

**INFLUENCE OF ADOPTION OF MANAGEMENT INFORMATION SYSTEM ON
PERFORMANCE OF HEALTH PROGRAMS: A CASE OF HEALTH FACILITIES
IN NAIROBI COUNTY**

BY

STEVE MURIMI NJAGI

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

2014

DECLARATION

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

Signed Date.....

Steve Murimi Njagi

Reg. No: L50/82143/2012

This project has been submitted for examination with my approval as the university,

Supervisor

Signed Date.....

Dr. John Mbugua

Lecturer

Department of extra mural

University of Nairobi

DEDICATION

This project is dedicated to my family for support and encouragement.

ACKNOWLEDGEMENT

First, I give glory to God for enabling me come this far. Secondly, I wish to express my sincere thanks to my supervisor, Dr. John Mbugua for his immense contribution and patience during the course of the research Project. Without his support and guidance, this research Project would not have been a reality. I also thank my classmates and colleagues at work for their support.

Last but not least, I wish to express my sincere appreciation to my parents for their encouragement and support during the research Project.

TABLE OF CONTENTS

DECLARATION.....	i
DEDICATION.....	ii
ACKNOWLEDGEMENT.....	iii
LIST OF TABLES.....	viii
LIST OF ABBREVIATIONS AND ACRONYMS.....	x
ABSTRACT.....	xi
CHAPTER ONE.....	1
INTRODUCTION.....	1
1.1 Background of the Study.....	1
1.1.1 Health Information Systems and Management Information Systems.....	2
1.1.2 Health Programs in Kenya.....	2
1.1.3 HMIS and Health Programs.....	4
1.2 Statement of the Problem.....	6
1.3 Purpose of the Study.....	7
1.4 Objectives of the Study.....	7
1.5 Research Questions.....	8
1.6 Significance of the Study.....	8
1.7 Delimitations of the Study.....	9
1.8 Limitations of the Study.....	9
1.9 Assumptions of the study.....	10
1.10 Definitions of Significant Terms Used in the Study.....	10
1.11 Organization of the Study.....	11
CHAPTER TWO.....	13
LITERATURE REVIEW.....	13

2.1 Introduction.....	13
2.2 Importance of Public Health Programs.....	13
2.2.1 Health Information Processing and Performance	15
2.2.2 Health Data Storage and Performance.....	17
2.2.3 Health information Accessibility and Performance.....	20
2.3 Theoretical Framework.....	22
2.4 Conceptual Framework.....	24
2.5 Research gap	26
CHAPTER THREE	30
RESEARCH METHODOLOGY	30
3.1 Introduction.....	30
3.2 Research Design.....	30
3.3 Target Population.....	30
3.4 Sample Size and Sampling Technique.....	30
3.5 Research Instrumentation.....	31
3.5.1 Pilot study	31
3.5.2 Validity of Instruments	32
3.5.3 Reliability of Instruments	32
3.6 Data Collection Procedure	33
3.7 Data Analysis Procedure.....	34
3.8 Operational Definition of Variables.....	35
3.9 Ethical Considerations	35
CHAPTER FOUR:	36
DATA ANALYSIS, PRESENTATION AND INTERPRETATION	36
4.1 Introduction.....	36

4.2 Demographic Information.....	36
4.2.1 Respondents' by Job Title.....	36
4.2.2 Respondents by Gender	37
4.2.3 Respondents' distribution by Age.....	38
4.2.4 Respondents' by Hospital Employment Experience in Years	38
4.2.5 Respondents' by Job Category.....	39
4.3 Health Information Processing	40
4.3.1 Collection of all Necessary Data.....	40
4.3.2 Problems Encountered in Data Collection.....	41
4.3.3 Information Process in Respondents Organization.....	41
4.3.4 Respondents Experience in Usage of the Computers	43
4.3.5 Respondents Computers Protected and Maintained	44
4.3.6 Respondents Opinion on Health Information Processing in their Organizations	45
4.3.7 State of Data at the Units	46
4.4 Influence of Data Storage on Performance of Health Programs in Kenya.	47
4.4.1 How Data is Stored in the Respondents Organization.....	47
4.4.2 Existence of a Resource Centre the Respondents Health Unit	47
4.4.3 Qualifications of the In-Charge of the Resource Centre.....	48
4.4.4 Information Sharing with the Resource Centre	48
4.4.5 Daily Attendance of Patients According to the Respondents Records	49
4.4.6 Services offered at the Respondents' Unit.....	50
4.4.7 Storage of Information on Records of the Services.....	51
4.4.8 Sources of the Information Collected	52
4.4.9 Respondents opinion on the dissemination of health-related information in storage on the performance of health programs in Kenya.....	52

4.5 Health Information Accessibility	54
4.5.1 Users of the Resource Centre.....	54
4.5.2 Willingness to Share Data.....	55
4.5.3 Utilizers of Health Information.....	55
4.5.4 Storage of Datasheets.....	57
4.6 Influence of MIS on the Performance of Health Programs in Kenya.....	58
4.6.1 Respondents Opinion on Health Information Processing in their Organizations	58
4.7 Inferential Statistics	59
4.8 Variable analysis.....	62
4.9 Discussion of findings.....	64
CHAPTER FIVE	65
SUMMARY OF FINDING, CONCLUSION AND RECOMMENDATIONS.....	66
5.1 Introduction of Findings	66
5.2 Summary of findings.....	66
5.3 Conclusion	73
5.4 Recommendations.....	77
5.5 Areas for further research	79
REFERENCES.....	81
APPENDIX I: LETTER OF TRANSMITTAL	86
APPENDIX II: QUESTIONNAIRE	87

LIST OF TABLES

Table 4.1: Summary of Reliability Results (Cronbach's Alpha).....	33
Table 4.2: Respondents' Job Title	37
Table 4.3: Respondents Gender	37
Table 4.4: Respondents' distribution by Age	38
Table 4.5: Respondents' Hospital Employment Experience in Years	39
Table 4.6: Respondents' Job Category	39
Table 4.7: Collection of all Necessary Data	40
Table 4.8: Information Process in Respondents Organization.....	41
Table 4.9: Capacity of Computers	42
Table 4.10: Software and versions available of the respondents organizations' computers	43
Table 4.11: Respondents Experience in Usage of the Computers	43
Table 4.12: Respondents Computers Protected and Maintained	44
Table 4.13: Respondents Opinion on Health Information Processing in their Organizations.....	45
Table 4.14: State of Data at the Units	46
Table 4.15: Existence of a Resource Centre/Library at the Respondents Health Unit	47
Table 4.16: Information Sharing with the Resource Centre	48
Table 4.17: Regularity of Information Sharing with the Resource Centre	49
Table 4.18: Daily Attendance of Patients According to the Respondents Records	49
Table 4.19: Services offered at the Respondents' Unit.....	50
Table 4.20: Storage of Information on Records of the Services.....	51

Table 4.21: Respondents opinion on the dissemination of health-related information in storage on the performance of health programs in Kenya.....	53
Table 4.22: Willingness to Share Data	55
Table 4.23: Utilizers of Health Information	55
Table 4.24: Information sharing with various stakeholders.....	56
Table 4.25: Information feedback from various stakeholders	57
Table 4.26: Storage of Datasheets	57
Table 4.27: Respondents Opinion on Health Information Processing in their Organizations.....	58
Table 4.28: Model Summary	60
Table 4.29 ANOVA of the Regression	61
Table 4.30: Coefficients table	61

LIST OF ABBREVIATIONS AND ACRONYMS

AIDS	Acquired Immune Deficiency Syndrome
FBO	Faith-based Organization
GOK	Government of Kenya
HIS	Hospital Information Systems
HIT	Health Information Technology
HIV	Human Immune Deficiency Virus
HMIS	Health Management Information Systems
HSRS	Health Sector Reform Secretariat
IEC	Information, education and communication
IMCI	Integrated Management of Childhood Illnesses
MIS	Management Information Systems
MOH	Ministry of Health
NASCOP	National AIDS and STI Control Programme
NGO	Non-Governmental Organization
USAID	United States Agency for International Development
WHO	World Health Organization

ABSTRACT

Management Information System is one of the important functions of management which plays an important role in providing information that is required for crucial decision making which directly affects the performance of the organization. Modern public health practice requires good and reliable management information system. A Health Information System (HIS) is a functional entity within the framework of a comprehensive health system to improve the health of individuals and the population. As such, it is a management information system. The lack of reliable health information is one of the major obstacles to the effective planning of health services in Kenya. 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 fulfill all these needs. The purpose of this study was to assess the influence of management information system on the performance of health programs in Kenya. To examine the influence of the nature of health information on the performance of health programs in Kenya. Specifically, the study analyzed how health information; processing affects the performance of health programs in Kenya, data storage and management influence performance of health programs in Kenya and accessibility on the performance of health programs in Kenya. The design was a descriptive survey because it allows the collection of large amount of data from a sizable population in a highly economical way. The target population was the the staffs accredited private and public hospitals in Nairobi in Kenya. Thus, the sample size for this study was selected using convenience sampling technique. Convenience sampling (sometimes known as grab or opportunity sampling) is a type of non-probability sampling which involves the sample being drawn from that part of the population which is close to hand. The method was used to select a sample of 40 hospitals. This is 44% of the total population. The study will be of benefit to the practitioners and academicians both in the private and in public sector by contributing to the existing body of knowledge in the area of management information systems in general. The study will also benefit the government and other actors by reviewing the reports based on health programmes reforms through effective management information systems practices as a new concept for efficient and effective health care delivery. The study established that health information processing contribute most to the performance of health programs in Kenya followed by health information accessibility and finally health data storage. The study concluded that health information processing had a positive and significant influence on performance of health programs in Kenya. The study concluded that health data storage influence performance of health programs in Kenya. The study concluded that health information accessibility influence performance of health programs in Kenya. The study recommended that Success of the HMIS depends upon the input of each individual health worker at each level. Integrating all existing health programmes and the general administration of the health unit will ensure that common information (and the work involved in the collection and processing) is not duplicated and is in fact shared without wasting limited resources. All information should be collected for the explicit purpose of decision-making at the health unit level, i.e., the system will provide functional information at the level of collection.

CHAPTER ONE

INTRODUCTION

1.1 Background of the Study

An information system (IS) is a group of components which can increase competitiveness and gain better information for decision making. Therefore various institutions have chosen to apply this group of components to their associations (Spalding, 1998). Consequently, the institutions decide to implement IS in order to improve the effectiveness and efficiency of the organizations. Information systems have become a major function area of business administration. According to Ein-Dor and Segev (1978), an IS becomes a management information system (MIS) when it is applied to improve management by directors of the organization. This system can increase the performance of the management. MIS is a collection of manpowers, tools, procedures and software to perform various business tasks at various levels in the organization. This system has three basic levels: operational, middle management and top management where the information is passed from bottom to top (Tripathi, 2011). Moreover, MIS is one of the important functions of management which plays an important role in providing information that is required for crucial decision making which directly affects the performance of the organization (Murthy, 2006).

Modern public health practice requires good and reliable management information system. The functions of the system include rapid reporting of notifiable diseases, dissemination of information, outbreak investigation, provision of information on magnitude of health events, monitoring risk factors and disease trends (Ministry of Health, 2000). Managing effectively requires relevant and reliable information on which to base management decisions, and the

Health Management Information System (HMIS) can do this effectively for the manager in a health system (Bukonya et al, 1997). HMIS is one of the most important tools needed for the prevention and control of diseases because it gives information critical for planning, monitoring and evaluation of services. Today the success of any organization is dependent on the effective use of information. As organizational resources, such as people and time, become more expensive to maintain, and the cost for services and production continues to increase, information can be used to co-ordinate and control these and other important technologies, which affect all sectors of society. For example, governments capability to collect, generate, distil and distribute information to consumers has greatly improved (Cortez &Kazlauskas, 1997).

1.1.1 Health Information Systems and Management Information Systems

A Health Information System (HIS) is a functional entity within the framework of a comprehensive health system to improve the health of individuals and the population. As such, it is a management information system. Although many definitions of a management information system have been proposed, this study proposes the one given by Hurtubise (1984): “a system that provides specific information support to the decision making process at each level of an organization” (Hurtubise 1984 cited Lippeveld, 2001). The HIS structure should allow generation of necessary information for use indecision-making at each level of the health programs with a given amount of resources. This involves the processes for collecting, processing and disseminating information in a health system (Shrestha and Bodart, 2000).

1.1.2 Health Programs in Kenya

Traditionally data has always been collected in different formats by government and private sector. Data is collected on different data sheets and it is a regulation for all Government Health Units to send back returns to the District Health Office en route to the MOH for planning

purposes. In 1994, the Government of Kenya (GOK) approved the Kenya Health Policy Framework (KHPF) as a blueprint for developing and managing health services. It spells out the long-term strategic imperatives and the agenda for Kenya's health programs. To operationalize the document, the Ministry of Health (MOH) developed the Kenya Health Policy Framework Implementation Action Plan and established the Health Sector Reform Secretariat (HSRS) in 1996 under a Ministerial Reform Committee (MRC) in 1997 to spearhead and oversee the implementation process. A rationalization programme within the MOH was also initiated to include all health facilities, and sensitizing the in-charges to utilize the data so collected in improvement of services management at the units. The above policy initiatives aimed at responding to the following constraints: decline in health sector expenditure, inefficient utilisation of resources, centralized decision making, inequitable management information systems, outdated health laws, inadequate management skills at the district level, worsening poverty levels, increasing burden of disease, and rapid population growth.

The MOH is focusing on a number of health priorities in Kenya, and specific health programmes have been developed to address these priorities (MOH, 2007).

1.1.2.1 Reproductive Health

The Ministry of Health has sanctioned the existence and free unfettered operation of the Reproductive Health Division. The components of the reproductive health programmes are as follows (MOH, 1996): Safe motherhood, including antenatal, safe delivery, and postnatal care, especially breastfeeding, infant health and women's health; Family planning; Prevention and treatment of unsafe abortions and post-abortion care; Prevention and treatment of reproductive tract infections, including sexually transmitted diseases and HIV/AIDS; Prevention and treatment of infertility; Management of cancer, including prevention and management of cervical

cancers; Discouragement of harmful traditional practices that affect the reproductive health of men and women, such as female genital mutilation; Information and counselling on human sexuality, responsible sexual behaviour, responsible parenthood, preconception care, and sexual health; Gender and reproductive rights. The reproductive health care system, which was designed for adults, is currently being modified to meet the needs of adolescents as well.

1.1.2.2 Child Health

The Child Health Division constitutes all child health activities aimed at promoting and maintaining the optimal growth and development of children age 0-18 years. Its specific responsibilities are (MOH, 1996): To ensure survival, growth and development of children age 0-5 years; To promote health in all children, pre-school and school-age, including adolescents (up to 18years), both in and out of school; To promote good nutrition to children, expectant and nursing mothers, the sick, and the general population, including elimination of micronutrient deficiencies; Promotion of child's rights and child protection.

1.1.3 HMIS and Health Programs

The private sector and FBOs/NGOs play a large role in delivering health care in Kenya, but this role is decreasing with the investment of government funds in the construction of health facilities. The ministry's HMIS report from 2006 stated that 59% of health care delivery was by the private sector, NGOs, and FBOs. By the end of 2007 the numbers reversed: the government managed 58%. Hospitals, which make up just 7% of all health facilities, employ the majority of health workers and care for the majority of patients. Other health facilities include "health centers, dispensaries and specialized clinics for physicians, dentists, and other health practitioners." More investment is needed in health infrastructure to address the urban-rural divide and regional variability as well as the shortage of health workers. In 2000, there was only

one doctor for 10,150 people and in 2007 the situation worsened, with the ratio declining to one doctor per 16,000 people (MOH, 1996).

The goal of HMIS stated in the Annual Health Sector Status Report for 2005-2007 is “to generate and use health information for policy formulation, management, planning, budgeting, implementation, monitoring and evaluation of health services and programme interventions in the health sector.” Health management information systems are according to the literature systems used to collect, analyze, retain, retrieve and evaluate health information (Hauxet al. (2004); Tan (2002). The WHO (2005) article on “Issues in health information” adds to this definition by stating that a health management information system incorporates all the data needed by policy makers, clinicians and health service users to improve and protect population health. A health information system usually describes one of these several separate subsystems containing data (WHO, 2005): Disease surveillance and outbreak notification, Data generated through household surveys, Registration of vital events and censuses (births, deaths and causes of death), Data collection based on patient and service records and reporting from community health workers, health workers and health facilities, Programme-specific monitoring and evaluation (for example for TB, HIV/AIDS, and EPI), Administration and resource management (including budget, personnel, and supplies).

The 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 programme development and implementation, and is a requirement for strategic decision making, providing the basis upon which improved health outcomes depend. However, Kenya’s

HMIS is not delivering on this goal. The information systems at the central (ministry) level are stand-alone and therefore focused on a specific vertical function. The provincial and district level systems, which provide data to centrally managed health service units and hospitals at their respective levels, are also fragmented (MOH, 1996).

1.2 Statement of the Problem

Health information system aims 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 lack of reliable health information is one of the major obstacles to the effective planning of health services in Kenya. HMIS is aimed at being utilized at the Health Units where data is collected, in monitoring and evaluation of their activities before being channeled to the District Health Office for compilation, and use. This is still lacking. Returns brought to the District Health Office indicate that only Government Health Unit's report regularly, and a few NGOs and Private Health Units normally see a good percentage of patients. Even then quality of the reports is not ascertained. No reports have ever been got from the drug shops despite the big numbers in the communities who consult drug shops when they are sick. The introduction of information systems in healthcare knows of failures and successes.

Most studies have looked at MIS implementation (electronic health records) rather than influence (Bates, 2005; Fraser et al., 2005; Jha et al., 2006; Bates, 2005; Chaudhry et al., 2006; Hillestad et al., 2005; Miller et al., 2005). Locally, at least in Kenya to date, little empirical work appears in the relevant literature that examines influence of management information system on the performance of health programs. A study by Ongalo (2012) found 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. But this study was on the influence of computerized health management information system on service delivery by health institutions within Nairobi, Kenya. This research aims to fill this gap by focusing on the influence of management information system on the performance of health programs in Kenya with a focus on WHO. The objective of WHO is ambitious, stated as "the attainment by all peoples of the highest possible level of health," with health being very broadly defined as "a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity." WHO works to reach this lofty goal by directing and coordinating international health work.

1.3 Purpose of the Study

The purpose of this study was to investigate the influence of management information system on the performance of health programs in Kenya.

1.4 Objectives of the Study

The study was guided by the following objectives:

- i. To examine the influence of health information processing on the performance of health programs in Kenya.
- ii. To examine the influence of health data storage on the performance of health programs in Kenya.

- iii. To examine the influence of health information accessibility on the performance of health programs in Kenya.

1.5 Research Questions

The study will seek to answer the following questions:

- i. How does health information processing influence the performance of health programs in Kenya?
- ii. How does health data storage influence the performance of health programs in Kenya?
- iii. How does health information accessibility influence the performance of health programs in Kenya?

1.6 Significance of the Study

The health sector can be considered as an important and relevant sector within which countries or societies can learn about information systems, where experiences relevant to local settings can be made. The health sector is important and relevant in this respect because it extends to the most peripheral areas of the society and effective use of information is crucial to primary health care delivery and health management. One central characteristic of developing countries is the health problems experienced by the majority of the population. There is generally low level of use and management of local information within the HMIS in developing countries, and very little research and development is aimed at the health sector in the world's poorer countries.

The study hopefully will be of benefit to the practitioners and academicians both in the private and in public sector by contributing to the existing body of knowledge in the area of management information systems in general. Academicians may use findings for further research, while practitioners may apply lessons in planning and implementing future changes.

The government and other actors may also benefit from the study by reviewing the reports based on health programmes reforms through effective management information systems practices as a new concept for efficient and effective health care delivery. Finally the management of health institutions will benefit from the study by understanding the influence of management information system on the performance of health programs in Kenya and thereby be able to discern good management practices which can enable the institutions survive in turmoil business environment of competitiveness.

1.7 Delimitations of the Study

Delimitation is the process of reducing the study population and area to a manageable size. This research will be delimited in terms of the scope that it covered. Participation of this study will be delimited to public and private hospitals within Nairobi County.

1.8 Limitations of the Study

Limitations of this study were related to external validity and length of study. Caution in interpretation is advised because personality measures are susceptible to measurement error. Due to the self-report nature of data, responses on the survey may not accurately convey their real involvement in the management information system activities. This study may not be generalized to other organizations which might have different management information systems. Some of the respondent may not return the questionnaires therefore, resulting to lesser the targeted sample. Lack of proper understanding of the questions is one of the factors that may limit the findings of the study.

1.9 Assumptions of the study

There are several assumptions in this study. First, the hospitals using MIS are assumed to be representative of the population. Secondly, the data collection instruments have validity and reliability and measured the desired constructs. Finally it is assumed that different management information system methods are representative of information systems as a technology.

1.10 Definitions of Significant Terms Used in the Study

Health A state of complete physical, mental and social well-being and not merely the absence of *disease* or infirmity.

Health Management

Information System Any organized effort to systematically collect, maintain and disseminate data relevant to the performance of a health system or any of its component parts. As such, any health system has potentially many health applications functioning within it.

Health system The complete universe of all activities that serve to maintain or improve the health and longevity of a population in a specific place.

Health System The mechanism to deliver quality health care services to all people, when and where they need them.

Management Information

Systems Management information systems are typically computer systems used for managing.

Non-State Actors Individuals, or institutions whose primary purpose are in provision of Health Services, but are not a part of the State. They include service providers (for profit and not for profit), Health Civil Society organizations, NGO's and their related management systems.

Public Health Services The health care services concerned with the science and art of preventing disease, prolonging life and promoting health through organized efforts and informed choices of society, organizations, public and private, communities and individuals and are concerned with threats to the overall health of a community.

1.11 Organization of the Study

In chapter one the following is covered: Background of the study, statement of the problem, purpose of the study, objectives, research questions, justification, significance, basic assumptions, limitations, delimitation and definition of significant terms used in the study.

Chapter two presents literature review on influence of management information system on the performance of health programs in Kenya; it summarizes the background and context for the research problem. Works and results from other researchers who have carried out their research in the same field of study are presented here as well as a conceptual framework.

Chapter three presents the methodology employed in the study. It presents the research design, area of study, population, sample and sampling technique, instrumentation, reliability and validity, data collection procedure, and data analysis procedure.

Chapter four presents analysis and findings of the study as set out in the research methodology. It presents the data that was found on the influence of management information system on the performance of health programs in Kenya and gives an interpretation of the findings as well as relating the study findings to previous research.

Chapter five presents summary, conclusion and recommendations on the influence of management information system on the performance of health programs in Kenya. Areas of further study are also identified and recommended in this chapter.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

Literature review chapter summarizes the background and context for the research problem. Works and results from other researchers who have carried out their research in the same field of study are presented here. The specific areas covered in this chapter are; the theoretical framework; Importance of Public Health Programs with a focus on nature of health information, health information processing, health data storage and management, health information accessibility and How the Public Interest is Protected; conceptual framework and the research gap the study seeks to fill.

2.2 Importance of Public Health Programs

Globally, the public health community is faced with difficult new challenges including bioterrorism, emerging infections, and antibiotic resistant organisms. This is in addition to historical challenges such as infectious diseases, mortality, malnutrition, and lack of sanitation (WHO, 2001; World Bank, 2003). Therefore, there is an urgency to expand and use information and communication technologies (ICTs) in public health and create truly effective and efficient public health information systems (Yasnoff et al., 2001). According to the authors, these integrated systems have the potential to collect, organize and disseminate health-related information in real-time from a number of sources with respect to the current health status of communities. Singer and de Castro (2007) emphasize, among other things, the need to build “integrated human and animal disease surveillance infrastructure and technical capacity in tropical countries on the reporting and scientific evidence requirements of the sanitary and phytosanitary agreement under the World Trade Organization.” The improvements in health

would translate into higher incomes, higher economic growth and reduced population growth (WHO, 2001).

According to WHO (2001), there are three primary ways that disease impedes economic well-being and development. The first way is preventable disease reduces the number of years of healthy life expectancy. The economic losses to society of shortened lives – due to the combination of early deaths and chronic disability are substantial. The second way is the effect of disease on parental investment in children. Societies with high rates of infant mortality (<1 year of age) and child mortality (< 5 years of age) have higher rates of fertility in part to compensate for the frequent deaths of children. Large numbers of children in turn reduce the ability of poor families to invest heavily in the health and education of each child. The third way is the depressing effects of disease on the returns to business and infrastructure investment, beyond the effects on individual worker productivity. Whole industries in agriculture, mining, manufacturing and tourism, as well as important infrastructure projects are undermined by a high prevalence of disease. In addition, epidemic and endemic diseases can also undermine social cooperation and even political and macroeconomic stability. The essential interventions needed to eliminate much of the avoidable mortality of the low income countries are not expensive, but they are not free either (National Research Council, 1999; WHO, 2001).

Since good health increases the economic productivity of individuals and the economic growth rate of countries, investing in health programs is one means of accelerating development (National Research Council, 1999; WHO, 2001; World Bank, 1993). More importantly, good health is a goal in itself. However, while life expectancy has increased and child mortality has decreased over the past decades, new challenges have emerged. The fatalities from childhood and tropical diseases including AIDS as well diseases of ageing populations are quite high.

Furthermore, countries, particularly, developing ones are faced with budget deficits and limited health expenditures (National Research Council, 1999; WHO, 2001; World Bank, 1993). Public health programs, therefore, attack directly the health problems of entire populations or population sub-groups (Koo et al, 2008). Their objective is to prevent disease or injury and to provide information on self-cure and on the importance of seeking cure.

2.2.1 Health Information Processing and Performance

In the development of HMIS the following steps are recommended: define and/or develop objectives of the district health system: develop indicators; determine assessment frequency; identify sources of data; design data collection tools; design reporting and self-assessment tools; and institutionalize utilisation, self-assessment and feedback.

The Health Management Information System includes the following steps: collection of the data; calculation and reporting of the indicators; and determination and evaluation of the problems; and reactions to the problems (Werner, 1991). Linda (1991) further summarized the indicators to be tested in the HMIS user six categories: general administrative indicators; essential drugs programme; child health programme; family planning programmes; immunization programmes; and maternal health.

Information and communication technologies as “electronic means of capturing, processing, storing, and communicating information” (Heeks 1999). These comprises computer hardware, software and networks, radio, television, telephone, books and newspapers. Given their role in the current transformation of advanced economies, information and communication technologies (ICTs) have the potential to affect health conditions in developing countries both directly and indirectly. ICTs can work directly by improving health care provision and disease prevention.

They also work indirectly on the health status of the population through their effects on the broader determinants of health, such as growth, the economic position of households, and the social infrastructure (Chandrasekhar and Gosh 2001).

Health Information Systems development depends on the level of the general ICT infrastructure in a particular setting. The expectations that ICTs generate for health improvement in developing countries as described by Chandrasekhar and Ghosh (2001), stem from three sources. The first is their role as an instrument for continuing education and lifelong learning that will enable doctors in developing countries to be informed about and trained in the use of advances in knowledge. The second is their use as a delivery mechanism to poor and remote locations of a wide variety of services varying from improved public health education to emergency advice, including advice on dealing with and mitigating the consequences of natural disasters. The third source is their potential use as a mechanism to increase the transparency and efficiency of governance which would, in turn, improve the available and delivery of publicly provided health services (Chandrasekhar and Ghosh 2001).

Computer technology is a crucial question for ICT development in developing countries, and it is an important area for further research. However, to achieve positive results in the use of computer equipment, the health sector has to invest in pre-service and in-service computer training for all health workers. Also the maintenance of the computer; both hardware and software, should be decentralized to the peripheral levels to avoid delays, especially when the maintenance function requires going to the central level. As Lippeveld (2001) puts it, introducing computer technology is not necessarily the silver bullet that creates effectiveness and efficiency in health services. On the contrary, lack of appropriately trained staff and hardware and software

problems sometimes result in the decay and obsolescence of expensive computer equipment, without any gains in decision making (Lippeveld 2001, page 24).

2.2.2 Health Data Storage and Performance

Most computing serves as a resource or tool to support other work: performing complex analysis, preparing documents and sending electronic messages using office automation equipments. To improve the character, quality, and easy use of computing work, we must understand how automated systems actually are integrated into the work they support; how people adapt to computing as a resource, how they deal with the unreliability in hardware, software and operations, which are present in almost every computing environment, even where computing is widely used and considered highly successful (Gasser 1986).

In this study of routine computer use in several organizations, Gasser (1986) argued that, the routine user of computing often faces several low-level problems whereby the nature and severity of such problems vary with the nature of opportunities and contingencies faced in work. That is, the nature of recurrent computing problems that users face depends on how easily they can fit computing (the activity of making changes to computing or changing the structure of work to accommodate for computing misfit, for example, adjusting work schedules and commitments), augment computing (undertaking additional work to make up for misfit, for example, conducting training), or work around computing (intentionally using computing in ways in which it was not designed or avoiding its use and relying on an alternative means of accomplishing work, for example, the use of backup systems, manual or computerized), given the contingencies they face, the resources they control, and the place of their work in the production lattice of computing. Gasser defines the production lattice as “a complex, coordinated structure of intersecting task chains” (Gasser 1986, page 28), whereby, work in organizations can

be seen as a complex structure of organized commitments, which serves to coordinate tasks performed by many people.

The routine information generating process within HIS in developing countries involves interrelating components. Many resources and activities of health workers are taken for granted in this process. Each health worker has a variety of roles to play, each role involving a different line of work. Each of these roles may demand the health worker's attention and activity in the course of the work. Coordination of activities requires commitment from individual health workers. And health workers need to work across and around gaps in existing health systems.

Each level has a database book in which summary compilations are recorded. The Health Unit Level is pre-dominantly paper based. However, as progression is made upwards, computerization increases. Research findings indicate weakness in timeliness, completeness of HMIS, rapid analysis of data for epidemic response, and analysis of data for planning and evaluation (MOH, 2000). Routinely collected data are often used to provide a rough indication of the frequency of occurrence of health events of diseases. MOH (2000) emphasizes that the methods used in the system (collection, analysis, dissemination, use and storage) and the tools designed to facilitate management information system must: be simple and short for easy understanding, which should contain few variables; be manageable through self-sustaining structures within the community; have the mechanisms to disseminate and utilize the collected information; generate information that is useful and leads to action; allow for collection of different kinds of information of different periodicity; be responsive to factors and demands from within the community and also outside; be able to make self-assessment and measure the impact of community action; have a provision for follow up from collection to utilisation; and be sensitive to characteristics peculiar to particular communities e.g. culture and language.

Pabire et al 1999 revealed a potential Community Based Management Information System that exists through burial groups. These groups keep simple records on death. Research findings confirm that information on causes of death is extremely important for policymaking, planning, monitoring and evaluation of health programmes as well as necessary for field research, comparisons and epidemic awareness. In developing countries where most deaths are neither attended by doctors nor medically certified, this crucial information is usually incomplete or of poor quality. There is, therefore, a need to search for alternative methods and sources of information about death. Because these records have information, which dates back many years, they can be important in tracking down mortality trends. Moreover, if well kept, the death records help not only be useful in checking for the incidence of disease but also calculation of variables specific mortality rates in the communities. There was therefore need to standardise the writing for these records to help in further planning of viable community management information systems.

Research elsewhere indicates that vital registration records have been disappointing in both qualitative and quantitative terms. This has mainly been attributed to low priority given to the initiation and improvement of civil and vital registration systems because of the consideration resources (both human and financial) required without any visible economic returns (Makannah, 1981). Available literature attributes failure of the Vital Registration System mainly on lack of co-ordination amongst the ministries concerned, follow up and feed-back actions, control, guidance and supervision, training of personnel, publicity and incentives, transport, stationery, all of which were attributed to lack of adequate funding.

There was also little effort put in to discuss with and educate the public about the uses and benefits of the registration of vital events. To Makannah (1981), the campaign to educate the

public with regard to civil registration functions, practices and benefits involves enlisting the support and co-operation of: doctors, teachers, nurses, and religious and opinion leaders. All these were either lacking or poorly mobilized to sustain the system. It was concluded that there was lack of a credible Vital Registration System, which could be used for monitoring of some health and demographic indicators in the communities.

Three outstanding recommendations were made out of this study: because of their organisational abilities, burial organizations form a good entry point for health education, social development and other activities that need to be spread to the community. They need to be exploited by health and development workers in the communities. Secondly, community burial members should be encouraged to share information and net working amongst themselves and other institutions (government and non-government) in the field of health, as this would encourage acquisition of ideas and solutions to several problems through a concerted effort. And finally the Districts, Sub-county level Authorities, Health Workers and the Community should be sensitized about the existing and usefulness of data from burial groups. With information seen to be from the people by the people and about themselves, the groups and their records could as well form the basis for a “community based information system (Pabire, et al. 1999).

2.2.3 Health information Accessibility and Performance

Health management information systems in most countries are centrally planned and managed. Indicators, data collection instruments, and reporting forms usually have been designed by centrally located epidemiologists, statisticians, and administrators (called data people), with minimal involvement of lower-level line managers and providers of the health services (called action people) (Lippeveld 2001).

Recent experiences have shown that decentralization of information management toward the district level is an effective strategy to improve local use of health information in developing countries. However, there are some questions about the actual extent of decentralization. “By some indications, the extent of decentralization is quite modest, restricted to only a few administrative functions” (Hutchinson, 2002). In a survey of District Health Management Teams (DHMTs) in Tanzania on the progress of the decentralization process in that country, it was reported that, ...while decentralization has been ongoing for over a decade, at least rhetorically, less than half of DHMTs report that decentralization is underway in their districts and the actual transfer of administrative and fiscal responsibilities is still limited for the majority of districts (Hutchinson 2002).

It is expected that, in decentralized health information system most public health functions can be carried out by the DHMT, in collaboration with and with active involvement of the community. Thus, delegation of information systems management responsibilities to the district level becomes a major step towards integrating individual and community health information systems (Lippeveld 2001). The importance and needs for appropriate decentralized district-based health information systems addressing the needs of local management and health workers has been widely acknowledged and emphasized by the World Health Organization (WHO). According to the WHO definition, a district health system based on primary health care is a more or less self-contained segment of the national health system. It comprises first and foremost a well-defined population living within a clearly delineated administrative and geographical area. It includes all the relevant health care activities in the area, whether governmental or otherwise. It therefore consists of a large variety of interrelated elements that contribute to health in homes, schools, workplaces, communities, the health sector and related social and economic sectors. It

includes self-care and all health care personnel and facilities, up to and including the hospital at the first referral level (Tamiro 1991 cited Lippeveld 2001).

However, substantially less agreement has been reached on exactly how to develop such systems. “The scientific literature on how to develop appropriate health information systems in support of basic health services is relative scanty, despite the general consensus that these systems should be restructured” (Lippeveld et al. 2000).

2.3 Theoretical Framework

The study will be guided by activity theory (Lev and Sergei, 1978). Activity Theory provides a method of understanding and analyzing a phenomenon, finding patterns and making inferences across interactions, describing phenomena and presenting phenomena through a built-in language and rhetoric. A particular activity is a goal-directed or purposeful interaction of a subject with an object through the use of tools. These tools are exteriorized forms of mental processes manifested in constructs, whether physical or psychological. Activity Theory recognizes the internalization and externalization of cognitive processes involved in the use of tools, as well as the transformation or development that results from the interaction.

2.3.1 Activity theory and its applications

From the activity theoretical perspective, the activity of any subject is a purposeful interaction of the subject with the world. It is a process in which mutual transformations between the subject and the object are achieved. The subject and the object of an activity transform each other. In activity theory, this central process is called internalization. Through the analysis of activities, it is possible to understand both the subject and the object of the activity (Kaptelinin and Nardi 2006; Kuutti 1995).

The model is systemic and all the elements are related to each other. According to Kuutti (1995) it contains mutual relationships between subject, object and community. There are always various artefacts included in the activities. Tools and signs, Rules and Division of labour involve artefacts which have a mediating role. The relationship between subject and object is mediated by tools (like instruments or programs) and signs (e.g., language), the relationship between subject and community is mediated by rules (for example laws) and the relationship between object and community is mediated by the division of labour. The mediating terms are also historically formed and open to change.

In the activity system the object is transformed into outcomes through a hierarchical process of activity. The hierarchy was developed by Leont'ev (1978) and it distinguishes between activity, actions and operations and relates these terms to motives, goals and the conditions under which the activity is performed.

Activity, a collective phenomenon with a shared object and motive, can be divided to actions according to the division of work. Actions are conducted by individuals or a collective using a physical, or intellectual or abstract tool. For example, an abstract tool can be knowledge or skills (Mursu et al. 2007). Activity systems are networked and interact with other activity systems. Even though individual or group actions are goal-directed and might be independent, they are understandable only against the background of the whole activity system. According to activity theory the prime unit of analysis should be the activity system (Engeström 2001).

Contradictions have a central role in the development and change of activities. Contradictions mean historically accumulated structural tensions within and between activity systems. These tensions might be caused by adopting a new element such as a technology from outside the

system. Contradictions might not produce disturbances and conflicts exclusively, but may also produce innovative solutions to change the activities. When the object and motive are reconceptualized to involve a radically wider horizon of possibilities than in the previous mode of the activity, an expansive transformation happens (Engeström 2001). According to Kaptelinin and Nardi (2006) all practice is a result of certain historical developments under certain conditions. The development is both an object of study and general research methodology in activity theory.

The area where activity theory is applied is very broad, ranging from psychology and educational development to organization studies. The most interesting applications of activity theory in respect to the present study are work studies, information systems development and human-computer interaction (Wilson 2008). The usefulness of activity theory for human computer interaction has been proposed by (among others) by (Kaptelinin and Nardi 2006; Kuutti 1995). According to Kaptelinin and Nardi (2006) the use of activity theory meant a turn towards contextual approaches in human-computer interaction.

2.4 Conceptual Framework

Conceptual framework is defined as the result of when a researcher conceptualizes the relationship between variables in the study and shows the relationship graphically or diagrammatically (Mugenda and Mugenda, 2003). It allows the quantitative conceptualization; operationalization, data collection and measurement of the variables identified. Based on the discussion of the various variables, the study will be guided by the following conceptual framework.

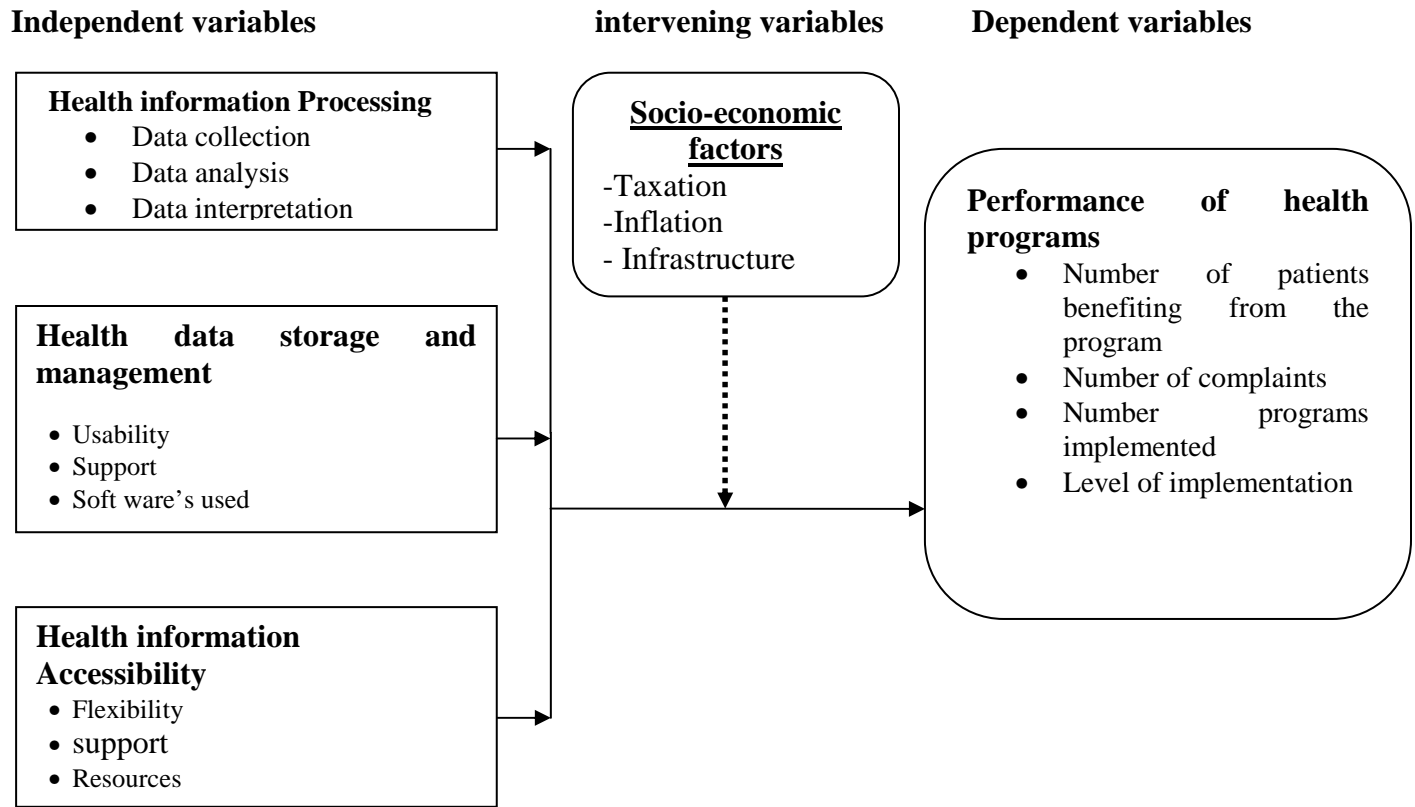


Figure 1: Conceptual Framework

A health information system requires systematic attention to each component of both the information process and the management structure, the aim being to provide specific information support for the decision-making process in the health services system at large. Through the information process, raw data or inputs are transformed into decision making, i.e. outputs. The information process involves data collection, transmission, processing and analysis; and the production of information for use in the planning and management of health services. All data recorded and reported at a service facility should be relevant to the management of patients and health units. A health information system provides information support for decision making at all levels of health services, and should therefore fit into the overall management structure of the health services system to enhance performance of health programs.

The nature of health information is evaluated in terms of number of patients, types of services offered and type of information collected in the HMIS. The Health information Processing is evaluated in terms of data collection, data analysis and data interpretation of the HMIS while Health data storage and management is evaluated in terms of usability, support, and soft ware's used for the HMIS and finally health information is evaluated in terms of accessibility, flexibility, support and resources of the HMIS.

Socio-economic factors are evaluated in terms of taxation, inflation, infrastructure and security.

Performance of health programs is evaluated in terms of no of patients benefiting from the program, patient involvement in medical decision making, quality of care and service provider behavior.

2.5 Research gap

Heeks (2006) examined the use of technology in national health information system development. He drew from the health information system development studies literature to define this latter concept of technology infusion. He derived some conclusions for intervention by the key stakeholders, including the importance of minimizing the so-called Design, Reality Gap.

The notion of uniform development of health information systems was problematized by Braa (2007) and in particular questioned the rhetoric that health information system should be a standardized instrument for gains within the context of healthcare services. He drew from a discourse analysis of research literature generated in developing countries, and argued for the crucial role, in his view, of the standardization and scalability in complex national health information system development.

Another study by Cibulskis and Hiawalye (2002) dealt with a specific country, Papua New Guinea, and discussed how to promote the increased use of health information in this particular country context, especially among the decision makers at national level. In terms of information use, they emphasized the importance of demand for accurate health information by national health policy formulators, so the entire national health system will be motivated to produce such information. The paper provides an interesting conceptual basis, although, in line with most published studies in this broad category, the data used were largely secondary in nature rather than being derived from the authors own empirical research. This is not necessarily an unsatisfactory situation, but contrasts with the more micro-level studies, drawing on primary data, which form the basis in the majority of the research literature surveyed.

The role of each component of health information system in bringing together networks in national interest in Uganda has also been studied. These included, in their case study, national health organizations, local health management units, other public sector organizations and aid organizations. They showed how heterogeneous elements of a national health information system are brought together in a specific national–local combination, linked for example, to particular national plans for development. Although they did not state this explicitly in the article, the evaluation is clearly related theoretically to Design-Reality gap model proposed by Heeks (Hotchkiss, 2010).

The growing phenomena of diffusion of innovation and dynamic equilibrium organizational change models, and the problems related to wider organizational issues in health information management were discussed by Gladwin and Dixon (2003). With data drawn from Uganda, they emphasized the specific difficulty in non face-to-face communication when working across different related sectors. To offset this, they generated a model for sensitizing collaborators in

cross-cultural and inter-sectoral development projects to issues and problems which may need to be handled.

Hammond and Baily (2010) also dealt with cross-cultural and inter-sectoral issues in health information management both in developed and developing countries, drawing on secondary data. They highlighted the fact that, in most parts of the world today, health data most likely come from many different and unconnected systems and therefore must be organized into a composite whole. They use the word interoperability to capture what is required to accomplish this goal. They present five priority areas for achieving interoperability in health care applications namely, patient identifier, semantic interoperability, data interchange standards, core data sets, and data quality. The output in this study is a model for the way forward with a stepwise approach, namely, definition of a vision, developing a strategy, identifying leadership, assigning responsibilities, and harnessing resources.

Other researchers took a critical stance on one aspect of inter-sectoral coordination, namely that standardization may impose its own logic when transferred between different sectoral contexts. They addressed the challenge of how to avoid the inappropriate imposition of standardization, by making an attempt to classify the health information systems into four types according to their data sources. They argue that information requirement by the diseases-specific funds (Global Fund to Fight AIDS, Tuberculosis and Malaria) and projects implemented by development agencies increase the workloads of health professionals at facility level and subsequently compromise data quality within an environment of improper standardization (Aiga and Kuroiwa, 2008).

To wit, the above review indicates a dearth of empirical studies in this area. Additionally, the studies are mostly qualitative and case-study oriented. The limited literature that is available is more often at the micro level. From a methodological perspective, sample sizes are relatively small. Therefore, generalizability is a limitation. The study, therefore, attempts to fill this gap in the literature. It examines the relationship between management information systems and health programs at the macro level and is empirical in orientation. Furthermore, our sample is large enough to enable generalizability. Considering all of the limitations of the prior studies and the paucity of empirical work, our study seeks to fill this research gap.

CHAPTER THREE

RESEARCH METHODOLOGY

3.1 Introduction

This chapter presents the research methodology. The chapter specifically presents the research design, area of study, population, sample and sampling technique, instrumentation, reliability and validity, data collection procedure, and data analysis procedure.

3.2 Research Design

This study was a descriptive survey. Descriptive surveys portray an accurate profile of persons, events, or situations (Robson, 2002). Surveys allow the collection of large amount of data from a sizable population in a highly economical way. Therefore, the descriptive survey was deemed the best strategy to fulfill the objectives of this study. The design takes on a case study on of both public and private hospitals in Nairobi

3.3 Target Population

The target population was the staffs in the accredited private and public hospitals in Nairobi in Kenya. According to NHIF, their number is 64; this comprising of 5 public hospitals and 59 private/mission hospitals (<http://www.nhif.or.ke/healthinsurance/hospitals/>)

3.4 Sample Size and Sampling Technique

Sampling is that part of statistical practice concerned with the selection of individual observations intended to yield some knowledge about a population of concern, especially for the purposes of statistical inference. Since a sample was selected from the hospitals located in Nairobi, it was assumed that selecting one hospital is the same as selecting the other. Simple

random sampling technique was applied. According to Cooper and Schindler (2003), random sampling frequently minimizes the sampling error in the population. This in turn increases the precision of any estimation methods used. In random sampling, each item or element of the population has an equal chance of being chosen at each draw. A sample is random if the method for obtaining the sample meets the criterion of randomness (each element having an equal chance at each draw).

The method was used to select a sample of 40 hospitals. This is 62.5% of the total population. Mugenda and Mugenda (2003) contend that a sample size should be at least 10% of the population. Thus, the sample size of 40 (62.5% of the population) was considered appropriate.

3.5 Research Instrumentation

Questionnaires were used to collect data. These were structured questionnaires. The questionnaires contained 6 sections. Section A addressed general issues on firm characteristics. Section B to section F addressed the study objectives. The questionnaires were addressed to the managers of each of the selected Hospitals and was administered using drop and pick later method. A period of two weeks was given for data collection period after which those who would not have completed will be given one more week for completion. These was then collected and sorted ready for analysis.

3.5.1 Pilot study

A pilot study is a preliminary test conducted before the final study to ensure that research instruments are working properly. Prior to the main study, the researcher carried out a pilot study among 10 respondents. Mugenda & Mugenda, (2007) states that a relatively small sample of 10

to 20 respondents can be chosen from the population during piloting which is not included in the sample chosen for the main study.

3.5.2 Validity of Instruments

Validity indicates the degree to which an instrument measures what it is supposed to measure; the accuracy, soundness and effectiveness with which an instrument measures what it is intended to measure (Kothari, 2004) or the degree to which results obtained from the analysis of the data actually represent the phenomena under study (Mugenda & Mugenda, 2007). The validity of the questionnaire was established by the help of the supervisor and the panelists from the Department of extra mural at University of Nairobi.

3.5.3 Reliability of Instruments

Reliability of measurements concerns the degree to which a particular measuring procedure gives similar results over a number of repeated trials. It also refers to the consistency of an instrument to yield the same results at different times. The researcher used test, re-test type of method in order to establish the reliability of the instruments. Test re-test method is applied where a test is given to respondents then after some time given again, gives the same results. The researcher made a comparison between answers obtained from the two groups of respondents and the responses were consistent with the instruments hence deemed reliable. A Pearson's product moment formula for the test – retest was employed to compute the correlation, coefficient in order to establish the extent to which the content of the questionnaires were consistent in eliciting the same responses every time the instrument is administered. A reliability of at least 0.70 at $\alpha=0.05$ significance level of confidence is acceptable (Saunders et al., 2007).

Table 3.1: Summary of Reliability Results (Cronbach's Alpha)

Cronbach's Alpha	N	Cronbach's Alpha Based on Standardized Items	No of Items
.832	5	.100	3

Usually, the internal consistency of a measurement scale is assessed by using Cronbach's coefficient alpha. It is generally recommended that if a measurement scale having a Cronbach's coefficient above 0.50 is acceptable as an internally consistent scale so that further analysis can be possible. From the findings, the alpha value was higher above 0.5, implying that the study instruments yielded highly reliable and valid data for this research, thus measuring the relationship between independent variables (Health Information Processing, Health Data Storage and Health information Accessibility) and the dependent variable (Health Programs Performance).

3.6 Data Collection Procedure

This set out how data for the study was collected and analyzed. To achieve the research objectives, primary was used to answer the research questions. Primary data was collected using questionnaires and interview schedules (Franker, 1993). Questionnaires were used to collect primary data. The questionnaires contained closed and open-ended items. Structured questions were used where widely varied views on issue were expected. They were used to get data from those categories with numerous respondents. The questionnaires are the best instrument because they are cheap and easier to administer and results in data is suitable for analysis as designed for the study (Borg, 1997). The questionnaires are ideal because of the need to collect detailed and well thought out responses. It also offers the respondent time and privacy to fill in the

questionnaire at their convenience.

3.7 Data Analysis Procedure

Quantitative data collected using questionnaires was analyzed by the use of descriptive statistics using SPSS (Statistical Package for Social Sciences) and presented through percentages, means and frequencies. The information was also displayed by use of frequency tables and charts. Content analysis was used to analyze data collected from the open-ended questions. According to Baulcomb, (2003), content analysis uses a set of categorization for making valid and replicable inferences from data to their context. This offered a systematic and qualitative description of the objectives of the study. In addition, the study conducted a multiple regression analysis. The regression model was ($Y = \beta_0 + \beta_1X_1 + \beta_2X_2 + \beta_3X_3 + \epsilon$):

Whereby Y = Health Programs Performance

X_1 = Health Information Processing

X_2 = Health Data Storage

X_3 = Health information Accessibility and β_0 β_1 β_2 β_3 and β_4 are the regression equation coefficients for each of the variables discussed.

Both quantitative and qualitative techniques were used for analysis. The data from the questionnaires was coded and the response on each item put into specific main themes. The data obtained from the research instruments was analyzed by use of descriptive statistics (frequencies and percentages, means and standard deviations) as well as inferential statistics (correlations and regression of variables). Data Presentation was done through the use of quantitative (Statistical) or Qualitative (descriptive) methods, so that the study objectives are achieved. Frequencies and

percentages were tabulated and the results discussed. Quantitative data was presented using tables, graphs and a set of percentages to present the results of these methods.

3.8 Operational Definition of Variables

Objectives	Variables	Measurement scale	Method of Analysis	Tool of Analysis	Respondent
To examine the influence of health information processing on the performance of health programs in Kenya.	<u>Intervening:</u> Socio-economic factors <u>Dependent:</u> Performance of health programs	Nominal Ordinal	Descriptive statistics Regression analysis	SPSS	Accredited private and public hospitals in Nairobi staff
To examine the influence of health data storage and management on the performance of health programs in Kenya.	<u>Intervening:</u> Socio-economic factors <u>Dependent:</u> Performance of health programs	Nominal Ordinal	Descriptive statistics Regression analysis	SPSS	Accredited private and public hospitals in Nairobi staff
To examine the influence of health information accessibility on the performance of health programs in Kenya.	<u>Intervening:</u> Socio-economic factors <u>Dependent:</u> Performance of health programs	Nominal Ordinal	Descriptive statistics Regression analysis	SPSS	Accredited private and public hospitals in Nairobi staff

3.9 Ethical Considerations

Transmittal letter from relevant authorities was issued to the management of intervening agencies stating who the researcher is and what type of research study the researcher was undertaking. The researcher also indicated that the data collected would only be used for research purposes alone so as to maintain confidentiality. The study did not involve plagiarism materials because this can lead to a serious and punishable offense.

CHAPTER FOUR:

DATA ANALYSIS, PRESENTATION AND INTERPRETATION

4.1 Introduction

This chapter presents the data that was found on the influence of management information system on the performance of health programs in Kenya. The research was conducted on sample size of 60 respondents out of which 40 respondents completed and returned the questionnaires duly filled in making a response rate of 67%. Mugenda and Mugenda (1999) stated that a response rate of 50% and above is a good for statistical reporting. The study made use of frequencies (absolute and relative) on single response questions. On multiple response questions, the study used Likert scale in collecting and analyzing the data whereby a scale of 5 points were used in computing the means and standard deviations. These were then presented in tables with explanations being given in prose.

4.2 Demographic Information

The study initially sought to inquire information on various aspects of the respondents' background, i.e. the respondent's age and academic background. This information aimed at testing the appropriateness of the respondent in answering the questions regarding the influence of management information system on the performance of health programs in Kenya.

4.2.1 Respondents' by Job Title

The study sought to establish the respondents job title. A summary of the findings are as tabulated.

Table 4.2: Respondents' Job Title

	Frequency
Doctor	6
Nurse	4
IT manager	6
Accountant	4
Human Resource Manager	8
Administrator	12
Total	40

The results in table 4.2 depicts that most of the respondents were administrators (12), others were Human resource managers (8), doctors and IT managers (6 each), nurses and accountants (4 each).

4.2.2 Respondents by Gender

The respondents were requested to indicate their gender. Accordingly, the findings are as presented in the table.

Table 4.3: Respondents Gender

	Frequency	Percentage (%)
Male	21	52.5
Female	19	47.5
Total	40	100.0

From the findings, majority (21) of the respondents were male and 19 of the respondents were female. This implies that even though most of the responses emanated from male there was gender balance.

4.2.3 Respondents' distribution by Age

The study sought to establish the age of the respondents and the findings are as shown in table 4.4.

Table 4.4: Respondents' distribution by Age

	Frequency
18-25 years	8
26-35 years	6
36-45 years	9
46-55 years	8
55 years and above	9
Total	40

According to the findings, 9 of the respondents were 36-45 and above 55 years old each, 8 were 46-55 and 18-25 years each and 6 respondents were 26-35 years old. This depicts that most of the staff were over 25 years old.

4.2.4 Respondents' by Hospital Employment Experience in Years

The study also sought to establish how long respondents have worked for their hospital. The findings are as shown in table 4.5.

Table 4.5: Respondents' Hospital Employment Experience in Years

	Frequency
1 – 12 months	5
2 – 3 years	4
4 – 7 years	17
8 – 12 years	8
13 years and above	6
Total	40

Based on the findings, 17 of the respondents have worked for their hospital for 4-7 years, 8 of the respondents have worked for their hospital for 8 – 12 years, 6 of the respondents have worked for their hospital for 13 years and above, 5 of the respondents have worked for their hospital for 1 – 12 months while 4 of the respondents have worked for their hospital for 2 – 3 years. This illustrates that the most of the respondents have worked for their hospital for over 2 years and therefore had accumulated a lot of knowledge and skills over time.

4.2.5 Respondents' by Job Category

The respondents were asked to indicate their job category and the findings are as shown in Table 4.6.

Table 4.6: Respondents' Job Category

	Frequency
Senior Management	6
Middle Level Management	9
Lower Level Management	12
Support staff	13
Total	40

According to the findings, most of the respondents (13) were support staff, 12 were in lower level of management, 9 were in the middle level of management while 6 were in the senior level of management. This information shows that the respondents were in all management levels and therefore could be relied upon to give comprehensive information.

4.3 Health Information Processing

The health information processing involves data collection, transmission, processing and analysis; and the production of information for use in the planning and management of health services. Through the information process, raw data or inputs are transformed into decision making, i.e. outputs.

4.3.1 Collection of all Necessary Data

The respondents were asked to indicate whether all the necessary data was collected. The findings are as tabulated.

Table 4.7: Collection of all Necessary Data

	Frequency
Yes	32
No	8
Total	40

From the findings, 32 of the respondents agreed that all the necessary data is collected while 8 of them were of the contrary opinion. This implies that all the necessary data is collected in most cases.

4.3.2 Problems Encountered in Data Collection

The respondents were requested to explain the problems encountered in data collection. In this regard, the consensus was that there were no opportunities for most hospitals to acquire software, hardware and expertise in developing health management information systems and therefore remained with the basic information, which was continuously weeded. For the hospitals that had in place HMIS, there are also clear signs of under-utilization of databases that had been developed and some managers were not capable of or willing to analyze data for decision-making purposes. The main obstacle to implementation of the systems was lack of a functional centralised system for routine health data, and using individual patient tick-sheets for scanning.

4.3.3 Information Process in Respondents Organization

The study sought to determine how the information is processed. The findings are as tabulated.

Table 4.8: Information Process in Respondents Organization

	Frequency
Manual	8
Computerized	32
Total	40

The findings in table 4.8 indicate that 32 respondents mentioned that information processing is computerized whereas 8 said that information processing is manual. This implies that majority of the respondents hospitals' information processing is computerized which leads to fast service and accuracy of patients health information system provides information support for decision making at all levels of health services, and therefore fits into the overall management structure of the health services system.

The study probed the respondents who said that information processing is computerized on how many and what types of computers are available in their hospitals. The respondents stated that, the computers available at the hospitals were desktops. Regarding the capacity of computers, the memory range varied as tabulated.

Table 4.9: Capacity of Computers

	Frequency
DDR3 1600 MHz or PC312800	11
DDR3 1333 MHz or PC310600/PC310666	16
DDR3 1066 MHz or PC38500	8
DDR3 800 MHz or PC36400	5
Total	40

From the findings, most (16) of the computer memory are DDR3 1333 MHz or PC310600/PC310666, followed by DDR3 1600 MHz or PC312800 (11), DDR3 1066 MHz or PC38500 (8) and finally DDR3 800 MHz or PC36400 (5). The type of memory does matter to the performance of a system, therefore the memories of the computers range from optimal to high speed and hence health information processing increases the performance of health programs.

The study also requested the respondents to indicate the software and versions available of the computers. A summary of the findings is as tabulated.

Table 4.10: Software and versions available of the respondents organizations' computers

	Frequency
Database Management	12
Spreadsheets	18
Statistics analysis programs	22
Accounts programs	26
Word Processing	36
Total	114

From the findings, the most common software available in the computers was word processing with a frequency level of 36, followed by accounts programs with a frequency level of 26, Statistics analysis programs with a frequency level of 22, spreadsheets with a frequency level of 18 and finally database management with a frequency level of 12. This depicts that the respondents' organizations have a variety of software for their computers for the different tasks of health programs.

4.3.4 Respondents Experience in Usage of the Computers

The study sought to determine the respondents experience in usage of the computers. The findings are as summarized.

Table 4.11: Respondents Experience in Usage of the Computers

	Frequency
Low	8
Medium	17
High	15
Total	40

According to the findings in table 4.11, most (17) of the respondents possess medium experience in usage of the computers, 15 possess high experience in usage of the computers and the remaining 8 possess low experience in usage of the computers. This depicts that majority of the respondents know how to use the computers positively influencing performance of health programs.

4.3.5 Respondents Computers Protected and Maintained

The respondents were requested to state whether the computers protected and maintained. The findings are as tabulated.

Table 4.12: Respondents Computers Protected and Maintained

	Frequency
Budget for Computer services and software	18
Burglary proofing	20
Security of computers (Anti-virus etc)	33
Cleanliness of computers	36
Total	107

The findings in table 4.12 show that cleanliness of computers was the most common protection and maintenance measure for the computers in the respondents organizations with a frequency level of 36, this was followed by security of computers (Anti-virus etc) with a frequency level of 33, burglary proofing with a frequency level of 20 and finally budget for computer services and software with a frequency level of 18. This depicts that the computers are maintained to ensure the information processing is carried out smoothly.

4.3.6 Respondents Opinion on Health Information Processing in their Organizations

The respondents were asked to indicate the extent to which they agreed with statements in relation to Health Information Processing in their Organizations. The responses were placed on a five Likert scale where 1 =very small extent, 2=small extent 3= moderate 4=great extent and 5=very great extent. The results are as in the table 4.13.

Table 4.13: Respondents Opinion on Health Information Processing in their Organizations

Statements	Mean	Std Dev.
The information processed is utilized for returns to DDHS office	3.56	0.142
The information processed is utilized in review of financial statement	3.59	0.185
Training of users to be effective team members was adhered to	3.75	0.214
The information processed is utilized in Tax assessment	3.78	0.247
The staff in charge of collecting the data are given the necessary knowledge and skills to use the information collected at their level in order to improve their work	3.87	0.366
There are specific people allocated to fill the database sheets	3.91	0.248
When setting up the HMIS the team members who are going to collect and use the data were involved	3.96	0.325
The staff in charge of collecting the data understand what management decisions and activities are being supported or problems the HMIS is meant to help resolve.	4.01	0.289
The information processed is utilized in Review, Planning, and monitoring at health units	4.09	0.322

The results imply to a great extent that; the information processed is utilized in Review, Planning, and monitoring at health units (mean= 4.09) and the staff in charge of collecting the data understand what management decisions and activities are being supported or problems the HMIS is meant to help resolve (mean= 4.01). Respondents further implied that when setting up the HMIS the team members who are going to collect and use the data were involved (mean= 3.96), there are specific people allocated to fill the database sheets (mean=3.91), the staff in

charge of collecting the data are given the necessary knowledge and skills to use the information collected at their level in order to improve their work (mean=3.87), The information processed is utilized in Tax assessment (mean=3.78), Training of users to be effective team members was adhered to (mean=3.75), the information processed is utilized in review of financial statement (mean=3.59) and The information processed is utilized for returns to DDHS office (mean=3.56).

This implies that information processed facilitates Review, Planning, and monitoring at health units.

4.3.7 State of Data at the Units

The respondents were also asked what the state of data at the units was. A summary of the findings is as presented.

Table 4.14: State of Data at the Units

	Frequency	Percentage
Well managed	8	18%
Fairly managed	32	82%
Total	40	

As per the findings in table 4.14, 82% of the respondents agreed that the state of data at the units was well managed whereas 18% of the respondents stated that the state of data at the units was fairly managed.

4.4 Influence of Data Storage on Performance of Health Programs in Kenya.

Data storage is a general term for archiving data in electromagnetic or other forms for use by a computer or device. Routinely stored health data are often used to provide a rough indication of the frequency of occurrence of health invents of diseases.

4.4.1 How Data is Stored in the Respondents Organization

The study sought to establish how data is stored in the respondents' organization. Accordingly, the respondents stated that data was stored in computers and files. This implies that data stored is secure and can be used for future reference hence improving the Performance of Health Programs in Kenya.

4.4.2 Existence of a Resource Centre the Respondents Health Unit

The respondents were requested to state whether there is a resource centre/library at the health unit. The findings are summarized in the table.

Table 4.15: Existence of a Resource Centre/Library at the Respondents Health Unit

	Frequency
Yes	27
No	13
Total	40

As illustrated in table 4.15, 27 of the respondents agreed that they had a resource centre/library at the health unit while 13 of them stated they did not have a resource centre/library at the health unit. This depicts that for most of the hospitals data stored is secure and can be used for future reference.

The study probed the respondents who agreed that they had a resource centre on the type that it is. The respondents mentioned that the hospitals had filing cabinets and filing rooms as the resource centre.

4.4.3 Qualifications of the In-Charge of the Resource Centre

The study sought to determine the qualifications of the in-charge of the resource centre. All the respondents were unanimous that the qualification of the in-charge of the resource centre was information management. This implies that, having qualified staff in managing the HMIS data facilitated performance of health programs.

4.4.4 Information Sharing with the Resource Centre

The respondents were asked to state if they send copies to the Resource Centre. A summary of the findings is as presented.

Table 4.16: Information Sharing with the Resource Centre

	Frequency
Yes	35
No	27
Total	40

From the findings, 35 of the respondents agreed that they send copies to the Resource Centre while 27 were not sure if that is the case. This depicts that the resource centre is usually updated with the current information.

The study probed the respondents who agreed that they send copies to the resource centre on how often they do so. The findings are as tabulated.

Table 4.17: Regularity of Information Sharing with the Resource Centre

	Frequency
Irregularly	14
Monthly	22
Daily	30
Weekly	36
Total	102

From the table, weekly basis is the most common period respondents send copies to the resource centre with a frequency level of 36, this was followed by daily with a frequency level of 30, monthly with a frequency level of 22 and finally irregularly with a frequency level of 14. This implies that, most of the respondents send copies to the resource centre regularly.

4.4.5 Daily Attendance of Patients According to the Respondents Records

The respondents were requested to indicate how many patients attend daily according to their records. The findings are as tabulated.

Table 4.18: Daily Attendance of Patients According to the Respondents Records

	Frequency
Over 100	3
21-40	4
0-20	6
81-100	7
61-80	8
41-60	12
Total	40

According to the findings in table 4.18, most (12) respondents revealed that according to their records, the number of patients attending the hospital daily were 41-60, 8 of the respondents revealed that according to their records, the number of patients attending the hospital daily were 61-80, 7 of the respondents revealed that according to their records, the number of patients attending the hospital daily were 81-100, 6 of the respondents revealed that according to their records, the number of patients attending the hospital daily were 0-20, 4 of the respondents revealed that according to their records, the number of patients attending the hospital daily were 21-40 and finally 3 of the respondents revealed that according to their records, the number of patients attending the hospital daily were over 100. This shows that most of the hospitals serve over 20 patients daily and therefore proper record keeping is important.

4.4.6 Services offered at the Respondents' Unit

The respondents were requested to list the services they offer at the unit/hospital. The findings are as tabulated.

Table 4.19: Services offered at the Respondents' Unit

	Frequency
Outreach services	18
Counselling	24
Drug Dispensed	26
Laboratory Services	28
Dental Services	33
Immunization	34
Admissions	35
Family Planning	36
Ante Natal Clinic (ANC)	37
Out Patient Department (OPD)	38
Maternity Services	39
Total	348

As per the findings, the most common services offered at the respondents unit/hospital is Maternity Services with a frequency level of 39, this was followed by Out Patient Department (OPD) with a frequency level of 38, Ante Natal Clinic (ANC) with a frequency level of 37, Family Planning with a frequency level of 36, Admissions with a frequency level of 35, Immunization with a frequency level of 34, Dental Services with a frequency level of 33, Laboratory Services with a frequency level of 28, Drug Dispensed with a frequency level of 26, Counselling with a frequency level of 24 and Outreach services with a frequency level of 18.

4.4.7 Storage of Information on Records of the Services

The respondents were asked whether there are records of the above services of information is stored. The findings are as discussed.

Table 4.20: Storage of Information on Records of the Services

	Frequency
Yes	29
No	11
Total	40

Table 4.20 illustrates that 29 of the respondents hospitals store records of the above services while 11 did not. This depicts that HMIS supports a wide variety of functions in terms of type of information stored.

The study sought to establish what kind of information is stored. Accordingly, the respondents revealed that the kind of information that is stored included; demographic data, deliveries including TBAs Reports, Patient attendance's; disease condition/diagnostic, ANC attendance's, family planning attendance, immunization, health units population reports, physical inventory;

equipment inventory; staff listing, financial, quarterly activities report; annual reports; and special events; and the health units monthly reports.

4.4.8 Sources of the Information Collected

The study requested the respondents to state what the sources of the information collected were. The commonly mentioned sources of this health information were through recording of patients at the Reception Desk, Dental Room, Laboratory, Maternity Ward and In-patient Wards, Paediatric Wards; AIC clinic; TB Clinic; Dispensary and the Outreaches. Depending on the source, the data is filled in the patient's registers; Immunization Tally Sheets; Outreach Registers, In-patient Registers and TBAs, CBDA Reports. Information collection is through face to face interview with the clients.

4.4.9 Respondents opinion on the dissemination of health-related information in storage on the performance of health programs in Kenya

The respondents were asked to indicate the extent to which they agreed with statements on the dissemination of health-related information in storage on the performance of health programs in Kenya; The responses were placed on a five Likert scale; where 1= strongly disagree, 2= disagree, 3= neutral, 4= agree and 5= strongly agree.

Table 4.21: Respondents opinion on the dissemination of health-related information in storage on the performance of health programs in Kenya

Statements	Mean	Std
Biomedical supplies and distribution data is easily tracked	3.65	0.358
Emerging infections are easily tracked	3.78	0.328
National Demographic data is easily tracked	3.79	0.247
Antibiotic resistant organisms are easily tracked	3.86	0.116
Provincial health indicators are easily tracked	3.86	0.213
Clinic data is easily tracked	3.88	0.223
Infectious diseases are easily tracked	3.96	0.241
Mortality rates are easily tracked	3.96	0.014
Notifiable disease data is easily tracked	3.96	0.145
National Health indicators are easily tracked	3.97	0.114
Provincial inventory data is easily tracked	3.99	0.289
Provincial archives/ Databases are easily tracked	3.99	0.196
Malnutrition is easily tracked	4.00	0.146
Inpatient data is easily tracked	4.02	0.352
Provincial financial data is easily tracked	4.03	0.342
Political manifestos are easily tracked	4.03	0.336
Human resource data is easily tracked	4.07	0.412
Community requests are easily tracked	4.08	0.115
Out patient data is easily tracked	4.09	0.111
National Epidemiological data is easily tracked	4.09	0.387
Donor requests is easily tracked	4.12	0.288
Provincial Demographic data is easily tracked	4.16	0.114
Provincial Epidemiological data being the most easily tracked	4.21	0.259

From the findings in table 4.21, the respondents strongly agreed that; Provincial Epidemiological data is easily tracked (mean=4.21), Provincial Demographic data is easily tracked (mean=4.16), Donor requests is easily tracked (mean=4.12), National Epidemiological data is easily tracked and Out patient data is easily tracked (mean=4.09 each), Community requests are easily tracked (mean=4.08), Human resource data is easily tracked (mean=4.07), Political manifestos are easily tracked and Provincial financial data is easily tracked (mean=4.03 each), Inpatient data is easily

tracked (mean=4.02), Malnutrition is easily tracked (mean=4.00). They also agreed that Provincial archives/ Databases are easily tracked and Provincial inventory data is easily tracked (mean=3.99 each), National Health indicators are easily tracked (mean=3.97), Notifiable disease data is easily tracked, Mortality rates are easily tracked and Infectious diseases are easily tracked (mean=3.96), Clinic data is easily tracked (mean=3.88), Provincial health indicators are easily tracked and Antibiotic resistant organisms are easily tracked (mean=3.86), National Demographic data is easily tracked (mean=3.79), Emerging infections are easily tracked (mean=3.78) and Biomedical supplies and distribution data is easily tracked (mean=3.65).

This implies that dissemination of health-related information in storage influences the performance of health programs in Kenya with Provincial Epidemiological data being the most easily tracked.

4.5 Health Information Accessibility

Information accessibility encompasses the many issues surrounding availability, accessibility and affordability of information. For health information to be relevant, it must be accessible to the relevant authorities.

4.5.1 Users of the Resource Centre

The study sought to determine who uses the resource Centre in the respondents' hospitals. All the respondents revealed that the hospital staff use the resource Centre and occasionally researchers in the government hospitals. This depicts that stored information is utilized by the hospital staff as expected and not outsiders therefore the possibilities of tampering with it were greatly reduced.

4.5.2 Willingness to Share Data

The respondents were also asked to indicate the willingness to share data by the staff in charge.

The findings are as illustrated.

Table 4.22: Willingness to Share Data

	Frequency
Willing	26
Very willing	8
Not willing	6
Total	40

The findings in table 4.22 portray that 26 of the respondents agreed that there was willingness to share data by the staff in charge, 8 stated the staff in charge were very willing to share data and 6 stated the staff in charge were not willing to share data.

4.5.3 Utilizers of Health Information

The study asked the respondents to indicate who utilizes the information. The study findings are as tabulated.

Table 4.23: Utilizers of Health Information

	Frequency
In-charges at the Health units	40
The Health Sub-district	36
The DDHS office	28
Ministry of Health	22
Management	40
Total	166

As per the findings in table 4.23, management and in-charges at the health units were the most common utilizers of health information with a frequency level of 40 each, this was followed by the health subdistrict with a frequency level of 36, the DDHS office with a frequency level of 28, and the ministry of health with a frequency level of 22. This illustrates that health information is mainly utilized in the health sector.

The study probed the respondents on whether they send returns to various stakeholders. The findings are as tabulated.

Table 4.24: Information sharing with various stakeholders

	Frequency
Community level	18
Health Sub District	28
DDHS's office	32
Ministry of Health	36
Total	114

According to the findings in table 4.24 the Ministry of Health was the most common stakeholder that the respondents send returns to with a frequency level of 36, followed by DDHS's office with a frequency level of 32, Health Sub District with a frequency level of 28 and finally Community level with a frequency level of 18. This depicts that the hospitals send returns to various stakeholders especially the ministry of health and this facilitates planning of health services.

The respondents were the asked to indicate if they get feedback from the various stakeholders on the information shared. A summary of the findings is as tabulated.

Table 4.25: Information feedback from various stakeholders

	Frequency
Community level	14
Health Sub District	22
DDHS's office	28
Ministry of Health	32
Total	96

From the findings in table 4.25, the Ministry of Health was the most common stakeholder that the respondents get feedback from with a frequency level of 32, followed by DDHS's office with a frequency level of 28, Health Sub District with a frequency level of 22 and finally Community level with a frequency level of 14. This depicts that the hospitals receive feedback from various stakeholders especially the ministry of health and this facilitates monitoring, evaluation and planning of health services.

4.5.4 Storage of Datasheets

The respondents were requested to indicate where they finally put the data sheets. The findings are as presented.

Table 4.26: Storage of Datasheets

	Frequency
Enter into a Computer	40
Files	40
Total	80

The findings in table 4.26 illustrates that the respondents finally put the data sheets in files and enter into a computer. This depicts that, data is stored both manually and in soft copy.

4.6 Influence of MIS on the Performance of Health Programs in Kenya.

4.6.1 Respondents Opinion on Health Information Processing in their Organizations

The respondents were asked to indicate the extent to which they agreed with statements on the Influence of MIS on the Performance of Health Programs in Kenya. The responses were placed on a five Likert scale; where 1= strongly disagree, 2= disagree, 3= neutral, 4= agree and 5= strongly agree.

Table 4.27: Respondents Opinion on Health Information Processing in their Organizations

Statements	Mean	Std Dev
The system enables rapid reporting of notifiable diseases	3.69	0.523
The system enables centralized decision making	3.76	0.410
The system enables dissemination of information	3.89	0.412
The system enables equitable management information systems	3.96	0.159
The system enables outbreak investigation	3.99	0.421
The system enables updated health laws	3.99	0.149
The system enables adequate management skills at the district level	3.99	0.147
The system enables improving poverty levels	4.00	0.056
The system enables decreasing burden of disease and rapid population growth.	4.01	0.265
The system enables provision of information on magnitude of health invents, monitoring risk factors and disease trends.	4.03	0.255
The system enables provision of feedback to reporting Health Institutions and to the Ministry; The system introduces the indicators to the politicians and administrators on the district and give them regular reports	4.06	0.147
HMIS is one of the most important tools needed for the prevention and control of diseases because it gives information critical for planning, monitoring and evaluation of services.	4.09	0.415
The system enables decline in health sector expenditure	4.19	0.336
The system enables efficient utilisation of resources	4.21	0.096
The system enables review of significant issues to be followed up with individual health units;	4.28	0.222
The system enables budgeting for HMIS activities	4.32	0.325
The system enables conducting of regular supervision on the implementation of the HMIS in the district.	4.39	0.289

From the findings in table 4.27, the respondents strongly agreed that; The system enables conducting of regular supervision on the implementation of the HMIS in the district (mean=4.39), The system enables budgeting for HMIS activities (mean=4.32), The system enables review of significant issues to be followed up with individual health units (mean=4.28), The system enables efficient utilisation of resources (mean=4.21), The system enables decline in health sector expenditure (mean=4.19), HMIS is one of the most important tools needed for the prevention and control of diseases because it gives information critical for planning, monitoring and evaluation of services (mean=4.09), The system enables provision of feedback to reporting Health Institutions and to the Ministry; The system introduces the indicators to the politicians and administrators on the district and give them regular reports (mean= 4.06), The system enables provision of information on magnitude of health invents, monitoring risk factors and disease trends (mean=4.03), The system enables decreasing burden of disease and rapid population growth (mean=4.01), The system enables improving poverty levels (mean 4.00). They also agreed that; The system enables adequate management skills at the district level, The system enables updated health laws and The system enables outbreak investigation (mean=3.99 each), The system enables equitable management information systems (mean=3.96), The system enables dissemination of information (mean=3.89), The system enables centralized decision making (mean=3.76) and The system enables rapid reporting of notifiable diseases (mean=3.69). This implies that the system enables conducting of regular supervision on the implementation of the HMIS in the district.

4.7 Inferential Statistics

The study further applied general Linear Model to determine the predictive power of the management information system on the performance of health programs in Kenya. This included

regression analysis, the Model, Analysis of Variance and coefficient of determination.

4.7.1 Regression Analysis

In addition, the researcher conducted a multiple regression analysis so as to test relationship among variables (independent) on the performance of health programs in Kenya. The researcher applied the statistical package for social sciences (SPSS V 17.0) to code, enter and compute the measurements of the multiple regressions for the study.

Coefficient of determination explains the extent to which changes in the dependent variable can be explained by the change in the independent variables or the percentage of variation in the dependent variable (management information system and the performance of health programs in Kenya) that is explained by all the three independent variables (Health Information Processing, Health Data Storage and Health information Accessibility).

4.7.2 Model Summary

Table 4.28: Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	0.822	0.807	0.791	0.716

The four independent variables that were studied, explain only 80.7% of the performance of health programs in Kenya as represented by the R^2 . This therefore means that other factors not studied in this research contribute 19.3% of the performance of health programs in Kenya. Therefore, further research should be conducted to investigate the other factors (19.3%) that affect performance of health programs in Kenya.

4.7.3 ANOVA Results

Table 4.29 ANOVA of the Regression

Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	2.534	10	1.267	8.635	.000 ^a
	Residual	9.307	30	2.327		
	Total	11.841	40			

The significance value is 0.000 which is less than 0.05 thus the model is statistically significant in predicting how health information processing, health data storage and health information accessibility affect the performance of health programs in Kenya. The F critical at 5% level of significance was 2.25. Since F calculated is greater than the F critical (value = 8.635), this shows that the overall model was significant.

4.7.4 Coefficients

Table 4.30: Coefficients Table

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	1.103	0.2235		5.132	0.000
	Health Information Processing	0.852	0.1032	0.1032	6.569	.001
	Health Data Storage	0.578	0.3425	0.1425	4.117	.004
	Health information Accessibility	0.654	0.2178	0.1178	3.968	.002

Multiple regression analysis was conducted as to determine the relationship between the performance of health programs in Kenya and the three variables. As per the SPSS generated table below, regression equation

($Y = \beta_0 + \beta_1X_1 + \beta_2X_2 + \beta_3X_3 + \beta_4X_4 + \varepsilon$) becomes:

$$(Y = 1.103 + 0.852X_1 + 0.578X_2 + 0.654X_3)$$

According to the regression equation established, taking all factors into account (health information processing, health data storage and health information accessibility) constant at zero, performance of health programs in Kenya will be 1.103. The data findings analyzed also shows that taking all other independent variables at zero, a unit increase in health information processing will lead to a 0.852 increase in performance of health programs in Kenya; a unit increase in health data storage will lead to a 0.578 increase in performance of health programs in Kenya, a unit increase in health information accessibility will lead to a 0.654 increase in performance of health programs in Kenya.

This infers that health information processing contribute most to the performance of health programs in Kenya followed by health information accessibility and finally health data storage. At 5% level of significance and 95% level of confidence, health information processing, health data storage and health information accessibility were all significant in performance of health programs in Kenya.

4.8 Variable analysis

The results of regression analysis were interpreted based on the following;

β = A measure of how strongly each independent variable influences the dependent variable.

t= statistic is the *coefficient* divided by its *standard error*

p = determined by t statistic, is the probability of getting a result as extreme as the one you are getting in a collection of random data in which the variable have no effect.

4.8.1 Health information processing and its influence on performance of health programs in Kenya.

The analysis of health information processing was done through descriptive and regression analysis. The majority of the respondents (80%) indicated that information processing is computerized. The regression analysis showed that health information processing had a positive and significant effect on performance of health programs in Kenya. The findings were supported by these statistics which gave, $\beta= 0.852$, $t= 6.569$, and $p<000$.

4.8.2 Health Data Storage and its influence on health programs in Kenya.

The analysis on this variable was conducted through descriptive and regression analysis. From the findings, majority (100%) of the respondents indicated that data was stored in computers and files to a great extent. The regression analysis showed that the health data storage influence performance of health programs in Kenya. This was supported by the statistics from the regression analysis, $\beta=0. 0.578$, $t=4.117$, and $p<000$.

4.8.3 Health information Accessibility and its influence on health programs in Kenya.

The analysis on this variable was conducted through descriptive and regression analysis. From the findings, majority (65%) of the respondents agreed that there was willingness to share data by the staff in charge. These finds were supported by regression analysis results which showed

that health information accessibility influence performance of health programs in Kenya. The findings were supported by these statistics showing that, $\beta = 0.654$, $t = 3.968$, and $p < 0.000$.

4.9 Discussion of findings

The purpose of this study was to investigate the influence of management information system on the performance of health programs in Kenya. Accordingly the study revealed that the four independent variables that were studied, explain only 80.7% of the performance of health programs in Kenya. This finding concurs with Calman et al. (2007) who stated that healthcare technology is among the most important equipment in a hospital. It helps to improve the quality and performance of treatments. Furthermore, it affects indirect profit added to hospitals.

The study also found out that health information processing contribute most to the performance of health programs in Kenya followed by health information accessibility and finally health data storage. Likewise Holden (2010) argues that electronic medical records (EMR) and computerized provider order entries (CPOE) can decrease the time necessary or care processing steps, especially when retrieving information.

The study also revealed that all the necessary data is collected in most cases at the respondents hospitals. However there were no opportunities for most hospitals to acquire software, hardware and expertise in developing health management information systems and therefore remained with the basic information, which was continuously weeded. For the hospitals that had in place HMIS, there are also clear signs of under-utilization of databases that had been developed and some managers were not capable of or willing to analyze data for decision-making purposes. The main obstacle to implementation of the systems was lack of a functional centralised system for routine health data, and using individual patient tick-sheets for scanning. Some previous research

studies have discovered that if healthcare services do not adopt new information technology for additional support, they will be ineffective, and lose credibility among patients (Aggelidis and Chatzoglou, 2009; Lu et al., 2005; Ammenwerth et al., 2003). Therefore, information technology needs to be applied to healthcare services.

CHAPTER FIVE

SUMMARY OF FINDING, CONCLUSION AND RECOMMENDATIONS

5.1 Introduction of Findings

This chapter presents summary, conclusion and recommendations on the the influence of management information system on the performance of health programs in Kenya.

5.2 Summary of findings

This section presents the findings based on the objectives of the study.

5.2.1 Health Information Processing

The study revealed that all the necessary data is collected in most cases at the respondents hospitals. However there were no opportunities for most hospitals to acquire software, hardware and expertise in developing health management information systems and therefore remained with the basic information, which was continuously weeded. For the hospitals that had in place HMIS, there are also clear signs of under-utilization of databases that had been developed and some managers were not capable of or willing to analyze data for decision-making purposes. The main obstacle to implementation of the systems was lack of a functional centralised system for routine health data, and using individual patient tick-sheets for scanning.

The study established that 80% of the hospitals process information using computers whereas 20% of the hospitals process information manually. This leads to fast service and accuracy of patients information. Additionally, the most common software available in the computers was word processing with a frequency level of 26, followed by accounts programs with a frequency level of 26, Statistics analysis programs with a frequency level of 22, spreadsheets with a

frequency level of 18 and finally database management with a frequency level of 12. Therefore the respondents' organizations have a variety of software for their computers for the different tasks of the health programs.

The study also found out that the computers available at the hospitals were desktops, most (16) of the computer memory are DDR3 1333 MHz or PC310600/PC310666, followed by DDR3 1600 MHz or PC312800 (11), DDR3 1066 MHz or PC38500 (8) and finally DDR3 800 MHz or PC36400 (5). The type of memory does matter to the performance of a system, therefore the memories of the computers range from optimal to high speed and hence health information processing increases the performance of health programs. In addition to this, the study found out that the most common software available in the computers was word processing with a frequency level of 26, followed by accounts programs with a frequency level of 26, Statistics analysis programs with a frequency level of 22, spreadsheets with a frequency level of 18 and finally database management with a frequency level of 12. This depicts that the respondents' organizations have a variety of software for their computers for the different tasks of health programs. In relation to this, it was established that majority of the respondents were experienced in computers usage with, (17) of the respondents possessing medium experience in usage of the computers, 15 possess high experience in usage of the computers and the remaining 8 possess low experience in usage of the computers. This depicts that majority of the respondents know how to use the computers positively influencing performance of health programs.

The study further found out that cleanliness of computers was the most common protection and maintenance measure for the computers in the respondents organizations with a frequency level of 36, this was followed by security of computers (Anti-virus etc) with a frequency level of 33, burglary proofing with a frequency level of 20 and finally budget for computer services and

software with a frequency level of 18. This depicts that the computers are maintained to ensure the information processing is carried out properly.

The study further found out that the information processed is utilized in Review, Planning, and monitoring at health units (mean= 4.09) and the staff in charge of collecting the data understand what management decisions and activities are being supported or problems the HMIS is meant to help resolve (mean= 4.01). Respondents further implied that when setting up the HMIS the team members who are going to collect and use the data were involved (mean= 3.96), there are specific people allocated to fill the database sheets (mean=3.91), the staff in charge of collecting the data are given the necessary knowledge and skills to use the information collected at their level in order to improve their work (mean=3.87), The information processed is utilized in Tax assessment (mean=3.78), Training of users to be effective team members was adhered to (mean=3.75), the information processed is utilized in review of financial statement (mean=3.59) and The information processed is utilized for returns to DDHS office (mean=3.56). 82% of the respondents agreed that the state of data at the units was well managed whereas 18% of the respondents stated that the state of data at the units was fairly managed. This implies that information processed facilitates Review, Planning, and monitoring at health units as the state of data at the units was well managed.

5.2.2 Influence of Data Storage on Performance of Health Programs in Kenya.

The study found out that data was stored in computers and files and therefore data stored is secure and can be used for future reference hence improving the performance of health programs in Kenya. In relation to this, the study revealed that 68% of the hospitals were found to have a resource centre/library at the health unit while 32% of them did not. The kinds of resource centres were found to be filing cabinets and filing rooms.

The study went on to establish that the qualifications of the in-charge of the resource centre was information management. This implies that, having qualified staff in managing the HMIS data facilitated performance of health programs. Additionally, 88% of the respondents agreed that they send copies to the Resource Centre while 12% were not sure if that is the case. This depicts that the resource centre is usually updated with the current information. The study also established that weekly basis is the most common period respondents send copies to the resource centre with a frequency level of 36, this was followed by daily with a frequency level of 30, monthly with a frequency level of 22 and finally irregularly with a frequency level of 14. This implies that, most of the respondents send copies to the resource centre regularly.

The study established that, most (30%) respondents revealed that according to their records, the number of patients attending the hospital daily were 41-60, 20% of the respondents revealed that according to their records, the number of patients attending the hospital daily were 61-80, 18% of the respondents revealed that according to their records, the number of patients attending the hospital daily were 81-100, 15% of the respondents revealed that according to their records, the number of patients attending the hospital daily were 0-20, 10% of the respondents revealed that according to their records, the number of patients attending the hospital daily were 21-40 and finally 7% of the respondents revealed that according to their records, the number of patients attending the hospital daily were over 100. This shows that most of the hospitals serve over 20 patients daily and therefore proper record keeping is important.

The study further found out that the most common services offered at the respondents unit/hospital is Maternity Services with a frequency level of 39, this was followed by Out Patient Department (OPD) with a frequency level of 38, Ante Natal Clinic (ANC) with a frequency level of 37, Family Planning with a frequency level of 36, Admissions with a frequency level of 35,

Immunization with a frequency level of 34, Dental Services with a frequency level of 33, Laboratory Services with a frequency level of 28, Drug Dispensed with a frequency level of 26, Counselling with a frequency level of 24 and Outreach services with a frequency level of 18. In relation to this, it was established that 72% of the respondents hospitals store records of the above services while 28% did not. This depicts that HMIS supports a wide variety of functions in terms of type of information stored. The study further revealed that the kind of information that is stored included; demographic data, deliveries including TBAs Reports, Patient attendance's; disease condition/diagnostic, ANC attendance's, family planning attendance, immunization, health units population reports, physical inventory; equipment inventory; staff listing, financial, quarterly activities report; annual reports; and special events; and the health units monthly reports. Likewise the commonly mentioned sources of this health information were through recording of patients at the Reception Desk, Dental Room, Laboratory, Maternity Ward and In-patient Wards, Paediatric Wards; AIC clinic; TB Clinic; Dispensary and the Outreaches. Depending on the source, the data is filled in the patient's registers; Immunization Tally Sheets; Outreach Registers, In-patient Registers and TBAs, CBDA Reports. Information collection is through face to face interview with the clients.

The study went on to establish that to a great extent with dissemination of health-related information in storage; Provincial Epidemiological data is easily tracked (mean=4.21), Provincial Demographic data is easily tracked (mean=4.16), Donor requests is easily tracked (mean=4.12), National Epidemiological data is easily tracked and Out patient data is easily tracked (mean=4.09 each), Community requests are easily tracked (mean=4.08), Human resource data is easily tracked (mean=4.07), Political manifestos are easily tracked and Provincial financial data is easily tracked (mean=4.03 each), Inpatient data is easily tracked (mean=4.02), Malnutrition is

easily tracked (mean=4.00). They also agreed that Provincial archives/ Databases are easily tracked and Provincial inventory data is easily tracked (mean=3.99 each), National Health indicators are easily tracked (mean=3.97), Notifiable disease data is easily tracked, Mortality rates are easily tracked and Infectious diseases are easily tracked (mean=3.96), Clinic data is easily tracked (mean=3.88), Provincial health indicators are easily tracked and Antibiotic resistant organisms are easily tracked (mean=3.86), National Demographic data is easily tracked (mean=3.79), Emerging infections are easily tracked (mean=3.78) and Biomedical supplies and distribution data is easily tracked (mean=3.65). This implies that dissemination of health-related information in storage influences the performance of health programs in Kenya with Provincial Epidemiological data being the most easily tracked.

5.2.3 Health Information Accessibility

The study revealed that the hospital staff use the resource Centre and occasionally researchers in the government hospitals. This depicts that stored information is utilized by the hospital staff as expected and not outsiders therefore the possibilities of tampering with it were greatly reduced. The study also found that there was information sharing in the hospitals as 65% of the respondents agreed that there was willingness to share data by the staff in charge, 20% stated the staff in charge were very willing to share data and 15% stated the staff in charge were not willing to share data.

The study also found out that management and in-charges at the health units were the most common utilizers of health information with a frequency level of 40 each, this was followed by the health subdistrict with a frequency level of 36, the DDHS office with a frequency level of 28,

and the ministry of health with a frequency level of 22. This illustrates that health information is mainly utilized in the health sector.

The study further found out that the Ministry of Health was the most common stakeholder that the respondents send returns to with a frequency level of 36, followed by DDHS's office with a frequency level of 32, Health Sub District with a frequency level of 28 and finally Community level with a frequency level of 18. This depicts that the hospitals send returns to various stakeholders especially the ministry of health and this facilitates planning of health services.

Moreover, the study established that the Ministry of Health was the most common stakeholder that the respondents get feedback from with a frequency level of 32, followed by DDHS's office with a frequency level of 28, Health Sub District with a frequency level of 22 and finally Community level with a frequency level of 14. This depicts that the hospitals receive feedback from various stakeholders especially the ministry of health and this facilitates monitoring, evaluation and planning of health services. The study also found out that the respondents finally put the data sheets in files and enter into a computer. This depicts that, data is stored both manually and in soft copy.

The study established that MIS strongly influences the performance of health programs in Kenya by; The system enables conducting of regular supervision on the implementation of the HMIS in the district (mean=4.39), The system enables budgeting for HMIS activities (mean=4.32), The system enables review of significant issues to be followed up with individual health units (mean=4.28), The system enables efficient utilisation of resources (mean=4.21), The system enables decline in health sector expenditure (mean=4.19), HMIS is one of the most important tools needed for the prevention and control of diseases because it gives information critical for

planning, monitoring and evaluation of services (mean=4.09), The system enables provision of feedback to reporting Health Institutions and to the Ministry; The system introduces the indicators to the politicians and administrators on the district and give them regular reports (mean= 4.06), The system enables provision of information on magnitude of health invents, monitoring risk factors and disease trends (mean=4.03), The system enables decreasing burden of disease and rapid population growth (mean=4.01), The system enables improving poverty levels (mean 4.00). They also agreed that; The system enables adequate management skills at the district level, The system enables updated health laws and The system enables outbreak investigation (mean=3.99 each), The system enables equitable management information systems (mean=3.96), The system enables dissemination of information (mean=3.89), The system enables centralized decision making (mean=3.76) and The system enables rapid reporting of notifiable diseases (mean=3.69).

This implies that the system enables conducting of regular supervision on the implementation of the HMIS in the district.

5.3 Conclusion

Based on the above review of findings, the study made the following conclusions;

5.3.1 Health Information Processing

All the necessary data is collected in most cases at the respondents hospitals. However there were no opportunities for most hospitals to acquire software, hardware and expertise in developing health management information systems and therefore remained with the basic information, which was continuously weeded. For the hospitals that had in place HMIS, there are also clear signs of under-utilization of databases that had been developed and some managers

were not capable of or willing to analyze data for decision-making purposes. The main obstacle to implementation of the systems was lack of a functional centralised system for routine health data, and using individual patient tick-sheets for scanning.

80% of the hospitals process information using computers whereas 20% of the hospitals process information manually. This leads to fast service and accuracy of patients information. Additionally, the most common software available in the computers was word processing, followed by accounts programs, Statistics analysis programs, spreadsheets and finally database management. Therefore the respondents' organizations have a variety of software for their computers for the different tasks of the health programs.

The computers available at the hospitals are desktops, most (40%) of the computer memory are DDR3 1333 MHz or PC310600/PC310666, followed by DDR3 1600 MHz or PC312800 (28%), DDR3 1066 MHz or PC38500 (20%) and finally DDR3 800 MHz or PC36400 (12%). The type of memory does matter to the performance of a system, therefore the memories of the computers range from optimal to high speed and hence health information processing increases the performance of health programs. In relation to this, it was concluded that majority of the respondents know how to use the computers positively influencing performance of health programs.

The cleanliness of computers was the most common protection and maintenance measure for the computers in the respondents organizations, this was followed by security of computers (Anti-virus etc), burglary proofing and finally budget for computer services and software. This depicts that the computers are maintained to ensure the information processing is carried out smoothly.

The study also concluded that information processed facilitates Review, Planning, and monitoring at health units as the state of data at the units was well managed.

5.3.2 Influence of Data Storage on Performance of Health Programs in Kenya.

The data was stored in computers and files and therefore data stored is secure and can be used for future reference hence improving the performance of health programs in Kenya. In relation to this, the study concluded that 68% of the hospitals were found to have a resource centre/library at the health unit while 32% of them did not. The kinds of resource centres were found to be filing cabinets and filing rooms.

The qualifications of the in-charge of the resource centre was information management. This implies that, having qualified staff in managing the HMIS data facilitated performance of health programs. Additionally, 88% of the respondents agreed that they send copies to the Resource Centre while 12% were not sure if that is the case. This depicts that the resource centre is usually updated with the current information. The study also concluded that weekly basis is the most common period respondents send copies to the resource centre, this was followed by daily, monthly and finally irregularly. This implies that, most of the respondents send copies to the resource centre regularly.

The highest number of patients attending the hospital daily were 41-60. This shows that most of the hospitals serve over 20 patients daily and therefore proper record keeping is important. The study further concluded that the most common services offered at the respondents unit/hospital is Maternity Services, this was followed by Out Patient Department (OPD), Ante Natal Clinic (ANC), Family Planning, Admissions, Immunization, Dental Services, Laboratory Services, Drug Dispensed, Counselling and Outreach services. In relation to this, it was concluded that

72% of the respondents hospitals store records of the above services while 28% did not. This depicts that HMIS supports a wide variety of functions in terms of type of information stored.

The kind of information that is stored included; demographic data, deliveries including TBAs Reports, Patient attendance's; disease condition/diagnostic, ANC attendance's, family planning attendance, immunization, health units population reports, physical inventory; equipment inventory; staff listing, financial, quarterly activities report; annual reports; and special events; and the health units monthly reports. Likewise the commonly mentioned sources of this health information were through recording of patients at the Reception Desk, Dental Room, Laboratory, Maternity Ward and In-patient Wards, Paediatric Wards; AIC clinic; TB Clinic; Dispensary and the Outreaches. Depending on the source, the data is filled in the patient's registers; Immunization Tally Sheets; Outreach Registers, In-patient Registers and TBAs, CBDA Reports. Information collection is through face to face interview with the clients.

To a great extent dissemination of health-related information in storage influences the performance of health programs in Kenya with Provincial Epidemiological data being the most easily tracked.

5.3.3 Health Information Accessibility

The hospital staff use the resource Centre and occasionally researchers in the government hospitals. This depicts that stored information is utilized by the hospital staff as expected and not outsiders therefore the possibilities of tampering with it were greatly reduced. The study also concluded that there was information sharing in the hospitals as 65% of the respondents agreed that there was willingness to share data by the staff in charge, 20% stated the staff in charge were very willing to share data and 15% stated the staff in charge were not willing to share data.

The management and in-charges at the health units were the most common utilizers of health information, this was followed by the health subdistrict a, the DDHS office and the ministry of health. This illustrates that health information is mainly utilized in the health sector.

The Ministry of Health was the most common stakeholder that the respondents send returns to, followed by DDHS's office, Health Sub District and finally Community level. This depicts that the hospitals send returns to various stakeholders especially the ministry of health and this facilitates planning of health services.

The Ministry of Health was the most common stakeholder that the respondents get feedback from, followed by DDHS's office, Health Sub District and finally Community level. This depicts that the hospitals receive feedback from various stakeholders especially the ministry of health and this facilitates monitoring, evaluation and planning of health services. The study also found out that the respondents finally put the data sheets in files and enter into a computer. This depicts that, data is stored both manually and in soft copy.

MIS strongly influences the performance of health programs in Kenya as the system enables conducting of regular supervision on the implementation of the HMIS in the district.

5.4 Recommendations

From the study findings and conclusions, the following recommendations are made:

Health offices should provide stationery and other related scholastic materials. Facilitation in data collection in form of counter books and monthly summary forms should be done. In addition, health fuctions should be devoled to counties as well as reproductive health, child health programs.

There is need to establish record offices/resource centres at all health centres. Emphasis should be on the use of excel template sheets for accurate and standard data for efficiency

The government should take the initiative to recognize the work and assistance private health units' render to the public, especially in areas where services by government health units are inadequate. Private practitioners should be included in the HMIS system process.

Health workers should be trained in data management including the private practice staff. The staff in charge of collecting the data should be given the necessary knowledge and skills to use the information collected at their level in order to improve their work. They need to understand what management decisions and activities are being supported or problems the HMIS is meant to help resolve. Sensitization and training workshops should be organized. All the people handling records at the health units should be trained and motivated. The staff registrars should also be trained to know importance of HMIS. Community leaders should be aware of the situation because they are "our eyes in the community". They should be mobilized to appreciate and utilize the system. For the HMIS system to improve, there should be adequate stationery and if possible a computer to ease the analysis of data.

There should be follow up in form of support supervision. These follow-ups should be to all the health units including the private clinics and drug shops. This will encourage the staff to stick to standard, update, fill the forms accordingly, and to report accurately and in time.

Success of the HMIS depends upon the input of each individual health worker at each level. Integrating all existing health programmes and the general administration of the health unit will ensure that common information (and the work involved in the collection and processing) is not duplicated and is in fact shared without wasting limited resources. All information should be

collected for the explicit purpose of decision-making at the health unit level, i.e., the system will provide functional information at the level of collection.

HMIS should have access to online users in an authenticated manner (read only) to allow monitoring and evaluation for program data and commodity tracking. There should be the interconnection of various databases for easy overall forecasting by program heads and decision making.

5.5 Areas for further research

Since research on Health Management Information Systems is quite a new and complex area, it is recommended that other detailed studies be carried out to determine the status of Health management systems countrywide. Other areas that need in-depth research include:

An analysis of the dissemination of HMIS data and the actual applicability and utilisation of the data generated;

An assessment of the health data collecting instruments and formats with regards to whether they capture management information;

An analysis of the cost of the data transmission mechanism and whether it is cost effective in terms of data transfer and compilation at all necessary levels of the process;

Since research on Health Management Information Systems is quite a new and complex area, it is recommended that other detailed studies be carried out to determine the status of Health management systems countrywide;

Mechanisms for improved and sustained transmission of health information for communities and the stakeholders in health care management systems;

Lastly an assessment of communication linkages within the HMIS.

Due to limited time available to carry out the research, the above areas were not comprehensively studied to provide a national wide picture. This would be an important area because policy makers and implementers argue that the effectiveness of HMIS can only be resolved by providing them with research action points based on empirical data.

REFERENCES

- Aiga, H., et al. (2008). *The reality of health information systems: challenges for standardization*. Bioscience Trends, 2(1): p. 5-9.
- Bates, B. R. (2005). "Sustainable health: a new dimension of sustainability science." Proceedings of the National Academy of Sciences, Vol. 104, No. 41, 2005, p. 15969.
- Braa, J., Hanseth, O., Heywood, A., Mohammed, W., & V. Shaw. (2007). "Developing health information systems in developing countries: the flexible standards strategy." MIS Quarterly, Vol. 31, No. 2, 2007, pp. 381-402.
- Braa, J., Macome, E., Mavimbe, C., & Jose, B. (2004). A study of the actual and potential usage of information and communication technology at district and provincial levels in Mozambique with a focus on the health sector. The Electronic Journal on Information Systems in Developing Countries. 5, 1–29. Available on-line at <http://folk.uio.no/patrickr/refdoc/Mozambique.pdf>
- Braa, J., et al., Developing health information systems in developing countries: the flexible standards strategy. MIS Quarterly, 2007. 31(2): p. 381-402.
- Chaudhry, B., Wang, J., Wu, S., Maglione, M., Mojica, W., Roth, E., Morton, S. C., & P. G. Shekelle. (2006). "Systematic Review: Impact of Health Information Technology on Quality, Efficiency, and Costs of Medical Care." Annals of Internal Medicine, Vol. 144, No. 10, 2006, pp. 742-752.

- Chen, Y-C., & J. L. Perry. (2006). "Global healthcare crises: how information technology can address pandemics and disasters." IBM Report, 2006.
- 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.
- Cibulskis, R.E. and Hiawalyer, G. (2002). Information systems for health sector monitoring in Papua New Guinea. *Bulletin of the World Health Organization*, 80(9): p. 752.
- Engeström, Y. (2001). Expansive learning at work: toward an activity theoretical reconceptualization. *Journal of Education and Work*, 14(1), 133-156.
- Eysenbach, G., & Wyatt, J. (2007). Using the internet for surveys and health research. *Journal of Medical Internet Research* 4(2), e13. Retrieved May 18, 2007, from www.pubmedcentral.nih.gov/articlerender.fcgi?pmid=12554560
- Fraser, B., Wang, J., Wu, S., Maglione, M., Mojica, W., Roth, E., Morton, S. C., & P. G. Shekelle. (2005). "Systematic Review: Impact of Health Information Technology on Quality, Efficiency, and Costs of Medical Care." *Annals of Internal Medicine*, Vol. 144, No. 10, 2005, pp. 742-752.
- Gladwin, J., Dixon, R., Wilson, T., (2000), Using external training materials to strengthen health information management in East Africa, *Information Research*, Vol. 5 No. 4, July.
- Gladwin, J., R.A. Dixon, and T.D. (2003). Wilson, Implementing a new health management information system in Uganda. *Health Policy and Planning*, 18(2): p. 214-224.
- Hammond, W.E., et al. (2010). *Connecting information to improve health*. *Health Affairs*, 29(2): p. 284-288.

- Heeks, R. (2006). Health information systems: Failure, success and improvisation. *International Journal of Medical Informatics*, 75(2): p. 125-137.
- Hillestad, A., Riedl, M., Kastner, P., Schreier, G., & B. Ludvik. (2005). "Feasibility of a mobile phone-based data service for functional treatment of type 1 diabetes mellitus patients." *Journal of Medical Internet Research*, Vol. 9, No. 5, 2007, p. e36. doi:10.2196/jmir.9.5.e36
- Hotchkiss, D., et al. (2010). *Evaluation of the Performance of Routine Information System Management(PRISM) framework: evidence from Uganda*. *BMC Health Services Research*, 10(1): p. 188.
- Hurtubise, R. (1984). *Managing Information Systems: Concepts and Tools*. West Hartford CT: Kumarian Press.
- Information for Development Program. (2003). *Voxiva: A voice portal for health*. Retrieved November 7, 2009, from www.sustainableicts.org/infodev/Voxiva.pdf
- Jha, A., Ly, O., Lovis, C., & L'Haire, J. (2006). *Telemedicine in Western Africa: Lessons learned from a pilot project in Mali, perspectives and recommendations*. Paper presented at the American Medical Informatics Association Annual Symposium, Washington, D.C.
- Kaptelinin, V. & Nardi, B.A. (2006). *Acting with technology*. Cambridge, MA: MIT Press.
- Kellenberger, E. (2004). [The evolution of molecular biology](#). *EMBO reports*, 5(6), 546-549.

- Kuhn, K. A., Giuse, D. A., (2001). From Hospital Information Systems to Health Information Systems Problems, Challenges, Perspectives. Institute of Medical Informatics.
- Kuutti, K. (1995). Activity theory as a potential framework for human-computer interaction research. In B.A. Nardi (Ed.), *Context and consciousness* (pp. 17-44). Cambridge, MA: MIT Press.
- Kwankam, S. Y. (2004). "What e-health can offer." *Bulletin of the World Health Organization*, Vol. 82, No. 10, 2004, pp. 800-801.
- Leont'ev, A. N. (1978). [*Activity, consciousness, and personality*](#). Retrieved 23 August, 2012 from <http://www.marxists.org/archive/leontev/works/1978/index.htm> (Archived by WebCite® at <http://www.webcitation.org/5IWYmOhTm>)
- Lippeveld, T. (2001). Routine Health Information Systems: The Glue of a Unified Health System. In: The RHINO workshop on issues and innovation in routine health information in developing countries, The Bolger Center, Protomac, MD, USA 14-16 March 2001. Arlington, VA 22209, USA: MEASURE Evaluation, JSI Research and Training Institute, 13-27.
- Lippeveld, T., Sauerborn, R., and Bodart, C., eds., (2000). Design and implementation of health information systems. Geneva: World Health Organisation.
- Miller, R. H., West, C., Brown, T. M., Sim, I., & Ganchoff,. "The Value of Electronic Health Records in Solo or Small Group Practices." *Health Affairs*, Vol. 24, No. 5, 2005, pp. 1127-1137.

Mursu, A., Luukkonen, I., Toivanen, M. & Korpela, M. (2007). [Activity theory in information systems research and practice: theoretical underpinnings for an information systems development model](#). *Information Research*, **12**(3), paper 311. Retrieved 23 August, 2012 from <http://informationr.net/ir/12-3/paper311.html> (Archived by WebCite® at <http://www.webcitation.org/5um42oLJv>)

Ongalo, S. A. (2012). Influence of computerized health management information system on service delivery: a case of health institutions within Nairobi, Kenya.

Shrestha, L.B. and Bodart, C. (2000). Data transmission, data processing, and data quality. In: Lippeveld, T., Sauerborn, R., and Bodart, C., eds. *Design and Implementation of Health Information Systems*. Geneva: World Health Organisation, 128-145.

Wilson, T.D. (2008). Activity theory and information seeking. *Annual Review of Information Science and Technology*, **42**, 119-161.

World Health Organization, 2004-2007. "Strategy 2004-2007 eHealth for Health-care Delivery." http://www.who.int/eh/eh/en/eHealth_HCD.pdf

World Health Organization (WHO). "Macroeconomics and health: investing in health for economic development." Report of the Commission on Macroeconomics and Health (Chaired by Jeffrey D. Sachs), 2001.

World Health Organization. "Building foundations for ehealth." Progress of Member States, Report of the WHO Global Observatory for ehealth, 2006. http://www.who.int/goe/publications/bf_FINAL.pdf

APPENDIX I: LETTER OF TRANSMITTAL

Steve Murimi Njagi

University of Nairobi

Department of Extra-Mural Studies

Tel:

Email:

17/07/2014

To my Respondent,

Dear Sir/Madam,

RE: REQUEST FOR YOUR PARTICIPATION

I am a postgraduate student at the University of Nairobi, carrying out a research study on the influence of management information system on the performance of health programs in Kenya. The results of this study will assist policy makers in designing policies that will enhance health programmes reforms through effective management information systems practices as a new concept for efficient and effective health care delivery. The feedback obtained from the respondents maybe used as a measurement scale to assess the influence of management information system on the performance of health programs in Kenya.

I humbly request that you participate in this study by filling in the attached questionnaire appropriately. The information to be obtained will be purely for the research study and identity of respondents will be strictly confidential. Thank you for your participation.

Yours faithfully,

Steve Murimi Njagi

APPENDIX II: QUESTIONNAIRE

Instructions

Tick in the appropriate box.

Where necessary give a brief description in the space provided.

SECTION A: GENERAL INFORMATION

1. What is your job title _____

2. What is your Gender? Male [] Female []

3. In what age bracket do you fall?

a) 18 – 25 []

b) 26 – 35 []

c) 36 – 45 []

d) 46 – 55 []

e) 56 and above []

4. How long have you worked for your hospital?

a. 1 – 12 months []

b. 1 – 3 years []

c. 4 – 7 years []

d. 8 – 12 years []

e. 13 years and above []

5. What is your job category?
- a. Senior Management []
 - b. Middle Level Management []
 - c. Other employees []

SECTION B: Health Information Processing

6. Is all the necessary data collected? Yes [] No []

7. What problems if any are encountered in data collection?

.....

8. How is the information processed? Manual [] Computerized []

If Computerized:

- a) How many and what types of computers are available?.....

.....

- b) Capacity of computers:

Hard disk space []

Random Access Memory (RAM) []

- c) What software and versions available?

Word Processing []

Spreadsheets []

Database Management []

Statistics analysis programs []

Accounts programs []

d) What is the experience in usage of the computers?

Bad [] Low [] Medium [] High []

e) Are the computers protected and maintained?

Security of computers (Anti-virus etc) []

Burglary proofing []

Cleanliness of computers []

Budget for Computer services and software []

9. To what extent do you agree with the following statement on Health Information

Processing; where 1= strongly disagree, 2= disagree, 3= neutral, 4= agree and 5= strongly

agree.

Statements	1	2	3	4	5
When setting up the HMIS the team members who are going to collect and use the data were involved					
The staff in charge of collecting the data are given the necessary knowledge and skills to use the information collected at their level in order to improve their work					
The staff in charge of collecting the data understand what management decisions and activities are being supported or problems the HMIS is meant to					

Training of users to be effective team members was adhered to					
There are specific people allocated to fill the database sheets					
The information processed is utilized in Review, Planning, and monitoring at health units					
The information processed is utilized for returns to DDHS office					
The information processed is utilized in Tax assessment					
The information processed is utilized in review of financial statement					

10. In your opinion what is the state of data at the units

Well managed []

Fairly managed []

Poorly managed []

SECTION C: How Health Data Storage Influence Performance of Health Programs in Kenya.

11. How is the data stored?.....

12. Is there a resource centre/library at the health unit? Yes [] No []

If yes, What type of resource centre is there?.....

13. What are the qualifications of the in-charge of the resource Centre?

.....

14. Do you send copies to the Resource Centre?

YES [] NO []

If yes how often?

Monthly [] When we fill like [] Irregularly []

15. How many patients attend daily according to your records?

0-20 []

21-40 []

41-60 []

61-80 []

81-100 []

Over 100 []

16. What services do you offer at the unit []

OPD []

ANC []

Maternity Services []

Admissions []

Family Planning []

Dental Services []

Lab. Services []

Drugs Dispensed []

17. Are there records of above services YES [] NO []

18. What kind of information is stored.....

19. What are the sources of the information collected?

HMIS

- a. Rumours []
- b. Informal discussions with officials or community members []
- c. Personal experiences []
- d. Education []
- e. Common sense []
- f. Intuition []
- g. Knowledge of the political and social situation in a community []
- h. Universities []
- i. Non-government agencies []
- j. Churches []
- k. Reports and statistics that the health teams are gathering directly or from other organizations []

20. To what extent do you agree on the following statement in regard to the dissemination of health-related information in storage on the performance of health programs in Kenya; where 1= strongly disagree, 2= disagree, 3= neutral, 4= agree and 5= strongly agree.

Statements	1	2	3	4	5
Emerging infections are easily tracked					
Antibiotic resistant organisms are easily tracked					
Infectious diseases are easily tracked					
Mortality rates are easily tracked					

Malnutrition is easily tracked					
Inpatient data is easily tracked					
Out patient data is easily tracked					
Clinic data is easily tracked					
Notifiable disease data is easily tracked					
Provincial inventory data is easily tracked					
Provincial financial data is easily tracked					
Provincial Epidemiological data is easily tracked					
National Epidemiological data is easily tracked					
Provincial Demographic data is easily tracked					
National Demographic data is easily tracked					
Provincial health indicators are easily tracked					
National Health indicators are easily tracked					
Provincial archives/ Databases are easily tracked					
Political manifestos are easily tracked					
Community requests are easily tracked					
Donor requests is easily tracked					
Human resource data is easily tracked					
Biomedical supplies and distribution data is easily tracked					

SECTION D: Health Information Accessibility

21. Who uses the resource Centre?

Staff [] Researchers [] Public []

22. Willingness to share data?

Very willing [] willing [] Not willing []

23. Who utilizes the information?

In-charges at the Health units []

The Health Sub-district []

The DDHS office []

Ministry of Health []

Other.....

24. Do you send returns to the following:

a) Community level YES [] NO []

b) Health Sub District YES [] NO []

c) DDHS's office YES [] NO []

d) Ministry of Health YES [] NO []

25. Do you get feedback from the:

a) Community level YES [] NO []

b) Health Sub District YES [] NO []

c) DDHS's office YES [] NO []

d) Ministry of Health YES [] NO []

26. Where do you finally put the data sheets?

- a) Store []
- b) Destroy []
- c) Sell off []
- d) Enter into a computer []

SECTION F: Influence of MIS on the Performance of Health Programs in Kenya.

27. To what extent do you agree with the following statement on the Influence of MIS on the Performance of Health Programs in Kenya; where 1= strongly disagree, 2= disagree, 3= neutral, 4= agree and 5= strongly agree.

Statements	1	2	3	4	5
The system enables rapid reporting of notifiable diseases					
The system enables dissemination of information					
The system enables outbreak investigation					
The system enables provision of information on magnitude of health invents, monitoring risk factors and disease trends.					
HMIS is one of the most important tools needed for the prevention and control of diseases because it gives information critical for planning, monitoring and evaluation of services.					
The system enables decline in health sector expenditure					
The system enables efficient utilisation of resources					
The system enables centralized decision making					
The system enables equitable management information systems					
The system enables updated health laws					
The system enables adequate management skills at the district level					
The system enables improving poverty levels					
The system enables decreasing burden of disease and rapid population growth.					

The system enables provision of feedback to reporting Health Institutions and to the Ministry; The system introduces the indicators to the politicians and administrators on the district and give them regular reports					
The system enables review of significant issues to be followed up with individual health units;					
The system enables budgeting for HMIS activities					
The system enables conducting of regular supervision on the implementation of the HMIS in the district.					