

**CLINICIANS USER SATISFACTION WITH PAPER-BASED PATIENT
INFORMATION SYSTEM IN KENYATTA NATIONAL HOSPITAL AND
MBAGATHI COUNTY HOSPITAL, NAIROBI, KENYA**

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REG. NO. P57/PT/12214/09

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REQUIREMENTS FOR THE AWARD OF THE DEGREE OF MASTER OF
SCIENCE IN HEALTH INFORMATION MANAGEMENT IN THE SCHOOL OF
PUBLIC HEALTH OF KENYATTA UNIVERSITY**

MARCH, 2016

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DECLARATION

This thesis is my original work and has not been presented for a degree in any other University or any other award.

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DEDICATION

To my mum Elizabeth Wambui and my late dad Charles Ndung'u.

To my loving children Lawrence and Wesley, Nelly and Shola, Charles and Ady, Moses, and Jemy, Salma and Ian.

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First and foremost I am grateful to God who favored me with physical and mental health and for providing all that I needed to successfully complete the entire project.

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DEFINITION OF TERMS

Clinicians:	Doctor (medical officers/specialists), Dentists, and Clinical officers.
Computer-based patient information system:	This refers to electronic health Record (EHR) or electronic medical record (EMR) where information is keyed into a computer through the keyboard.
Paper-based patient information systems:	The system is used to describe the traditional medical record that consists of entirely handwritten records.
Perceived ease of use:	The degree to which a user believes that using a particular system would be free from effort.
Perceived usefulness:	The degree to which a user believes that using a particular system would enhance his or her job performance.
User satisfaction:	The opinion of the user about a specific information system that they use.

ABBREVIATIONS AND ACRONYMS

EHR	Electronic Health Record
EMR	Electronic Medical Record
ERC	Ethical Research Committee
EUCS	End User Computer Satisfaction
FDG	Focus Group Discussion
IS	Information System
KI	Key Informant
KMTC	Kenya Medical Training College
KNH	Kenyatta National Hospital
KU	Kenyatta University
MCH	Mbagathi County Hospital
MR	Medical Record
MRD	Medical Record Department
NCSTI	National Council of Science and Technology and Innovation
PEOU	Perceived Ease of Use
PIS	Patient Information System
PU	Perceived Usefulness
SPSS	Statistical Package for Social Sciences
UON	University of Nairobi
U.S.	United States
WHO	World Health Organization
IOM	Institute of Medicine
DHHS	Department of Health and Human Services
MDGs	Millennium Developmental Goals

ONC	Office of the National Coordinator
HIV	Human Immunosuppressant Virus
NHIIH	National Health Information Network
UIS	User Information Satisfaction

ABSTRACT

User satisfaction with paper-based information system is a subjective evaluation of the various individual, organizational, and societal consequences of information systems use. Despite the widespread use, the need to identify the extent to which clinicians are satisfied with the patient information systems in health institutions is still necessary. The purpose of this study was therefore to investigate the clinicians' (doctors, dentists and clinical officers) user satisfaction with paper-based patient information systems in Kenyatta National Hospital (KNH) and Mbagathi County Hospital (MCH).The specific objectives were: To determine the proportion of clinicians who were satisfied, to determine the influence of user characteristics, to determine the organizational characteristics that influenced satisfaction and to determine the influence of information quality to clinicians satisfaction. This was a cross sectional descriptive study. The two hospitals were purposively selected. The study employed stratified random sampling. Probability proportionate to size sampling of the clinicians was done and simple random sampling was done to identify the respondents. Data collection tools employing both quantitative and qualitative parameters were used in this study. Questionnaire was pre-tested in Mathari Hospital and thereafter refined accordingly. Data was obtained from 190 clinicians using self-administered questionnaires, FGDs and KI interviews to provide in-depth information. Data was analyzed by SPSS Version 16.0 and the results of the findings presented in form of figures and tables while association between variables was assessed using chi square statistics. The findings showed that clinician's satisfaction was at 15.3%. Age ($\chi^2=42.079$, $df=3$, $p=.000$), years worked ($\chi^2=41.973$, $df=4$, $p=.000$), education ($\chi^2=4.518$, $df=1$, $p=0.034$), designation ($\chi^2=23.385$, $df=3$, $p=.000$) was statistically significant to clinicians user satisfaction. Overall organizational characteristics ($\chi^2=6.409$, $df=1$, $p=.011$) and information quality dimensions ($p<.01$) was statistically significant in relation to clinician's user satisfaction. The study therefore showed need to address factors that contribute to very low clinicians' satisfaction level with paper based patient information systems. Findings of this study will be used by policy makers to develop policy on information systems to ensure that clinicians' requirements are met.

CHAPTER ONE: INTRODUCTION

1.1: Background of the study

For a long time, health information systems have been a topic of interest for researchers and practitioners both nationally and internationally. The reason behind this is the fact that people have an expectation that information systems can contribute to higher quality and more efficient health services. In spite of this expectation, studies on clinician's user satisfaction with paper-based information system have lacked the consideration it deserves even as many health institutions migrate to Electronic Medical Records (EMR) (Blumenthal et al., 2010). Globally, studies seem to concentrate more on comparative studies between paper-based records versus computerized medical records or user satisfaction with the newly implemented electronic records. For example in 2003, a study of a Norwegian hospital deprived of paper records indicated that there was high use mostly in tasks where the users had no choice but to use EMR since paper-based records no longer existed (Cohen, (2010).

The information system in any health organization is an important aspect of quality medical care. The information system needs to meet the requirements (present and future) of the clinicians using it. Clinicians will value an information system that will timely avail patient's records to enable him/her provide the required service to the patient especially in emergency situations (U.S. Department of Health and Human Services, 2006).

Studies in patient information systems in both developed and developing countries indicate that due to the complexity of the health sectors, it has not been easy to have standardized information systems that will meet the requirements of each user. However,

documented studies indicate that developing countries lag behind the developed countries in the management of their health information systems (WHO, 2004).

In Kenya, public health care system delivers the largest share of the health services. The health care system is organized in multi-tiered referral pyramid. At the bottom of the pyramid are dispensaries and health centers responsible for providing primary health care and in-patient services mainly maternity services at health centers. Above this level are the sub-district and district hospitals. Provincial general hospitals form another tier of the health care system. At the top of the pyramid are the national hospitals, which function as tertiary care of referral facilities, professional training and medical research. The national hospitals include; Kenyatta National Hospital (KNH), Moi Teaching and Referral Hospital (MTRH), Mathari Referral Hospital (MRH) and Spinal Injury Referral Hospital (SIRH) (Ministry of Health, 2005).

Kenya has a long history of health sector reform. In 1972 the Ministry of Health (MoH), World Health Organization (WHO), Central Bureau of Statistics (CBS) and the Attorney General Chambers (AGC) formed a committee to design a Health Information System (HIS) for Kenya. In 1984, in response to the national Policy on District focus for rural development, the ministry of health decentralized its reporting activities by establishing Health Information offices in all districts where all health data from all health facilities would be processed. The Health Sector Strategic Plan I (1999-2004), articulated the ministry's strategy to strengthen its coordination function with the private sector and non-government organizations in health care delivery. Proper design and implementation of integrated health information systems was critical.

Based on National Policy framework (1999-2010), implementation plans (1996), HMIS Needs assessment report (2003) and the National Health Sector Strategic Plan II (NHSSP II) (2005-2010), outlined are the areas that required immediate attention. These included provision of integrated data, collection and reporting tools, improvement of data flow mechanisms, support districts in supportive supervision, provide clear policy guidelines on HIS and improve feedback mechanisms at all levels. Investing in the development of effective health information systems would have multiple benefits and would enable decision makers at all levels.

The Ministry of Health (MoH) has a very fragmented information system. At the region level where provincial systems exist the information is equally fragmented and designed to provide information to centrally managed provincial health service units and hospitals. At the central level, it is acknowledged that there are a number of stand-alone information systems which operate within the ministry. Each system tends to support a vertical reporting function and there is no horizontal integration. As a result essential information is largely unavailable for effective planning, monitoring and evaluation either at district, provincial or national level (Odhiambo, G. (2005).

Hospitals deal with life and death of patients. Good medical care relies on good patient record keeping. The patient medical record is vital to the care of the patient as it is a communication tool between all individuals involved in the patient care and provides a documented account of the episode to aid clinicians' memories (Slee, Slee & Schmidt, 2000). Without accurate, comprehensive up-to-date and accessible case notes, clinicians may not be able to offer the best treatment or may indeed misdiagnose a condition, which can have serious consequences. Good records also provide evidence of the hospital's

accountability for its actions and they form key data for medical research and statistical reports (Dolton & Gerry, 2004).

Healthcare is one of the world's largest and fastest growing industries, consuming a substantial proportion of labor force and receiving a good deal of patronage from the customers referred to in the health industry as patients (Dolton & Gerry, 2004). Accompanying the high utilization of medical services has been the concern for measures aimed at safeguarding and promoting patient rights to quality healthcare. Good health care relies on well trained personnel and on high quality facilities and equipment's. Good health care also relies on patient information systems that provide accessible, accurate and timely information to support the treatment given by clinicians (Slee, Slee & Schmidt, 2000). The World Health Organization (2004) stated that an effective healthcare system is the cornerstone of safe practice within hospital and other healthcare organizations.

Accordingly, several developed and developing countries have developed nation-wide information reporting systems to monitor and analyze patient data (Rai, et al., 2002). User satisfaction is generally regarded as one of the most important measures of information systems success. There has been considerable research devoted to establishing a standard user satisfaction instruments since the 1980s (Ives et al., 1983; Bailey & Pearson, 1983; Baroudi, et al., 1996; Benson, 1983). In 1988, Doll and Torkzadeh developed and validated a Satisfaction instrument. This instrument had five components: content, accuracy, format, ease of use, and timeliness. Doll and Torkzadeh's instruments are widely accepted measures worldwide of user satisfaction

that has been validated by other researchers (Seddon & Kiew, 1994; McHanney et al., 1998, 2000; McHanney et al., 1999).

Hussein (2003) did a study in Malaysia on the influence of organizational factors on information system success particularly in public sector organizations. One of the highly significant contributions in the literature of the study was the model done by DeLone and McLean (1992) which resulted in a proposed information systems success model. The model stated that some organizational characteristics as well as user characteristics may also influence the success of information systems. The model has since become instrumental towards contributing to a universal model which many employ when looking at information systems performance. Further attempts have been made to produce enhanced validating or improving the tools, for example, Seddon and Kiew, (1994); Rai et al., (2002). In validating their proposed information system model, Rai et al., (2002) made use of six dimensions namely: system use, system quality, user satisfaction, information quality, individual impact and organizational impact. The model was updated in 2003 for use in a health system study. The authors pointed out the gap in previous information system studies as being the lack of understanding the impact of user and organizational dimensions.

The current study used a modified measurement instrument from the model of Doll and Torkzadeh (1988) to investigate the factors that may influence clinician's user satisfaction with paper-based patient information systems in Kenyatta National Hospital (KNH) and Mbagathi County Hospital (MCH).

1.2: Problem Statement

Every patient has the right to quality health care at all times. This care depends on competence of personnel and on good medical records keeping. The clinicians depend on timely and accurate clinical information that would support the provision of quality health care and clinical decision-making (WHO, 2004). In Kenya the health information system is fragmented. As a result of this fragmentation, essential information is largely unavailable for effective planning, monitoring and evaluation either at district, provincial or national level (Odhiambo, 2005). Existing studies have concentrated on implementation of computerized information systems and user satisfaction of the same, and/or comparing the implemented systems with paper-based information systems. Without accurate and comprehensive up-to-date and accessible patient records, clinicians may not be able to offer the best treatment or may misdiagnose a condition which can have serious consequences (Slee, Slee & Schmidt, 2000). Delayed diagnostic and radiological reports may result to inaccurate treatment, increased length of stay and also increased cost. Lost / misplaced patient records (e.g., files and treatment cards) may result to inaccurate decision-making. It can be very difficult for a doctor to track patient's medical history (e.g., past visit information, laboratory results, previous medication, and drug allergies) without the previous records (Dolton et al., 2004)

Many health care facilities in developed and developing countries are turning to evidence-based medicine which partly uses findings of clinical research to aid the treatment giving and clinical decision making by information sharing (Jayasuriya, 1999).

Despite the evidence for improved quality, few studies have been conducted on satisfaction to clinician's user satisfaction with paper-based patient information system.

1.3: Justification and Significance of the study

The findings of the study were to help fill the gaps in knowledge of the factors relating to malfunctioning of paper-based information systems in Kenya and therefore hindering clinician's satisfaction with the systems. The study has enabled the identification of the factors that influence clinician's satisfaction with information systems which will assist the ministry of health in relation to developing policies that will address management of information systems. The study findings is to provide current data to the decision makers for various purposes including facilitating decision making regarding the distribution of adequate resources to Kenyan hospitals . This will enhance clinician's satisfaction with information systems.

Kenyatta National Hospital, a regional referral hospital, is mandated to provide quality health care to its customers both internal and external, as well as participate in National Health Planning and Policy formulation (KNH Strategic Plan, 2007). Mbagathi County Hospital is the largest public hospital in Nairobi which serves most of the Nairobi county residents mainly due to its location, and proximate to the Kenya's largest (and second largest in Africa) residential urban informal settlement, Kibra. The fact that there are inadequate public health facilities in Nairobi County coupled with the city's high population, rapid Kenyan population growth within the last few decades, increased disease burden and high poverty levels to the majority of the Kenyans have overstretched the two hospitals negatively (Ministry of Health, 2008). The situation has been made worse by the instability of Kenyan neighboring countries leading to overflow in the refugee camps (KNH Strategic Plan, 2007). In view of the above, and given the disproportionate doctor- patient ratio (1:16,000), a study on the clinician user satisfaction

with the existing paper-based patient information in the local public hospitals is necessary.

In Kenya, there are inadequate documented studies on clinician's user satisfaction with paper-based patient information systems in KNH and MCH.

1.4: Research Questions

1. What was the proportion of clinicians who were satisfied with paper-based patient information systems in KNH and MCH?
2. What was the influence of user characteristics to clinician's user satisfaction with paper-based patient information systems in KNH and MCH?
3. What were the organizational characteristics that influenced clinician's user satisfaction with paper-based patient information system in KNH and MCH?
4. What was the influence of information quality to clinician's user satisfaction with paper-based patient information system in KNH and MCH?

1.5: Null Hypothesis

There is no relationship between user characteristics, organizational factors, and information quality and satisfaction with paper-based information system among clinicians in KNH and MCH.

1.6: General Objective

The main objective of this study was to document the clinicians' user satisfaction with paper-based patient information system in KNH and MCH.

1.6.1: Specific Objectives

The study addressed the following specific objectives:

1. To determine the proportion of clinicians who were satisfied with paper-based patient information system in KNH and MCH.
2. To determine the influence of user characteristics to clinician's user satisfaction with paper-based patient information system in KNH and MCH.
3. To determine the organizational characteristics that influenced clinician's user satisfaction with paper-based patient information system in KNH and MCH.
4. To determine the influence of information quality to clinician's user satisfaction with paper-based patient information system in KNH and MCH.

1.7: Limitations and delimitations of the study

The study was limited by the varying work shifts of the clinicians. Some of the respondents also required persistent persuasion to spare some time to complete the questionnaire due to heavy workload in the work stations. This delayed the data collection process.

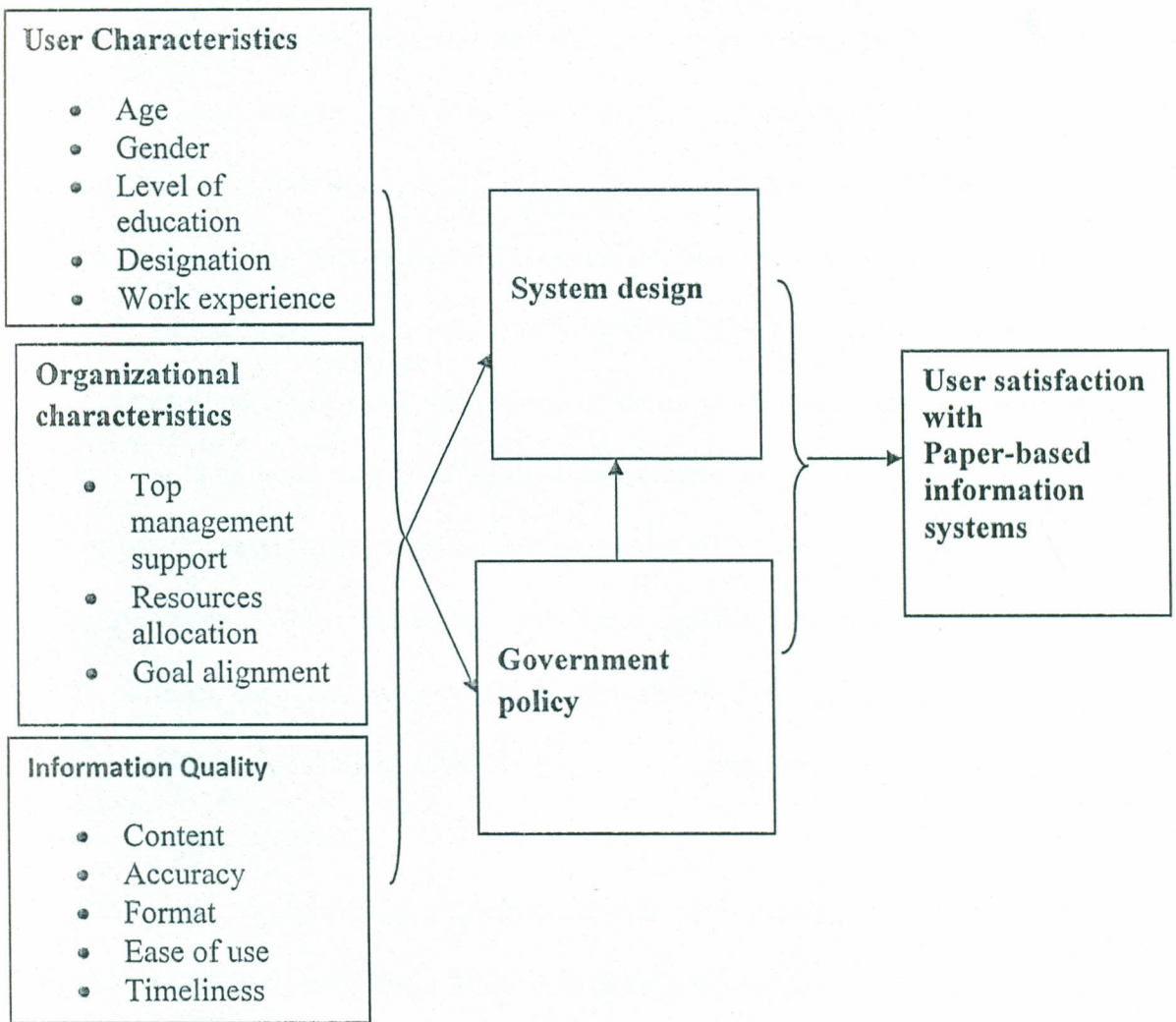
Independent variable**Intervening variable****Dependent variable**

Figure 1.1 Conceptual Framework:

Modified from Doll and Torkzadeh (1988).

1.8: Conceptual framework

Satisfaction with paper-based information systems is believed to be influenced by individual and organizational characteristics as well as information quality (Figure 1.1). Relationship between individual characteristics and satisfaction has received considerable research attention with many of these studies reporting contradictory results. Walsh (2004) found age to have no significant effect while Roghmann and Hengst (1983) found

older clinicians to be more satisfied with paper based information systems than younger ones. While individual characteristics have been found to be important (Zastowny, 1983), in general the data suggest that user characteristics are not reliable predictors of satisfaction (Tange, H.J.1994).

According to Doll and McLean (1992), organizational characteristics are important determinants of satisfaction with information systems. For example, top management support has been one of the most widely researched organizational factors in relation to satisfaction and has been found to have direct effects on perceived usefulness and perceived ease of use of the information systems in use (Boynton, 1994 & Ang. (2001).

Doll and Torkzadeh (1988) reported that information quality dimensions such as content, accuracy, format, ease of use and timeliness should be highly considered when conducting satisfaction studies with information systems more than individual and organizational characteristics.

The existing HIS is designed and implemented with no or limited participation of those who are to ultimately operate them. Neither is there adequate involvement of those who are to use the information generated by the systems. The HIS is highly fragmented with no linkages with other health care providers at various levels. The design and implementation of these systems does not facilitate integration of different sources of health information within the health system. There is poor integration of vertical programs and administrative information in the routine His. Consequently, there is no sharing of information among health care providers in the health care system.

Since the establishment of HIS in Kenya in 1972, a number of weaknesses with the existing system especially the coordination and maintenance of a uniform system in

which both the public and private sector can monitor implementation of health services have been identified. This has largely been attributed to lack of policy and legal framework to harmonize and enforce the data and information management at all levels. Consequently, the ministry of health developed Health Information Systems Policy to streamline the identified HIS weaknesses (National Health Sector Strategic Plan II (NHSSP II) 2005-2010 in line with the Economic Recovery Strategy (ERS) and Millennium Development Goals (MDGs). The objective of the HIS policy is:

- (a) Promote one health information system in Kenya upon which all shall be committed to.
- (b) Promote use of health information for evidence-based decision making, promote accountability and empower citizens to make health choices.
- (c) Promote linkages with other statistical constituencies, partnerships and management components.
- (d) Promote collection of sufficient, relevant, reliable and quality health statistical data pertaining to the health status of the nation, health services coverage and utilization.
- (e) Promote and encourage production and dissemination of timely, easily understood health and health related information for evidence-based decision making by managers at various management levels within the health sector.
- (f) Enhance closer cooperation between producer and users of health related data and information through regular meetings, seminars, training and publications.
- (g) Promote reporting by all health related statistical constituencies through the use of standardized data collection and reporting tools.

CHAPTER TWO: LITERATURE REVIEW

2.1: Introduction

The literature was reviewed in the following areas in order to develop understanding and knowledge around issues relating to health information systems and user satisfaction. This section contain theoretical framework, types of information systems, user satisfaction, user characteristics and satisfaction, organizational characteristics, information quality, measurements of user satisfaction and summary of literature review.

2.2: Theoretical framework

Globally, according to Benjamin (1980), there is ample evidence to support the belief that medical records in various forms were made long before the age of civilization. It is a historical fact that the apothecaries of the past, indeed of ancient times, appreciated the necessity to make records concerning the sick who sought their aid and skill – hence their recourse to the slow and unwieldy methods which were the only ones available in the primitive times. Symptomatology and operative procedures have been discovered carved in wood and chipped in stone; hieroglyphics have been found on parchment. All of these have been handed down to posterity and have provided stimulus to scientific progress throughout the ages. We are told that at no time was the practice of recording medicine abandoned, improved methods being evolved with changing circumstances- a policy which is true and must always remain extant (Benjamin, 1980).

Throughout the history of medicine, a definite order of recording data has always emerged, (regardless of the medical record form) and the same pattern is adhered to even

to this day – identification of patient, details of examination, tentative diagnosis, and treatment given (Benjamin, 1980).

Healthcare is one of the world's largest and fastest growing industries, consuming a substantial proportion of labor force and receiving a good deal of patronage from the customers referred to in this health industry as patients (Dolton & Gerry, 2004). Accompanying the high utilization of medical services has been the concern for measures aimed at safeguarding and promoting patient rights to quality healthcare. Good health care relies on well trained clinicians and on high quality facilities and equipments. Good health care also relies on reliable and efficient patient information systems that provide accessible, accurate and up-to date information to support the treatment given by clinicians (Slee, Slee & Schmidt, 2000). The World Health Organization (2004) stated that an effective healthcare system is the cornerstone of safe practice within hospital and other healthcare organizations.

Accordingly, several developed and developing countries have developed nation-wide information reporting systems to monitor and analyze incident data (Rai et al., 2002).

User satisfaction is generally regarded as one of the most important measures of information systems success. There has been considerable research devoted to establishing a standard user satisfaction instruments since the 1980s (Ives, et al., 1983; Bailey & Pearson, 1983; Baroudi, et al., 1996; Benson, 1983). Doll and Torkzadeh (1988) developed and validated an End –User Computing Satisfaction (EUCS) instrument. This instrument had five components: content, accuracy, format, ease of use, and timeliness. After the exploratory study was completed in 1988, two confirmatory

studies were conducted respectively in 1994 and 1997, which suggest the instrument was valid (Doll et al., 1994; Doll & Xia, 1997). Doll and Torkzadeh's instruments are acceptable measures of user satisfaction that have been validated by other researchers (Seddon & Kiew, 1994; McHaney & Cronan, 1988, 2000; Chen et al., 2000; McHaney et al., (1999).

In 2003, Hussein did a study in Malaysia on the influence of organizational factors on information system success particularly in public sector organizations. One of the highly significant contributions in the literature of this study was the model done by DeLone and McLean (1992) which resulted in a proposed information systems success model. This model stated that some organizational characteristics as well as user characteristics may also influence the success of information systems. The model has since become instrumental towards contributing to a universal model which many employ when looking at information systems performance. Further attempts have been made to produce enhanced models, for example, Seddon & Kiew, 1994; Rai et al., (2002). In validating their proposed information system model, Rai et al., (2002) made use of six dimensions namely: system use, system quality, user satisfaction, information quality, individual impact and organizational impact. The model was updated in 2003 for use in an e-commerce study. The authors pointed out the gap in previous information system studies as being the lack of understanding the impact of user and organizational dimensions.

Doll and Torkzadeh (1988) developed their measurement of end-user computing satisfaction because decision analysis (examination of specific uses of information systems in decision making) is not generally available, but that satisfaction is a reasonable surrogate for assessing use. Doll and Torkzadeh claim that evidence from

other studies support an expectation that satisfaction leads to use (as opposed to use leads to satisfaction).

The user satisfaction scale is a multidimensional instrument. Doll and Torkzadeh (1988) started with 40 items, and reduced those first to 18 items, and then reduced the scale further to a final set of 12 items. The dimensions of user satisfaction according to Doll and Torkzadeh are content, accuracy, format, ease of use and timeliness. Aladwani (2003) reviewed the existing measures of information satisfaction and found Doll and Torkzadeh(1988) measure to be less limited by particular context or application than other measures are. Aladwani applied end user computing satisfaction scale to assess student satisfaction with e-mail. McHaney and Cronan (1998) used the end-user computing satisfaction scale to assess responses to computer simulations.

Reliability

Doll and Torkzadeh (1988) report an overall reliability (alpha) of .92 for the end-user computing satisfaction scale. The reliabilities for the specific dimensions are: Content, .89; Accuracy, .91; Format, .78; Ease of use, .82 and Timeliness .82. Doll and Torkzadeh (1991) demonstrated high test-retest reliability for the end-user computing satisfaction scale.

Validity

In 1988, Doll and Torkzadeh conducted a multitrait- multimethod approach to assess the validity of the end – user computing satisfaction scale, and reported a strong convergent and discriminant validity. They reported a criterion- related validity coefficient of .76. Doll and Weidong (1997) and also McHaney, Hightower, and Pearson (2002) replicated

the original factor analytic structure with a confirmatory factor analysis. McHaney, Hightower, and Pearson (2002) demonstrated the utility of the end-user computing satisfaction scale to test for differences between competing applications, features and technologies. Lee and Kim (1995) demonstrated that end-user computing satisfaction predicts information system acceptance and job satisfaction.

2.3: Types of patient information systems

Basically there are two types of patient health/medical information systems. These are

Paper-based patient record System (Manual/Traditional System) and

Computer-based patient information system is often referred to as electronic health record (EHR) or electronic medical record (EMR).

The two systems have advantages and disadvantages.

2.3.1: Paper-based patient information systems

The system is used to describe the traditional medical records that consist of entirely handwritten records.

2.3.1.1: Advantages of paper-based information system

It is familiar to its users, does not need training as compared to computerized system, the language does not become obsolete as compared to computer languages, does not require hardware and software or special equipment in order to operate, portable and can be carried to the point of care, the paper based is perceived to have flexibility in recording data and narrative entries and the paper chart can be rapidly browsed and scanned.

2.3.1.2: Disadvantages of paper-based information systems

Paper-based records often become illegible with time (as records age), scattered patient data, patient records are maintained in various locations, important information such as drug allergies to certain medications is not easily accessible, difficult data storage and retrieval, difficult to maintain single patient's record with all the different forms of the medical record such as the x-rays, CT scans reports, blood work and prescriptions. Paper-based record systems require a lot of physical space to store all the patients' records. The physical storage faces destruction in case of water flooding as in the case of U. S. Gulf Coast in 2005 after hurricane Katrina devastation. The continuity of patient care was negatively impacted when paper medical records maintained by healthcare providers were destroyed during this overwhelming water disaster (U. S. Department of Health and Human Services, 2006). In response, the U. S. Secretary of the Department of Health and Human Services announced plans to promote the widespread use of electronic health records to accelerate accessibility of patient data to healthcare providers (US - DHHS, 2006).

Health information department (KNH) has had its records destroyed by water from left unclosed taps leading to flooding of the paper records storage area. This has impacted negatively on the patient care for those whose records were destroyed. The hospital has compensated patients with medical legal cases large sums of money due to unavailability of patient's records in a court of law (Kenyatta National Hospital, 2007).

The hospitals spend enormous amounts to maintain the hard copies especially to safeguard the records from water and fire. Paper-based information systems work very poorly in an emergency situation where the clinician has to wait for the physical patient record to be availed in order to make the correct decisions. Delay which is unavoidable sometimes may cost the life of the patient. It may be impossible to replicate a lost paper record and undetected tampering with a paper record may occur. It is difficult to protect the information within a paper record from being accessed by individuals not authorized to view the patient record and it may be difficult to find specific information within a paper patient record. Paper records can only be accessed by only one person at a time.

2.3.2: Computerized patient information systems

Regardless of the type of records, computer-based medical records referred to as electronic health/medical records have many advantages. With a heightened awareness of medical errors associated with paper-based records and an increased focus on improving the quality of patient care (Institute of Medicine, 2001), the United States president called for EHRs for all Americans by the year 2014. In an executive order issued on April 27, 2004, President Bush established the Office of the National Coordinator for Health Information Technology (ONC) (Bush, 2004). The U. S. Secretary of the Department of Health and Human Services announced plans to promote the widespread use of electronic health records to accelerate accessibility of patient data to healthcare providers (US-D HHS, 2006).

2.3.2.1: Advantages of using computerized patient record systems compared to Paper-based medical records

Benefits of computerizing paper records include improved patient care, (Shekelle, Morton & Keeler, 2006), improved communication between care givers and providers due to increased record portability, increased efficiency of care, reduced medical errors, reduced cost, links to medical knowledge and clinical support systems, simultaneous access to patient data, greater security, improved legibility and more complete documentation (Rippen & Yasnoff, 2004; Thompson & Bailer, 2004). A study by the Institute of Medicine (IOM) in 2003, called for development and implementation of computer-based records (CPRs) now commonly referred to as Electronic Health Records (EHRs) (Amatayakul , 2004; IOM, 2003) in order to improve the quality of care (Dick & Steen, 1991). In the year 2004, the U.S. president called for EHRs to “avoid dangerous medical mistakes, reduce costs and improve patient care”, and he appointed a National Health Information Technology Coordinator to lead this initiative (Amatayakul, 2004).

The particular benefits are as follows.

a) Efficiency

The enormous amount of data that is collected about a patient’s health can be stored and organized in a more efficient system than the current paper system permits. The record can be searched to find key pieces of information. The ability to compress large amounts of data into minimal space relieves providers of the pressure to cull files.

b) Quality of Information

Computerized records manipulate and display information in a way that no paper and pen system could duplicate. All notes related to a specific aspect of care can be collated and printed out. Computerized records can be used to track more effectively outcomes of care. Instead of using ineffective methods of treating problems, data collected about outcomes can be used to define the most appropriate approaches of care. This would facilitate clinical research and outcomes analysis. Computerized records promote standardized documentation, providing consistent information about a patient.

c) Reduction of medical errors

Pen and paper are plagued with illegible handwriting, non-standardized and dangerous abbreviations, which can lead to medical errors. EMRs are legible. EMRs may be supplemented with resources such as information about medication which is useful when prescribing drugs. Systems that include data from laboratory systems can incorporate clinical prompts, for example, which may warn against prescribing a specific medication in presence of declining kidney or liver function. A prescriber can be warned when an order is entered for a medication to which the patient is allergic. These decision making supports may improve the quality of care and reduce medical errors.

d) Forensic Issues

Access to a medical record may be electronically limited thus enabling certain information only to authorized users. For example, a nursing assistant may be required to enter vital signs but not review orders, laboratory results, or write nursing notes. A paper record may be accessed by anyone. It is possible to determine who has accessed an EMR

but not in a paper record. For example, registered nurse Charles Gullen who confessed killing patients was finally caught up in 2003, through the use of computers. His excessive use of digoxin, a medicine used to kill his victims, was preceded by accessing medical records of patients.

2.3.2.2: Disadvantages of EMR

There are troublesome issues surrounding implementation of Electronic Medical Records or Electronic Health Records.

a) Privacy, Security and Confidentiality

Privacy is the right of individuals to determine when, who and to what extent information is transmitted about themselves.

Security is the trust placed that the information that is shared will be respected and used only for the purpose disclosed. Dedicated hackers may breach the security of health records, gaining access to potentially embarrassing details of an individual. Documentation about sexual preferences, histories of abuse, incest, mental illness, pregnancies, substance abuse, suicidal attempt, HIV status, and other personal medical history details may provide fodder for blackmail and other schemes. This is not far-fetched concern. A January 2003 theft of computers from an Arizona-based medical records contractor resulted in loss of confidential and personal files for more than 500,000 members of the military retirees and their families.

Confidentiality is the protection of information from accident or intentional access by unauthorized people, including modification or destruction of the information.

There are problems with security and confidentiality of patient information inherent in computer medical records. The consequences of release of private health information can be severe, including career destruction, public ridicule, social rejection and economic devastation of individuals and their families (Milholland, D. 1994). Computer records pose new challenges to the healthcare provider's ethical and legal obligation to safeguard confidential information and comply with provisions of the local regulations and the code of conduct. The ability of individuals to access patient computer medical records from distant sites requires rigorous adherence to security measures.

b) Training

One disadvantage is that EMR require training in order to be used effectively and a period of adjustment while the doctors and other staff get used to the software. This training involves all staff working in the health care facility. While software designers work hard to make interface user friendly, a lack of training could lead to loss of files or misuse of the software. Changing familiar routines is considered to be loss due to reduced productivity during the learning curve (IOM 2003).

c) Conversion

All physical patient records have to be put in the system in order to refer to it later. This conversion is time-consuming, and extremely demanding to the staffs that are responsible for the data entry of the old records. Errors are possible during this phase, particularly when the responsibility for the data entry includes interpretation of anyone's handwriting.

Start up is costly as compared to paper medical record system but becomes cheaper in the long term and resistance to plans to computerize medical records is pervasive. Critics

reacted to the plans of the Department of Health and Human Resources (U.S. 2006) to implement a medical database system known as the National Health Information Network (NHIN). The plan was to include the creation of electronic health records that could be shared by doctors, insurance companies, and governmental healthcare providers. Opponents of the plan took the position that EMRs were a major violation of patients' privacy. Records would not only be accessible to healthcare providers without patient consent but by any member of other people and organizations. These would include universities conducting research, medical students, and bureaucrats at every level, from entry level data processors to registration clerks at medical clinics.

Devastation of computer medical records through computer viruses which are introduced via floppy disks is likely to occur to data storage.

2.4: User satisfaction

According to Doll and Torkzadeh (1988), user satisfaction is defined as the opinion of the user about a specific information system which they use. Ives and others (1983) defined user information satisfaction as the extent to which users believe the information system available to them meets their information requirements. Other terms for user information satisfaction are "system acceptance" (Igersheim, 1976), "perceived usefulness" (Larcker & Lessig, 1980) and "feelings about information system" (Maish, 1979). Ang, (1997) has described user information satisfaction (UIS) as a "perceptual or subjective measure of system success". This then means that user information satisfaction will differ in meaning and significance from person to person. In other words, users who are equally satisfied with the same system according to one definition and measure may not be equally

satisfied according to another. User satisfaction studies have over the past few decades remained an important topic in research despite somewhat contradictory results in the developed countries.

User satisfaction is generally regarded as one of the most important measures of information system success. Researchers have since the 1980s been trying to develop a standard user satisfaction instrument (Ives, 1983; Bailey & Pearson 1983; Baroudi , 1986; Benson 1983). Several models for measuring user satisfaction were developed including the user information satisfaction instrument by Ives, (1983) and a 12- item End-User Computing satisfaction by Doll and Torkzadeh (1988).

Ives, (1983) developed a user information satisfaction (UIS) to measure users' general satisfaction with the information provided by the data processing computing environment. The emphasis was on computing tasks that were carried out by the processing group in an organization. The measurement scale was semantic differential rather than Likert- scale type scaling. Due to the limitation of this study, this instrument is not used as much as the instrument developed by Doll and Torkzadeh (1988).

Doll and Torkzadeh developed a 12-item EUCS instrument by contrasting traditional data processing environment and end-user computing environment, which comprised of five components: content, accuracy, format, ease of use, and timeliness. Their instrument was regarded as comprehensive because they viewed the previous work on user satisfaction in their search for a comprehensive list of items. They included that measurement of "ease of use" which was not included in earlier research. Two global measures of perceived overall satisfaction and success were added to serve as a criterion. The construct was

developed with a five point Likert-type scale (1=almost never; 2= some of the time; 3= about half of the time; 4= most of the time 5= almost always).

This research used the instrument by Doll and Torkzadeh (1988) because it is a widely used instrument, and has been validated through several confirmatory analyses and constructs validity tests. After the exploratory was completed in 1988, two confirmatory studies with different samples were conducted respectively in 1994 and 1997, which suggested the instrument was valid (Doll, 1994; Doll & Xia 1997). A pretest of reliability of the instrument was conducted in 1991, indicating that the instrument was reliable overtime (Torkzadeh & Doll 1991).The instrument is widely accepted and adopted in other research studies. McHaney and Cronan (1998, 2000) adopted it to examining computer simulation success. McHaney and others (1999) adopted it in decision support systems research.

DeLone and McLean (1992) also conducted a study which was considered very significant for they looked at the influence of individual and organizational impact on Information system success. Several researchers have attempted to validate this model (Seddon & Kiew, 1994) and Rai et al., 2001). This model was updated in 2003 and the authors stated that there was a huge gap in the IS studies in which many researchers seemed to overlook. One of the most important antecedent factor of IS success is the organizational factor. The identified organizational factors were top management support, goal alignment, managerial style and resources allocation among others.

In 1963, Cyert and March proposed that if an information system meets the requirements of the users, the users' satisfaction with the information system will increase (Ives et al.,

1983). Conversely, if the information system does not provide the needed information, the users will become dissatisfied. Locke (1976) defined satisfaction as an emotional response or affect toward an object. Similar definitions of satisfaction have been used by information system researchers. Ives, Olson and Baroudi (1983) defined user satisfaction as the extents to which users believe the information system available to them meet their informational requirements. Bailey and Pearson (1983) defined satisfaction as the sum of feelings or attitudes, both positive and negative, affecting the specific situation. Doll and Torkzadeh (1988) also defined satisfaction as an affective attitude. Galetta and Lederer (1989) concluded that satisfaction includes both perceptions and attitudes. According to Delone (1990) user attitude is a tendency to respond favorably or unfavorably to an information system.

2.5: User Characteristics and users satisfaction

The relationship between user characteristics and satisfaction has received considerable research attention). The variables studied include age, marital status, and gender, among others. Many of these studies have reported contradictory results. In a hospital setting, DiMatteo and Hays (1980), Gray (1980), Lu, H.P. and Wang, J.Y. (1997), Pope (1978), Ware, Davis-Avery and Stewart (1978), and Zastowny, Roghmann and Hengst (1983), also found older clinicians to be more satisfied than younger, while Walsh (2004) found age to have no significant effect. Rogoski, R.R. (2003) found age to be inversely related to satisfaction. A review of Dutch studies showed that elderly clinicians were more satisfied with several aspects of paper based patients health records (Jayasuriya, R.1999).

Similarly, when these studies examined the effect of education, lower educational clinicians were more satisfied than those highly educated. Thus, the relationship between age and clinicians satisfaction may be confounded by educational and professional levels.

The relationship between gender and satisfaction has also been examined. Most studies showed that women had higher levels of satisfaction than men (DiMatteo & Hays, 1980; Ware, 1978; Zastowny, et al., 1983). The relationship between marital status and satisfaction has received less attention; Tessier and Mechanic (1975) found unmarried people to be more satisfied with paper based health records than married persons. While individual characteristics have been found to be important (Zastowny, 1983), in general the data suggest that user characteristics are not reliable predictors of satisfaction (Tange, H.J.1994). Several studies have placed greater emphasis on the organizational characteristics of the health care providers or on factors that enable a person to access the service (Zastowny, 1983).

2.6: Organizational Characteristics

Delone and McLean (1992) study on information systems success indicated that organizational factors should not be ignored as they are equally important. Several attempts have been made to validate this proposed model (Seddon & Kiew, 1994, Rai, 2001). Their model comprised of six dimensions; system use, system quality, user satisfaction, information quality, individual and organizational impact. This model focusing on an e-commerce study was also updated in 2003. This study adopted the possible organizational characteristics that may influence clinician's user satisfaction with paper-based patient information systems as identified by Ang et al. (2001). Ang et

al. (2001) identified organizational factors that influence information system as top management support, resources allocation, goal alignment and management style.

2.6.1: Top Management Support

Top management support is conceptualized as the involvement and participation of the executive or top-level management of the organization in the existing patient information activities (Jarvenpaa & Ives, 1991). In an organization, Lack of executive commitment can be detrimental to the successful use of an information system. When clinicians and end users do not recognize a strong sense or strategic vision from senior management, satisfaction may be affected negatively. Based on the important role of the top-level managers to organizations, it is not surprising that top management support has been one of the most widely discussed organizational factors in information system success studies. For example, top management support has been investigated in several studies linking its influence on information system use (Jarvenpaa & Ives.1991; Boynton, et al., 1994; Ang, et al., (2001).

Another study by Igbaria, et al., 1996 found the importance of organizational support on most of the factors they investigated- perceived usefulness, perceived complexity, social pressure, perceived fun and system use. Accordingly, Igbaria et al., (1996) found that management support has direct effects on perceived usefulness and perceived ease of use of the information system in use.

2.6.2: Resources Allocation

Developing countries suffer from resources especially people and money in comparison to developed countries. According to Odhiambo and Odero, (2005), even where there may be enough people there is unequal distribution as per the needs of the Kenyan

hospitals. In 2004, the American president (Bush) established and allocated funds to an office of a National Coordinator for Health Information. Surprisingly, the year that followed saw mass destruction of patient paper records due to Hurricane Katrina that devastated the U.S. Gulf Coast in 2005 (U.S. Department of Health and Human Services, 2006).

Ein-Dor and Sejev (1978) stated that resources include money, people and time that are required for the success of the information system and therefore user's satisfaction. Ongoing commitment for financial and human resource is key to success of an existing system thus leading to satisfaction. Resources lead to a better organizational commitment and also overcome organizational obstacles (Beath, 1991; Tait & Vessey, 1988). Ein-Dor & Sejev (1978) and Wixom & Watson (2001) have found significant relationship between resources and information systems success.

2.6.3: Goal Alignment

Goal alignment involves the linking of business goals and corporate information system goals of an organization together. According to Saunders and Jones (1992), to promote the achievement of organizational goals, information system planning must be tied to organizational planning.

Accordingly, the current trend has towards this issue gained interest among researchers and practitioners in both public and private sectors (Swain, et al., 1995; Watson et al., 1997; King, & Teo, 1996; Tallon et al., 2000). Ang et al., (2001) investigated the impact of organizational factors together with other factors on information system usage in the Malaysian public sector and found that goal alignment was the second strongest predictor of information system usage.

2.7: Information Quality

Information Quality (IQ) is a term used to describe the quality of the content of information systems. It is often pragmatically defined as the “the fitness for use of the information provided source” Most of the information system practitioners use the term synonymously with data quality. However, as many academicians make a distinction between data and information, some will make a distinction between data quality and information quality.

Information quality is a measure of the value which the information provides to the user of that information. Quality is often perceived as subjective and the quality of information can then vary among users of the information. Nevertheless, a high degree of quality increases its objectivity or at least its inter subjectivity. Accuracy can be seen as just one element of the information quality but, depending on how it is defined, can also be seen as encompassing many other dimensions of quality. Wang and Strong (1996) propose a list of dimensions or elements used in assessing Information quality.

- Intrinsic IQ: accuracy, objectivity, believability and reputation.
- Contextual IQ: relevance, value-added, timeliness, completeness and amount of information.
- Representational IQ: interpretability, format coherence and compatibility.
- Accessibility IQ: accessibility, access and security.

According to the study conducted by Doll and Torkzadeh (1988), five dimensions of information are considered to have influence on user satisfaction measurement with information systems. The dimensions are comprised of content, accuracy, format, ease of use and timeliness. Doll and Torkzadeh study is also considered comprehensive for it

viewed previous researchers work and added “perceived ease of use” that was not included in the other studies.

2.7.1: Perceived Ease of Use

Perceived ease of use is defined as the degree to which an individual believes that using a particular system will be free from physical and mental effort (Davis, et al., 1993; Gefen & Straub, 2000; Gahtani, 2001) and is the most commonly used to measure Information Quality. However, Perceived ease of use (PEOU) does not capture the system quality construct as a whole. Extensive researches over the past decades provide evidence of the significant effect of PEOU on usage intention, either directly or indirectly (Hernandez & Masson, 2007; Guriting & Ndubisi, 2006; Ericksson, 2005, Wang, et al., 2003; Venkatesh, 2000; Venkatesh & Davis, 1996). Recently, Chen and Barnes (2007) have empirically found that PEOU and perceived usefulness (PU) significantly affect usage and user’s satisfaction.

Several researchers have studied determinants of perceived ease of use with varying results. Davis (1989) suggested that there are two beliefs that determine an individual’s behavioral intention to use a specific information system. The two beliefs are perceived ease of use and perceived usefulness. Perceived usefulness is defined as the degree to which an individual believes that using a particular system would enhance his /her job. It was argued that the two above formed the user’s attitude toward using the information system which in turn impacts upon the actual system use. The more positive perceived ease of use and perceived usefulness of the system is, the higher the possibility of actually using the system appropriately. Davis suggested that perceived ease of use

influence the perceived usefulness of an information system. The easier the information system is to use, the more useful it can be.

Understanding the determinants of perceived ease of use is further underscored by the two mechanisms by which it influences intention (Venkatesh & Davis, 1996).

a) PEOU has a direct effect on intention and an indirect effect on intention via PU.

b) It is an initial hurdle that users have to overcome for satisfaction and usage of an information system (Davis et al., 1989).

2.8: Measurements of User Satisfaction

The study mainly used a modified user satisfaction measurement items that were developed by Doll & Torkzadeh (1988). Doll & Torkzadeh developed a 12-item instrument which they called End-User Computing Satisfaction (EUCS) and was comprised of 5 components: Content, accuracy, format, ease of use and timeliness (Quality of Information). Their instrument was regarded as comprehensive because they reviewed previous work on user satisfaction in their search for a comprehensive list of items. They included measurement of ease of use which was not included in earlier research. Two global measures of perceived overall satisfaction and success were added to serve as a criterion. The construct was developed with a five point Likert-type scale (1= almost never; 2= some of the time; 3=about half of the time; 4= most of the time; and 5=almost always). Organizational factors were measured using the Delone & McLean items.

2.9: Summary of literature review

According to literature review paper-based patient information systems have been associated with fragmentation of records which affects timely retrieval and availability of patient's records or clinical reports when required by the clinicians. Delayed availability of information common with paper-based information systems affects also decision making by the managers. Paper-based information systems are also associated with medical errors which sometimes lead to incorrect diagnosis by clinicians and sometimes death.

WENYATA UNIVERSITY

CHAPTER THREE: MATERIALS AND METHODS

3.1: Introduction

This chapter outlines the materials and methods that were used to achieve the study objectives so as to ensure the desired results. In this section the researcher discusses the study design, variables, location of the study, study population, inclusion and exclusion, sample size determination, sampling technique, construction and research instruments, pre-testing, validity, reliability, data collection techniques, data analysis, and logistical and ethical considerations.

3.2: Study design

This study adopted a cross sectional descriptive research design focusing on the factors that influenced clinicians' user satisfaction with paper-based information system in KNH and MCH hospitals. The study employed quantitative design through the use of interviewee self administered questionnaire and qualitative design through use of key informants and focus group discussions to collect additional information. The researcher chose this design because it could provide results at a relatively low cost and in a shorter period of time.

3.3 : Study Variables

3.3.1: Dependent variable

The dependent variable in this study is user satisfaction. This variable was measured using ratings of overall satisfaction with paper-based information system.

3.3.2: Independent variables

The independent variables in this study were:

- a) User characteristics (gender, age, designation and work experience. Gender was male or female while age and work experience were measured in years. Designation was medical specialist/officer, dentist and clinical officer.
- b) Organizational characteristics (top management support, goal alignment, and resource allocation). Responses were recorded on a five point Likert scale ranging from 1–strongly disagrees to 5 –strongly agree.
- c) Information quality (content, accuracy, format, ease of use and timeliness). These were measured using five point likert scale ranging from 1-strongly disagree to 5-strongly agree.

3.4: Location of the study

The study was conducted in KNH and MCH hospitals. KNH, the largest national, referral, teaching and research hospital in Kenya has 2,000 beds, 50 wards, 22 outpatient clinics, 24 theatres (16 specialized) and an Accident and Emergency Department. This location was selected because it plays a critical role in health information system through training of students from medical colleges and universities both public and private. In 2012, KNH attended 80,000 inpatients and about 500,000 outpatients. It is at the apex of the referral system in the health sector and participates in national health planning and policy formulation. It is the only public hospital that offers specialized services in its specialized units (e.g. radiotherapy, renal, burns, cardiology, dental and ICU). In 2012, KNH attended to 80,000 inpatients and about 500,000 outpatients. . KNH is located in Nairobi County along Hospital Road, Upper Hill, about 5 km west of the Central Business District. Within the KNH complex are College of Health Sciences (University

of Nairobi); the Kenya Medical Training College; Kenya Medical Research Institute and National Laboratory Service (Ministry of Health).

Mbagathi County Hospital is located along Mbagathi Road, off Ngong Road and just opposite KNH staff houses. Previously it was an Infectious Diseases Hospital (IDH), a branch of KNH before it (KNH) changed status to a state corporation. Due to inadequacy of public health care facilities in Nairobi County, the hospital serves a large population of Nairobi County and especially from Kibra (the largest informal urban settlement in Nairobi County and the second largest in Africa) which is located just 1 km from Mbagathi County Hospital. Mbagathi County hospital has 6 wards, and has 300 beds. In 2012, 162,201 outpatients and 15,694 inpatients were attended to.

3.5: Study Population

The study targeted the doctors, dentists and clinical officers (clinicians) working in the two selected hospitals.

Table 3.1: Total Clinicians in KNH and MDH

Hospital	Doctors	Dentists	Clinical officers	Total
KNH	189	25	73	287
MDH	29	2	31	62
Total	218	27	104	349

3.5.1: Inclusion-exclusion criteria

- **Inclusion criteria-** clinicians (employees of the selected hospitals) who had worked for a year or more in the hospital. Key informants and focus group discussion participants were also included in the study.

- **Exclusion criteria-** All radiology, laboratory and pharmacy doctors were excluded because they do not diagnose or interact with patients records, non-consenting clinicians, and those clinicians who had worked for a period of less than one year for they were on probation terms of service. Consultants from University of Nairobi (medical school) were excluded from participating because they are not employees of KNH though they work in the hospital.

3.6: Sampling Techniques

3.6.1: Sampling Techniques

The researcher applied purposive sampling technique to select KNH and MCH hospitals because of their enormous use of paper-based information systems due to the high numbers of patients they attend to. Stratified sampling technique based on designation and gender was used in this study. This sampling technique was used because it ensures inclusion in the sample all the subgroups (doctors, dentists and clinical officers) which otherwise would have been omitted entirely by other sampling methods because of their small numbers in the population. Lastly, the researcher applied simple random sampling using computer randomized numbers based on personal numbers to select 165 respondents from KNH and 36 respondents from MCH.

3.6.2: Sample size determination

The required sample size was determined by use of Fisher's et al. (1998) formula for the target population less than 10,000, where a final sample estimate (nf) was calculated.

$$n = \frac{Z^2 PQ}{d^2}$$

Where

n = the desired sample size (if the target population is greater than 10,000)

Z = the standard normal deviation at 95% CI (Z -value = 1.96)

P = the proportion of the population estimated to have characteristics being investigated

(0.5)

Q = the proportion of the population without characteristics being investigated ($1-p$)

d = the level of statistical significance set (0.05)

$$n = (1.96^2(0.5)(0.5) / (0.05)^2) = 384$$

When the population is less than 10,000

Then, $n_f = n / 1 + (n/N)$

n_f = the desired sample size when the population is less than 10,000

n = sample size where the population is more than 10,000

N = the estimate population size (349)

$$= 384 / 1 + (384/349)$$

$= 384 / 2.100 = 183$. An extra 10 % (18) was added to the sample size to cater for non-

responses and spoilt questionnaires. Total respondents included in the study therefore

were 201.

Table 3.2: Sample size distribution per hospital

Hospital	Total clinicians	Required sample size per cadre			Sample size per hospital
		Doctors	Dentists	Cos	
KNH	287	109	14	42	165
MCH	62	17	1	18	36
TOTAL	349	126	15	60	201

3.7 Sampling of key informants and focus group respondents

(a) Sampling of key informants

12 key informants were purposively selected (11 KNH heads of departments and the medical superintendent of MCH) with an aim of gathering qualitative data to complement the quantitative data.

(b) Focus group participants

The researcher conducted 5 focus group discussions where each group had 10 members. Each group comprised of 3 doctors, 2 dentists, 3 clinical officers and 2 health information officers. The researcher included the health information officers to gather their experiences with the paper-based patient records as they are the main custodians of the patient records in the hospitals. Health information officers are charged with the responsibility of availing patients records to authorized clinicians when and where required.

3.8: Construction and Research Instruments

3.8.1: Semi structured questionnaire

Globally, questionnaires are recommended and widely used data collection tools because they are cheaper in terms of cost and time. A questionnaire guarantees anonymity and

confidentiality therefore respondents are comfortable giving honest responses. A questionnaire (Appendix 2) was formulated with both open ended and closed ended questions to enable the researcher to capture both quantitative and qualitative information. The questionnaire had four sections. Section A captured the respondent's characteristics; section B-use of paper-based health records, section C-Satisfaction with paper-based health records and section D- captured the organizational characteristics for answering research questions.

3.8.2: Focus group discussion and key informant interviews

The researcher used focus group discussion (appendix 3) and key informants interview (appendix 4) guides to collect qualitative data. The aim of FGDs and KI interviews was to gather more information based on the objectives of the study to compliment the quantitative data.

3.9: Pre-testing

The questionnaire was pre-tested on 10 clinicians (4 doctors, 4 clinical officers and 2 dentists) who are employees in Mathari Hospital (MH). MH was chosen because it is a National Referral Hospital (for mental conditions) which also treats general outpatient cases. The clinicians in MH have the same characteristics as those in KNH and MCH and the information system in use is largely paper-based. The purpose of this pre-test was to ensure validity and reliability of the data collected from the final sample. Thereafter, the researcher refined the questionnaire accordingly.

3.10 Validity and reliability

For this study, instruments' content validity was established. Content validity is the degree to which the sample of the test items represented the content that the test was

designed to measure (Borg and Gall, 1989). Reliability is a measure of the degree to which a study instrument gives consistent results. The researcher conducted a pre-test study at Mathare hospital (MH) to test the questionnaires for comprehension and clarity.

The researcher relied heavily on the supervisors help. The Hospital was chosen because the clinicians working there had the same characteristics as those in KNH and MDH.

A list of all clinicians working at Mathare hospital was drawn from the hospital employee's data base. 10 respondents of both genders who had worked in the hospital for more than twelve months were contacted in person and those who were willing to participate in the pre-test study were selected. Each respondent completed the questionnaire and provided written comments independently on the existing questions. The researcher incorporated all the suggestions made and then refined the questionnaire accordingly.

3.11: Data collection techniques

Data was collected using a semi structured questionnaire (Appendix 2). This was because questionnaires are economical and time saving and free minded responses was encouraged. Interview guides for key informants and focus group discussions (appendix 3 and 4) were used to collect qualitative data.

3.11.1: Quantitative data collection techniques

Data was collected using a self administered semi structured questionnaire. Questionnaires are recommended in that they give an opportunity to the respondent to clearly state and elaborate his/her views accordingly. The researcher distributed the questionnaire to the 201 participants and collected them after 3 days from the receptionists of the work stations. In total, 190 questionnaires were received back. The

questionnaires were checked for completeness and accuracy and then stored in a locked cabinet for security purposes.

3.11.2: Qualitative data collection technique

Eleven key informants from KNH were interviewed by the researcher. The key informants included the heads of the major departments of the hospital. The Medical Superintendent of MCH was interviewed as a key informant. In total 12 key informants were interviewed individually. Data was also collected using six focus group discussions (FGDs) which were composed of 10 participants. The key informants and the focus group discussion participants gave the researcher more insight into the topic under investigation. The information collected from key informants and focus group discussions was recorded in a notebook and was later analyzed and formed part of the findings in narrative form.

3.12: Data analysis and presentation

The questionnaires were carefully checked to ensure that responses were correctly ascertained. The data were finally analyzed both qualitatively and quantitatively. This involved the use of descriptive statistical analysis method to ensure accuracy was obtained. Frequency tables, charts and figures and narration were used to present the results for easier understanding and interpretation. The information gathered was analyzed using the statistical package for social science (SPSS) version 16.0.

3.13 Logistical and Ethical Considerations

The researcher took into consideration all the logistical and ethical issues that pertain to research. Consent was sought from all respondents and confidentiality was assured. The raw questionnaires were locked in a cabinet while the data keyed into the computer was

safeguarded through password to prevent unauthorized access. The respondents were required to either accept to participate voluntarily or reject to participate. A respondent was allowed to withdraw at will at any stage.

Clearance was sought from the KU Graduate School (Appendix 5), National Council of Science and Technology (Ministry of Higher Education) (Appendix 6) and KNH/UON ERC (Appendix7). To enhance response rate, the respondent was encouraged to fill the questionnaire voluntarily and was explained that the information given was to be used only for academic purposes.

CHAPTER FOUR: RESULTS

4.1: Introduction

The objective of this chapter is to present quantitative and qualitative results of the study findings from the data. The study sample size was 201, whereby 190 clinicians responded. The purpose of the study was to investigate the factors that may influence clinician's user satisfaction with paper-based patient information systems in Kenyatta National Hospital and Mbagathi County Hospital. The response rate was 95%. Six FGDs (each group with 10 clinicians) and 12 key informants (departmental heads) were conducted to collect qualitative data. Detailed analysis, interpretation and explanation of the results in regards to study objectives are given.

Table 4.1: General Demographic characteristics of the respondents

Characteristics	Number of respondents	Percentage
Gender		
Male	124	65.3%
Female	66	34.7%
Age		
Below 30 years	13	6.8%
30-39 years	42	22.1%
40-49 years	78	41.1%
50-59 years	57	30.0%
60 years and above	-	-
Marital status		
Married	155	81.6%
Single	35	18.4%
Years worked		
1-5 years	14	7.4%
6-10 years	25	13.2%
11-15 years	90	47.4%
16-20 years	43	22.6%
21 years and above	18	9.5%
Designation		
Doctors	119	62.6%
Dentists	13	6.8%
Clinical officers	58	30.5%
Level of education		
University	132	69.5%
Diploma	58	30.5%
Employment status		
Permanent	186	97.9%
Contract	4	2.1%

4.1.1: General Demographic characteristics of the respondents

The demographic characteristics of the study respondents are as shown in Table 4.1. The male respondents were 65.3% while the female respondents were 34.7%. This is because the clinician cadres have more males than females. 41.1 % of the respondents were aged between (40-49) years. 81.6% of the respondents were married. 47.4% of the respondents had worked for (11-15) years. 69.5% of the respondents had university level of education.

97.9% of the respondents were on permanent and pensionable terms of employment and 62.6% of the respondents were doctors.

Table 4.2: Level of clinician's overall user satisfaction

Level of satisfaction	Number of respondents	percentage
Dissatisfied	161	84.7%
Satisfied	29	15.3%
Total	190	100%

4.2 : Level of clinician's overall user satisfaction with paper-based patient information system

On overall satisfaction, majority of the key informants 75% (n=12) and focus groups indicated that they were extremely dissatisfied with paper-based information systems in the hospitals. The participants were concerned that the health sector is lagging behind other sectors like the private hospitals and even the finance sector like the banks. This therefore means that no adequate improvement in the quality of health care can be realized without proper health information systems. Information systems are keys to any remarkable improvement in the health sector. Table 4.2 shows that majority 84.7% (n=161) of the respondents were on overall dissatisfied with paper-based information system in their hospital while only 15.3% (n=29) were satisfied.

Table 4.3: Distribution of respondents per hospital

Hospital	Number of respondents	Percentage
KNH	157	82.6%
MCH	33	17.4%
Total	190	100%

4.3: Distribution of respondents per hospital

The study sample size was 201 (KNH 165 respondents and MCH 36 respondents). The response rate was 95% (n=190) of which KNH had 82.6% (n=157) while 17.4% (n=33) were from MCH.

4.4: Demographic factors that influence clinician's user satisfaction with paper-based patient information systems

The second objective for this study was to determine the user characteristics that influenced the clinician's user satisfaction with paper-based patient information system in KNH and MCH. The user characteristics considered were age, gender, level of education, designation, years worked and employment status. Some user characteristics were significant to user satisfaction while others were not as shown in table 4.7.

Table 4.4: Age of respondents in relation to satisfaction

Age	Number of respondents	Percentage
Below 30 years	13	6.8%
30-39 years	42	22.1%
40-49 years	78	41.1%
50-59 years	57	30.0%
60 years and above	-	-

4.4.1 Age of respondents in relation to satisfaction

Majority 71.1% (n=135) of the respondents were aged more than 40 years while 29% (n=55) were aged below 40 years. 41.1% (n=78) of the respondents were in the 40-49 years age group as shown in Table 4.4. The results in table 4.7 indicated that age was statistically significant in relation to user satisfaction ($\chi^2=42.079$, $df=3$, $p=.000$). Results also showed that the respondents aged below 30 years had the highest percentage of satisfaction of 5.3% (n=10). The results showed that satisfaction decreased as age increased except for age group 40-49 years. However, dissatisfaction increased as age increased except for age group 50 years and above. This may be contributed by the fact that the number of patients to be attended to increases with the increase of the national population.

Table 4.5: Gender in relation to satisfaction

User characteristics	Level of overall satisfaction		Total n=190	χ^2	df	P value
	Dissatisfied n=161	Satisfied n=29				
Gender						
Male	105(55.3%)	19(10.0%)	124(65.3%)	.001	1	.975
Female	56(29.5%)	10(5.3%)	66(34.7%)			

4.4.2: Gender of respondents in relation to satisfaction.

The results in table 4.5 showed that 65.3% (124) of the respondents were male while female were 34.7% (n=66). Table 4.7 showed that gender was not statistically significant to clinician's user satisfaction with paper-based patient information system ($\chi^2=.001$, $df=1$, $p=.975$). The results also showed that the level of satisfaction was very low with 10.0% (n=19) for males and 5.3% (n=10) for females. However, the results indicate that the males were more satisfied than females.

Table 4.6: Marital Status in relation to satisfaction

Gender	Marital status		Total
	Married	Single	
Male	98(51.6%)	26(13.7%)	124(65.3%)
Female	57(30.0%)	9(4.7%)	66(34.7%)
Total	155(81.6%)	35(18.4%)	190(100%)

4.4.3: Marital status of respondents in relation to satisfaction

Table 4.6 showed that 81.6% (n=155) of the respondents were married while 18.4% (n=35) were single. The results also showed that 51.6% (n=98) of the respondents were married males while 30.0% (n=57) were married females as shown in table 4.6. 11.1% (n=21) of the married respondents were satisfied with paper-based information systems while 4.2% (n=8) of the single respondents were satisfied as shown in table 4.7. The findings therefore means that though the satisfaction percentage is very low, married respondents were more satisfied than the single respondents with paper-based information systems. The results (Table4.7) indicated that marital status was not statistically significant ($\chi^2=1.913$, $df=1$, $p=0.167$) in relation to user satisfaction with paper-based patient information systems.

Table 4.7: Demographic factors that influence clinicians' satisfaction.

User characteristics	Level of overall satisfaction		Total (n=190)	χ^2 Results
	Dissatisfied (n=161)	Satisfied (n=29)		
Gender				
Male	105(55.3%)	19(10.0%)	124(65.3%)	$\chi^2 = .001$ df=1 p=.975
Female	56(29.5%)	10(5.3%)	66(34.7%)	
Age				
Below 30 years	3(1.6%)	10(5.3%)	13(6.8%)	$\chi^2 = 42.079$ df=3 p=.000
30-39 years	36(18.9%)	6(3.2%)	42(22.1%)	
40-49 years	69(36.3%)	9(4.7%)	78(41.1%)	
50 and above	53(27.9%)	4(2.1%)	57(30.0%)	
Marital status				
Married	134(70.5%)	21(11.1%)	155(81.6%)	$\chi^2 = 1.913$ df=1 p=0.167
Single	27(14.2%)	8(4.2%)	35(18.4%)	
Years worked				
1-5 yrs	4(2.1%)	10(5.3%)	14(7.4%)	$\chi^2 = 41.973$ df=4 p=.000
6-10 yrs	19(10.0%)	6(3.2%)	25(13.2%)	
11-15 yrs	81(42.6%)	9(4.7%)	90(47.4%)	
16-20 yrs	39(20.5%)	4(2.1%)	43(22.6%)	
Above 20 yrs	18(9.5%)	0(0.0%)	18(9.5%)	
Level of education				
University	107(56.3%)	25(13.2%)	132(69.5%)	$\chi^2 = 4.518$ df=1 p=0.034
Diploma level	54(28.4%)	4(2.1%)	58(30.5%)	
Employment status				
Permanent	157(82.6%)	29(15.3%)	186(97.9%)	$\chi^2 = .736$ df=1 p=0.391
Contract	4(2.1%)	0(0.0%)	4(2.1%)	
Designation				
Dentists	8(4.2%)	5(2.6%)	13(6.8%)	$\chi^2 = 23.385$ df=3 p=.000
Medical Specialists	50(26.3%)	19(10.0%)	69(36.3%)	
Medical Officers	49(25.8%)	1(0.5%)	50(26.3%)	
Clinical officers	54(28.4%)	4(2.1%)	58(30.5%)	

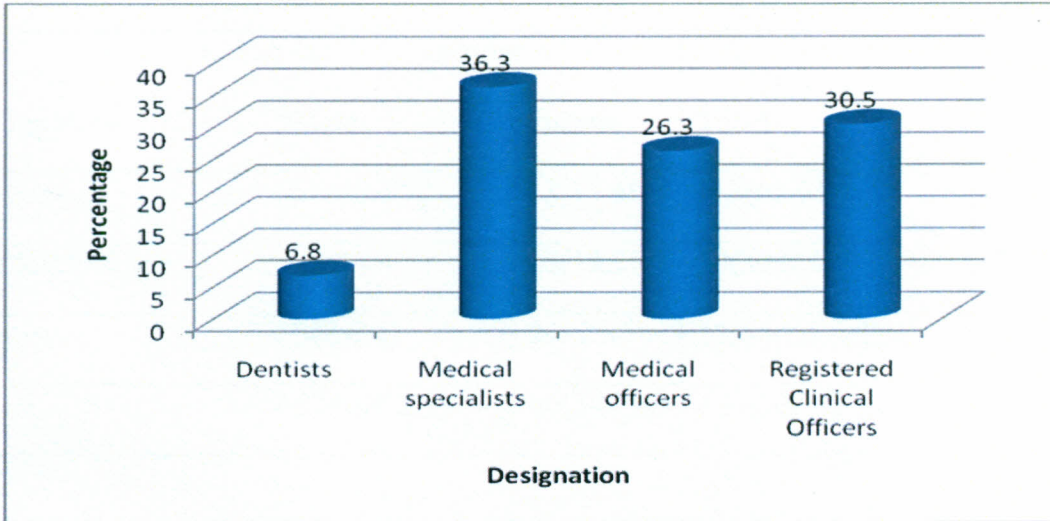


Figure 4.1: Distribution of respondents by designation

4.4.4: Distribution of respondents by designation

Over half of the respondents 62.6% (n=119) were doctors (medical specialists / medical officers) while registered clinical officers comprised 30.5% (n=58) and dentists were (6.8% (n=13). The medical specialists were 36.3% (n=69) while the medical officers were 26.3% (n=50). The total number of clinicians in the two hospitals was 349 (doctors 218, dentists 27 and clinical officers 104). Results indicated that designation was statistically significant ($\chi^2=23.385$, $df=3$, $p=.000$) in relation to user satisfaction as shown in table 4.7. The results further indicated that only 10.5% (n=19) doctors were satisfied with paper-based information system, 2.6% (n=13) dentists were satisfied while 2.1% (n=58) clinical officers were satisfied with the system. The results show that the higher the designation the lower the satisfaction with paper-based patient information system.

Table 4.8: Designation by gender

Designation	Gender		Total
	Male	Female	
Doctors	86(45.3%)	33(17.4%)	119(62.6%)
Clinical Officers	33(17.4%)	25(13.2%)	58(30.5%)
Dentists	5(2.6%)	8(4.2%)	13(6.8%)
Total	124(65.3%)	66(34.7%)	190(100%)

4.4.5: Designation by gender

Table 4.8 shows that majority of doctors 45.3% (n=86) were male and 17.4% (n=33) were female. For clinical officers 17.4% (n=33) were male while 13.2 % (n=25) were female. 4.2% (n=8) male dentists and 2.6% (n=5) were female. There was gender imbalance with more males than females for in most of the professions in the medical field (with an exception of the nursing profession where the females outnumber the males significantly), the number of males is slightly more than double that of females. The results indicate that gender was not statistically significant in relation to user satisfaction ($\chi^2=.001$, df=1, p=.975) as shown in Table 4.7 but designation is ($\chi^2=23.385$, df=3, p=.000).

Table 4.9: Work experience of respondents

Gender	Years worked		Total
	Below 20 years	More than 20 years	
Male	89(46.8%)	35(18.4%)	124(65.3%)
Female	40(21.1%)	26(13.7%)	66(34.7%)
Total	129(67.9%)	61(32.1%)	190(100%)

4.4.6: Work experience of respondents

Table 4.9 shows that 67.9% (n=129) of the respondents had worked for less than 20 years. 46.8% (n=89) were male while 21.1% (n=40) were female. 32.1% (n=61) had worked for more than 20 years where 18.4 % (n=35) were male and 13.7% (n=26) were female. The results (Table 4.7) showed that there was statistically significant relationship between work experience and user satisfaction with paper-based patient information systems ($\chi^2=41.973$, $df=4$, $p=.000$). The results showed that satisfaction decreased with increase in years worked while dissatisfaction increased with increase in the years worked except for 16-20 years and above 20 years age groups.

Table 4.10: Employment status of respondents

Employment status	No of respondents	Percent
Permanent	186	97.9%
Contract	4	2.1%
Total	190	100%

4.4.7: Employment status of respondents

Table 4.10 shows that almost 97.9% (n=186) of the respondents in the study were employed on permanent terms while 2.1% (n=4) were on contract. The results showed that the 4 on contract were all aged less than 60 years but were employed on contract terms possibly because they joined the hospital when aged above 45 years. The results indicated that employment status was not statistically significant ($\chi^2=.736$, $df=1$, $p=0.391$) in relation to user satisfaction with paper-based patient information system. 15.3% (n=29) of the respondents on permanent terms of service were satisfied while none 0.0% (n=0) of the respondents on contract terms of service were.

Table 4.11: Level of education of respondents

User characteristics	Level of overall satisfaction		Total (n=190)	χ^2 Results
	Dissatisfied (n=161)	Satisfied (n=29)		
Level of education				
University	107(56.3%)	25(13.2%)	132(69.5%)	$\chi^2=4.518$ $df=1$ $p=0.034$
Diploma level	54(28.4%)	4(2.1%)	58(30.5%)	

4.4.8: Level of education of respondents

Level of education was statistically significant with satisfaction ($\chi^2=4.518$, $df=1$, $p=0.034$). Respondents with university level of education were more dissatisfied with paper-based information systems compared to respondents with diploma level of education. The findings showed that some clinical officers had attained university level of education but in different fields outside their profession. This study was silent on these degrees because even the human resource department does not recognize them.

Table 4.12: Organizational characteristics that influence clinician's user satisfaction with paper-based patient information systems

Organization characteristics		Level of overall satisfaction		Total	χ^2 Results
		Disagree (n=161)	Agree (n=29)		
Our management highly recognize the potential of information system to enhance productivity	Disagree	93(48.9%)	6(3.2%)	99(52.1%)	$\chi^2=13.535$ df=1 p=.000
	Agree	68(35.8%)	23(12.1%)	91(47.9%)	
Our management provides strong support for information systems application	Disagree	110(57.9%)	11(5.8%)	121(63.7%)	$\chi^2=9.814$ df=1 p=.002
	Agree	51(26.8%)	18(9.5%)	69(36.3%)	
Resources allocated to information system budget are sufficient	Disagree	134(70.5%)	19(10.0%)	153(80.5%)	$\chi^2=4.916$ df=1 p=.027
	Agree	27(14.2%)	10(5.3%)	37(19.5%)	
Our information system strategy and business objectives are aligned	Disagree	109(57.4%)	11(5.8%)	120(63.2%)	$\chi^2=9.360$ df=1 p=.002
	Agree	52(27.4%)	18(9.5%)	70(36.8%)	
Overall Organization characteristics	Disagree	137(72.1%)	19(10.0%)	156(82.1%)	$\chi^2=6.409$ df=1 p=.011
	Agree	24(12.6%)	10(5.3%)	34(17.9%)	

4.5: Organizational characteristics that influence clinician's user satisfaction with Paper-based patient information systems

The third objective of this study was to determine the organizational characteristics that influence clinician's user satisfaction with paper-based patient information systems.

A host of organizational characteristics may influence user satisfaction with paper-based systems. However, the organizational characteristics considered in this study were top management support, resources allocation and goal alignment. The findings on overall organizational characteristics was statistically significant in relation to user satisfaction with paper based patient information system ($\chi^2=6.409$, $df=1$, $p=.011$) as indicated in Table 4.12. The respondents who agreed that top management adequately supported the information systems were (36.3% (n=69) while those who disagreed were (63.7% (n=121). 80.5% (n=153) respondents disagreed that the resources allocated to information systems by the top management were adequate while, 19.5% (n=37) agreed. Results showed that 63.2% (n=120) disagreed that information systems strategy was aligned with the organization's business objectives while 36.8% (n=70) agreed.

From the focus group discussions, like their colleagues (KIs) the findings were similar. It was unanimous that paper-based information systems are no longer useful in the present world. The top management should commit itself to a more user friendly computerized system that would enable timely availability of patient's laboratory and radiological reports and overcome the problem of lost patient files. Lost files are not only affecting patient's treatment but also expensive for the hospital when faced with medical- legal cases in a court of law whereby large sums of money are paid to patients due to lack of patients files.

Table 4.13: Influence of information quality to clinician's user satisfaction with Paper-based patient information system

Information quality		Level of satisfaction		Total n=190	χ^2
		Dissatisfied n =161	Satisfied n =29		
Content	Disagree	140(73.7%)	0(0.0%)	140(73.7%)	$\chi^2=95.826$ df=1
	Agree	21(11.1%)	29(15.3%)	50(26.3%)	P=.000
Accuracy	Disagree	137(72.1%)	4(2.1%)	141(74.2%)	$\chi^2=65.274$ df=1
	Agree	24(12.6%)	25(13.2%)	49(25.8%)	p=.000
Format	Disagree	142(74.7%)	11(5.8%)	153(80.5%)	$\chi^2=39.597$ df=1
	Agree	19(10.0%)	18(9.5%)	37(19.5%)	p=.000
Ease of use	Disagree	147(77.4%)	6(3.2%)	153(80.5%)	$\chi^2=78.140$ df=1
	Agree	14(7.4%)	23(12.1%)	37(19.5%)	P=.000
Timeliness	Disagree	151(79.5%)	16(8.4%)	167(87.9%)	$\chi^2=34.441$ df=1
	Agree	10(5.3%)	13(6.8%)	23(12.1%)	P=.000

4.6: Influence of information quality to clinician's user satisfaction with paper-based patient information system

The results showed that information quality was statistically significant ($p < .01$) in all the five dimensions (content, accuracy, format, ease of use and timeliness) in-relation to clinician's user satisfaction with paper-based patient information systems. The results

also showed that those who agreed/satisfied with paper-based information system were: content 26.3% (n=50), accuracy 25.8% (n=49), format 19.5% (n=37), ease of use 19.5% (n=37) and timeliness 12.1% (n=23). The results further indicated those respondents who disagreed/dissatisfied were: content 73.7% (n=140), accuracy 74.2% (141), format 80.5% (n=153), ease of use 80.5% (n=153) and timeliness 87.9% (n=167). The results may therefore mean that timeliness of the required information by clinicians is of optimal importance followed by ease of use and format respectively.

The majority 75% (n=9) of the key informants expressed their feelings that they perceived paper systems as "outdated (imepitwa na wakati) and cumbersome to use with numerous problems and challenges that cannot be sorted with the same system."

Another key informant said this "It is crystal clear that the National Hospital will not achieve its vision of becoming a global centre of excellence when still maintaining paper based information systems..."

CHAPTER FIVE: DISCUSSION, CONCLUSIONS AND RECOMMENDATIONS

5.0: Introduction

This chapter discusses the findings of the study, conclusions, recommendations, and proposes further research.

5.1: Discussion

Although clinician's user satisfaction studies with paper-based information systems are scanty, it seems that paper-based information systems have been associated with some medical errors in developing countries that may have been prevented. The primary objective of this study was to determine the level of satisfaction with paper-based information systems among clinicians in Kenyatta National Hospital and Mbagathi County Hospital. In an era when organizations in developing and developed countries are struggling to improve their information systems to meet the demands of evidence based information required by various users in the health sector, there was no better time for this study than now. Establishing the level of clinician satisfaction with the paper information system will enable the relevant managements to forge forward to improve the information systems for increased quality patient care and clinician's user satisfaction.

5.1.1: Level of satisfaction among clinicians

From the current study level of clinicians' user satisfaction with paper-based patient information system was below 50%. Only 15.3% (=29) of the clinicians were satisfied while majority 84.7% (n=161) were dissatisfied. This finding concurs with (Ives et al., 1983) who found that if information system meets the requirements of the users, the users' satisfaction with the information system will increase. Conversely, if the

information system does not provide the needed information, the users will become dissatisfied (Ives, et al. 1983). This result may be contributed to several factors such as perception and workload. Davis 1989 suggested that there are two beliefs that determine an individual's behavioral intention to use a specific information system. The two beliefs are perceived ease of use and perceived usefulness. Perceived usefulness is defined as the degree to which an individual believes that using a particular system would enhance his /her job (Davis, 1989). Continuous increase of patients in hospitals leading to increased workload to the clinicians may also contribute to the low satisfaction level with paper-based information systems.

5.1.2: Demographic factors that influence clinician's user satisfaction with paper based patient information systems

Age was statistically significant to clinician's satisfaction with paper-based patient information systems. This finding concurs with DiMatteo & Hays, (1980) and Zastowny et al., (1983), who reported that age influences user satisfaction. This finding contrasts Walsh (2004) who reported that age has no significance with satisfaction.

Gender was not significant in relation to clinician's satisfaction with paper-based patient information systems. This finding disagrees with studies conducted by DiMatteo & Hays, (1980), and Zastowny et al., (1980), which indicated that women had higher levels of satisfaction than men. This finding concurs with Tange (1994) who reported that existing data suggest that user characteristics are not reliable predictors of satisfaction.

Designation has been found to be significant in relation with user satisfaction with paper-based information systems in this study. This finding disagree with the finding of Doll

and Torkzadeh (1988) who reported that user characteristics are not good predictors of satisfaction with information systems.

Level of education was statistically significant in relation with clinician's satisfaction with paper-based information systems. This finding concurs with a study conducted by Dimatteo et al., (1980) who reported that clinician's of lower education were more satisfied with information systems than those with higher education.

The years worked (experience) by the clinicians was statistically significant in relation with satisfaction with paper-based information systems. This finding showed that satisfaction decreased with increase in years worked while dissatisfaction increased with increase in the years worked. This finding disagrees with the study that reported that existing data suggest that user characteristics are not reliable predictors of satisfaction (Tange, H.J. 2004). According to Doll and Torkzadeh (1988), information quality dimensions are better determinants of user satisfaction with information systems. The finding in this study disagrees with Doll and Torkzadeh's finding.

5.1.3: Organizational characteristics that influence clinician's satisfaction

The findings indicated that there was a significant relationship between overall organizational characteristics and satisfaction with paper-based patient information systems ($p < .05$). This finding concurs with (Delone and McLean, 1992) who found that organizational characteristics were just as important as the user/individual characteristics in user satisfaction studies. This finding disagrees with Doll and Torkzadeh (1988) whose study indicated that information quality dimensions (content, accuracy, format, ease of use and timeliness) were good predictors of user satisfaction with information systems.

The results indicated that resources allocation was statistically significant in relation to clinician user satisfaction with paper-based patient information system. Ein-Dor and Sejev (1978) stated that resources include money, people and time that are required for the success of information systems and therefore user satisfaction. This finding concurs with Odhiambo and Odero (2005) who stated that developing countries suffer from resources especially people and money in comparison to developed countries. Even where there may be enough people there is unequal distribution as per the needs of the Kenyan Hospitals (Odhiambo, G. and Odero, O. 2005). Doll and Torkzadeh (1988) disagree with this finding and argue that information quality dimensions are better measures of user satisfaction with information system.

Goal alignment was statistically significant to user satisfaction with paper-based patient information system. This finding was in agreement with (Ang et al., 2001) who found that goal alignment was the second strongest predictor of satisfaction with information systems in a study conducted in Malaysia (Ang et al., 2001). According to Jarvenpaa and Ives (1991) if clinicians do not recognize a strong sense or strategic vision from the top management, satisfaction may be affected negatively (Jarvenpaa and Ives, 1991). This finding contrasts (Doll and Torkzadeh, 1988) whose findings indicated that information quality factors are good determinants of user satisfaction with information studies.

5.1.4: Information quality factors that influence clinician's user satisfaction

The results in this study showed that information quality was statistically significant in all the five dimensions (content, accuracy, format, ease of use and timeliness) in relation to clinician's user satisfaction with paper-based patient information systems. Majority of the clinicians were dissatisfied with the timeliness of the required patient information. The

results may therefore mean that timeliness of the required information by clinicians is of optimal importance followed by ease of use and format respectively. This finding concurs with Odhiambo, G. (2005) who reported that the health information systems in Kenya are fragmented resulting in untimely availability of patient information when required. This finding concurs with Doll and Torkzadeh (1988) who reported that there is relationship between information quality dimensions and user satisfaction with information systems.

5.2: Conclusions

Based on the findings of this study the following conclusions were drawn:

1. The proportion of clinicians who were satisfied with paper-based patient information systems was at 15.3%. An information system is key to any remarkable improvement in the health sector. The health sector lags behind other sectors such as private hospitals in modernizing information systems.
2. Demographic factors such as age, designation, level of education, and work experience were associated with clinicians' satisfaction with paper-based information systems.
3. Organizational Characteristics such as top management support, resources allocation, and goal alignment were associated with clinicians' satisfaction with paper-based information systems.
4. Information quality dimensions such as content, accuracy, format, ease of use and timeliness were associated with clinicians' satisfaction with paper-based information systems.

5.3: Recommendations

Based on the study findings, the following are the recommendations.

1. The government/hospitals' top managements should provide clinicians' with modern friendly, effective and integrated information systems to enhance productivity and quality health care.
2. The government should develop and monitor a policy on patient information systems to be effected in all health institutions.
3. The government/hospitals' top management should ensure that all health institutions have adequate resources (personnel and money).

5.4: Further research

1. This study was carried out in two public hospitals therefore there is need to conduct similar researches in other public hospitals especially in rural settings to compare results.
2. A research needs to be carried out to evaluate how effective the ongoing implementation of computerized patient information systems is to clinicians in public hospitals.

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APPENDICES

APPENDIX 1: CONSENT FORM FOR QUESTIONNAIRE RESPONDENTS

Dear Respondent

I am a Masters student in Kenyatta University, Department of Health Management and Informatics. I am conducting a study on clinician's user satisfaction with paper-based information systems in your hospital.

Kindly voluntarily participate in completing the attached questionnaire and I assure you that the purpose of the study is purely academic and confidentiality will highly be observed. No identification details are to be recorded.

The findings of the study will be used to improve the patient information systems in your hospital to possibly maximize clinician's satisfaction and quality patient care. Please complete the part below.

Thank you very much.

Respondent's part (please tick one here below).

I accept

I do not accept

Signature..... Date..... (Optional)

Serial number of respondent/ participant.....

APPENDIX 2: QUESTIONNAIRE

SERIAL NO.....

Section A: Background information

Please select one and tick inside the appropriate box as shown here

What is your gender?Male Female **What is your age?**Under 30 years 30-39 years 40-49 years 50-59 years 60 years and above **3. Marital status**Married Single **4. How many years have you worked in your current hospital?**1- 5 years 6- 10 years 11-15 years 16- 20 years 21 years and above **5. Academic Level (please tick the highest)**University College (Diploma Level)

Any other (Please specify)

6. Employment StatusPermanent Contract Temporary

7. What is your designation? _____

8. The patient records in my hospital are:Paper-based Computerized Partly paper-based and partly computerized **Section B: Use of Paper-based health record**

Please select one from below and tick in the appropriate box as provided:

1= Strongly disagree; 2= Disagree; 3= Neutral; 4= Agree; and 5= Strongly agree.

9. Tasks performed by clinicians using paper-based patient health records.

		1	2	3	4	5
a)	Review the patients problems					
b)	Seek out specific information from patient records					
c)	Follow the results of a particular test or investigation over time					
d)	Enter daily patient treatment notes					
e)	Order laboratory/X-ray requests for patients					
f)	Refer patients to other departments or specialists					
g)	Write prescriptions					

Section C: Satisfaction with paper-based patient record

Please tick in the appropriate box using the 5-Point Likert scale below where

1 = Strongly Disagree; 2 = Disagree; 3 = Neutral; 4 = Agree; and 5 = Strongly Agree.

10. Content

		1	2	3	4	5
a)	Paper-based patient records provide the precise information I need					
b)	Information content meets my needs					
c)	Paper-based patient records provide sufficient information					

11. Accuracy

		1	2	3	4	5
a)	The system is accurate					
b)	I am satisfied with the accuracy of the system					

12. Format

		1	2	3	4	5
a)	Paper-based patient record is presented in a useful format					
b)	The information is clear					

13. Ease of use

		1	2	3	4	5
a)	Paper-based system is easy to use					
b)	I find it easy to get the system to do what I want to do					

14. Timeliness

		1	2	3	4	5
a)	I get the information I need in time					
b)	Paper-based system provide up-to-date information					

15. Perception about the information system in your hospital

	1	2	3	4	5
The system is successful					
I am satisfied with the system					

16. How would you rate your OVERALL level of satisfaction with paper-based information system in your hospital?

Select one and tick in the appropriate box.

1	Strongly Dissatisfied	
2	Dissatisfied	
3	Neutral	
4	Satisfied	
5	Strongly Satisfied	

17. Have you had any complaint or problem with paper-based health records?

Yes

No

If 'Yes' please list the form of complaint/problem

18. What are your Comments and Recommendations of a paper-based patient information system?

Section D: Organizational Characteristics

19. (Select one and tick inside the appropriate box.

1 = strongly disagree; 2 = disagree; 3 = neutral; 4 = agree; and 5 = strongly agree.

		1	2	3	4	5
a)	Our management highly recognize the potential of information system to enhance productivity					
b)	Our top management provides strong support for information systems					
c)	Our information system strategy and business objectives are aligned					
d)	Our top management allocates sufficient resources to information system					

THANK YOU FOR PARTICIPATING

APPENDIX 3: FOCUS GROUP DISCUSSION GUIDELINE

(Approximate time- 1 Hour)

Introduction (15 minutes)

Welcome participants and conduct self-introduction

Inform the participants why they were selected and the purpose of the group discussion

Address the importance of each participant to respect each other's opinion and not to repeat what has been said by others

Stress to the participants the issue of confidentiality and inform them that participation is voluntary and that a participant can withdraw at any stage

Inform the group that information collected from the discussion will be analyzed collectively and there will be no names recording

Discussion (30 Minutes)

The purpose of the study is to assess the level of clinician user satisfaction with paper-based patient information system. The discussion will be informal and all the participants have an equal chance of participating. The researcher will be taking notes as discussion takes place

What is your perception of the term paper-based patient information system or paper health records?

What are the most positive things about this system?

What are the most negative things about this system?

Do you think the hospital's top management has done enough to make the system work and improve user's satisfaction the users considering the following areas?

- Top management support

-Resource allocation

- Goal alignment and

Do you think user characteristics such as age, gender, work experience, designation and marital status have any influence on user satisfaction?

On overall, would you say you are satisfied with the paper-based information system?

What are your suggestions /recommendations of a patient information system?

Closing (10 Minutes)

Closing remarks

Thank the participants

APPENDIX 4: KEY INFORMANT INTERVIEW GUIDE

Approximate time -35 minutes

A. Introduction (5 minutes)

- Introduce self and invite the key informant to do the same
- Explain the general purpose of the interview discussion and why the participant was selected
- Address the issue of confidentiality and inform the key informant that participation is voluntary and withdrawal can be at any stage of the interview
- The researcher will be taking notes within the interview session

The purpose of the study is to assess the level of clinician user satisfaction with paper-based patient information system. The discussion will be informal and all the participants have an equal chance of participating.

B. Interview (25 minutes)

The purpose of the study is to assess the level of clinician user satisfaction with paper-based patient information system. The discussion will be informal and all the participants have an equal chance of participating.

Focus group discussion (30 Minutes)

- What is your perception of the term paper-based patient information system or paper health records?
- What are the most positive things about this system?
- What are the most negative things about this system?

- Do you think the hospital's top management has done enough to make the system work and improve user's satisfaction the users considering the following areas?

-Top management Support

-Resource allocation

- Goal alignment and

- Do you think user characteristics such as age, gender, work experience, designation and marital status have any influence on user satisfaction?
- On overall, would you say you are satisfied with the paper-based information system?
- What are your suggestions /recommendations of a patient information system?

C. Closing (5 minutes)

Thank the key informant for availing himself/herself to participate in this important discussion.

APPENDIX 5: RESEARCH APPROVAL BY GRADUATE SCHOOL



**KENYATTA UNIVERSITY
GRADUATE SCHOOL**

E-mail: dean-graduate@ku.ac.keP.O. Box 43844, 00100
NAIROBI, KENYAWebsite: www.ku.ac.ke

Tel. 810901 Ext. 57530

Internal Memo

FROM: Dean, Graduate School

DATE: 8th September, 2012TO: Alice Wanjiku Kimani
C/o Health Management and Informatics

REF: P57/FT/12214/09

SUBJECT: APPROVAL OF RESEARCH PROPOSAL

=====

This is to inform you that Graduate School Board, at its meeting of 3rd September, 2012, approved your Research Proposal for the M.P.H Degree Entitled, "Clinicians User Satisfaction with Paper-Based Patient information systems in Public Hospitals in Dagoretti District, Nairobi County, Kenya".

You May now Proceed with Data Collection.

Thank you.

JOHN M. ODONGI
FOR DEAN, GRADUATE SCHOOL

c.c. Chairman, Department of Health Management and Informatics

Supervisors:

1. Dr. George Ochieng
C/o Department of Health Management and Informatics
Kenyatta University
2. Dr. Isaac Mwanzo
Department of Community Health
Kenyatta University

APPENDIX 6: RESEARCH AUTHORIZATION BY NCST

REPUBLIC OF KENYA



NATIONAL COUNCIL FOR SCIENCE AND TECHNOLOGY

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

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

Our Ref:

NCST/RCD/12A/012/71

Date:

12th November 2012

Alice Wanjiku Kimani
 Kenyatta University
 P.O.Box 43844-00100
 Nairobi.

RE: RESEARCH AUTHORIZATION

Following your application for authority dated *5th November, 2012* to carry out research on "*Clinicians user satisfaction with paper-based patient information systems in public hospitals in Dagoretti District, Nairobi County, Kenya.*" I am pleased to inform you that you have been authorized to undertake research in **Nairobi County** for a period ending **31st December, 2012.**

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

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

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

Copy to:

The Provincial Commissioner
 The Provincial Director of Education
 The Provincial Director of Medical Services
 Nairobi County.

APPENDIX 7: RESEARCH AUTHORIZATION BY KNH /UON ERC



UNIVERSITY OF NAIROBI
COLLEGE OF HEALTH SCIENCES
P O BOX 19676 Code 00202
Telegrams: varsity
(254-020) 2726300 Ext 44355
Ref: KNH-ERC/A/357

KNH/UON-ERC
Email: uonknh_ere@uonbi.ac.ke
Website: www.uonbi.ac.ke
Link: www.uonbi.ac.ke/activities/KNHUoN



KENYATTA NATIONAL HOSPITAL
P O BOX 20723 Code 00202
Tel: 726300-9
Fax: 725272
Telegrams: MEDSUP, Nairobi
19th December 2012

Alice Wanjiku Kimani
P57/PT/12214/2009
Dept. of Health Management and Informatics
Kenyatta University

Dear Alice

RESEARCH PROPOSAL: CLINICIANS USER SATISFACTION WITH PAPER-BASED PATIENT INFORMATION SYSTEMS IN PUBLIC HOSPITALS IN DAGORETTI DISTRICT, NAIROBI COUNTY, KENYA ((P454/08/2012))

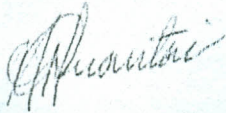
This is to inform you that the KNH/UoN-Ethics & Research Committee (KNH/UoN-ERC) has reviewed and approved your above revised proposal. The approval periods are 19th December 2012 to 18th December 2013.

This approval is subject to compliance with the following requirements:

- a) Only approved documents (informed consents, study instruments, advertising materials etc) will be used.
- b) All changes (amendments, deviations, violations etc) are submitted for review and approval by KNH/UoN ERC before implementation.
- c) Death and life threatening problems and severe adverse events (SAEs) or unexpected adverse events whether related or unrelated to the study must be reported to the KNH/UoN ERC within 72 hours of notification.
- d) Any changes, anticipated or otherwise that may increase the risks or affect safety or welfare of study participants and others or affect the integrity of the research must be reported to KNH/UoN ERC within 72 hours.
- e) Submission of a request for renewal of approval at least 60 days prior to expiry of the approval period. (*Attach a comprehensive progress report to support the renewal*).
- f) Clearance for export of biological specimens must be obtained from KNH/UoN-Ethics & Research Committee for each batch of shipment.
- g) Submission of an executive summary report within 90 days upon completion of the study. This information will form part of the data base that will be consulted in future when processing related research studies so as to minimize chances of study duplication and/or plagiarism.

For more details consult the KNH/UoN ERC website www.uonbi.ac.ke/activities/KNHUoN

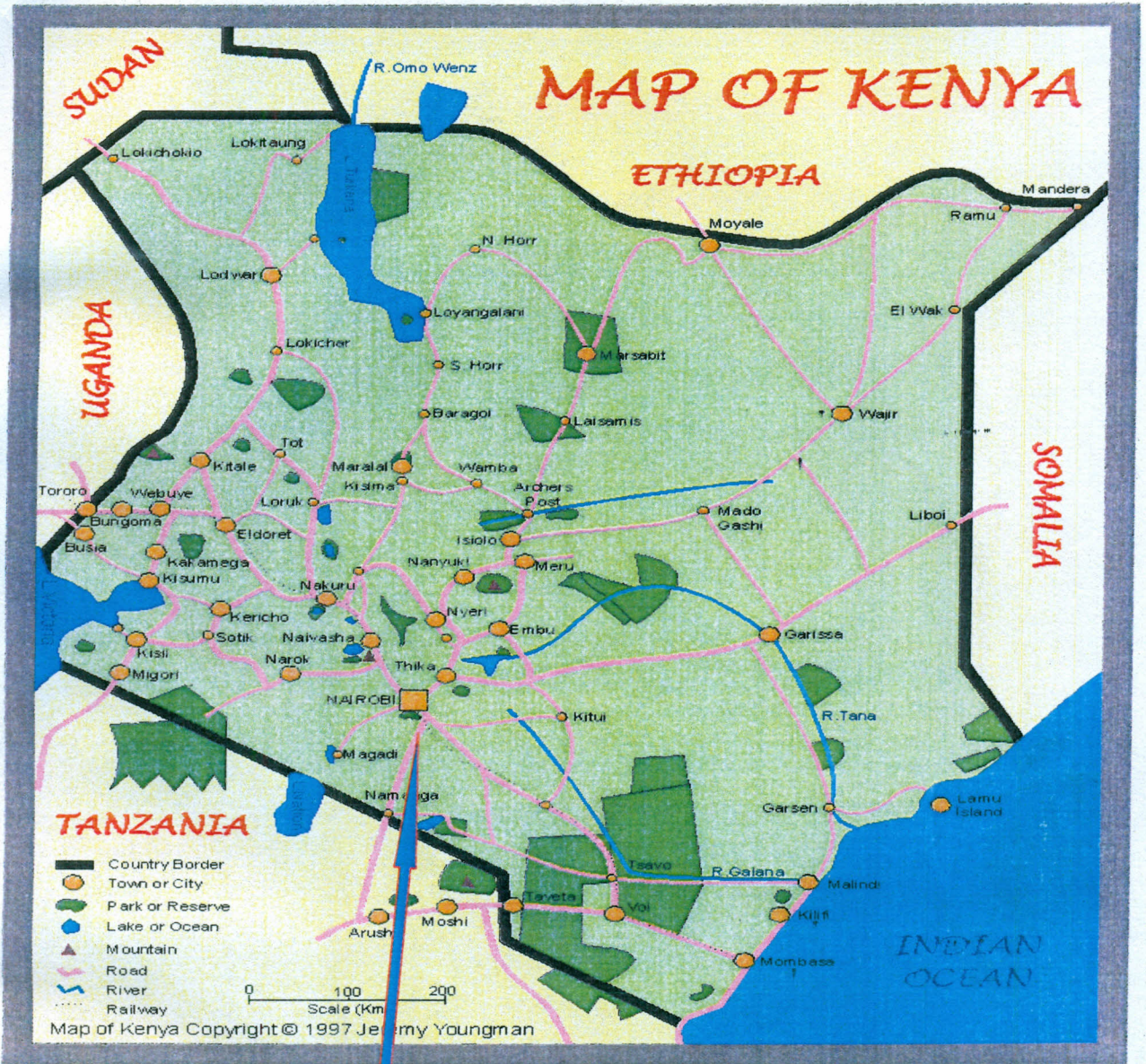
Yours sincerely



PROF. A.N. GUANTAI
SECRETARY, KNH/UON-ERC

c.c. The Deputy Director CS, KNH
 The Principal, College of Health Sciences, UoN
 The HOD, Records, KNH
Supervisors: Dr. George Ochieng Otieno, Dept. of Health Management and Informatics, Kenyatta University
 Dr. Isaac Mwanzo, Dept. of Community Health, Kenyatta University

APPENDIX 8: MAP OF KENYA



Nairobi County

KENYATTA UNIVERSITY LIBRARY