best if the claims encounter flows

directly from the provision of the healthcare delivery, and if the encounter information is "fed back" to the provider(s) who supplied the care. By having the provider be an integral part of the workflow, the highest possible accuracy of information can be obtained.

Computerized HMIS helps improve the internal and external reliability of the health data on routine clinic operations. Manuals for health workers and managers will be developed for training in operational procedures. These measures, in addition to ongoing supervision and monitoring, will significantly reduce the number of inaccuracies found in previous systems. Clinic clients receive a client card with a family file number, a patient file sub-number, and a personal identification (ID) number. The clinic nurse or community health worker enters patient data into the computer during a period designated for data entry (Gladwin *et al.* 2003). If the patient is new, the nurse or health worker will create a computer file for her. After the data is entered, the patient record is returned to the files for storage.

2.6 Computerized Health Management Information System and Reporting

HMIS can improve diagnosis, treatment and reporting of specific conditions dramatically. When circumstances are favorable, computers can make major contributions at all levels of the health system. They can facilitate and greatly accelerate the communication of basic data, feedback, reports and queries/replies between departments and levels within a country, and can make information resources accessible through the Internet. In the presence of computerized HMIS information is regularly disseminated through wall charts, quarterly bulletins, quarterly and annual review meetings, annual review reports and thematic maps. For the benefit of external stakeholders, information is made available on the website (Campbell, 1997). As a result

of disseminating the information in a variety of ways, awareness among policy makers, development partners, program managers, health workers, civil societies, local government, communities and individual clients is on the increase. The process itself is empowering the people (Chetley, 2006). In Africa, for example, the use of telemedicine has helped people in rural areas by saving money and time for travelling and long queuing lines. Clinical staff can now sent patient information by email to specialists in the cities and symptoms can now be analyzed a day ahead from a distance.

The health management information system can be on a district or national level and consists of data for policy and strategy its main goal is to provide timely and accurate information leading to better health care planning and improved diagnosis and more patients getting access to health services for an entire country (Haux *et al*, 2004). HMIS provides access to information so that health institutions can monitor and evaluate health services programs, collect baseline information on health status of the populations served, and then, over time, analyze health outcome trends of their population. This then provides the nation with information about the population and subsets within the population, so as to be able to make changes to program initiatives and to evaluate program change effects. Determining the needs and views of all health system users – patients, providers, administrators and policy-makers – is essential to the development of effective HMIS.

The establishment of continuous, audience-specific reporting systems is imperative. Additionally, informed consumer choice is not completely effective in driving change at the procedure- or provider-specific level, but may be effective at a macro-level in an environment of competing health plans. Supply-side drivers of change include regulatory frameworks and the alignment of funding with performance. Reforms

are ultimately dependent on collaborative action by professionals and administrators aimed at identifying and implementing best practices. With a well-implemented HMIS, the use of health system performance information will ensure that health services reflect the best policies and practices, in addition to community contexts and values.

HMIS have the potential to increase or decrease inequality in healthcare provision. It must be implemented with a proper understanding of the healthcare system and individual payer and provider needs in order to realize potential benefits. While it may be costly to implement HMIS (the capital investment costs and running costs are not small), these costs may well be warranted where they are integrated into better managerial and medical practice; however this is by no means assured. Initial HMIS benefits are vast for developing countries. Weisbrod (2007) argues that technology increases healthcare costs, however his studies focus on OECD countries and on extremely advanced interventions. His findings support the contention that the higher costs are offset by better outcomes. Additionally, market level analyses of the value of technology within healthcare are rare. Within the OECD countries, "technology has been included in the risks covered by insurers, the marginal cost to the patient has been low. Thus, the concern over technology in the present institutional context arises from a the fact that institutional incentives to make such evaluations are weak, and the lack of agreement as to the criteria and methodology to be used in judging whether new technology provides significant benefit to warrant the expenditure.

2.7 Theoretical Framework

This study is grounded on the study of diffusion of innovation theory. The theory is relevant in the study as it explains the process of diffusion of innovation through

introduction of information technology. The diffusion of innovation is a theory of how, why, and at what rate new ideas, and technology spread through cultures. Diffusion of innovation theory seeks to explain the spread of new ideas (Gabor, 1970). First developed in the early 1950s using research in rural sociology, it continues to be widely used. Rogers proposed four main elements that influence the spread of new ideas as the innovation communication channels, time, and a social system. That is, diffusion is the process by which an innovation is communicated through certain channels over time among the members of a social system. Individuals progress through five stages: knowledge, persuasion, decision, implementation, and confirmation.

If the innovation is adopted, spreads via communication channels. During communication, the idea is rarely evaluated from a scientific standpoint, rather, subjectively perceptions of innovation influence diffusion. The process occurs over time. Finally, social systems determine diffusion, roles of opinion leaders and change agents, types of innovation, decisions, and innovation consequences. To use Rogers's theory requires us to assume that the innovation in classical diffusion is equivalent to scientific research findings in the context of practice, an assumption that has not been rigorously tested.

Diffusion of an innovation occurs through a five-step process. This is a type of decision-making Ryan and Gross first indicated the identification of adoption as a process in 1943 (Rogers, 1995).Rogers categorizes the five steps as: awareness, interest, evaluation, trial and adoption. An individual might reject an innovation at any time during or after the adoption process. In later editions of Diffusion of innovations, Rogers changes the terminology to five stages: knowledge, persuasion, decision, implementation

and confirmation. The rate of adoption is defined as the relative speed with which members of a social system adopt an innovation .It is usually measured by the length of time required for a certain percentage of the members of a social system to adopt an innovation (Rogers, 1995).

The rate of adoption for innovations is determined by an individual adopter category. Individuals who first adopt an innovation require a shorter adoption period than late adopters. The categories of adopters are innovators, early adopters, early majority, late majority, and laggards (Rogers, 1995). Innovators are the first individuals to adopt an innovation. Innovators are willing to take risks, youngest in age, have the highest social class, have great financial lucidity, very social and have closest contact to scientific sources and interaction with other innovators. Risk tolerance has them adopting technologies which may ultimately fail. Financial resources help absorb these failures (Rogers, 1995).

Early Adopters is the second fastest category of individuals who adopt an innovation. These individuals have the degree of opinion leadership among the other adopter categories. Early adopters are typically younger in age, have higher social status, have more financial lucidity, advanced education, and are more socially forward than late adopters. Realize judicious choice of adoption will help them maintain central communication position (Rogers, 1995).

Early majority Individuals in this category adopt an innovation after a varying degree of time. This time of adoption is significantly longer than the innovators and early adopters. Early majority tend to be slower in the adoption process, have above average

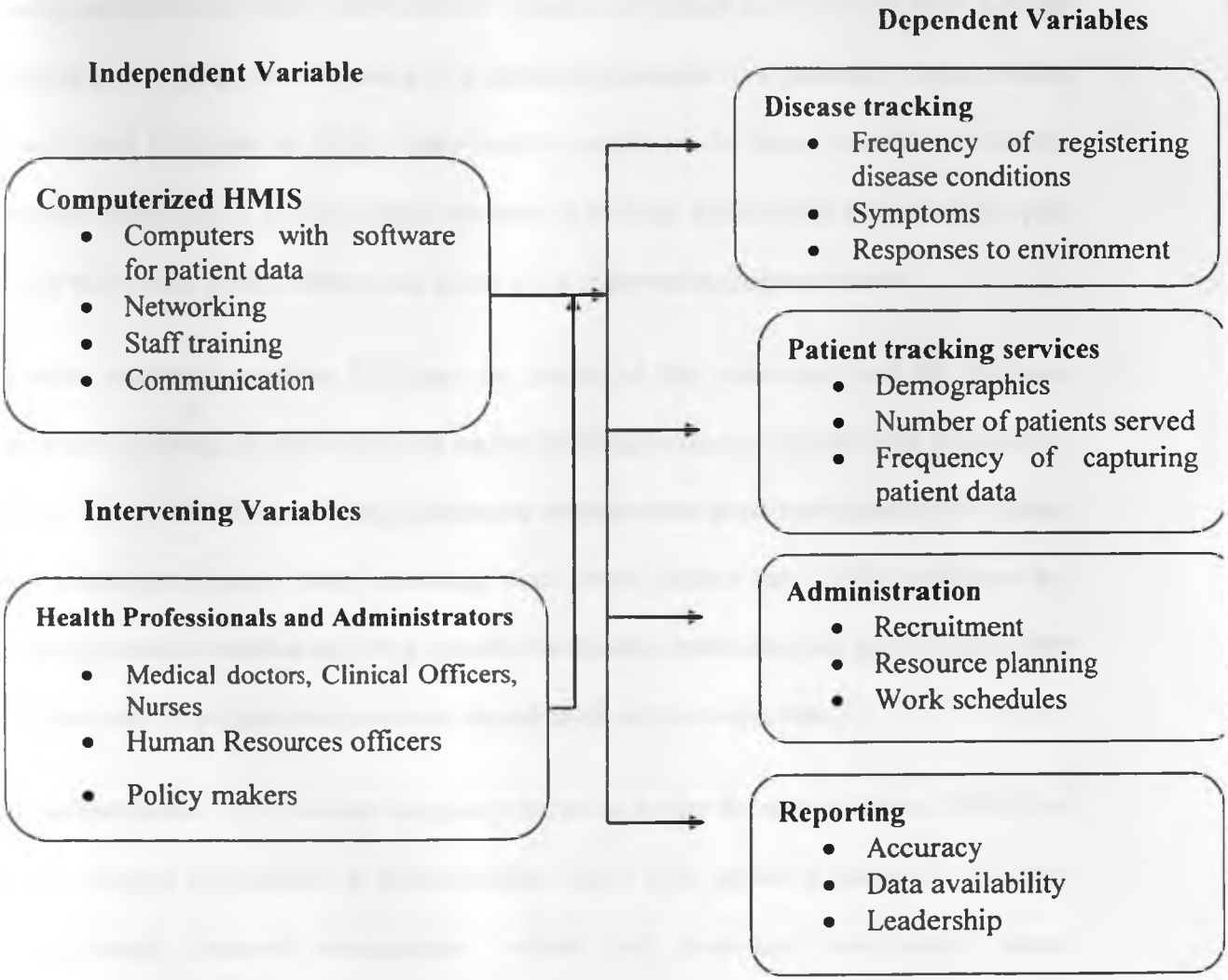
social status, and contact with early adopters, seldom hold positions of opinion leadership in a system (Rogers, 1995).

Late majority Individuals in this category will adopt an innovation after the average member of society. These individuals approach an innovation with a high degree of skepticism and after the majority of society has adopted the innovation. Late majority are typically skeptical about an innovation, have below average social status, very little financial lucidity, in contact with others in late majority and early majority, very little opinion leadership. Laggards Individuals in this category are the last to adopt an innovation. Unlike some of the previous categories, individuals in this category show little to no opinion leadership. These individuals typically have an aversion to change-agents and tend to be advanced in age. Laggards typically tend to be on traditions, likely to have lowest social status, lowest financial fluidity, be oldest of all other adopters, in contact with only family and close friends, very little to no opinion leadership.

2.8 Conceptual Framework

Framework refers to the main structure or skeleton that not only gives form and shape to the whole system, but also supports and holds together all the other elements in a logical configuration. In this research, the conceptual framework is the concise description of the phenomenon under study accompanied by visual depiction of the variables under study (Mugenda, 2008). The independent variables include disease tracking, patient tracking services, administration and reporting, while the dependent variable is access to health service delivery.

Figure 2.1: Conceptual Framework



A computerized health management information system is one among the many ways that Information Technology (IT) can help improve the health system. Computerization has enabled implementation of a good system for service delivery, monitoring and supervision. Computerized HMIS is designed to support individual patient care, health unit management and health system management functions. The practice of operating computerized HMIS has resulted in improvements in knowledge about the current health and management situation and use of such knowledge in routine management decisions.

Disease tracking: Involves the process of carrying out planning and tracking services using computerized health management systems to detect how far and how fast the disease is spreading, the frequency of a disease occurrence in a particular region. Health institutions are able to track every health condition by cross checking with the computerized HMIS. The computers are used to indicate the simplest indicators that play a key role in any health service, and hence in its information support system.

Patient tracking services: Utilizing the results of the assessment and the indicator selection processes, it becomes much easier for HMIS teams to identify their information needs. Use of HMIS is reducing equipment expenses and asset shrinkage and its nurses, are gaining efficiency while delivering even better patient care. While indicators are normally used in routine reporting systems to monitor operations and performance, they are also used in periodic and one-time assessments and in evaluations.

Administration: This involves assigning resources as per the need allocated. HMIS has been of great importance in administrative issues like reporting purposes, inventory management, financial management, vehicle and personnel management issues. Adequate HMIS provide access to information such as coverage and types of insurance, in order to provide appropriate care and/or referrals.

Reporting: A perfect HMIS requires all health facilities to report promptly in all months, allowing comprehensive quantification of treatment events through time and space across the health system. HMIS will help the health facilities report such cases to MOH or even DHMT.

Patient consultations, broken down by specific condition/disease and disaggregated by age group, Follow-up of people living with HIV/ number of malnourished patients cared for divided into over 5 years and under 5 years of age, Number of births, PMTCT data, Newborns data, Consultations for children under 5, Follow-up of children of HIV+ mothers, Pharmacy management and also other administrative issues.

2.9 Summary of Literature Review

A hospital consists of various organizational units with differing tasks for various types of healthcare professionals. These units often tend to be in very different locations in a hospital. A good example would have to be the physician who sends a patient to a clinic who is then transferred to a hospital. Every time the patient moves to one place information about his condition is registered. This often leads to missing information and double registration due to the lack of cooperation between the different instances like the doctor, pharmacy, hospital and insurance. There is a visible gap between the information needed and the information exchanged. Critical patient information is often not available when and where needed and this makes the whole process take much longer.

Health management information incorporates all the data needed by policy makers, clinicians and health service users to improve and protect population health. Moving from healthcare to integrated care, meaning, the merging of hospitals and individual practices into larger integrated healthcare networks. This is called a decentralized network of healthcare delivery by replacing hospitals as the only Centre's of care delivery (Bossert, 1998). The new hospital information systems have due to these changes taken in a much broader scope. Introducing information systems into health care

is one way they want to achieve better health. They set their own targets against which to measure progress in health and other dimensions of development. According to the WHO few systems in developing countries are effective because the available data often tend to be out of date therefore making trend assessment particularly difficult. And in these countries accurate health information is needed the most. This is why statistical, public health and biomedical knowledge and expertise are very much required.

Health management requires the monitoring of the health status of the population, the provision of services as to the coverage and utility, drugs stocks and consumption patterns, equipment status and availability, finances and personnel on a regular basis. This requires timely and accurate information from various sources. Accurate, relevant and up-to-date information is essential to health service managers if they are to recognize weakness in health service provision and take actions that will improve service delivery. Accordingly, the development of effective information systems is a necessary precursor to managerial improvement in health information systems. To this end there has been no known study that has examined the influence of computerized Health Management Information Systems on service delivery in health institutions in developing countries like Kenya. This study therefore aimed to fill the gap by carrying out a survey of hospitals in Nairobi.

CHAPTER THREE

RESEARCH METHODOLOGY

3.1 Introduction

This chapter sets out various stages and phases that were followed in carrying out the study. Specifically the following subsections were included; research design, target population, sample design, data collection instruments, data collection procedures and finally data analysis.

3.2 Research design

Research design is the scheme, outline or plan that is used to generate answers to research problems. This research problem was studied through the use of a descriptive research design. According to Cooper and Schindler (2003), a descriptive study is concerned with finding out the what, where and how of a phenomenon. Descriptive research design was chosen because it enables the researcher to generalize the findings to a larger population. This research design was chosen because it helps in identifying the relationship between computerized HMIS and health service delivery in the hospitals in Nairobi. The intention of descriptive research is to gather data at a particular point in time and use it to describe the nature of existing conditions. This study therefore was able to generalize the findings to all the hospitals in Kenya.

This study utilized quantitative research methodology often within the same study which involves gathering data that describe events and then organizes, tabulates, depicts, and describes the data collection procedures. This research design was considered appropriate because variables involved do not involve any manipulation but to establish the current status of the phenomena (Borg and Gail, 1983). The design enabled the

researcher to investigate the influence of computerized Health Management Information Systems on service delivery in health institutions in Nairobi Kenya.

3.3 Target Population

Target population in statistics is the specific population about which information is desired. According to Ngechu (2004), a population is a well-defined or set of people, services, elements and events, group of things or households that are being investigated. The target population included personnel working in the hospitals in Nairobi. According to the Ministry of Health there were fifty five hospitals in Nairobi County, and these hospitals were further divided into categories namely; Category A which consisted of Public/Government Hospitals and were five in number, Category B which consisted of Private and Mission Hospitals were also five in number while Category C which had the biggest number of hospitals being private and were forty five in number.

3.4 Sample Size and Sampling Technique

This section presented the methods and techniques used for sampling, the procedure of sampling and eventually how the final study sample was reached from the target population. The details of how data was obtained processed and analysed.

3.4.1 Sample Size

Sample size is finite part of a statistical population whose properties are studied to gain information about the whole. Sampling is selecting a given number of subjects from a defined population as representative of that population. Any statements made about the sample should also be true of the population. It is however agreed that the larger the sample the smaller the sampling error. Where external validity is important, one need to

carry out purposive sampling from properly defined population. From the target population of fifty five hospitals,the researcher purposively interviewed specific respondents in all the health instituitions. These respondents being the health professionals dealing with computerized HMIS and were also in departments which are align to the study research objectives.

3.4.2 Sampling Procedure

The sampling procedure describes the list of all population units from which the sample will be selected (Cooper & Schindler, 2003). The technique is applied so as to obtain a representative sample when the population does not constitute a homogeneous group. The population was made up of strata of different hospital categories. Sample of responding staff was drawn from all the fifty five hospitals in Nairobi where purposive sampling technique was used. Purposive sampling technique produce estimates of overall population parameters with greater precision and ensures a more representative sample is derived from a relatively homogeneous population.

Table 3.1:

Sample Size by Personnel Category

Category	Target Organization	Population	Sample Size
A	Public/Government Hospitals	5	5
B	Private and Mission Hospitals	5	5
C	Private Hospitals	45	45
	TOTAL	55	55

Source: Ministry Of Health, 2011

From the 55 hospitals, the possible number of respondents was 950 doctors, health records management and information officers, administrators, accountants and others. Based on Krejcie and Morgan's (1970) table for determining sample size, for a given population of 950, a sample size of 275 respondents would be appropriate to adequately represent a cross-section of the population at 95% confidence level.

Table 3.2: Sample Sizes

Category	Target Organization	Doctors/Clinical Officials	Health records	Administrators	Accountants	Others/	Total
A	Public/Government Hospitals	5	5	5	5	5	25
B	Private and Mission Hospitals	5	5	5	5	5	25
C	Private Hospitals	48	46	51	42	38	225
	GRAND TOTAL	58	56	61	52	48	275

Source: Ministry Of Health, 2011

3.5 Data Collection Instruments

The study collected both primary and secondary data for the purpose of investigating the influence of computerized Health Management Information Systems on service delivery in health institutions where the focus was on hospitals in Nairobi, Kenya. Primary data was collected using a questionnaire while secondary data was obtained from annual reports of the health institutions.

The questionnaire designed in this study comprised of two sections. The first part was designed to determine fundamental issues including the demographic characteristics of the respondent, while the second part consisted of questions where the variables were focused.

The questionnaire was designed in line with the objectives of the study. To enhance quality of data to be obtained, Likert type questions were included whereby respondents indicated the extent to which the variables were practiced on a five point Likerts scale. The structured questions were used in an effort to conserve time and money as well as to facilitate in easier analysis as they were in immediate usable form; while the unstructured questions were used so as to encourage the respondent to give an in-depth and felt response without feeling held back in revealing of any information.

3.5.1 Piloting of the Instruments

The researcher carried out a pilot study to pretest the validity and reliability of data collected using the questionnaire. The researcher selected a pilot group of 5 individuals from the target sample of the responding staff to test the validity and reliability of the research instrument. The pilot study allowed for pre-testing of the research instrument. The clarity of the instrument items to the respondents was necessary so as to enhance the instrument's validity and reliability. The aim was to correct inconsistencies arising from the instruments, which ensures that they measure what was intended.

3.5.2 Validity of Research Instruments

Validity indicates the degree to which an instrument measure what it is supposed to measure. This gives the accuracy and meaningfulness of inferences. It is the extent to which differences found with a measuring instrument reflect true differences among those being tested. It also refers to the data that is not only reliable, but also true and accurate.

The instruments were subjected to appraisal and amendment by use of simple language, peers review and experts (supervisors) whose recommendations were taken to improve the face and content validity.

3.5.3 Reliability of Research Instruments

According to Shanghverzy (2003) reliability refers to the consistency of measurement and is frequently assessed using the test–retest reliability method. Reliability is increased by including many similar items on a measure, by testing a diverse sample of individuals and by using uniform testing procedures. The research intends to utilize the Cronbach's alpha of 0.70 to check internal reliability. The higher the alpha, the more reliable the research instrument is (Mugenda and Mugenda, 2003).

The alpha is denoted as:

Alpha = Nr (1+r (N-1))

Where r= the means inter – item correlation

N= number of items in the scale

The results from the pilot study on the validity and reliability of data collected using the questionnaires are presented in table 3.3.

Table 3.3:

Reliability Coefficients

Scale	Cronbach's Alpha	Number of Items
Disease Tracking Services	0.821	12
Patient tracking services	0.802	10
Administration of health services	0.743	10
Reporting of health services	0.571	8

The reliability of the questionnaire was evaluated through Cronbach's Alpha which measures the internal consistency. The Alpha measures internal consistency by establishing if certain item measures the same construct. Cronbach's Alpha was established for every objective in order to determine if each scale (objective) would produce consistent results should the research be done later on. The findings of the pilot study shows that questions on disease tracking services had the highest reliability (α=0.821) followed by patient tracking services (α=0.802), then administration of health services (α = 0.743) and finally reporting of health services (α=0.571). This illustrates that all the four scales were reliable as their reliability values exceeded the prescribed threshold of 0.6 (Nunnally, 1978).

3.6 Data Collection Procedures

Data collection involved a self-administered questionnaire. The researcher dropped the questionnaires physically at the respondents' place of work. The researcher left the questionnaires with the respondents and picked them up later. Each questionnaire was coded and only the researcher knew which person responded. The coding technique was only used for the purpose of matching returned, completed questionnaires with those delivered to the respondents.

3.7 Data Analysis Technique

Before processing the responses, the completed questionnaires were edited for completeness and consistency. The data was then coded to enable the responses to be grouped into various categories. Data collected was purely quantitative and it was analyzed by descriptive analysis techniques. The descriptive statistical tools such as SPSS helped the researcher to describe the data and determine the extent that was used. The findings were presented using tables and charts, percentages, tabulations, means and other central tendencies. Tables were used to summarize responses for further analysis and facilitate comparison. For this study, the researcher was interested in investigating the influence of computerized Health Management Information Systems on service delivery in hospitals in Nairobi Kenya. This generated quantitative reports through tabulations, percentages, and measure of central tendency.

3.8 Ethical Consideration

Before the study began, permission was sought by getting a letter of recognition from the University and the hospitals' management were also informed of the study in order to ensure the study followed principles. The five principles guiding ethics in

research are scientific merit, equitable selection of subjects, seeking informed consent, confidentiality and avoidance of coercion. Prior to collecting information from the respondents, research assistants explained to the respondents the objectives of the study, and how the findings would help them and the country at large. The respondents were asked to sign an informed consent form.

CHAPTER FOUR

DATA ANALYSIS, PRESENTATION, INTERPRETATION AND DISCUSSION

4.1 Introduction

The purpose of this research was to examine the influence of computerized health management information systems on service delivery: a case of health institutions within Nairobi, Kenya. This chapter presents analysis and findings of the study as set out in the research methodology. The results are presented on the influence of computerised Health Management Information Systems on service delivery in heath institutions in Nairobi, Kenya. The specific areas discussed in this section include questionnaire return rate, gender distribution of the respondents, age of the respondents, working experience in the hospitals, highest academic qualifications, computerized health management information system and service delivery, computerized health management information system and disease tracking, computerized health management information system and patient tracking services, computerized health management information system and administration and computerized health management information system and reporting.

4.2 Questionnaire Return Rate

The study sampled 275 respondents from the target population in collecting data with regard to the influence of computerized health management information systems on service delivery where the focus was on the health institutions within Nairobi, Kenya. The questionnaire return rate results are shown in Table 4.1.

Table 4.4:

Response Rate

Response	Frequency	Percentage
Responded	269	98
Not responded	6	2
Total	275	**100**

From the study, 269 out of 275 target respondents filled in and returned the questionnaire contributing to 98%. This commendable response rate was made a reality after the researcher made personal calls and visits to remind the respondent to fill-in and return the questionnaires as well as explaining the importance of their participation in this study. This commendable response rate can be attributed to the data collection procedure, where the researcher personally administered questionnaires and waited for respondents to fill in, kept reminding the respondents to fill in the questionnaires through frequent phone calls and picked the questionnaires once fully filled. This response rate was good and representative and conforms to Mugenda and Mugenda (1999) stipulation that a response rate of 50% is adequate for analysis and reporting; a rate of 60% is good and a response rate of 70% and over is excellent. The questionnaires that were not returned were due to reasons like, the respondents were not available to fill them in at that time and with persistence follow-ups there were no positive responses from them. The response rate demonstrates a willingness of the respondents to participate in the study.

4.3 Demographic Characteristics of the Respondents

The study targeted doctors/clinical officials, health records officers, administrators/ accountants and pharmacists, chemists and lab technicians in the health

institutions in Nairobi. As such the results on demographic characteristics of these respondents were investigated in the first section of the questionnaire. They are presented in this section under gender distribution of the respondents, age of the respondents, working experience in the hospitals, highest academic qualifications.

4.3.1 Distribution of the Respondents by Gender

The research sought to find out the gender of the respondents. In this study the respondents sampled were expected to comprise both male and female workers. as such, the study required the respondents to indicate their gender by ticking on the spaces provided in the questionnaire. Table 4.2 shows the distribution of the respondents by gender.

Table 4.5:

Gender of the Respondents

Gender	Frequency	Percent
Male	138	51.3
Female	131	48.7
Total	**269**	**100.0**

Accordingly, 138 (51.3%) of the respondents were male while 131 (48.7%) of them were female. It can be concluded that the majority of the employees in the health institutions in Nairobi are male staffs. The findings show that the health institutions studied had both male and female members.

4.3.2 Distribution of Respondents by Age

HMIS is about a technological advancement concept which is likely to be easily up taken by different age groups differently. In order to avoid biasness, this study thus had to investigate the composition of the respondent in terms of age brackets to understand their familiarity with this technological concept in the health sector setting. The study posed a question requesting the respondents to indicate their age brackets. Table 4.3 shows the results of the findings on the age brackets of the respondents.

Table 4.6:

Age Brackets of the Respondents

Age Bracket	Frequency	Percent
18-24 Years	18	6.7
25-30 Years	76	28.3
31-34 Years	90	33.5
35-40 Years	39	14.5
41-44 Years	25	9.3
45-50 Years	16	5.9
Over 51 Years	5	1.9
Total	**269**	**100.0**

From table 4.3, 90 of the respondents were aged between 31-34 years comprising 90 (33.5%) of the respondents, 76 (28.3%) of the respondents were aged between 25-30 years, 39 (14.5%) of the respondents were aged between 35-40 years, 25 (9.3%) indicated that they were 41-44 years, 18 (6.7%) of the respondents were aged between 18-24 years, 16 (5.9%) of them were aged between 45-50 years, while 1.9% were aged over 51 years.

Out of the 269 respondents that participated, the study findings show that more than 200 of them were well distributed in terms of age and that they are active in technological advancements and productivity and hence can contribute constructively in the use of computerized health management information systems for better service delivery.

4.3.3 Working Experience in the Hospitals

The length of service/working in an organization determines the extent to which one is aware of the issues sought by the study. In the wake of technological advancements and globalization, there are likely to be many changes in institutional and operating environment that the respondents should know when responding to the issues sought by the study. This study is about a newly introduced health management information system in the health institutions in Kenya. The study further sought to establish the length of time that the respondents had been working in the hospitals. The results on this question are presented in Table 4.4.

Table 4.7:

Working experience at the Hospital

Length in years	Frequency	Percent
0-5 Years	167	62.1
5-10 Years	66	24.5
10-15 Years	23	8.6
Over 15 Years	13	4.8
Total	**269**	**100.0**

From the study, 167 (62.1%) of the respondents indicated that they had an experience of 5 years and below in the hospitals, 66 (24.5%) of them had worked in the hospitals for a period of 5-10 years, 23 (8.6%) of the respondents indicated that they had an experience of between 10-15 years, while 13 (4.8%) of them had a working experience of over 15 years in the hospitals. This shows that majority respondents had enough work experience in the hospitals to respond effectively. The respondents with the shortest period had worked for a period of 5 years and the longest serving had worked for over 15 years. Most of the respondents had worked in the target departments for long period hence they understood the utilization of HMIS in the health institutions. The respondents are conversant with the utilization of HMIS since majority of the health institutions have implemented computerized HMIS over the last five years hence the respondents are likely to have been working in the organizations since the introduction of HMIS in the institutions.

4.3.4 Highest Academic Qualifications

Health institutions employ staff in different work stations hence different academic qualifications. This difference might contribute to differences in the responses given by the respondents. The study sought to establish the highest academic qualifications attained by the respondents. The responses on this question are depicted in table 4.5.

Table 4.8:

Level of Education of the respondents

Level of Education	Frequency	Percent
Certificate	21	7.8
Diploma	94	34.9
Bachelor's degree	115	42.8
Master's Degree	39	14.5
Total	**269**	**100.0**

The study results reveal that, 115 (42.8%) of the respondents had acquired a Bachelor's or undergraduate degrees level of education, 94 (34.9%) of the respondents indicated that they had acquired college diplomas, 39 (14.5%) had acquired masters degrees level of education, while 21 (7.8%) of them indicated that they had acquired college certificates as their highest level of education. This results imply that majority of the respondents (57.8%) had at least an undergraduate degree and hence understood the information sought by this study. These findings further imply that all the respondents were academically qualified and also familiar with their duties and could dispense them effectively in terms of professional work ability and performance.

4.4 Computerized Health Management Information System and Service Delivery

This theme comes from the main objective of the study which sought to examine the influence of computerized health management information systems on service delivery within the health institutions within Nairobi, Kenya. This section will therefore present analysis in terms of computerized health management information system and service delivery, computerized health management information system and disease

tracking, computerized health management information system and patient tracking services, computerized health management information system and administration and computerized health management information system and reporting. Table 4.6 presents the results on the extent to which the various hospitals had been using the computerized health management information system (HMIS).

Table 4.9:

Extent to which the Hospitals had been using the Computerized HMIS

Extent	Frequency	Percent
To a very great extent	81	30.1
To a great extent	143	53.2
To a moderate extent	35	13.0
To a little extent	6	2.2
To a very little extent	4	1.5
Total	**269**	**100.0**

From the study, 143 (53.2%) of the respondents indicated that their hospitals had been using the Computerized HMIS to a great extent, 81 (30.1%) of them indicated that their hospitals had been using the computerized health management information system to a very great extent, 35 (13.0%) of the respondents indicated to a moderate extent, 6 (2.2%) of the respondents indicated that they had been using the computerized health management information system in their hospitals to a little extent, while 4 (1.5%) of them hospitals had been using the computerized health management information system to a very little extent. These findings are in line with Mengiste (2010) who found that

large investments have been made in improving information technology for health institutions.

The study further sought to establish the extent to which the use of computerized HMIS influenced the service delivery in the hospitals. The results are as depicted in table 4.7.

Table 4.10:

Use of Computerized HMIS and Service Delivery

Extent	Frequency	Percentage
To a very great extent	85	31.6
To a great extent	137	50.9
To a moderate extent	32	11.9
To a little extent	12	4.5
To a very little extent	3	1.1
Total	**269**	**100.0**

One hundred and thirty seven (50.9%) of the respondents indicated that the use of computerized HMIS influenced the service delivery in the hospitals to a great extent, 85 (31.6%) of them reiterated that the use of computerized HMIS influenced the service delivery in the hospitals to a very great extent, 32 (11.9%) of the respondents indicated to a moderate extent, 12 (4.5%) of the respondents indicated to a little extent, while only 3 (1.1%) of the respondents felt that the use of computerized HMIS influenced the service delivery in the hospitals to a very little extent. These findings concur with the previous findings by Abou Zahr (2005) who found that a robust Health Information System is the core of any successful public health system by checking quality of services delivered with the expected standards and to provide timely and accurate information leading to

better health care planning and improved diagnosis and more patients getting access to health services for an entire country.

The respondents were requested to rate the extent to which the hospitals they work for had been using computerized HMIS in the various areas of its service delivery.

Table 4.11:

Uses of HMIS in Hospitals and Service Delivery

Uses of HMIS in Hospitals	No extent	Little extent	Moderate extent	Great extent	Very great extent	Mean	Std dev
1. Antenatal care	8.2	11.9	48.7	28.3	3	3.06	0.92
2. Immunization	8.9	12.6	45.7	26.8	5.9	3.08	0.993
3. Disease control programs	9.3	6.7	18.6	36.8	28.6	3.69	1.218
4. Reporting	3.7	6.7	11.5	32	46.1	4.1	1.083
5. Inventory management	2.6	4.5	12.3	32.3	48.3	4.19	0.992
6. Financial management	1.5	5.6	8.6	30.1	54.3	4.3	0.948
7. Vehicle and personnel management	2.6	9.3	11.5	34.6	42	4.04	1.07

Majority of the respondents indicated that their hospitals had been using computerized HMIS in the financial management area to a great extent as shown by a mean score of 4.3. It was also found that computerized HMIS was used in the inventory management to a great extent as shown by a mean score of 4.19 as well as in reporting to a great extent as shown by a mean score of 4.1, vehicle and personnel management to a great extent as shown by a mean score of 4.04 and disease control programs to a great extent as shown by a mean score of 3.69, while computerized HMIS had been used to moderate extents in immunization as shown by a mean score of 3.08 and in antenatal care

as shown by a mean score of 3.06. These findings coincide with Mengiste (2010) findings that computerization of data storage and analysis has sped up data handling considerably while also getting all people involved in the information chain to determine the most appropriate and effective disease control programs, reporting, inventory management, financial management and vehicle and personnel management..

The study sought to establish the extent to which the use of computerized HMIS has led to the various benefits. As such a scale of 1 to 5 where 1= no extent, 2= little extent, 3= moderate extent, 4= great extent and 5 is to a very great extent was provided.

Table 4.12:
Benefits of Computerized HMIS

Benefits of Computerized HMIS	**No extent**	**Little extent**	**Moderate extent**	**Great extent**	**Very great extent**	**Mean**	**Std dev**
1. Computerized HMIS has enabled implementation of a good system for service delivery, planning, monitoring and supervision	1.9	3.7	17.8	49.1	27.5	3.97	0.878
2. It empowers individuals and communities with timely and understandable health related information	1.1	4.1	13.4	45.4	36.1	4.11	0.865
3. HMIS results in health workers valuing the data generated by them better	1.1	3.7	11.9	46.5	36.8	4.14	0.848
4. Computerization of data storage and analysis has sped up data handling considerably	1.1	2.2	8.9	41.3	46.5	4.3	0.811
5. HMIS supports program planning and decision making	1.5	4.1	16	53.9	24.5	3.96	0.839
6. HMIS ensures improved the quality of and access to health care	1.9	2.2	10.4	40.9	44.6	4.24	0.867

From the study, majority of the respondents reiterated that computerization of data storage and analysis has sped up data handling considerably to a great extent as shown by a mean score of 4.3, HMIS ensures improved the quality of and access to health care to a great extent as shown by a mean score of 4.24, HMIS results in health workers valuing the data generated by them better to a great extent as shown by a mean score of 4.14, it empowers individuals and communities with timely and understandable health related information to a great extent as shown by a mean score of 4.11, computerized HMIS has enabled implementation of a good system for service delivery, planning, monitoring and supervision to a great extent as shown by a mean score of 3.97 and HMIS supports program planning and decision making to a great extent as shown by a mean score of 3.96. These findings confirm that health management information system incorporates all the data needed by policy makers, clinicians and health service users to improve and protect population health (according to Tan, 2002). As a result the various benefits realized can be enjoyed by all the stakeholders in the various departments concerned with health management.

4.4.1 Computerized Health Management Information System and Disease Tracking

This section presents the findings on computerized health management information system and disease tracking which comes from the first specific objective of the study which sought to establish the extent to which computerized health management information system influences disease tracking services within the health institutions within Nairobi. The results depicted in table 4.10 are on the influence of computerized HMIS on disease tracking in the health institutions in Kenya.

Table 4.13:

Influence of Computerized HMIS on Disease Tracking

Extents	Frequency	Percent
To a very great extent	85	31.6
To a great extent	148	55.0
To a moderate extent	26	9.7
To a little extent	9	3.3
To a very little extent	1	0.4
Total	**269**	**100.0**

On the respondents rating on the influence of computerized HMIS on disease tracking in the health institutions in Kenya, 148 (55.0%) of the respondents rated the influence of computerized HMIS on disease tracking in the health institutions in Kenya to be great extent, 85 (31.6%) of them indicated to a very great extent, 26 (9.7%) of the respondents indicated that computerized HMIS influences disease tracking in the health institutions in Kenya to a moderate extent, 9 (3.3%) of them rated the influence of computerized HMIS on disease tracking in the health institutions in Kenya to be on a little extent, while 1 (0.4%) of the respondents indicated that computerized HMIS influences disease tracking in the health institutions in Kenya to a very little extent. From the literature review, disease tracking isn't just a question of agreeing what diseases to report on, it also requires that clinicians are able to diagnose the diseases accurately and are rigorous about applying correct coding (WHO, 2009). As such, the use of computerized HMIS has enabled the health institutions to succeed in disease tracking and surveillance.

Table 4.14: *Aspects of disease tracking in computerized HMIS*

Aspects of disease tracking in computerized HMIS	No extent	Little extent	Moderate extent	Great extent	Very great extent	Mean	Std dev
1. Accurate diagnose of diseases	2.6	7.4	14.5	48.7	26.8	3.9	0.968
2. Rigorous application of correct coding	1.1	4.1	16	36.1	42.8	4.15	0.912
3. Adequate consumer safeguards and protections	2.6	6.3	13	37.2	40.9	4.07	1.012
4. Confidentiality of medical records	2.6	4.5	13.8	37.2	42	4.12	0.98

The study sought to establish the extent to which computerization of HMIS in the health systems consider the various aspects of disease tracking in order to enhance service delivery. Majority of the respondents indicated that computerization of HMIS in the health systems consider rigorous application of correct coding to a great extent as shown by a mean score of 4.15, confidentiality of medical records is also considered to a great extent as shown by a mean score of 4.12, adequate consumer safeguards and protections to a great extent as shown by a mean score of 4.07 and accurate diagnose of diseases to a great extent as shown by a mean score of 3.9. These findings also correspond to the findings by WHO (2009) that a proper healthcare delivery system contains adequate consumer safeguards and protections which are medically necessary for prognosis, medical directives, decisions making and performance reviews on a periodic basis which ensure rigorous application of correct coding and confidentiality of medical records.

The respondents were required to indicate the extent to which computerized HMIS influence disease tracking in the various ways. A scale of 1 to 5 where 1= no extent, 2= little extent, 3= moderate extent, 4= great extent and 5 is to a very great extent was provided.

Table 4.15:

Influence of Computerized HMIS on Disease Tracking

Influence of Computerized HMIS on Disease Tracking	No extent	Little extent	Moderate extent	Great extent	Very great extent	Mean	Std dev
1. Computerized HMIS helps in providing optimal patient care	1.1	4.1	15.6	57.2	21.9	3.95	0.799
2. It enhances training of medical personnel to generate appropriate results	0.4	3	9.7	52	34.9	4.18	0.753
3. Computerized HMIS helps to facilitate research and development activities in various fields of medicine	0.7	4.1	14.1	55	26	4.01	0.796
4. Computerized HMIS helps decision makers to detect and control emerging and endemic health problems	1.1	2.2	14.5	47.2	34.9	4.13	0.819
5. Computerized HMIS assists in monitoring progress towards health goals	1.1	4.1	10.4	49.8	34.6	4.13	0.837
6. It strengthens the evidence base for effective health policies	0.7	1.5	7.8	50.2	39.8	4.27	0.73

Majority of the respondents indicated that computerized HMIS strengthens the evidence base for effective health policies to a great extent as shown by a mean score of 4.27, it enhances training of medical personnel to generate appropriate results to a great

extent as shown by a mean score of 4.18, computerized HMIS helps decision makers to detect and control emerging and endemic health problems to a great extent as shown by a mean score of 4.13, computerized HMIS assists in monitoring progress towards health goals to a great extent as shown by a mean score of 4.13, computerized HMIS helps to facilitate research and development activities in various fields of medicine to a great extent as shown by a mean score of 4.01 and computerized HMIS helps in providing optimal patient care to a great extent as shown by a mean score of 3.95. According to Williams and Prosser (2006) the influence of computerized HMIS on disease tracking includes managerial aspects such as the planning, organizing and control of health care facilities at the national, state and institution levels and clinical aspects which result to providing optimal patient care, training of medical personnel to generate appropriate human resources, and facilitate research and development activities in various fields of medicine.

4.4.2 Computerized Health Management Information System and Patient Tracking

The second specific objective of this study was to assess the level at which computerized health management information system influences patient tracking services in the health institutions within Nairobi. As such this section presents the findings on the various issues on computerized health management information system and patient tracking services. Table 4.13 shows the findings on the extent to which computerized HMIS influence patient tracking within the health institutions in Kenya.

Table 4.16:

Extent to which Computerized HMIS Influence Patient Tracking in Hospitals

Extent	Frequency	Percent
Very high	76	28.3
High	166	61.7
Low	16	6.0
Very low	7	2.6
Not at all	4	1.5
Total	**269**	**100**

From the study, 166 (61.7%) of the respondents unanimously indicated that computerized HMIS influence patient tracking within the health institutions in Kenya at a high extent, 76 (28.3%) of them indicated very high extent, 16 (6.0%) of the respondents indicated that the influence of computerized HMIS on patient tracking within the health institutions in Kenya is low, 7 (2.6%) rate the influence as being very low, while 4 (1.5%) of the respondents indicated that computerized HMIS does not influence patient tracking within the health institutions in Kenya at all. From the literature reviewed, the findings confirm the conception by Mengiste (2010) that the aim of a health management information system is to improve the ability to collect, store and analyze accurate health data for monitoring the health trends. The objective of computerized HMIS is to record information on these health characteristics depicted by the patients.

Patient tracking service in HMIS aims at improving the ability to collect, storing and analyzing accurate health data, service delivery efficiency, improving data accuracy, effectiveness of intervention, increase accountability and learn about trends. Table 4.14 presents respondents' rating on the effectiveness of HMIS in the achievement of various standards of service delivery with regard to patient tracking.

Table 4.17:

Patient Tracking and Service Delivery Standards

Patient tracking and Service delivery standards	No extent	Little extent	Moderate extent	Great extent	Very great extent	Mean	Std dev
1. Pertinent information	0.7	3.3	18.6	53.2	24.2	3.97	0.793
2. Usable documented patient information	0.4	2.6	12.3	43.9	40.9	4.22	0.788
3. Quality of patient care	0.4	3.3	12.3	39.8	44.2	4.24	0.822
4. Patient drug actions and effects-to diagnosis and therapy	0.7	4.1	10.8	39	45.4	4.24	0.858
5. Hospital performance and costs	2.2	1.5	11.9	45.7	38.7	4.17	0.86

Majority of the respondents recapped that HMIS is effective in the achievement of quality of patient care to a great extent as shown by a mean score of 4.24, in patient drug actions and effects-to diagnosis and therapy to a great extent as shown by a mean score of 4.24, usable documented patient information to a great extent as shown by a mean score of 4.22, hospital performance and costs to a great extent as shown by a mean score of 4.17 and pertinent information to a great extent as shown by a mean score of 3.97. The task of a HMIS is to support patient care and associated administration by providing information, primarily about patients, in a way that it is correct, pertinent and up to date, accessible to the right persons at the right location in a usable format. These findings concur with Haux *et al.* (2004) and Winter *et al.* (2003) who found that computerization of HMIS influences various aspects such as drug actions and adverse effects-to support diagnosis and therapy; information about the quality of patient care and hospital performance and costs.

A health information management system or clinical information system is used in hospitals to assist the overall management of the health care facility through information about diseases and information about patient care. This section was interested in establishing the extent to which the respondents agreed with the expected outcomes of HMIS in health institutions. The respondents were requested to indicate their agreement with various statements with regard to the influence of computerized HMIS on patient tracking in the health institutions in Kenya. A scale of 1 to 5 where 1= strongly disagree, 2= disagree, 3= neutral, 4= agree and 5 is strongly agree was provided.

Table 4.18:

Computerized HMIS on Patient Tracking

Statements on the influence of computerized HMIS on patient tracking	**Strongly disagree**	**Disagree**	**Neutral**	**Agree**	**Strongly agree**	**Mean**	**Std dev**
1. Use of telemedicine to improve diagnosis and enhance patient care	1.5	1.5	22.3	63.2	11.5	3.82	0.707
2. Computerized HMIS is enhancing better sharing of research findings through e-health	0.4	3	13.4	46.8	36.4	4.16	0.792
3. Accurate information can be used for patient monitoring ensuring that information about the patient can be retrieved easily hence improving patient follow up	1.1	2.6	13.4	45	37.9	4.31	2.568
4. HMIS ensures sharing and dissemination of health information to different audiences for quality health information	1.1	2.2	11.9	49.8	34.9	4.15	0.798
5. It ensure that health information is used rationally, effectively and efficiently to improve health action	0.4	3.3	12.6	50.2	33.5	4.13	0.783

From the study, the respondents agreed that accurate information can be used for patient monitoring ensuring that information about the patient can be retrieved easily hence improving patient follow up as shown by a mean score of 4.31, computerized HMIS is enhancing better sharing of research findings through e-health as shown by a mean score of 4.16, HMIS ensures sharing and dissemination of health information to different audiences for quality health information as shown by a mean score of 4.15, it ensure that health information is used rationally, effectively and efficiently to improve health action as shown by a mean score of 4.13 and use of telemedicine to improve diagnosis and enhance patient care as shown by a mean score of 3.82. The findings support Haux *et al.* (2004) conception that the task of a hospital information system is to support patient care by providing information, primarily about patients, in a way that it is correct, pertinent and up to date, accessible to the right persons at the right location in a usable format. As such, computerized HMIS bring together data from all the different subsystems, to share and disseminate them to the many different audiences for health information, and to ensure that health information is used rationally, effectively and efficiently to improve health action.

4.4.3 Computerized Health Management Information System and Administration

Under its third objective the study sought to examine how computerized health management information system influences administration of health services within the health institutions within Nairobi. As such, the study posed a statement that HMIS is primarily concerned to assist in the administrative, management and planning of health service delivery and required the respondents to rate their level of agreement with the this statement with regard to influence of computerized HMIS on administration.

Table 4.19:

HMIS assist in Administrative, Management Planning Health Service Delivery

Agreement	Frequency	Percentage
Strongly agree	105	39.0
Agree	149	55.4
Neutral	14	5.2
Disagree	1	.4
Total	**269**	**100.0**

From the study results, 149 (55.4%) of the respondents agreed that HMIS is primarily concerned to assist in the administrative, management and planning of health service delivery, 105 (39.0%) of them strongly agree with the same statement, 14 (5.2%) of the respondents remained neutral, while only 1 (0.4%) of the respondents disagreed that HMIS is primarily concerned to assist in the administrative, management and planning of health service delivery. From the literature review, the goal of HMIS is to optimize the health of individual patients and of the population as a whole in an equitable, efficient and effective manner that is acceptable to patients, providers and administrators. According to Gladwin *et al* (2003) HMIS achieves overarching reforms of service delivery alongside improvement of the institutional results in incremental changes at all levels of administration of health services.

To examine how computerized health management information system influences administration of health services within the health institutions, the study further sought to

establish the extent to which computerization of HMIS influence the various outcomes of administration. The respondents' responses on these questions are depicted in table 4.17.

Table 4.20:

Outcomes of Computerization of HMIS on Administration

Outcomes of computerization of HMIS on administration	No extent	Little	Moderate	Great	Very	Mean	Std dev
1. HMIS improves governance	0.7	2.6	17.8	44.6	34.2	4.09	0.828
2. It helps in mobilizing new resources	0	2.2	11.2	42.4	44.2	4.29	0.751
3. HMIS is ensuring accountability in the way they are used	0	2.6	12.6	36.4	48.3	4.3	0.789
4. Computerized HMIS improves reliability of the health data on clinic operations	0.4	1.9	10	45.4	42.4	4.28	0.747
5. HMIS ensures eligibility checking and simple for the provider	0	2.2	11.9	34.9	50.9	4.35	0.775

Majority of the respondents reiterated that HMIS ensures eligibility checking and simple for the provider to a great extent as shown by a mean score of 4.35, HMIS is ensuring accountability in the way they are used to a great extent as shown by a mean score of 4.3, it helps in mobilizing new resources to a great extent as shown by a mean score of 4.29, computerized HMIS improves reliability of the health data on clinic

operations to a great extent as shown by a mean score of 4.28 and that HMIS improves governance to a great extent as shown by a mean score of 4.09. These findings are consistent with WHO (2004) that with the introduction of HMIS, eligibility checking becomes simplified for the provider as well as adequate eligibility checking HMIS also allow a provider to foresee and resolve issues with coverage before services are rendered.

4.4.4 Computerized Health Management Information System and Reporting

In its fourth specific objective the study sought to determine the extent to which computerized health management information system influence reporting of health services in the health institutions within Nairobi. The study was interested in establishing the extent to which computerized HMIS influence reporting services within the health institutions in Kenya. Table 4.18 presents these findings.

Table 4.21:

Extent to which Computerized HMIS influence Reporting Services

Extent	Frequency	Percentage
To a very great extent	103	38.3
To a great extent	133	49.4
To a moderate extent	28	10.4
To a little extent	5	1.9
Total	**269**	**100.0**

From the study, one hundred and thirty three (49.4%) of the respondents indicated that computerized HMIS influence reporting services within the health institutions in Kenya to a great extent, 103 (38.3%) of them indicated to a very great extent, another 28

(10.4%) of the respondents reiterated that computerized HMIS influence reporting services within the health institutions in Kenya to a moderate extent, while only 5 (1.9%) of the respondents indicated to a little extent. From the available literature, HMIS can improve diagnosis, treatment and reporting of specific conditions dramatically. As such these findings are in accordance with Campbell (1997) that computerized HMIS can facilitate and greatly accelerate the communication of basic data, feedback, reports and queries/replies between departments and levels within a country, and can make information resources accessible through the Internet.

As a function of reporting, HMIS facilitates and greatly accelerate the communication of basic data, feedback, reports and queries/replies between departments and levels within a country, and can make information resources accessible through the Internet. The respondents were required to rate their agreement with various statements about the reporting status in the health institutions in Kenya. A scale of 1 to 5 where 1= strongly disagree, 2= disagree, 3= neutral, 4= agree and 5 is strongly agree was provided. Table 4.19 shows the results.

Table 4.22:

Reporting Status in the Health Institutions

Reporting status in the health institutions	Strongly disagree	Disagree	Neutral	Agree	Strongly agree	Mean	Std dev
1. Extensive recording and reporting requirements are placed upon service providers and managers at all levels	4.5	19	27.5	37.9	11.2	3.32	1.045
2. HMIS improves reporting of specific conditions	4.1	16.7	26.4	35.3	17.5	3.45	1.087
3. Data recording requirements and formats at the client level are often inappropriate for reinforcing correct procedures and quality of care	14.5	30.5	31.2	19.3	4.5	2.69	1.079
4. Procedures and knowledge for making appropriate use of health data by staff and managers of health services at all levels are inadequate	15.6	36.8	21.2	19	7.4	2.66	1.169
5. Reports are not well prepared and feedback to the service levels is rare	19	36.1	22.3	16	6.7	2.55	1.163
6. The perception that the quality and completeness of data is inadequate further inhibits the use of HMIS	14.9	33.1	24.2	20.1	7.8	2.73	1.171

From the study, majority of the respondents were neutral on that HMIS improves reporting of specific conditions as shown by a mean score of 3.45, extensive recording and reporting requirements are placed upon service providers and managers at all levels as shown by a mean score of 3.32, the perception that the quality and completeness of data is inadequate further inhibits the use of HMIS as shown by a mean score of 2.73, data recording requirements and formats at the client level are often inappropriate for reinforcing correct procedures and quality of care as shown by a mean score of 2.69, procedures and knowledge for making appropriate use of health data by staff and managers of health services at all levels are inadequate as shown by a mean score of 2.66 and that reports are not well prepared and feedback to the service levels is rare as shown by a mean score of 2.55. These findings are in line with Chetley (2006) who found that HMIS provides access to information so that health institutions can monitor and evaluate health services programs, collect baseline information on health status of the populations served, and then, over time, analyze health outcome trends of their population. Weisbrod (2007) also posited that with a well-implemented HMIS, the use of health system performance information will ensure that health services reflect the best policies and practices, in addition to community contexts and values.

HMIS improves various aspects of reporting dramatically. The aspects of HMIS that make major contributions at all levels of the health system are sought in this section. The study sought to establish the extent to which computerization of HMIS influence the various aspects of reporting in the health institutions in Kenya. The results on this question are presented in table 4.20.

Table 4.23:

Aspects of Reporting in the Health Institutions

Aspects of reporting in the health institutions	No extent	Little extent	Moderate extent	Great extent	Very great extent	Mean	Std dev
1. Communication of basic data	0.7	2.2	15.6	56.9	24.5	4.02	0.748
2. Reports and queries/replies between departments	0	2.2	11.5	41.6	44.6	4.29	0.755
3. Accessibility of information resources	0.4	1.1	15.2	41.3	42	4.23	0.773
4. Imperative audience-specific reporting systems	1.5	2.6	11.5	48.7	35.7	4.14	0.832
5. Informed consumer choice	0.7	2.2	10.8	48	38.3	4.21	0.778

Majority of the respondents reiterated that computerization of HMIS influence reports and queries/replies between departments to a great extent as shown by a mean score of 4.29, accessibility of information resources to a great extent as shown by a mean score of 4.23, informed consumer choice to a great extent as shown by a mean score of 4.21, imperative audience-specific reporting systems to a great extent as shown by a mean score of 4.14 and communication of basic data to a great extent as shown by a mean score of 4.02. According to Haux *et al*, (2004) computerized HMIS provides access to information so that health institutions can monitor and evaluate health services programs, collect baseline information on health status of the populations served, and then, over time, analyze health outcome trends of their population. As such the various

aspects of reporting including communication of basic data, reports and queries/replies between departments, accessibility of information resources, imperative audience-specific reporting systems and informed consumer choice for determining the needs and views of all health system users – patients, providers, administrators and policy-makers – is essential to the development of effective HMIS.

CHAPTER FIVE

SUMMARY OF FINDINGS , CONCLUSIONS AND RECOMMENDATIONS

5.1 Introduction

This chapter provides the summary of the findings, the conclusions and recommendations of the study based on the objectives of the study. The chapter finally presents the suggestions for further studies.

5.2 Summary of the Findings

On disease tracking, the study found the influence of computerized HMIS on disease tracking in the health institutions in Kenya to be great extent as indicated by 55% of the respondents. Computerization of HMIS in the health systems consider rigorous application of correct coding to a great extent as shown by a mean score of 4.15, confidentiality of medical records is also considered to a great extent as shown by a mean score of 4.12, adequate consumer safeguards and protections to a great extent as shown by a mean score of 4.07 and accurate diagnose of diseases to a great extent as shown by a mean score of 3.9. From the study, computerized HMIS strengthens the evidence base for effective health policies, it enhances training of medical personnel to generate appropriate results, computerized HMIS helps decision makers to detect and control emerging and endemic health problems, computerized HMIS assists in monitoring progress towards health goal, computerized HMIS helps to facilitate research and development activities in various fields of medicine and computerized HMIS helps in providing optimal patient care to great extents as shown by mean scores of 4.27, 4.18, 4.13, 4.13, 4.01 and 3.95 respectively.

The study further found that computerized HMIS influence patient tracking within the health institutions in Kenya at a high extent as shown by 61.7% of the respondents. On rating the effectiveness of HMIS in the achievement of various standards of service delivery with regard to patient tracking, majority of the respondents recapped that HMIS is effective in the achievement of quality of patient care to a great extent as shown by a mean score of 4.24, in patient drug actions and effects-to diagnosis and therapy to a great extent as shown by a mean score of 4.24, usable documented patient information to a great extent as shown by a mean score of 4.22, hospital performance and costs to a great extent as shown by a mean score of 4.17 and pertinent information to a great extent as shown by a mean score of 3.97. The respondents agreed that accurate information can be used for patient monitoring ensuring that information about the patient can be retrieved easily hence improving patient follow up, computerized HMIS is enhancing better sharing of research findings through e-health, HMIS ensures sharing and dissemination of health information to different audiences for quality health information and it ensures that health information is used rationally, effectively and efficiently to improve health action as shown by a mean score of 4.13 and use of telemedicine to improve diagnosis and enhance patient care.

With regard to administration, the study established that HMIS is primarily concerned to assist in the administrative, management and planning of health service delivery. As such, 55.4% of the respondents agreed that HMIS is primarily concerned to assist in the administrative, management and planning of health service delivery. HMIS ensures eligibility checking and simple for the provider to a great extent as shown by a mean score of 4.35, HMIS is ensuring accountability in the way they are used to a great

extent as shown by a mean score of 4.3, it helps in mobilizing new resources to a great extent as shown by a mean score of 4.29, computerized HMIS improves reliability of the health data on clinic operations to a great extent as shown by a mean score of 4.28 and that HMIS improves governance to a great extent as shown by a mean score of 4.09.

Further, the study found that computerized HMIS influence reporting services within the health institutions in Kenya to a great extent as pointed out by majority (49.4%) of the respondents. majority of the respondents were neutral on that HMIS improves reporting of specific conditions as shown by a mean score of 3.45, extensive recording and reporting requirements are placed upon service providers and managers at all levels as shown by a mean score of 3.32, the perception that the quality and completeness of data is inadequate further inhibits the use of HMIS as shown by a mean score of 2.73, data recording requirements and formats at the client level are often inappropriate for reinforcing correct procedures and quality of care as shown by a mean score of 2.69, procedures and knowledge for making appropriate use of health data by staff and managers of health services at all levels are inadequate as shown by a mean score of 2.66 and that reports are not well prepared and feedback to the service levels is rare as shown by a mean score of 2.55. Computerization of HMIS influence reports and queries/replies between departments to a great extent, accessibility of information resources to a great extent, informed consumer choice to a great extent, imperative audience-specific reporting systems to a great extent and communication of basic data to a great extent.

5.3 Conclusions

The study set out to establish the extent to which computerized health management information system influences disease tracking services within the health institutions within Nairobi. From the study findings, the study concludes that computerized HMIS has a significant influence on disease tracking in the health institutions. It was clear from the study that Computerization of HMIS in the health systems consider rigorous application of correct coding, confidentiality of medical records, adequate consumer safeguards and protections and accurate diagnose of diseases. As a result of the considerations mentioned, the use of computerized HMIS strengthens the evidence base for effective health policies, it enhances training of medical personnel to generate appropriate results, computerized HMIS helps decision makers to detect and control emerging and endemic health problems, computerized HMIS assists in monitoring progress towards health goal, computerized HMIS helps to facilitate research and development activities in various fields of medicine and computerized HMIS helps in providing optimal patient care.

The study also sought to assess the level at which computerized health management information system influences patient tracking services in the health institutions within Nairobi. As such, the study deduced from the findings that computerized HMIS influence patient tracking within the health institutions. HMIS is effective in the achievement of quality of patient care, inpatient drug actions and effects-to diagnosis and therapy, usable documented patient information, hospital performance and costs and pertinent information. Further, accurate information can be used for patient monitoring ensuring that information about the patient can be retrieved easily hence

improving patient follow up, computerized HMIS is enhancing better sharing of research findings through e-health, HMIS ensures sharing and dissemination of health information to different audiences for quality health information and it ensures that health information is used rationally, effectively and efficiently to improve health action.

The other objective of this study was to examine how computerized health management information system influences administration of health services within the health institutions in Nairobi. From the results, the study concludes that HMIS is primarily concerned to assist in the administrative, management and planning of health service delivery. As a result, computerized HMIS ensures eligibility checking and simple for the provider, computerized HMIS ensures accountability in the way they are used, it helps in mobilizing new resources, computerized HMIS improves reliability of the health data on clinic operations and that HMIS improves governance.

To determine the extent to which computerized health management information system influence reporting of health services in the health institutions within Nairobi, the study concludes that computerized HMIS has a great influence on reporting services within the health institutions. The study further deduces that computerized HMIS improves reporting of specific conditions, extensive recording and reporting requirements are placed upon service providers and managers at all levels, the perception that the quality and completeness of data is inadequate further inhibits the use of HMIS, data recording requirements and formats at the client level are often inappropriate for reinforcing correct procedures and quality of care, procedures and knowledge for making appropriate use of health data by staff and managers of health services at all levels are inadequate and that reports are not well prepared and feedback to the service levels is

rare. As a consequence Computerization of HMIS influence reports and queries/replies between departments to a great extent, accessibility of information resources to a great extent, informed consumer choice, imperative audience-specific reporting systems and communication of basic data.

5.4 Recommendations

Looking forward toward the realization of the social pillar of Kenya's Vision 2030 demands that the health institutions be equipped with computerised HMIS in order to eliminate problems of detecting and control of emerging and endemic health problems, monitoring progress towards health goals, untimely and un-understandable health related information and poor quality of health services. Having investigated the influence of computerized health management information systems on service delivery among the health institutions within Nairobi, the following recommendations are made.

On disease tracking, the study recommends that there is dire need of training the medical personnel to generate appropriate human resources as well as facilitate research and development activities in various fields of medicine. These will ensure that the health practitioners and other stakeholders are equipped with relevant skills that would ensure that the health institutions are efficient in disease tracking. These will further enhance rigorous application of correct coding, confidentiality of medical records, adequate consumer safeguards and protections and accurate diagnose of diseases. Computerized Health management information systems are essential instruments in the development of health systems and general services. If properly utilized, health management information systems allow service providers to monitor diseases, clients' needs, as well as monitor and prioritize service provision effectively.

The study found and concluded that computerized HMIS influence patient tracking within the health institutions. The task of a hospital information system is to support patient care and associated administration by providing information, primarily about patients, in a way that it is correct, pertinent and up to date, accessible to the right persons at the right location in a usable format. The study therefore recommends that there is need to engage the relevant stakeholders in patient tracking aspects like training and refresher courses as well as to ensure that the personnel are conversant with the various aspects of computerized HMIS to enhance patient tracking through accurate information, sharing of research findings through e-health, dissemination of health information to different audiences for quality health information and ensuring that health information is used rationally, effectively and efficiently. These would ensure tracking for patient monitoring and ensuring that information about the patient can be retrieved easily hence improving patient follow up.

The study further recommends that since computerized health management information system influences administration of health services within the health institutions, there is need to align the administration function of the health institutions with the computerization of HMIS to enhance service delivery in the health institutions. These would ensure that there is eligibility checking, accountability in the way they are used, mobilizing new resources, improved reliability of the health data on clinic operations and governance.

The study finally recommends that defining the specific roles and responsibilities, the goals and added value of the computerized health management information system is necessary. This will make it clear that the sharing of information does not mean a loss of

power. The personnel should be made more aware of the required aspects of the reporting to enhance service delivery. As a result the extensive recording and reporting requirements, quality and completeness of data, data recording requirements and formats, procedures and knowledge for making appropriate use of health data would be well monitored and distributed among various cadres as appropriate as opposed to the systems where most of these duties of reporting are left at some strata in management system.

5.5 Suggestions for Further Studies

The study has explored the influence of Computerised Health Management Information Systems on service delivery in heath institutions in Kenya with a specific reference to hospitals within Nairobi and established that disease tracking services, patient tracking services, administration of health services and reporting of health services are the main aspects of computerized health management information systems that influence service delivery within the heath institutions. The heath sector in Kenya however is comprised of various other heath institutions which differ in their way of management and have different settings all together. This warrants the need for another study which would ensure generalization of the study findings for all the heath institutions in Kenya and hence pave way for new policies. The study therefore recommends another study be done with an aim to investigate the influence of computerised Health Management Information Systems on service delivery in heath institutions in Kenya.

REFERENCES

Abou Zahr, C.; Boerma, T. (2005) Bulletin of the World Health Organization (WHO): the International Journal of Public Health, Vol. 2 (4).

Bhatt, A. (1987) Making Decentralisation Work for the Poor: An Indian Case of Community Initiative for Development and Social Justice, in: Local Initiatives for Decentralized Development in Asia and Pacific, Bhatt, A., Carino, L., Shams, K., Siedentopf, H. and The Electronic Journal on Information Systems in Developing Countries EJISDC (2008) 33, 1, 1-21. Sosmena, G. (Eds.) 2, 237-267, Kuala Lumpur: Asian and Pacific Development Centre.

Borg, W., & Gail, M. D. (1983). Educational research: An introduction. (5th ed.). New York: Longman.

Bossert, T. (1998) Analyzing the Decentralization of Health Systems in Developing Countries: Decision Space, Innovation and Performance, Social Science & Medicine, 47, 10, 1513-1527.

Campbell B. (1997). Health management information systems in lower income countries: an analysis of system design, implementation and utilization in Ghana and Nepal. Amsterdam: Royal Tropical Institute.

Chetley, A. (2006), Improving health, connecting people: the role of ICT in the health sectors of developing countries a framework paper. *InfoDev*, 31 May 2006.

Cooper, D.R and Schindler, P.S. (2003), *Business Research Methods* (8th edn), McGraw-Hill: New York

Dolton,Peter, and Gerry Makepeace. (2004) "Computer use and Earnings in Britain," Economic journal 114: 117-129.

East Africa Policy Forum (2006): Health Management Information Systems, Plans to improve health information in East Africa. DFID Health Resource Centre / Department for International Development (DFID) Health Resource Centre (HRC).

Gabriel, D. (1970), *Innovations: Scientific, Technological and Social*, Oxford: Oxford University Press.

Gladwin J, Dixon R, Wilson T. (2003). Implementing a new health management information system in Uganda. Health Policy and Planning 18: 214–24.

Haux, R., Winter, A., Ammenwerth, E., Brigl,B. (2004). Strategic Information Management in Hospitals: an introduction to hospital information systems. Springer

Mengiste, S. A. (2010). Analyzing the Challenges of IS implementation in public health institutions of a developing country: the need for flexible strategies [Electronic Version]. Journal of Health Informatics in Developing Countries, 4(1), 1-17, from http://www.jhidc.org/index.php/jhidc/issue/view/9.

Mugenda, O. M and Mugenda, A. G (2003). *Research Methods: Quantitative and Qualitative approaches.* Nairobi, Acts Press.

Ngechu. M. (2004), *Understanding the research process and methods.* An introduction to research methods. Acts Press, Nairobi.

Odhiambo-Otieno GW, Odero WWO. (2005), Evaluation criteria for the district health management information systems: lessons from the Ministry of Health, Kenya. African Health Sciences, 5(1):59-64.

Rogers,E.(1995) Diffusion of innovations, Free Press, New York.

Rondinelli, D. A. (1993) Development Project as Policy Experiments: An Adaptive Approach to Development Administration, London: Routledge.

Shenghverzy, N.J. (2003). Statistics for People in Statistics (2nd edn). Sage publication

Simba DO, (2004) Application of ICT in strengthening the Health Information system in the developing countries in the wake of globalization. African Health Sciences Dec; 4(3): 195-199. 2004.

Sohani, S.; Kamau, M.; Alidina, S. (2005) Best practices in community-based health initiatives: leading the information revolution in Kwale district. Aga Khan Health Services (AKHS)

Weisbrod, E. O (2007) Impact on the management and delivery of primary health care by a computer-based information system. Computer Methods Programs Biomed, 37(1):55-64.

Williamson, G.R., Prosser, S. (2006), "Action research: politics, ethics and participation", Journal of Advanced Nursing, Vol. 40 No.5, pp.587-93.

World Health Organisation (2006). Health information systems in support of the Millennium Development. Goals Report by the Secretariat, Sixtieth World Health Assembly A60/22.

World Health Organization, (2009) WHO Statistical Information System (WHOSIS) Bulletin of the World Health Organization. version ISSN 0042-9686. Bull World Health Organ vol.88 no.7

World Health Organization, Regional Office for the Western Pacific: (2004) Developing health management information systems: a practical guide for developing countries. W.H.O. Geneva, Switzerland.

World Health Organization (1996) Equity in health and health care: A W.H.O./S.I.D.A initiative. W.H.O. Geneva, Switzerland.

World Health Organization (2005) Improving the use of information for health care decision-making: what is needed? World Health Organization (WHO) Geneva, Switzerland.

APPENDICES

Appendix I: Letter of Transmittal

I am a Master of Arts student at the University of Nairobi and in my final year of study. As part of the requirement for the award of the degree of Master of Arts in Project Planning and Management, I'm undertaking a research project on **THE INFLUENCE OF COMPUTERIZED HEALTH MANAGEMENT INFORMATION SYSTEM ON SERVICE DELIVERY: A CASE OF HEALTH INSTITUTIONS WITHIN NAIROBI, KENYA.**

In this regard, I'm kindly requesting for your support in terms of time, and by responding to the attached questionnaire. Your accuracy and candid response will be critical in ensuring objective research.

It will not be necessary to write your name on this questionnaire and for your comfort, all information received will be treated in strict confidence. In addition, the findings of the study will surely be used for academic research purposes and to enhance knowledge in the field of conflict resolution.

Thank you for your valuable time on this.

Yours faithfully

Sophie Ongalo.

MA Student

University of Nairobi

Appendix II: Questionnaire

INFLUENCE OF COMPUTERIZED HEALTH MANAGEMENT INFORMATION SYSTEM ON SERVICE DELIVERY: A CASE OF HEALTH INSTITUTIONS WITHIN NAIROBI, KENYA

Kindly answer all the questions to the best of your ability. Indicate with a tick or filling in the space(s) provided.

PART A: GENERAL INFORMATION

1. What is your gender?

Male	[ ]	Female	[ ]

2. Your age bracket (Tick whichever appropriate)

18 – 24 Years	[ ]	25 - 30 Years	[ ]
31 - 34 years	[ ]	35 – 40 years	[ ]
41 – 44 years	[ ]	45 – 50 years	[ ]
Over 51 years	[ ]		

3. How long have you been working in the Hospital?

0-5 yrs	[ ]	5-10 yrs	[ ]
10-15	[ ]	Over 15 yrs	[ ]

4. What is your highest academic qualification?

Certificate	[ ]	Diploma	[ ]
Bachelor's degree	[ ]	Masters Degree	[ ]

Others (Specify.....) [ ]

PART B: INFLUENCE OF COMPUTERIZED HMIS ON SERVICE DELIVERY

5. To what extent has this hospital been using the computerized health management information system (HMIS)?

   To a very great extent [ ]
   To a great extent [ ]
   To a moderate extent [ ]
   To a little extent [ ]
   To a very little extent [ ]

6. To what extent has the use of computerized HMIS influenced the service delivery in this hospital?

   To a very great extent [ ]
   To a great extent [ ]
   To a moderate extent [ ]
   To a little extent [ ]
   To a very little extent [ ]

7. HMIS is primarily concerned with health care delivery issues. To what extent has this hospital been using computerized HMIS in the following areas of its service delivery? Use a scale of 1 to 5 where 1= no extent, 2= little extent, 3= moderate extent, 4= great extent and 5 is to a very great extent.

Uses of HMIS in Hospitals	**1**	**2**	**3**	**4**	**5**
Antenatal care					
Immunization					
Disease control programs					
Reporting					
Inventory management					
Financial management					
Vehicle and personnel management					

8. To what extent has the use of computerized HMIS lead to the following benefits? Use a scale of 1 to 5 where 1= no extent, 2= little extent, 3= moderate extent, 4= great extent and 5 is to a very great extent.

Benefits of Computerized HMIS	**1**	**2**	**3**	**4**	**5**
Computerized HMIS has enabled implementation of a good system for service delivery, planning, monitoring and supervision					
It empowers individuals and communities with timely and understandable health related information					
HMIS results in health workers valuing the data generated by them better					
Computerization of data storage and analysis has sped up data handling considerably					
HMIS supports program planning and decision making					
HMIS ensures improved the quality of and access to health care					

DISEASE TRACKING

9. How would you rate the influence of computerized HMIS on disease tracking in the health institutions in Kenya?

Very great influence [ ]

Great influence [ ]

Moderate influence [ ]

Little influence [ ]

No influence [ ]

10. To what extent does computerization of HMIS in the health systems consider these aspects of disease tracking in order to enhance service delivery? Use a scale of 1 to 5

where 1= no extent, 2= little extent, 3= moderate extent, 4= great extent and 5 is to a very great extent.

Aspects of disease tracking in computerized HMIS	**1**	**2**	**3**	**4**	**5**
Accurate diagnose of diseases					
Rigorous application of correct coding					
Adequate consumer safeguards and protections					
Confidentiality of medical records					

11. To what extent does Computerized HMIS influence disease tracking in the following ways? Use a scale of 1 to 5 where 1= no extent, 2= little extent, 3= moderate extent, 4= great extent and 5 is to a very great extent.

Influence of Computerized HMIS on Disease Tracking	**1**	**2**	**3**	**4**	**5**
Computerized HMIS helps in providing optimal patient care					
It enhances training of medical personnel to generate appropriate results					
Computerized HMIS helps to facilitate research and development activities in various fields of medicine					
Computerized HMIS helps decision makers to detect and control emerging and endemic health problems					
Computerized HMIS assists in monitoring progress towards health goals					
It strengthens the evidence base for effective health policies					

PATIENT TRACKING SERVICES

12. To what extent does computerized HMIS influence patient tracking within the health institutions in Kenya?

    Very high [ ]

    High [ ]

    Low [ ]

    Very low [ ]

    Not at all [ ]

13. How would you rate the effectiveness of HMIS in the achievement of these standards of service delivery with regard to patient tracking? Use a scale of 1 to 5 where 1= no extent, 2= little extent, 3= moderate extent, 4= great extent and 5 is to a very great extent.

Patient tracking and Service delivery standards	**1**	**2**	**3**	**4**	**5**
Pertinent information					
Usable documented patient information					
Quality of patient care					
Patient drug actions and effects-to diagnosis and therapy					
Hospital performance and costs					

14. To what extent do you agree with the following statements with regard to the influence of computerized HMIS on patient tracking in the health institutions in Kenya? Rate using a scale of 1 to 5 where 1= strongly disagree, 2= disagree, 3= neutral, 4= agree and 5 is strongly agree.

Statements on the influence of computerized HMIS on patient tracking	1	2	3	4	5
Use of telemedicine to improve diagnosis and enhance patient care					
Computerized HMIS is enhancing better sharing of research findings through e-health					
Accurate information can be used for patient monitoring ensuring that information about the patient can be retrieved easily hence improving patient follow up					
HMIS ensures sharing and dissemination of health information to different audiences for quality health information					
It ensure that health information is used rationally, effectively and efficiently to improve health action					

ADMINISTRATION

15. HMIS is primarily concerned to assist in the administrative, management and planning of health service delivery. To what extent do you agree with this statement with regard to influence of computerized HMIS on administration?

    Strongly agree [ ]
    Agree [ ]
    Neutral [ ]
    Disagree [ ]
    Strongly disagree [ ]

16. To what extent does computerization of HMIS influence the following outcomes of administration? Use a scale of 1 to 5 where 1= no extent, 2= little extent, 3= moderate extent, 4= great extent and 5 is to a very great extent.

Outcomes of computerization of HMIS on administration	1	2	3	4	5
HMIS improves governance					
It helps in mobilizing new resources					
HMIS is ensuring accountability in the way they are used					
Computerized HMIS improves reliability of the health data on clinic operations					
HMIS ensures eligibility checking and simple for the provider					

17. To the best of your knowledge, how else does HMIS ensure administration services in ensuring service delivery?

.....

.....

REPORTING

18. To what extent does computerized HMIS influence reporting services within the health institutions in Kenya?

To a very great extent [ ]

To a great extent [ ]

To a moderate extent [ ]

To a little extent [ ]

To no extent [ ]

19. Rate your agreement with the following statements about the reporting status in the health institutions in Kenya. Use a scale of 1 to 5 where 1= strongly disagree, 2= disagree, 3= neutral, 4= agree and 5 is strongly agree.

Reporting status in the health institutions	1	2	3	4	5
Extensive recording and reporting requirements are placed upon service providers and managers at all levels					
HMIS improves reporting of specific conditions					
Data recording requirements and formats at the client level are often inappropriate for reinforcing correct procedures and quality of care					
Procedures and knowledge for making appropriate use of health data by staff and managers of health services at all levels are inadequate					
Reports are not well prepared and feedback to the service levels is rare					
The perception that the quality and completeness of data is inadequate further inhibits the use of HMIS					

20. To what extent does computerization of HMIS influence the following aspects of reporting in the health institutions in Kenya? Use a scale of 1 to 5 where 1= no extent, 2= little extent, 3= moderate extent, 4= great extent and 5 is to a very great extent.

Aspects of reporting in the health institutions	1	2	3	4	5
Communication of basic data					
Reports and queries/replies between departments					
Accessibility of information resources					
Imperative audience-specific reporting systems					
Informed consumer choice					

21. How else does computerization of HMIS influence service delivery with the health institutions in Kenya?

.....

.....

THANK YOU!!

Appendix III: Letter of Authorization

REPUBLIC OF KENYA

NATIONAL COUNCIL FOR SCIENCE AND TECHNOLOGY

Telephone: 254-020-2213471, 2241349
254-020-310571, 2213123, 2219420
Fax: 254-020-318245, 318249
When replying please quote
secretary@ncst.go.ke

P.O. Box 30623-00100
NAIROBI-KENYA
Website: www.ncst.go.ke

Our Ref: **NCST/RCD/13/012/30**

Date: **31st May 2012**

Sophie Ongalo
University of Nairobi
P.O.Box 30197-00100
Nairobi.

RE: RESEARCH AUTHORIZATION

Following your application for authority to carry out research on ***"Influence of computerized health management information system on service delivery: A case of health institutions within Nairobi. Kenya,"*** I am pleased to inform you that you have been authorized to undertake research in **Nairobi Province** for a period ending **30th June, *2012.***

You are advised to report to **the Medical Officers in charge, Private/Public Institutions, Nairobi** before embarking on the research project.

On completion of the research, you are expected to submit **two hard copies and one soft copy in pdf** of the research report/thesis to our office.

DR. M. K. RUGUTT, PhD-HSC.
DEPUTY COUNCIL SECRETARY

Copy to:

The Medical Officers in charge
Private/Public Health Institutions
Nairobi.

"The National Council for Science and Technology is Committed to the Promotion of Science and Technology for National Development."

Appendix IV: Research Clearance Permit

1. You must report to the District Commissioner and the District Education Officer of the area before embarking on your research. Failure to do that may lead to the cancellation of your permit
2. Government Officers will not be interviewed with-out prior appointment.
3. No questionnaire will be used unless it has been approved.
4. Excavation, filming and collection of biological specimens are subject to further permission from the relevant Government Ministries.
5. You are required to submit at least two(2)/four(4) bound copies of your final report for Kenyans and non-Kenyans respectively.
6. The Government of Kenya reserves the right to modify the conditions of this permit including its cancellation without notice

GPK6055t3mt10/2011

REPUBLIC OF KENYA

RESEARCH CLEARANCE PERMIT

(CONDITIONS - see back page)

PAGE 2

THIS IS TO CERTIFY THAT:
Prof./Dr./Mr./Mrs./Miss/institution
Sophie Ongalo
of (Address) University of Nairobi
P.O.Box 30197-00100, Nairobi.
has been permitted to conduct research in

Location
District
Nairobi Province

on the topic: Influence of computerized health management information system on service delivery: A case of health institutions within Nairobi, Kenya.

for a period ending: 30th June, 2012.

PAGE 3

Research Permit No. NCST/RCD/13/012/30
Date of issue 31st May, 2012
Fee received KSH. 1,000

Applicant's Signature

Secretary
National Council for Science &Technology