LEVEL OF USER SATISFACTION WITH ELECTRONIC MEDICAL RECORDS SYSTEM AMONG HEALTH WORKERS IN KAKAMEGA COUNTY TEACHING AND REFERRAL HOSPITAL, KENYA

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A RESEARCH THESIS SUBMITTED IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE AWARD OF THE DEGREE OF MASTER OF SCIENCE (HEALTH INFORMATION MANAGEMENT) IN THE SCHOOL OF HEALTH SCIENCES OF KENYATTA UNIVERSITY

FEBRUARY, 2024

DECLARATION

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

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DEDICATION

I dedicate this to my daughters. Never give up girls; all things are possible with hard work, patience and persistence.

ACKNOWLEDGEMENTS

This academic achievement would not be possible without the grace of God. Secondly, I acknowledge my loving husband Martin for the tireless support and encouragement he gave me. Thirdly, I acknowledge my supervisor Dr. George Otieno and Dr. Daniel Muthee, for the time they dedicated to ensure that all errors were corrected plus they guided and encourage me towards successful completion of this project despite their busy schedule. My parents, thank you for letting me know the wonder of books. Finally, my delight goes to my girls Sonia, Sasha, Serah and Stephanie who have walked with me in this journey from beginning to end.

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ABBREVIATIONS AND ACRONYMS

EMRS	Electronic Medical Records System
HIS	Health Information System
IQ	Information Quality
MOMs	Ministry of Medical Services
MOPHs	Ministry of Public Health Services
NHSSP	National Health Sector Strategic Plan
PEOU	Perceived Ease of Use
PU	Perceived Usefulness
SQ	Service Quality
KI	Key Informant

DEFINITION OF TERMS

EMR	An electronic medical record (EMR) is a digital version of the traditional paper-based medical record for an individual. The EMR represents a medical record within a single facility, such as a doctor's office or a clinic.
HEALTHCARE WORKER	A person who is contracted to provide medical care services to a sick or ailing individual or improve their health state either directly e.g. nurses or doctors or indirectly as a laboratory technician or radiographer.
USER CHARACTERISTICS	These are attributes that are unique is a person e.g. Age, gender.
SYSTEM FACTORS	These are elements in computer software that enable the user to complete a certain task.
INFORMATION QUALITY	How the information is perceived and used by its customer. Its attributes are accurate, complete, current, understandable, sufficient, secure, relevant, and timely and format of the output.
SERVICE QUALITY	The degree to which a person believes using a particular system would enhance his or her job.
SYSTEM QUALITY	This is the extent to which a user believes that using a particular system will be relatively free
SYSTEM USE	This is utilization of an electronic medical record system to achieve a desired task**.**
USER SATISFACTION	The opinion of the user about a specific electronic medical record system on whether or not it met the expectation of the users after system uses.

ABSTRACT

Studies have reported low adoption of Electronic Medical Records (EMR) mainly because of lack of EMR use by end users. The main objective of this study was to establish the level of satisfaction by users with electronic medical records system among health workers in Kakamega County Referral Hospital by determining the level of user satisfaction levels with the EMR system by examining the influence of user characteristics and system factors on the level of user satisfaction with EMR system. A descriptive cross-sectional research design was adopted. The study targeted health care workers who had ever used the EMRS system in the hospital before and during the time of the study. The respondents were stratified into homogeneous groups according to cadre and randomly sampled. Fisher et al. (1998) formula was used to determine a sample size of 252 respondents. Structured questionnaires and Key informant interviews were used to collect data. Instrument reliability was by use of Cronbach Alpha coefficient (0.743) and content and construct validity was verified by field experts. Data analysis was both descriptive and inferential analysis. Response rate was 98.01% and the average satisfaction index of EMRS was 54.5%. Key informant (KI) 1"Generally Satisfied with the system because it is easy to use and there is faster and easier retrieval of patient information…" Majority of user characteristics and system factors did influence the level of satisfaction of health workers on the use of ERMS. Age ($\chi 2$ 11.66(p value 0.03) Gender ($\chi 2$15.566 (p value <0.001) Profession ((Fisher exact) <0.001) Computer Literacy $\chi 2$ 15.159(p value < 0.001), Training $\chi 2$ 5.955(p value 0.015) Attitude $\chi 2$ 95.675(p value < 0.001), significantly associated with overall satisfaction of EMR system. Years worked in hospital were not associated with user satisfaction (p value of 4).KI3 "All staff are required to have a certificate in basic IT this enables the staff to use the system but regular trainings on the EMRs would be appreciated to increase competency of the staff on the system..." The system factors were Information quality $\chi 2$ 39.314(p value < 0.001), $\chi 2$ 6.352(p value < 0.012) System quality $\chi 2$ 8.062(p value < 0.005) $\chi 2$ 4.452(p value < 0.033) were all associated with user satisfaction while Service quality $\chi 2$ 2.047(p value < 0.153) $\chi 2$ 3.333(p value 0.068) was not associated with user satisfaction. KII "The system is secure you cannot access the Emr without a password. Though Users can easily manipulate the system thus the Information Is not taken as being 100% truthful e.g. you can be able to change past patient information..." The binary logistic regression model of overall satisfaction (Omnibus test $\chi 2$= 141.055, p < 0.001) and could correctly predict 84.1% of the users who were satisfied with EMRS systems.The study recommendations included a periodical review of user satisfaction levels plus frequent trainings on the system by users and lastly system developers should upgrade system factors such as security, clinical decision support and ability to generate end month reports. A study can be conducted to check why different healthcare professional's level of user satisfaction differs.

CHAPTER ONE: INTRODUCTION

1.1 Background to the study

Electronic Medical Record Systems (EMRs) in hospitals have had significant benefits and impact in Kenya. The EMRs have been instrumental in mitigating challenges such as reducing preventable errors; improve communication among health care workers and facilities and reducing medical costs. Other benefits include significant reduction of errors, elimination of legibility issues, easier billing methods and having a data repository for future research Nandikove, *et. al.* (2018). There has been a huge deployment and investment of EMRs from 2019 by the Kenya Ministry of Health in government hospitals in order to improve patient health outcomes (Muthee *et al*. 2018).

In Kenya, Kakamega County is ranked fourth as the most populated county in Kenya with a population of 1.8 million, making it the most populated County in the Western region in Kenya. (Kenya National Bureau of Statistics KNBS (2019). The Kakamega County Government with the Support from the national government and partners has implemented the EMRs within its hospitals. Research done within the county found that the EMRs has the potential to improve health outcomes in HIV/AIDs care and treatment, maternal and child mortality and Malaria in the county, which are the three major causes of death and disability in Kenya (Brandy 2020). Thus, the continued use of the EMRs within the county hospitals is crucial for the benefits of the EMRs to be realised.

1.2 Justification of the Study

The main objective of EMRs is to support informed strategic decision-making by providing quality data which will, in turn, assist managers and health workers at all

tiers of the healthcare system in planning and managing the health services, monitoring disease trends and control epidemics as well as providing periodic evaluation towards agreed targets. The specific objective of this component is to increase the quality of healthcare (HIS Strategic Plan 2009-2014)

Internationally EMRs adoption rate is quite low with over half of EMRs fail to be utilized fully despite the overall consensus that it can improve quality of care (Yehaulashet *et al* 2021) End EMRs users play a crucial role in the overall adoption and continual use of EMRs within the healthcare setup (O'Donnell *et .al.*2019)

In Kenya, there are a number of challenges that have hampered the implementation and use of EMRs in hospitals. In order to improve their effectiveness, there is need to analyse and identify the factors affecting use of EMRs (Foster, 2012).

Kakamega County Teaching and Referral Hospital in 2010 implemented EMRs. Though these initiatives were meant to improve health outcomes for patients and service delivery, the rate of adoption of EMR was slow. The reasons attributed were cost, resistance to change, fear or avoidance of technology, and ingrained patterns of behaviour. Overall, usability is highlighted as the main deterrent to adoption (HIMSS 2009). Studies done at the Kakamega County Teaching and Referral Hospital on EMRs looked at mostly technical factors that affect EMRs usage Nandikove *et al.* (2018). This, study therefore, presented the need to test the adoption of EMR through an evaluation of the user satisfaction levels with an electronic medical record system among health workers at the Kakamega County General Hospital.

1.3 Statement of the Problem

Studies done at the Kakamega County Teaching and referral Hospital by Uamuzi Bora and The International Training and Education Centre for Health (I-TECH) (2015) have shown that EMRs can improve patient outcomes in maternal and neonatal health, HIV/AIDs care and treatment as well as in service delivery to clients in the hospital. Despite this there are numerous studies that have reported low adoption EMRs rates (Yi 2018, Al-Adwan, Berger 2015). Electronic Medical Records implementation does not equate to electronic Medical Record use as intended by the implementers of the system. Various elements affect the use of the EMR and this differs with different end users. Ngugi, *et.al* (2021).

EMR end users are key in the overall adoption and use of EMRs in hospitals Htoo, (2017).The end users have a deep insight to what contributes or rather limits the EMRs use .(Ngugi, *et. al* (2021). According to a study conducted by Nandicove, *et. al* (2018) found that EMRs users in the Kakamega County Teaching and Referral hospital had a positive attitude towards information use of EMR but still found the adoption rate of the system was minimal with paper-based records still being predominantly used.

If in deed these systems are minimally used then the County and National Governments will not reap the full benefits that come with their implementation. It is therefore important to understand level of user satisfaction with EMRs at the Kakamega County Teaching and Referral Hospital.

1.4 Purpose of the Study

The aim of this study was to establish the level of user satisfaction with electronic medical records system among health workers at the County Teaching and Referral Hospital in Kakamega.

1.5 Research Questions

1. What is the range of the user satisfaction levels with EMRs among health workers at the County Referral and Teaching Hospital, in Kakamega Kenya?
2. What is the effect of user characteristics on user satisfaction with EMRs among health workers at the County Referral and Teaching Hospital, in Kakamega Kenya?
3. What is the effect of EMR system factors on user satisfaction with EMRs among the health workers at the County Referral and Teaching Hospital, in Kakamega Kenya?

1.6 Hypothesis

H_0: User characteristics and System factors do not influence user's level of satisfaction with electronic medical records systems at Kakamega County Referral Hospital.

1.7 Objectives of the Study.

1.7.1 Broad Objective

To assess user satisfaction with EMRS among healthcare workers at the County Referral and Teaching Hospital, in Kakamega Kenya.

1.7.2 Specific Objectives

1. To determine the user's satisfaction levels with the EMR system amongst the healthcare workers at the County Referral and Teaching Hospital, in Kakamega Kenya.
2. To examine the influence of user characteristics on the level of user satisfaction with the EMR system amongst the healthcare workers at the County Referral and Teaching Hospital, in Kakamega Kenya.
3. To determine the influence of system factors on the level of user satisfaction with the EMR system amongst the healthcare workers at the County Referral and Teaching Hospital, in Kakamega Kenya?

1.8 Assumptions

The study assumed that the respondents targeted for data collection would respond to the research instruments that were designed including questionnaires. The study also assumed that users' satisfaction with the EMR system in Kakamega County Referral Hospital was determined by evaluating how User characteristics and System Factors influence users' satisfaction.

1.9 Limitations of the Study

Failure of some respondent to fill some questions on the questionnaire and also the failure of respondents to return questionnaires. The researcher, therefore, used other data collection instruments including key informant interviews from respondents who had not done the quantitative questionnaire as a method of triangulation and to reduce bias.

1.10 Conceptual Framework

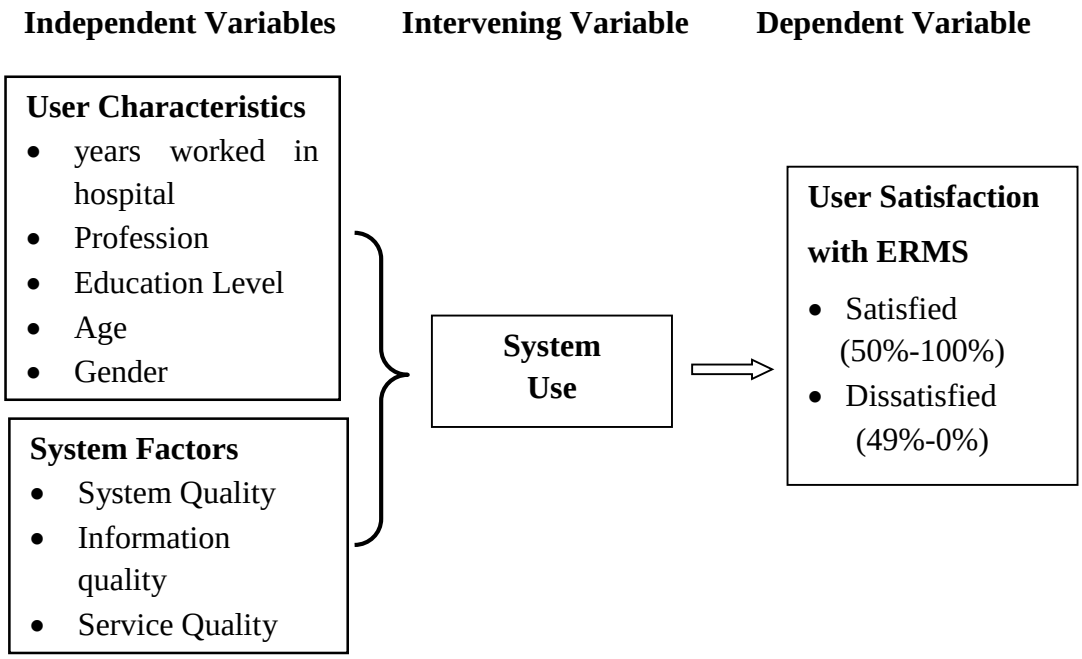


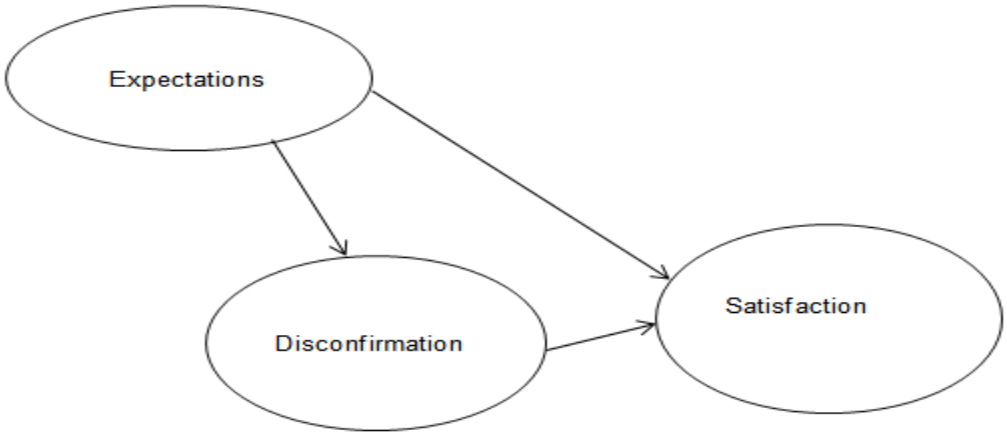
Figure 1.1: Adapted from the Delone and McClean Information Success Model (2013)

The study was conducted based on the Delone and McClean (D & M) Information Success Model. The basic elements of the model are system quality, information quality, service quality, system use and net benefit. The study looked at the five components of the D&M information success model that were applicable for user satisfaction that were system quality, information quality, service quality which were grouped into system factors and added user characteristic as a factor to be tested due to increased reports by researchers in other studies who stated that it was casual factor in user satisfaction Tilahun and Fritz (2015). The study looked at how two independent variables (system factors and user characteristics) affected user's satisfaction i.e. whether users are satisfied or not after system use.

1.11 Theoretical Framework

Expectation-Disconfirmation Theory

This study used the Expectation-Disconfirmation Theory (EDT) to take measurement of user satisfaction levels in objective one of the study. EDT explains that consumers of a product (in this case electronic medical records system) do a comparison of the expected performance of an electronic medical record system and rate it in a Likert scale of 1-5 to judge its user satisfaction.



Expectation-Disconfirmation Model (Adopted from Oliver (1997))

1.12 Significance and anticipated output

1.12.1 Significance of the study

a) Management

The study was beneficial to the management of Kakamega County Referral Hospital in establishing the level of user satisfaction and the appropriate actions that need to be taken in order to maintain or increase healthcare workers satisfaction for improved service delivery at the Hospital.

b) Employees

The study helped the healthcare workers to identify areas that they need to improve or seek more training on in order to embrace the technological changes. In addition, it gave employees a chance to interrogate the system and identify areas of satisfaction and dissatisfaction.

c) Researchers and Scholars

The outcome of the study added to the information that currently exists. It will provide background information to research institutes, individual researchers and scholars who would want to carry out further research in this area. The study would help researchers and academicians to expand their research to the level of user's satisfaction with the electronic medical records system among workers.

1.12.2 Anticipated output

The results of the study would help to identify gaps between the usage of the electronic medical records system among the health workers and the level of their satisfaction. This is important because satisfied employees are bound to be productive thus enhancing tremendous output. Furthermore, unless employees accept a new system, the intended benefits can never be felt in the organization. Therefore, employee satisfaction with the system is very crucial to service delivery and there, this study would facilitate the establishment of the level of employee’s satisfaction on the use of the EMR system and what needs to be done in order to enhance the satisfaction.

CHAPTER TWO: LITERATURE REVIEW

2.0 Introduction

This chapter provides theoretical and empirical review of literature from publications on titles related to the research. It looked at the Electronic Medical Record (EMR) and the importance of user satisfaction in relation to the EMRs. This chapter also reviewed literature on how user characteristics and system factors influence user satisfaction with EMR then gives a summary of the literature review.

2.1 The Electronic Medical Record (EMR)

According to Steinkamp, Kantrowitz, and Airan-Javia (2022), electronic medical record (EMR) allows electronic entry, storage and maintenance of digital data. The EMR comprises of digital systems which help in collection and storage of patient information Kibwage, (2022). Electronic medical record (EMR) replaces traditional paper-based records with an automated system that keeps clinical notes and other clinical data in an electronic format so as to make finding and sharing clinic notes faster and easier (Adler-Milstein *et. al* 2013).

Many developing countries, however, have not implemented the EMR system or where it has been implemented, the implementation is minimal. Published literature shows a lack of acceptance by users leading to a high failure rate of EMR as the reason behind the same (Johns' *et al.* 2003).

2.2 User satisfaction

User satisfaction is defined by as user's opinion on products and services provided compared to products or services expected in a particular organization or company (Martínez-Navalón, *et. al* (2021). Customers in every particular business setting have expectation on quality of a certain products or services and when such products or services received met his/her expectation, satisfaction is generated (Otto et al.,

(2020). Businesses and organizations that understand customer expectations, tastes and preferences are more likely to meet customer satisfaction. User feedback is crucial to the ongoing process of improving quality of service provided. The use of a customer satisfaction model is key in measuring user satisfaction one such model is the SERVQUAL Model.

2.2.1 SERVQUAL Model

The SERVQUAL Model originates from a 1985 study by Parasuraman, ZeithamI, and Berry on a gap between user expectation and user perception gap model (Enayati, 2023). The SERVQUAL Model has five factors to be measured to determine user satisfaction including reliability, tangibles, assurance, responsiveness and empathy. Limna and Kraiwanit (2022) state that reliability is how the electronic medical record accurately and consistency provides service to the user. Tangibility on the other hand is the electronic medical records physical appearance Yusuf, (2022). Responsiveness is the ability of electronic records system software to quickly and timely respond to the needs of a user Bernardo (2023). Empathy is the ability of an electronic records system to meet the needs of the users. Assurance security of the EMR content (quality of service level of confidence). Companies and institutions use the five dimensions in assessing how well their services match customer needs by doing a comparison of customer expectations and views across reliability, tangibles, assurance, responsiveness and empathy.

A study by Sharikh et al. (2020) aimed at examining the impact of electronic medical records' functions on the quality of health services found statistically significant impact of using electronic medical records on customer satisfaction on system service

Quality (reliability, responsiveness, assurance, and empathy). In Kenya, a study by Ngugi, (2021) on a multivariate statistical evaluation of actual use of electronic health record systems implementations in Kenya suggests improvement after finding weakness on active usage of the system and data exchange readiness. Too (2021) conducted a study at Kenyatta National Hospital and discovered that provision of electronic services in the hospital was significantly improved by the level of customer satisfaction with hospital services.

A study by Tierney et al. (2016) on assessing the impact of a primary care electronic medical record system in three Kenyan rural health centres discovered a positive impact of EMRs and was satisfied with implementation of EMRs stating that EMRs are timely and suggested more training of effective implementation of EMRs. Nzyoka *et al.* (2020) notes that the case study conducted by the University of Nairobi Health Services department on the Medical Device Integration system indicated a positive outcome on blood pressure reading time, time spent by the patient at the nursing station, doctor's time to search the patients' blood pressure readings as well as the data accuracy fed in the EMR system. Generally, the SERVQUAL model plays a vital role in assessing the level of user satisfaction of electronic medical records enhancing effective implementation of electronic medical records (Lee, 2022). This study seeks to use the five dimensions (reliability, tangibles, assurance, responsiveness and empathy) to determine the extent of user's satisfaction levels with the EMR system amongst the healthcare workers at the County Referral and Teaching Hospital, in Kakamega Kenya.

2.3 User Characteristics Influence on User Satisfaction

Various studies have been done on the impact of user characteristics and user satisfaction of electronic medical records. Jaber et al. (2021) notes that nurses' views on the use, quality, and satisfaction with electronic medical record in the outpatient department at a tertiary hospital revealed that user experience had a statistically significant influence on the user satisfaction of electronic records management. A related study on user satisfaction and experience of electronic medical record carried out by Smaradottir and Fensli (2020) revealed that as users were getting trained and interacting with the electronic medical records system interface, they developed a positive attitude towards the system. User characteristics such as ICT knowledge and user perception have an influence on user satisfaction of EMRSs.

A study by Tsai et al. (2019) suggests that knowledge insufficiency and lack of computer skills is a major contributor to physician resistance to EMRs. According to the findings by Dubale et al. (2023), computer literacy of users and training on electronic medical records system were among the major factors that affects user satisfaction of the EMRSs. Mwang'ombe (2021) recommends acquisition of sufficient ICT facilities and training of staff as strategies to enhance effective utilization and user satisfaction of electronic medical records systems in health facilities.

Mitaki (2019) informs us that scaling up implementation and usage of Electronic Medical Records in Migori County revealed a big portion of the staff in the health department who had a positive attitude with regard to implementing ERMs. Findings by Huvilac et al. (2021) revealed that young respondents were more likely to use electronic medical records compared the older respondents. A similar study on the

factors associated with user satisfaction of electronic medical records system by Salleh (2021) revealed users of EMRS who were aged 20, and were certified doctors and those who had used the system for more than a year were more satisfied with the electronic medical records systems. Rahman (2022) assert that findings on satisfaction level and its associated factors among government electronic medical record system users in Klang valley among the variables; age, system experience and education level had statistically significant association with user satisfaction of electronic medical records.

In Ghana, Essuman et al. (2020) informs us that factors associated with the utilization of electronic medical records in the Eastern Region of Ghana revealed age, computer competence, knowledge about EMR, use of EMR technology and communication among the staff as key factors that directly influence attitude of health workers towards electronic medical records. The above revelation supports findings of a study conducted by Oumer et al. (2021) which further indicated that sex, age, work experience knowledge, attitude on EMR, and other factors were associated user satisfaction after taking sex, age knowledge, and attitude on EMR as controlling variables. In Ethiopia, by Ambesse (2020) revealed that health professionals with good attitude, good knowledge and with basic computer courses were more likely to implement electronic medical records. In addition, the knowledge of electronic medical records system among frontline health care workers in Jos University teaching hospital, Plateau State Nigeria points out that the existence of good knowledge base among workers was a true reflection of effective implementation and future of electronic medical records Afolaranmi et al. (2020) Addo and Agyepong (2020) cited inadequate computer knowledge as a factor that

hinders effective implementation of electronic medical records. They recommend training of staff on computer skills and system use in order to enhance a positive attitude towards electronic medical records.

It is in regard to these studies, that I sought to find out whether the user characteristics reviewed also had an influence on user satisfaction of electronic medical records system amongst the healthcare workers at the County Referral and Teaching Hospital, in Kakamega Kenya.

2.4 System Factors Influence on User Satisfaction

System factors affect user satisfaction with electronic medical records in a health facility some of these factors are; availability, affordability and accessibility. Computers and system software should be available and reliable enough to gain trust on usability by the staff. Abore et al. (2022) asserts that health professionals' readiness to implement electronic medical recording system revealed that a network of interaction between stakeholders and technology helps to promote system acceptance. Adegbore and Omowumi (2021) state that strong commitment from the top management staff ensures adequate funding and human resources as well as the effective implementation of electronic medical records. When the executive members of staff in a hospital focused on provision of necessary resources to embrace information technology; they resort to embrace a better system success (Almarzouqi (2022).

An assessment by Kang'a *et al.* (2017) on functionality of electronic medical records systems used in the Kenyan public-Sector health facilities revealed a relatively recommended functionality of Electronic Medical records system. However, Kang'a et al. (2017) further states that the system had low clinical

decision support. A different study in Rwanda by Fraser (2022) revealed that successful scale-up and use electronic medical records in health facilities could improve clinical operations in low- and middle-income countries contradicting the finding by Kang'a et al. (2017) on clinical decision support.

Policies associated with adoption of electronic medical records directly influence sustainability of the EMR system hence user satisfaction. Muinga *et. al.* (2018) revealed that the initial stage of implementation of EMR system in Kenya healthcare facility was scaled back by socio-technical and administrative issues. A clear outline of electronic medical records policies ensures the roles of each staff and functionality to ensure efficient running of the system. System factors therefore influences acquisition, accessibility, use and maintenance of electronic medical records in medical facilities which in turn influence user satisfaction.

A study by Dubale et al. (2023) on User Satisfaction of Using Electronic Medical Record System and Its Associated Factors among Healthcare Professionals in Ethiopia revealed that perceived system quality had a significant association with user satisfaction. According to Walle *et al*. (2023), system quality and system use has a direct effect on user satisfaction of electronic medical records system. Trang and Tuan (2019) affirmed a direct influence of quality of the system, top management support and information quality on general user satisfaction of electronic medical records system.

This study therefore sought to find out whether the system factors reviewed had an influence on utilization of electronic medical records system amongst the healthcare workers at the County Referral and Teaching Hospital, in Kakamega Kenya.

2.5 Summary and knowledge gap

The SERVQUAL Model has been used in many studies to determine the level of user satisfaction. However, a few studies in Kenya have used this model to determine level of user satisfaction of EMRS especially among the health workers.Studies in different countries reveals the major determinant of user satisfaction of electronic medical records system including ICT knowledge, computer literacy, attitude, job experience, age, policies, system support, funding and system quality. However, the previous studies reviewed in literature might not be a reflection of what exactly happens amongst the healthcare workers at the County Referral and Teaching Hospital, in Kakamega County. An in-depth study involving data collection among the healthcare workers at the County Referral and Teaching Hospital, in Kakamega County was necessary to determine the Level of user Satisfaction with Electronic Medical Records System among health workers in Kakamega County Referral Hospital, Kenya.

CHAPTER THREE: MATERIALS AND METHODS

3.0 Introduction

This chapter gives an in depth picture of the research design and the variables in the research. The chapter also gives a comprehensive picture of the research instruments and analysis methods used.

3.1 Research Design

A descriptive cross-sectional study design was used so as to provide the correct description between variables and their associations. For this case the variables included user characteristics and system factors. Descriptive design was suitable since it minimized bias and maximized the reliability of the data collection plus analysis through the use of both qualitative and quantitative approaches were to collect data. This design enabled the appropriate description of the two independent variables which were user characteristics and system factors and how the variables affect user's satisfaction.

3.2 Variables

3.2.1 Dependent Variable

Level of user Satisfaction is (Satisfied 51-100%, Not Satisfied 0-50%)

3.2.2 Independent Variable

System Factors are elements in computer software that enable the user to complete a certain task (e.g. System quality, Information quality and service quality). The study looked at how these elements affected level of user satisfaction. User Characteristics are attributes that are unique to a person (e.g. Age, gender). The study looked at how these attributes affected level of user satisfaction.

3.2.3 Intervening Variables

System Use was an intervening variable because in-order for the users to be able to rate their satisfaction with the EMRs they have to have operated the system and have known its capabilities so as to rate whether they are satisfied or not.

3.3 Location of the Study

The study was carried out in Kakamega County Teaching and Referral Hospital (KCRH). The hospital is located in western Kenya in Lurambi Sub County. It serves two County hospitals and seven sub county hospitals providing acute care and surgical services to patients, primary care and community services. It offers a wide range of services and has a National reputation for cutting edge research. It is a 500-bed capacity hospital. The scale and complexity of the hospital makes it a particularly appropriate study setting. This was due to it's the large human resource (567 health workers) and bed capacity makes it ideal for the study. Being one of the pioneer sites for the implementation of the EMR in Rural Western Kenya. Frings *et.al* (2018) informs us that Kakamega had a high prevalence of HIV/AIDs and Maternal and Neonatal mortality. EMR was one of the strategies that were used to reduce this prevalence. It's because of this that makes it an appropriate site for this particular study.

3.4 Study Population

The study targeted health care workers in the Kakamega County Referral Hospital who were using or had used the hospital's EMR system. This was because different health care workers face different perspectives and experiences due to the difference in the extent of access to EMR systems. System use was ascertained by checking whether the healthcare worker had login credentials to the EMRs.

3.4.1 Inclusion Criteria

All staff who were using or had ever used an EMR system and had given informed consent. This included selection in different departments that have EMR systems. Each department that had EMR system had different access rights to the systems. Therefore, to be able to cover all the gaps, there was a need to incorporate all the departments within different levels of workers in Kakamega County Referral Hospital. Different departments that were using EMR systems were also considered.

3.4.2 Exclusion Criteria

All staff that had not given any informed consent and those who were absent during the data collection period. Staff that had never used the EMR systems before were excluded during the course of the research.

3.5 Sampling Techniques

Stratified random sampling was used. The health workers were grouped into homogenous strata based on training such as lab technicians, nurses. They were proportionately sampled from each stratum as shown in Table 3.1. The individual respondents were then chosen randomly from the stratum so as to achieve the required sample size.

3.6 Sample Size Determination

Formula proposed by Fisher *et al*. (1998) was used to determine sample size as follows:

$$\mathbf{n = \frac{Z^2pq}{d^2}}$$

Where:

n = described sample size (if the target population is more than 10,000).

z = standard normal deviate.

p = prevalence of health workers using EMR system in Kakamega County Referral Hospital (not known) default 0.5 will be used.

d = level of significance set at 5%

q = level of statistical significance set at 0.5

n = $\frac{1.96^2 \times 0.5 \times 0.5 = 384.16}{0.05} = 385$

Corrected for small population; nf = n/1+ (n/N)

nf = 385/ (1+ [(385)/567)] = 229.30, adjusted by 10%for total of **252 Health workers**

Table 3.1: Sample Technique and Sample Size of health workers

Source: Kakamega County Health Human Resource Department (2019)

Health Workers	**No. of Health Workers**	**Sample Technique**	**Sample Size**
Clinical Officer	45	(252/567)45	20
Health record Officer	8	(252/567)8	4
Medical Lab Technologist	26	(252/567)26	12
Medical Engineering Technologist	10	(252/567)10	4
Medical Officers	47	(252/567)47	21
Nurses	372	(252/567)372	166
Orthopaedic technologists	9	(252/567)9	4
Pharmacisits	10	(252/567)10	4
Physiotherapist	9	(252/567)9	4
Radiographers	16	(252/567)16	7
Nutrionist	6	(252/567)6	3
Dental technologists	4	(252/567)4	2
Optometrists	5	(252/567)5	2
TOTAL	**567**		**252**

3.7 Construction and Research Instruments

Questionnaires were used for data collection and were formulated according to the objectives of the study. The questionnaire had closed-ended questions and the other questionnaire that was administered to the key informants had open ended questions that enabled the respondent views to be expressed (Kothari 2004). The questionnaire was structured as follows:-introduction/demographic information, level of user satisfaction, the influence of user characteristics on user's level of satisfaction and the influence of system factors on user's level of satisfaction. Some of the advantages of questionnaires include a wide coverage of respondents, questionnaires put less pressure on the respondents and they were economical. The questionnaire took 10min to fill. While the opened ended questionnaire took 20 min.

3.8 Pre-test

A pre-test was carried out at AP line dispensary to make sure that the tools collect the required information and that they consistently measured the variables in the study. This site was considered because it was within close proximity to the Kakamega county Teaching and Referral Hospital and has high workload similar to KCTRH plus it also uses EMRs in its Comprehensive Care Clinic Similar to that which is in use at KCTRH. After the pre-test, the study tools were reviewed and adopted for the study.

3.9 Validity

The content and construct validity of the instrument of research was established by asking for options from the field of study experts. The questions were standardized to ensure accuracy in the generation of the required information. This helped the necessary revise the instrument of research.

3.10 Reliability

Inter-rater reliability was used in the study due to the fact that it is the preferred method of use when the data is both qualitative and quantitative as is the case with this research. Reliability was improved by doing a pre-test study where Cronbach's Alpha co-efficient was used. The pilot study also helped familiarized the researcher with the administrative procedures and enabled the researcher to identify items that require change. The overall internal consistency of Cronbach's alpha co-efficient was 0.73 which was dimmed satisfactory, according to Shi *et.al* 2012 the value of Cronbach's alpha co-efficient between 0.6 to 0.8 is deemed acceptable.

3.11 Data Collection Techniques

Primary data was collected by use of questionnaires, key informant interviews. The questionnaires were structured into three four parts. The first part looked at demographic data. The second part looked at user's satisfaction and used the SERVIQUAL MODEL to measure user satisfaction. By using 5 dimensions i.e. Reliability, Responsiveness, Assurance, Tangibility and Empathy. The questionnaire had nineteen questions under the 5 dimensions with reliability having 8 questions, this was followed by Tangibility which had 5 questions the other three dimensions Responsiveness, assurance and empathy all had 2 questions. The questionnaires were dropped and later collected by the researcher to enable the respondents have enough time to answer. Key informant interviews were held with heads of department of the four departments i.e. Outpatient, comprehensive care clinic, In-patient and Casualty. It aimed at gaining perspectives not covered in detail by other instruments but seen as having an important role in understanding the motives behind factors influencing satisfaction with EMR systems.

3.12 Data Analysis

3.12.1 Quantitative Data Analysis

Quantitative data analysis was done by changing the data to numerical codes representing attributes or measurement of variables. Data analysis was done using the Statistical Package for Social Sciences (SPSS) version 20. Descriptive statistics such as frequency distributions, percentages and frequency tables were used to summarize and relate variables, which were obtained from the study. Chi square was used to determine relationships between independent variables and user satisfaction. Binary logistic regression model was used to determine the effects of each component on user satisfaction.3.12.2 Qualitative Data Analysis.

The collected data underwent the following processes such as editing, coding, classification and then tabulation. Qualitative data was first coded to ensure confidentiality of all respondents who took part in the study. The data were then inputted into an Excel spreadsheet and grouped according to the various sections in the key informant questionnaire.

3.13 Ethical consideration

Approval was obtained from Kenyatta University Graduate School. Ethical clearance was obtained from Kenyatta University Ethics Review Committee (Appendix III). Research permit was obtained from the National Council for Science and Technology (Appendix IV). Authorization to undertake the research was sought from Kakamega County Teaching and Referral hospital. The participation of respondents was voluntary and informed consent was given by the respondents through reading and filling in the informed consent forms with anonymity being maintained to ensure confidentiality. Privacy was maintained by a one-on-one basis

for interview schedules. The information gathered was safeguarded at all times. The gathered information was entered into a computer and safeguarded with a password.

CHAPTER FOUR: RESULTS

4.0 Introduction

This chapter is divided into five key sections: Section one looks at the demographic distribution of respondents, the second section deals with the level of user satisfaction with Electronic Medical Records System (EMRS) at the Kakamega County Teaching and Referral Hospital. The third section is a presentation of data on the user characteristics influence on user satisfaction with EMR at the Kakamega County Teaching and Referral Hospital. The fourth part looks at system factors influence on user satisfaction with EMRS at the Kakamega County Teaching and Referral Hospital. The final section displays the binary regression model of overall satisfaction. A total of 252 questionnaires were distributed and only 246 questionnaires were well filled and collected for use in analysis. The response rate was at 97.61% which was considered adequate.

4.1. Demographic characteristics of the respondents

4.1.1: Age of Respondents

More than half of respondents were males 140 (56.9). Half of them were aged 25-40 years while the balance either below 25 years, 38 (15.4%) or over 40 years 85 (34.6%) respectively as shown in figure 4.1 below.

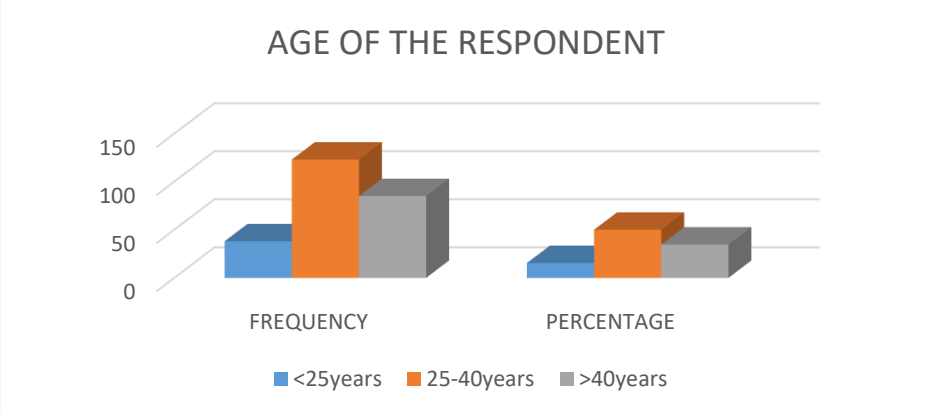


Figure 4.1 Age of Respondents

4.1.2: Marital Status

Majority of the respondents 194 (78.9%) were married. Those who were single were 16(6.5%) while those who were widowed were 19(7. 7%).Those who were separated/divorced were 17(6.9%) as shown in Figure 4.2 below.

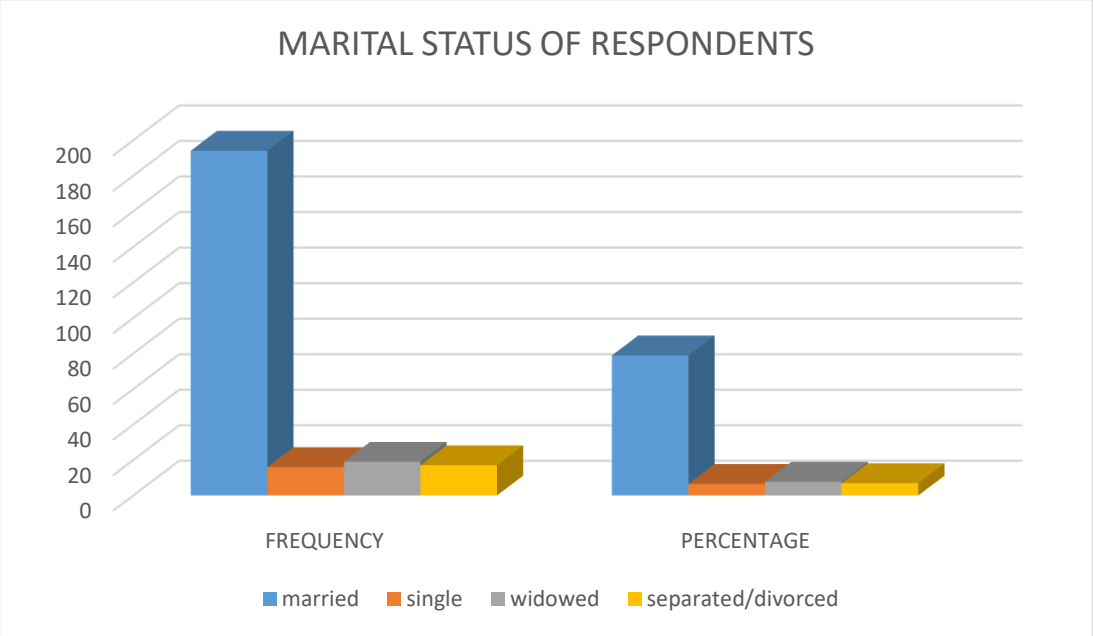


Figure 4.2 Marital Status of Respondent

4.1.3: Years of Service in Hospital

More two thirds of the respondents had worked for five years or less in their current facility 179 (72.7%) while 25 (10.2%) had worked for more than ten years.

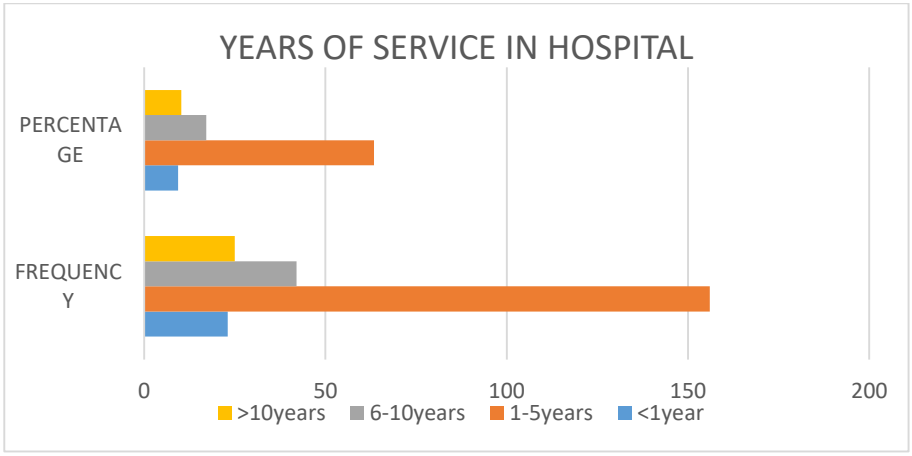


Figure 4.3 Years of Service in Hospital

4.1.4: Healthcare Workers Carders

From the ten clinical specialists, nurses were 166 (67.5%), health records officers 4 (1.6%), clinical officers 20 (8.1%), and pharmacist 4 (1.6%) while the rest were distributed as summarized in Figure 4.4

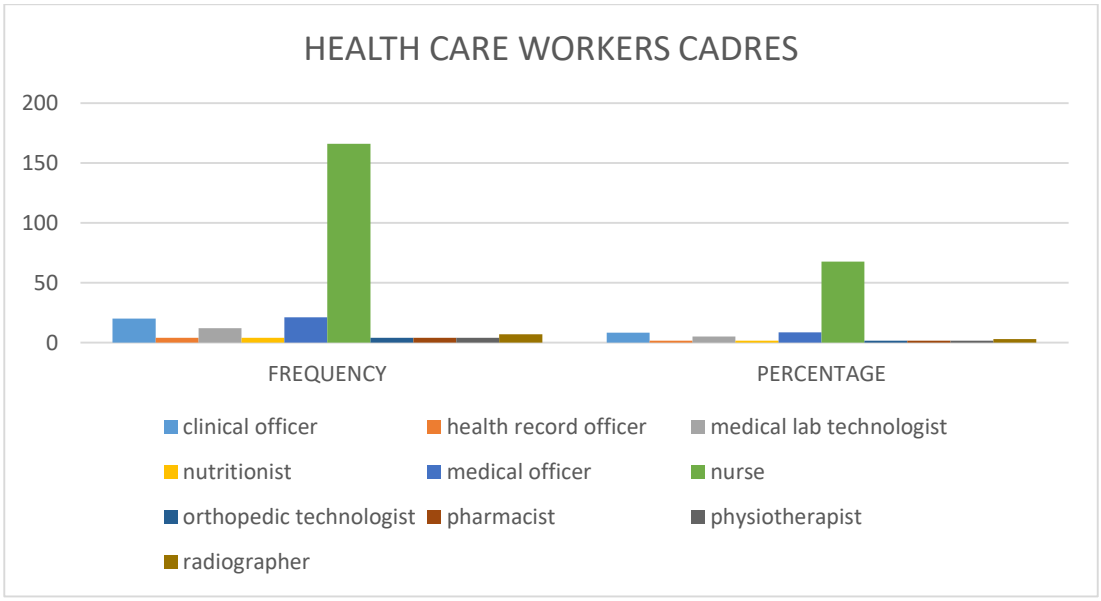


Figure 4.4 Health Care Workers Cadres

4.2 Level of user satisfaction with the EMR system among health workers at the Kakamega County Referral Hospital.

The first objective sought to find out user satisfaction levels at Kakamega county referral hospital. Satisfaction was measured using five service quality dimensions (reliability, tangibles, assurance, responsiveness, and empathy) using a 5-Likert scale. Tangibility was assessed using 5 statements, reliability 8, assurance 2, responsiveness 2 and empathy 2.

4.2.1 Tangibles

Against the 246 respondents who engaged in the study, 111(45%) strongly agreed that EMRS requires less space to operate, 55 (22.4%) agreed while 61 (24.8%) where indifferent. However, 5 (2.0%) disagreed and 14 (5.7%) strongly disagreed. In the study, 98(39.8%) strongly agreed with the statement that EMRS requires low labor to finish tasks, 54 (22.0%) agreed while 66 (26.8%) where indifferent. However, 28 (11.4 %) disagreed. One hundred and thirty five (54.9%) strongly agreed with the statement that EMRS reduces bulky paper-based records, 58(23.6%) agreed while 19(7.7%) where indifferent.

However, 20(8.1%) disagreed and 14 (5.7%) strongly disagreed. Eighty five 85 (34.6%) strongly agreed, 70(28.5%) agreed while 47(19.1%) where indifferent. However, 28(11.4%) disagreed and 16(6.5%) strongly disagreed. While ninety-four (38.2%) strongly agreed 70(28.5%) agreed while 34(13.8%) where indifferent. However, 39(15.9%) disagreed and 9 (3.7%) strongly disagreed. Table 4.1 shows distribution of responses on tangibles

Table 4.1: Distribution of Respondents on Tangibles

Satisfaction statement	Ratings	Frequency	Percentage
My expectations on an EMRS that requires less space for the operation were met.	strongly disagree	14	5.7
	disagree	5	2.0
	neutral	61	24.8
	agree	55	22.4
	strongly agree	111	45.1
My expectations on an EMRS that requires low labour to finish tasks were met.	disagree	28	11.4
	neutral	66	26.8
	agree	54	22.0
	strongly agree	98	39.8
My expectations on an EMRS that reduces bulky paper-based records were met	strongly disagree	14	5.7
	disagree	20	8.1
	neutral	19	7.7
	agree	58	23.6
	strongly agree	135	54.9
My expectations on an EMRS that reduces facility costs were met	strongly disagree	16	6.5
	disagree	28	11.4
	neutral	47	19.1
	agree	70	28.5
	strongly agree	85	34.6
My expectations on an EMRS that doesn't require other special software and hardware to run were met	strongly disagree	9	3.7
	disagree	39	15.9
	neutral	34	13.8
	agree	70	28.5
	strongly agree	94	38.2

4.2.2 Reliability

From the 246 respondents who participated in the study, 87(35.4%) strongly agreed with statement that an EMRS that is easy to understand were met, 56 (22.8%) agreed while 59 (24.0%) where indifferent. However, 34(13.0%) disagreed and 10 (4.1%) strongly disagreed. Additionally, 57(23.2%) strongly agreed with the statement that the EMRS saves cost, 83 (33.7%) agreed while 36(14.6%) where indifferent. Table 4.2 shows other distribution of responses with percentages on Reliability.

Table 4.2: Distribution of Respondents on Reliability

Satisfaction statement	Ratings	Frequency	Percentage
My expectations on an EMRS that is easy to understand were met	strongly disagree	10	4.1
	disagree	34	13.8
	neutral	59	24.0
	agree	56	22.8
	strongly agree	87	35.4
My expectations on an EMRS that manipulates data correctly were met	strongly disagree	14	5.7
	disagree	43	17.5
	neutral	53	21.5
	agree	76	30.9
	strongly agree	60	24.4
My expectations on an EMRS that provides sufficient security of records were met.	strongly disagree	14	5.7
	disagree	15	6.1
	neutral	52	21.1
	agree	79	32.1
	strongly agree	86	35.0
My expectations on an EMRS that saves costs of different operations were met.	strongly disagree	22	8.9
	disagree	48	19.5
	neutral	36	14.6
	agree	83	33.7
	strongly agree	57	23.2
My expectations on an EMRS that saves time in finishing tasks were met.	strongly disagree	24	9.8
	disagree	15	6.1
	neutral	34	13.8
	agree	96	39.0
	strongly agree	77	31.3
My expectations on an EMRS that provides data backup and recycle bins were met	strongly disagree	33	13.4
	disagree	35	14.2
	neutral	51	20.7
	agree	67	27.2
	strongly agree	60	24.4
My expectations on an EMRS with less or no system technical failures were met	strongly disagree	30	12.2
	disagree	61	24.8
	neutral	41	16.7
	agree	63	25.6
	strongly agree	51	20.7
My expectations on an EMRS that enables easy communication by different departments were met	strongly disagree	33	13.4
	disagree	39	15.9
	neutral	30	12.2
	agree	49	19.9
	strongly agree	95	38.6

4.2.3 Responsiveness

From the 246 respondents who participated in the study, 75(30.5%) strongly agreed with that the EMRS accomplishes tasks within specified time 85(34.6%) agreed while 53 (21.5%) where indifferent. However, 15(6.1%) disagreed and 18(7.3%) strongly disagreed. 67(27.2%) strongly agreed with the statement that EMRS is compatible with other system software available in the hospital, 68(27.6%) agreed while 57(23.2%) where indifferent. However, 35(14.2%) disagreed and 19(7.7%) strongly disagreed as shown in Table 4.3

Table 4.3: Distribution of Respondents on Responsiveness

Satisfaction statement	Ratings	Frequency	Percentage
My expectations on an EMRS that accomplishing tasks within specified time were met.	strongly disagree	18	7.3
	disagree	15	6.1
	neutral	53	21.5
	agree	85	34.6
	strongly agree	75	30.5
My expectations on an EMRS that is compatible with other system software available in the hospital were met	strongly disagree	19	7.7
	disagree	35	14.2
	neutral	57	23.2
	agree	68	27.6
	strongly agree	67	27.2

4.2.4 Assurance

The study was finding out the level of satisfaction of health workers on assurance of the ERMS. The distribution of 246 respondents indicates that forty one (16.7%) strongly agreed with that the EMRS is able to provide user support in case of system failure 83(33.7%) agreed while 54(22.0%) where indifferent. However, 43(17.5%) disagreed and 25(10.2%) strongly disagreed.71 (28.9%) strongly agreed with that the EMRS with competent performance, 62(25.2%) agreed while 49(19.9%) where

indifferent. However, 45(18.3%) disagreed and 19(7.7%) strongly disagreed. Table 4.4 shows frequency and percentages of responses

Table 4.4: Distribution of Respondents on Assurance

Satisfaction statement	Ratings	Frequency	Percentage
My expectations on an EMRS that provides user support in case of system failure were met	strongly disagree	25	10.2
	Disagree	43	17.5
	Neutral	54	22.0
	Agree	83	33.7
	strongly agree	41	16.7
My expectations on an EMRS with competent performance as indicated by the system providers were met	strongly disagree	19	7.7
	Disagree	45	18.3
	Neutral	49	719.9
	Agree	62	25.2
	strongly agree	71	28.9

4.2.5 Empathy

Finally, the study was checking level of satisfaction of health workers on empathy of ERMS at Kakamega Referral Hospital. Sixty eight 68(27.6%) strongly agreed with the EMRS is easy to adapt by users, 79(32.1%) agreed while 54(22.0%) where indifferent. However, 24(9.8%) disagreed and 21(8.5%) strongly disagreed as shown in Table 4.5.

Table 4.5: Distribution of Respondents on Empathy.

Satisfaction statement	Ratings	Frequency	Percentage
My expectations on an EMRS that is easy to adapt by users were met	strongly disagree	21	8.5
	disagree	24	9.8
	neutral	54	22.0
	agree	79	32.1
	strongly agree	68	27.6
My expectations on an EMRS with user-friendly interface were met	strongly disagree	18	7.3
	disagree	28	11.4
	neutral	61	24.8
	agree	67	27.2
	strongly agree	72	29.3

Table 4.6 shows the scores of satisfaction of the respondents with five quality dimensions for measuring customer satisfaction namely (reliability, tangibles, assurance, responsiveness, and empathy). Overall user satisfaction was derived from sum scores of these five dimensions. The overall proportion of respondents satisfied with EMR system was 134 (54.5%). More than a half of respondents, 133 (54.1%) were satisfied tangibility of EMR system, 129 (52.4%) expressed satisfaction with reliability of EMR system, 103 (41.9%) were satisfied with assurances of EMR system while empathy was indifferent 50%. Table 4.6: Levels of Satisfaction for the five quality dimensions for measuring customer satisfaction.

Table 4.6 The scores of satisfaction of the respondents with five quality dimensions

Variable	Frequency	Percentage
Overall satisfaction		
Dissatisfied/undecided	112	45.5
Satisfied	134	54.5
Tangibility		
Dissatisfied/undecided	113	45.9
Satisfied	133	54.1
Reliability		
Dissatisfied/undecided	117	47.6
Satisfied	129	52.4
Responsibility		
Dissatisfied/undecided	140	56.9
Satisfied	106	43.1
Assurance		
Dissatisfied/undecided	143	58.1
Satisfied	103	41.9
Empathy		
Dissatisfied/undecided	123	50.0
Satisfied	123	50.0

Table 4.7 shows the bivariate analysis between socio-demographic characteristics/work history and overall satisfaction with EMR systems of the respondents. Gender ($\chi 2$ =15.566, df=1 p < 0.001), age ($\chi 2$ =11.766, df=2 p =0.003), marital status ($\chi 2$ =11.766, df=3 p = 0.007), and professional ($\chi 2$ =70.085, df=9 p < 0.001) were significantly associated with overall satisfaction of EMR system. Years of service at present facility (p= 0.456), was, however, not associated with overall satisfaction. Seventy three (68.9 %) of female were satisfied with EMR

system compared to 61 (43.6%) of male respondents. Single were less satisfied in contrast to the other marital outcomes. Eleven (68.8%) of single respondents were dissatisfied with EMS system compared to 93 (47.9%) married. Widowed or separated/divorced recorded similar satisfaction scores of 15 (78.9%) and 13 (76.5%) respectively. Young respondents were more likely to have overall satisfaction than old respondents as shown in Table 3. Twenty six (68.4%) of the respondents who were less than 25 years and seventy four (60.2) who belonged to the age group 25-40 years tended to be satisfied compared older colleagues of above 40 years 34 (40%). Likewise, satisfaction decreased as years of services in facility increased. Ten (40%) of the respondents who had worked for over 10 years tended to be satisfied compared to 13 (56.5%) who had worked for less one year. Radiographers (100%), Medical engineering officers 7 (77.8%), Nurses 75 (72.1%) lean towards satisfaction than laboratory technician (100%), orthopedics (100%), clinical officers 14 (77.8%), Pharmacy 13 (72.2%) and Medical officers 9 (69.2%).

Table 4.7. Respondent user characteristics influence on overall satisfaction (n=246)

Variable	Overall satisfaction		
	Dissatisfied (n=112)	Satisfied(n=134)	$\chi 2$df (p-value)
Gender			
Male	79 (56.4)	61 (43.6)	15.566 1 **<0.001**
Female	33 (31.1)	73 (68.9)	
Age			
< 25 years	12 (31.6)	26 (68.4)	11.766 2 **0.003**
25-40 years	49 (39.8)	74 (60.2)	
>40years	51 (60)	34 (40)	
Marital status			
Married	93 (47.9)	101 (52.1)	(Fisher exact) **0.007**
Single	11 (68.8)	5 (31.3)	
Widowed	4 (21.1)	15 (78.9)	
Separated/divorced	4 (23.5)	13 (76.5)	
Years in Hospital			
< 1 Year	10 (43.5)	13 (56.5)	2.610 4 0.456
1-5years	70 (44.9)	86 (55.1)	
6-10years	17 (40.5)	25 (59.5)	
>10years	15 (60)	10 (40)	
Profession			
Clinical officer	16 (80)	4 (20)	(Fisher exact)**<0.001**
Records officers	3(75)	1(25)	
Lab technologist	12(100)	0	
Nutrition	1(25)	3 (75)	
Medical officer	15(71.4)	6(28.6)	
Nurse	46(27.7)	120(72.3)	
Orthopedics	4 (100)	0	
Pharmacy	3(75)	1(25)	
Physiotherapy	1 (25)	3(75)	
Radiographer	0	7 (100)	

$\chi 2$ = chi square, Df= degree of freedom; Significant p value in bold. Fisher exact used appropriately

The following in table 4.8 are responses by key informants on whether they are satisfied with electronic medical records systems at the Kakamega County and teaching referral hospital and reasons why they gave the above responses these

views were to give more in-depth understanding on reasons for users' satisfaction with electronic Medical Records

Table 4.8: Qualitative Data on Level of User Satisfaction from Key Informant Interviews

KEY INFORMANT	COMMENT
KI 1	*Generally satisfied with the system because it's easy to use and faster and easier retrieval of patient information……*
KI 2	*Satisfied with the system because it's able to track revenue collection in the hospital ……..*
KI 3	*Satisfied with the system because it enhanced confidentiality of patient information ……..*
KI 4	*Satisfied because the EMR reduced time in generating reports as opposed to the paper-based system…….*
KI 5	*Dissatisfied with the system because of downtime, leading to backlog in entering data and serving patients leading to use of paper based system.*
KI 6	*Dissatisfied with the system because of duplication of work i.e entering data in both the EMR and paper.*

4.3 User characteristics and user satisfaction with the EMRS at Kakamega County Referral Hospital

Objective two of the study sought to find out how user characteristics affect the user satisfaction levels with the EMR system among health workers at Kakamega County Referral Hospital. Respondents were asked about the extent they could agree or disagree on the statements related to user characteristics. One hundred and thirty (52.8%) strongly agreed with the statement that high level of ICT knowledge of users increases the user satisfaction with EMRS by users 75(30.5%) agreed while 20(8.1%) where indifferent. However, 14(5.7%) disagreed and 7(2.8%) strongly disagreed. Meanwhile 126(51.2%) strongly agreed with account that the new staff are more likely to be satisfied with EMRS compared to the older staff that have

worked longer in the hospital 71(28.9%) agreed while 30(12.2%) where indifferent. However, 10(4.1%) disagreed and 9(3.7%) strongly disagreed. From the 246 respondents who participated in the study, 94(38.2%) strongly agreed with the statement that perception positive cultural believes towards technology increases user satisfaction with the EMRS, 79 (32.1%) agreed while 50(20.3%) where indifferent. However, 21(8.5%) disagreed and 2(0.8%) strongly disagreed. Sixty nine (28%) strongly agreed and sixty three (25.6%) agreed with the statement that the fear of technology has no influence on user satisfaction while 43(17.5%) were indifferent. However, 30(12.2%) disagreed and 41(16.7%) strongly disagreed.

Table 4.9: Influence of user characteristics on the level of user satisfaction with the EMR system among health workers.

Variable	Rating	Frequency	percentage
High level of ICT knowledge of users increases user satisfaction (Computer literacy)	strongly disagree	7	2.8
	Disagree	14	5.7
	Neutral	20	8.1
	Agree	75	30.5
	strongly agree	130	52.8
New staff are more likely to be more satisfied with EMRs compared to those who have worked for many years in the hospital.(Years worked in the Hospital)	strongly disagree	9	3.7
	Disagree	10	4.1
	Neutral	30	12.2
	Agree	71	28.9
	strongly agree	126	51.2
High experience level of EMRS users will increase their level of user satisfaction with EMRs (Training)	strongly disagree	7	2.8
	Disagree	15	6.1
	Neutral	37	15.0
	Agree	84	34.1
	strongly agree	103	41.9
Positive cultural believes towards technology increases use of EMRS.	strongly disagree	2	.8
	Disagree	21	8.5
	Neutral	50	20.3
	Agree	79	32.1
	strongly agree	94	38.2
Fear of technology has no influence on use of EMRS by users (Attitude)	strongly disagree	41	16.7
	Disagree	30	12.2
	Neutral	43	17.5
	Agree	63	25.6
	strongly agree	69	28.0

Table 4.10 shows the chi square analysis for user characteristics against the user satisfaction levels with the EMR system among health workers at Kakamega County Referral Hospital. Highly knowledgeable ICT users were $\chi 2$ =15.159, p < 0.001), significantly associated with overall satisfaction of EMR system. One hundred and twenty three (60% of the respondent who agreed with the statement that high level of ICT knowledge of increases the user satisfaction levels with EMRS were satisfied

compared eleven (26.8%) of those who disagreed. Also experience with of EMRS was significantly associated ($\chi 2$ =5.955, p 0.015), with overall satisfaction of EMR system. One hundred and ten (58.8%) of the respondents who agreed with the preposition that high experience level of EMRS users will increase their level of the system compared to 24 (40.7%) who disagreed. Similarly, the perception that fear of technology has no impact on the user satisfaction with EMRS significantly associated ($\chi 2$ =95.675, p < 0.001) with overall satisfaction of EMR system. 110 (83.3%) of the respondents who agreed with the statement that fear of technology has no influence on user satisfaction with EMRS by users were satisfied compared 24 (21.1%) for those who disagreed.

However, the opinion that years worked in the hospital was not significantly associated ($\chi 2$ =3.328, p 0.068), with overall satisfaction of EMR system. This was despite 113 (57.4%) of those who participated in the study agreed that new staff are more likely to be satisfied with EMRS compared to those that have worked longer in the hospital staff in the hospital compared to 21 (42.9) who disagreed. Additionally, the view that positive cultural believes towards technology increases use EMR was not significantly associated ($\chi 2$ =3.594, p 0.058). Nonetheless, one hundred and one (58.4%) of the respondent who agreed with preposition that positive cultural believes towards technology increases use of EMRS were satisfied compared to 33 (45.2%) of those who disagreed.

Table 4.10: Chi Square Analysis for User Characteristics on the Overall User Satisfaction

Variable	**Overall satisfaction (n=246) %**		
	Dissatisfied (n=112)	Satisfied(n=134)	$\chi 2$ **(p-value)**
High level of ICT knowledge of users increases user satisfaction (Computer literacy)			15.159 (<**0.001)**
Disagree	30(73.2)	11 (26.8)	
Agree	82 (40)	123 (60)	
New staff who have worked for many years in the hospital are likely to be more satisfied with EMRs compared to elderly staff in the hospital. (Years worked in the Hospital)	28(57.1)	21 (42.9)	3.328(0.068)
Disagree	84 (42.6)	113 (57.4)	
Agree			
High experience level of EMRS users will increase their level of user satisfaction with EMRs (Training)	35 (59.3)	24 (40.7)	5.955 (**0.015)**
Disagree	77 (41.2)	110(58.8)	
Agree			
Positive cultural believes towards technology increases user satisfaction with EMRS.	40 (54.8)	33 (45.2)	3.594 (0.058**)**
Disagree	72(41.6)	101 (58.4)	
Agree			
Fear of technology has no influence on user satisfaction with EMRS. (Attitude)	90 (78.9)	24 (21.1)	95.675 (<**0.001)**
Disagree	22 (16.7)	110 (83.3)	
Agree			

$\chi 2$ = chi square, Df= degree of freedom; Significant p value in bold. Fisher exact used appropriately

The responses in table 4.11 were the views of key informants about whether user characteristics influence user satisfaction levels. These views were to give more in-depth understanding on users characteristics influence on user satisfaction with Electronic Medical Records.

Table 4.11: Qualitative Data on User Characteristics and Level of Satisfaction

KEY INFORMANT	COMMENT
KI 1	*Yes. Staff attitude towards EMR matters. There are some staff who believe the EMR duplicates work and thus are reluctant to using it……*
KI 2	*Yes. All staff are required to have a certificate in basic IT thus enable all staff to be able to use the system but Regular trainings on the EMR would be appreciated to increase competency of staff on the system…….*
KI 3	*Yes. New staffs are more receptive to the system as opposed to the older staff that have been in the facility longer…….*
KI 4	*Yes. Involvement by the end users in system development is also key in user satisfaction but hard as individual users have different needs that cannot all be accommodated to improve satisfaction……….*
KI 5	*Yes. I think that staffs just need basic training on how to navigate through EMR to be competent and thus satisfied.*
KI 6	*Yes. The younger staff are more receptive to the EMR as opposed to the older ones. I believe Age is a big contributing factor.*

4.4 System factors on the level of user satisfaction with the EMR system among health workers at Kakamega County Referral Hospital

The study enquired from the respondents if they are more likely to use EMRS which protects sensitive information of users. From the 246 respondents who participated in the study, 141(57.3%) strongly agreed with the statement that I am more likely to be satisfied with an EMRS which is able to protect both user and client information, 67(27.2%) agreed while 24(9.8%) where indifferent. However, 12(4.9%) disagreed

and 2(0.8%) strongly disagreed. 95(38.6%) strongly agreed with the statement that they are more likely to be satisfied an EMRS which can effectively run on different hardware components, 85(34.6%) agreed while 52 (21.1%) where indifferent. However, 7(2.8%) disagreed and 7(2.8%) strongly disagreed. 132(53.7%) strongly agreed with the statement that if they were more likely to be satisfied with an EMRS which can perform multiple tasks at the same time efficiently, 71(28.9%) agreed while 29(11.8%) where indifferent. However, 12(4.9%) disagreed and 2(0.8%) strongly disagreed.

One hundred and fourteen (46.3%) strongly agreed with the statement that if they are more likely to be satisfied with an EMRS which can which is easy to maintain and easy to change errors, 70(28.5%) agreed while 46 (18.7%) where indifferent. However, 9(3.7%) disagreed and 7(2.8%) strongly disagreed. Meanwhile, 110(44.7%) strongly agreed with the statement that if they are more likely to use an EMRS which has a user friendly interface, 85(34.6%) agreed while 38(15.4%) where indifferent. However, 6(2.4%) disagreed and 7(2.8%) strongly disagreed. One hundred and fifty (61.0%) strongly agreed with the statement that they are more likely to be satisfied with an EMRS which meets all the needs of the organization, 68(27.6%) agreed while 20(8.1%) where indifferent. However, 8(3.3%) strongly disagreed

Table 4.12: System factors on the level of user satisfaction with the EMR system among health workers

Satisfaction statement	Ratings	Frequency	Percent
I am more likely to be satisfied with an EMRS which is able to keep both user and client information confidential **(Information Quality)**	strongly disagree	2	.8
	Disagree	12	4.9
	Neutral	24	9.8
	Agree	67	27.2
	strongly agree	141	57.3
I am more likely to be satisfied with an EMRS which can effectively run on different hardware components**. (Service Quality)**	strongly disagree	7	2.8
	Disagree	7	2.8
	Neutral	52	21.1
	Agree	85	34.6
	strongly agree	95	38.6
I am more likely to be satisfied with an EMRS which can perform multiple tasks at the same time efficiently **(System Quality)**	strongly disagree	2	.8
	Disagree	12	4.9
	Neutral	29	11.8
	Agree	71	28.9
	strongly agree	132	53.7
I am more likely to be satisfied with an EMRs which is able to assist health workers in making clinical decisions to enhance patient care**. (System Quality)**	strongly disagree	7	2.8
	Disagree	9	3.7
	Neutral	46	18.7
	Agree	70	28.5
	strongly agree	114	46.3
I am more likely to be satisfied with EMRS which has a user friendly interface **(Service Quality)**	strongly disagree	7	2.8
	Disagree	6	2.4
	Neutral	38	15.4
	Agree	85	34.6
	strongly agree	110	44.7
I am more likely to be satisfied with an EMRS which meets all the needs of the organization **(Information Quality)**	strongly disagree	8	3.3
	Neutral	20	8.1
	Agree	68	27.6
	strongly agree	150	61.0

Table 4.13 shows the chi square analysis for system factors on the user satisfaction levels with the EMR system among health workers at Kakamega County Referral Hospital. I am more likely to be satisfied with an EMRs that protects both user and client information ($\chi 2$ =39.314, p < 0.001), EMRS which can perform multiple

tasks at the same time efficiently ($\chi 2$ =8.062, p =0.005) EMRS which is able to assist in making clinical decisions to enhance patient care ($\chi 2$ =4.542, p = 0.033) and EMRS which meets all the needs of the organization ($\chi 2$ =6.352, p < 0.012) were significantly associated with overall satisfaction of EMR system. However, EMRS which has a user friendly interface ($\chi 2$ =3.333, p < 0.068) and EMRS which can effectively run on different hardware components$\chi 2$ =2.047, p < 0.153), were not significantly associated with overall satisfaction of EMR system.

Table 4.13: Chi Square Analysis for System Factors and Level of User Satisfaction with the EMRS

Variable	**Overall satisfaction** Dissatisfied (n=112)	Satisfied(n=134)	$\chi 2$ **(p-value)**
I am more likely to be satisfied EMRS which is able to keep both user and client information confidential **(Information Quality)**			
Disagree	35(92.1)	3(7.9)	39.314
Agree	77 (37)	131 (63)	(<**0.001)**
I am more likely to be satisfied with an EMRS which can effectively run on different hardware components**. (Service Quality)**			
Disagree	35(53)	31 (47)	2.047 (0.153)
Agree	77 (42.8)	103 (57.2)	
I am more likely to be satisfied with an EMRS which can perform multiple tasks at the same time efficiently **(System Quality)**			
Disagree	28 (65.1)	15 (34.9)	8.062 (**0.005)**
Agree	84 (41.4)	119(58.6)	
I am more likely to be satisfied EMR which is able to assist health workers in making clinical decisions to enhance patient care**.(System Quality)**			
Disagree	21(33.9)	41 (66.1)	4.542 (**0.033)**
Agree	91(49.5)	93 (50.5)	
I am more likely to be satisfied with an EMRS which has a user friendly interface **(Service Quality)**			
Disagree	29(56.9)	22 (43.1)	
Agree	83 (42.6)	112 (57.4)	3.333 (0.068)
I am more likely to be satisfied with an EMRS which meets all the needs of the organization **(Information Quality**)			
Disagree			
Agree	19 (67.9)	9 (32.1)	6.352 (<**0.012)**
	93 (42.7)	125 (57.3)	

$\chi 2$ = chi square, Df= degree of freedom; Significant p value in bold. Fisher exact used appropriately.

The responses in table 4.14 were the views of key informants about whether system factors influence user satisfaction levels. These views were to give more in-depth understanding of which system factors influence user satisfaction with Electronic Medical Records

Table 4.14: Qualitative Data on System Factors and Level of Users Satisfaction

KEY INFORMANT	
KI 1	*The system is secure you cannot access the Emr without a password. Though Users can easily manipulate the system thus the Information Is not taken as being 100% truthful e.g. you can be able to change past patient information…….*
KI 2	*The system gives alerts but it's is not able to give options in regard to care of patient once abnormal results are recorded e.g. patient has high BP give the following at this dose immediately or twice.*
KI 3	*All requests e.g. lab, radiology, pharmacy are still paper-based and not directly interlinked to respective department EMR systems.*
KI 4	*All results have to be keyed in the system and also have to be documented in the register. Double documentation*
KI 5	*Frequent system downtimes leading to backlog i.e. clients will be seen on paper which will later be entered in to the EMR*
KI 6	*Inconsistency in reports for example pulling the same indicator in different reports in the system does not give concordant results.*

4.5 Binary logistic regression model of overall satisfaction

Table 4.15 present the Omnibus Tests of Model Coefficients results for the binary logistic regression model of overall satisfaction of the respondents'. The model was significantly reliable (Omnibus test $\chi 2 = 141.055$, $p < 0.001$) and could correctly predict 84.1% of respondents who were satisfied with EMRS systems as Tabulated in Table_ here under.

Table 4.15: Binary logistic regression model of overall satisfaction

Omnibus Tests of Model Coefficients					Predicted			
		Chi-square	df	Sig.		dissatisfied	satisfied	% Correct
Step 1	Step	141.055	6	.000	dissatisfied	95	17	84.8
	Block	141.055	6	.000	satisfied	22	112	83.6
	Model	141.055	6	.000	Overall %			84.1

Table 4.16 describes the binary logistic regression model of overall satisfaction of the respondents'. The proposition that fear of technology has no influence on user satisfaction with EMRS by users (AOR= 20.898, 95% CI= 9. 690-45.071), I am more likely to be satisfied with an EMRS which protects both user and client information (AOR= 69.738, 95% CI= 11.753-413.799) and I am more likely to be satisfied with an EMRS which is easy to maintain and easy to change errors if any (AOR= 0.289, 95% CI= 0.098-0.859), were independently associated with overall satisfaction of respondent. Conversely, High level of ICT knowledge of users increases user satisfaction of EMRS by users (AOR= 0.815, 95% CI= 0.815-2.832), high experience level of EMRS users will increase their level of the system (AOR= 0.836, 95% CI= 0.303-2.313) and I am more likely to be satisfied with an EMRS

which meets all the needs of the organization (AOR= 0.363, 95% CI= 0.111-1.191) were not.

Table 4.16: Description of Binary logistic regression model of overall satisfaction

	Variables in the Equation				
				95% C.I.for EXP(B)	
	Reference	P-value.	Exp(B)	Lower	Upper
High level of ICT knowledge of users increases the user satisfaction with EMRS by users.	Disagree	0.748	0.815	0.235	2.832
High experience level of EMRS users will increase their level of user satisfaction with EMRs	Disagree	0.730	0.836	0.303	2.312
Fear of technology has no influence on user satisfaction of EMRS by users	Disagree	0.000*	20.898	9.690	45.071
I am more likely to be satisfied with an EMRs which protects both user and client information.	Disagree	0.000*	69.738	11.753	413.799
I am more likely to be satisfied with an EMRS which is easy to maintain and easy to change errors if any	Disagree	0.025*	0.289	0.098	0.859
I am more likely to be satisfied with an EMRS which meets all the needs of the organization	Disagree	0.095	0.363	0.111	1.191
Constant	Dissatisfied	0.000*	0.000		

Exp(B)=*Significant; ‡Adjusted Odds Ratio; †Confidence Interval

CHAPTER FIVE: DISCUSSION, CONCLUSIONS, AND RECOMMENDATIONS

5.0 Introduction

This chapter is divided into three sections; the first section is a discussion of the research findings on level of user satisfaction plus the influence of user characteristics and system factors on the level of user satisfaction. The second section gives conclusions on the research findings and thirdly the recommendations.

5.1 Discussion of the Findings

The first objective of the study was to determine the level of user satisfaction with EMR system among healthcare workers at the Kakamega county referral Hospital. The study outcome therefore established that the overall proportion of respondents who were satisfied with EMR system was 54.5%. The findings are quite similar to those in a study by Dubale *et al*. (2023) which found user satisfaction levels at 53.10%. This is similar to what Al Alawi et al. (2014) found in their study although they did not give a specific percentage to measure the users satisfaction levels the study reported that users were satisfied.

These results however disagree with Tilahun and Fritz (2015) who reported that 61.4% of those who used EMR system were dissatisfied and therefore reduced system use of EMR. Alharthi *et al*. (2014) study agreed with this and rated user satisfaction at 40% with most users willing to return to paper based records.

The secondly the study was to examine the influence of user characteristics on the level of user satisfaction with the EMRS system among health workers at Kakamega county referral Hospital. This, therefore, prompted the researcher to test the following hypothesis:

H_0: user characteristics do not influence user satisfaction with electronic medical records systems at Kakamega county referral Hospital

From the result summarising table 4.11, most user characteristics had had p-values for the regression coefficient for user characteristics less than 0.05 level of significance, therefore, leading to rejection of null hypothesis and hence acceptance of the alternative hypothesis that predicts a significant relationship between user characteristics and level of user satisfaction The results of this study, therefore, corroborate what was observed by Joos *et al*. (2006), Kalankesh *et al.* (2020).Johns *et al.*, (2003); whose empirical findings established user characteristics are paramount in user satisfaction with Electronic Medical Record System.

The last objective focused on establishing if there was a statistically noteworthy relationship between system factors and the level of user satisfaction which led to the following hypothesis:

H_0: System factors do not influence user satisfaction with electronic medical records systems at Kakamega county referral Hospital

As per the results are shown in Table 4.13 above, most system factors had had p-values for the regression coefficient for system factors less than 0.05 level of significance, therefore, leading to rejection of null hypothesis and hence acceptance of the alternative hypothesis that predicts a notable relationship between user characteristics and level of user satisfaction. The results therefore confirm what was observed in an earlier empirical studies conducted by (Dansky *et al.*, 2007) who were able to establish key system factors and how they should be implemented for effective implementation of an electronic medical records system.

5.2 Summary

The summary of the key findings of this study was conducted in line with the study objectives as shown below:

5.2.1 Level of User Satisfaction

From descriptive and inferential analysis for user satisfaction, the overall user satisfaction was derived from sum scores of these five dimensions. The overall proportion of respondents satisfied with EMR system was 134 (54.5%). More than a half of respondents, 133 (54.1%) were satisfied tangibility of EMR system, 129 (52.4%) expressed satisfaction with reliability of EMR system, 103 (41.9%) were satisfied with assurances of EMR system while empathy was indifferent 50%.

5.2.2 User Characteristics and the Level of User Satisfaction

The influence of user characteristics on the level of user satisfaction was established by the use of chi square analysis (p values < 0.01 for age, profession p value < 0.01 computer literacy p values < 0.01 training p values < 0.015 and attitude p values < 0.01) which leads to rejection of the null hypothesis and acceptance of alternative hypothesis that predicted and significant relationship between the two variables.

5.2.3 System Factors and the Level of User Satisfaction

After regression analysis it was established that the system factors influence the level of user satisfaction was established by the use of chi square analysis (information quality p values < 0.001 p values < 0.012, system quality p values < 0.005 p values < 0.033) therefore, lead to rejection of the null hypothesis that indicated that there was no statistically significant relationship between these two variables.

5.3 Conclusions

The study descriptive analysis for the level of user satisfaction concluded that the user satisfaction of EMRS at Kakamega County Referral Hospital lies at 54.5 % of the satisfaction index. It is also confirmed that a user characteristic is an important aspect that influences the level of user to satisfaction especially in the context of Kakamega County referral Hospital. User characteristics such as gender (P-value <0.001) age (P-value 0.003) Profession (P-value <0.001) computer Literacy (P-value <0.001) Training (P-value <0.001) and Attitude (P-value <0.0015) are all Key components that can be associated with user satisfaction with EMRs. Key informant 1-6 gave more detailed information on what major user characteristics contributed to the user satisfaction with EMRs and they included staff attitude and end–user involvement in system development.

System factors such as information quality (P-value <0.001, P-value <0.0012) and system quality (P-value <0.033, P-value <0.005) .Key informant 1-6 gave more detailed information on what major system factors contributed to the user satisfaction with EMRs, such as clinical decision support ,interlinking of the EMRs in department and reduction of system down times came out as key in influencing the level of user satisfaction of the electronic medical record system in Kakamega County referral Hospital.

5.4 Recommendations

The Kakamega County Teaching and Referral Hospital can conduct a periodical users' satisfaction review in the hospital to check whether satisfaction levels have improved or reduced or if they have remained the same.

The study recommends that there should be policy changes to allow the EMRs to be the only source document for use in data summary. Such a policy change will lead to

reduced duplication of work and production of more clear reports with reduced errors. This will intern change staff attitude who will view the EMRs as a tool that would improve the quality or their work and service. Continuous end user involvement in EMRs development so as to improve system output and use.

The EMRs Clinical decision support be activated within the EMRs so as to avert medical errors. Interlinking the system to all departments so that it can be completely paperless. Interlinking the departments will also help in easy development of reports at the end of the month which have no errors. System downtimes can be reduced by use of Cloud Base EMRs.

5.5 Recommendations for Further Studies

A study can be conducted to check if the level of user satisfaction with the hospitals EMRs has improved, reduced or stayed the same over time. A study can be conducted to find out why different professionals have different levels of user satisfaction or why different healthcare professionals' level of satisfaction differs. A similar study can be replicated in a another hospital setting and county in order to draw comparisons with regard to factors that influence the level of user satisfaction of electronic medical records system.

This study sought to establish the level of user satisfaction with electronic medical records system among health workers in Kakamega County Referral Hospital. There is a need for a study to be conducted on the understanding ability of the output/ results from the electronic medical records system by the beneficiaries/ patients/ consumers in Kakamega County Referral Hospital.

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APPENDICES

Appendix I: Questionnaire for Hospital Staff

Informed Consent

My name is Olivia Bukachi Okumu. I am a Masters student from Kenyatta University. I am conducting a study on the level of user satisfaction with electronic medical records system among health workers in the Kakamega County Referral Hospital. The information will contribute towards the limited knowledge and research on user satisfaction with electronic medical records system in Kakamega County Referral hospital as well as in other regions of Kenya.

Procedures to be followed

Participation in this study will require that you will fill in a questionnaire. There will also be a focused group discussion where there will be 8 participants from each group.

You have the right to refuse participation in this study. Whether you agree to join the study or not, your decision will not affect your working conditions or appraisals from your superiors.

Please remember, the participation in this study is voluntary. You may ask questions related to the study at any time.

You may refuse to respond to any questions and you may stop an interview at any time. You may also stop being in the study at any time without any consequences to your current position from this clinic or any other organization now or in the future.

Discomforts and Risks

If some of the questions you will be asked make you uncomfortable, you may refuse to answer these questions if you so choose. You may also stop the interview at any time. The interview may add approximately half an hour to your daily work routine.

Benefits

If you participate in this study you will help us to learn how level of user's satisfaction with electronic medical records system among health workers affects the electronic medical record system use and thus will help other health care Organizations who plan to implement or have implemented their system and have a problem with system use will also benefit from this research.

Reward

If you agree to participate in this study, there will be no monetary reward.

Confidentiality

The interviews and examinations will be conducted in a private setting within the clinic. Your name will not be recorded on the questionnaire. The questionnaires will be kept in a locked cabinet for safe keeping at Kenyatta University. Everything will be kept private.

Contact Information

If you have any questions you may contact Dr. Otieno 1. On 0719506770 or Dr. Muthee On 0723934169 or the Kenyatta University Ethical Review Committee Secretariat on chairman.kuerc@ku.ac.ke, secretary.kuerc@ku.ac.ke, ercku2008@gmail.com

Participant's statement

The above information regarding my participation in the study is clear to me. I have been given a chance to ask questions and my questions have been answered to my satisfaction. My participation in this study is entirely voluntary. I understand that my records will be kept private and that I can leave the study at any time. I understand that I will still get the same care and medical treatment whether I decide to leave the study or not and my decision will not change the care that I will receive from the clinic today or that I will get from any other clinic at any other time.

Name of Participant……

_____ _____

Signature or Thumbprint Date

Investigators statement

I, the undersigned, have explained to the volunteer in a language s/he understands, the procedures to be followed in the study and the risks and benefits involved.

Name of Interviewer……..

_____ _____

Signature or Thumbprint Date

SECTION I: DEMOGRAPHICS

Instructions: This questionnaire contains both open ended and closed ended questions please fill them by ticking in the square brackets write answers for questions with no suggestions or options, thank you).

1. Please select your gender by ticking in the boxes provided

Male ( ) Female ( )

2. How long have you worked in this Hospital? (Tick)

	Duration	
i.	Less than one year	( )
ii.	Between 1-5 years	( )
iii.	Between 6- 10 years	( )
iv.	Between 11 – 20 years	( )
v.	Above 20 years	( )

3. Name of your Department /Section/Professional Qualification.

……

……

SECTION B: EXTEND OF USER SATISFACTION OF THE ELECTRONIC MEDICAL RECORDS SYSTEM

4. To what extent do you agree on the expected electronic medical records system in comparison with your perception after you have used the electronic medical records system? Use a scale of1 to 5 where 1=strongly disagree, 2=disagree, 3= neutral, 4 agree, 5= strongly agree.

	Satisfaction statements	**1**	**2**	**3**	**4**	**5**
	Tangibles					
i.	My expectations on an EMRS that requires less space for the operation were met.					
ii.	My expectations on an EMRS that requires low labor to finish tasks were met.					
iii.	My expectations on an EMRS that reduces bulky paper-based records were met					
iv.	My expectations on an EMRS that reduces facility costs were met					

v.	My expectations on an EMRS that doesn't require other special software and hardware to run were met					
	Reliability					
vi.	My expectations on an EMRS that saves time in finishing tasks were met.					
vii.	My expectations on an EMRS that saves costs of different operations were met.					
viii.	My expectations on an EMRS that provides sufficient security of records were met.					
ix.	My expectations on an EMRS that manipulates data correctly were met.					
x.	My expectations on an EMRS that is easy to understand were met					
xi.	My expectations on an EMRS that provides data backup and recycle bins were met					
xii.	My expectations on an EMRS with less or no system technical failures were met					
xiii.	My expectations on an EMRS that enables easy communication by different departments were met					
	Responsiveness					
xiv.	My expectations on an EMRS that accomplishing tasks within specified time were met.					
xv.	My expectations on an EMRS that is compatible with other system software available in the hospital were met.					
	Assurance					
xvi.	My expectations on an EMRS that provides user support in case of system failure were met.					
xvii.	My expectations on an EMRS with competent					

	performance as indicated by the system providers were met.					
	Empathy					
xviii.	My expectations on an EMRS that is easy to adapt by users were met					
xix.	My expectations on an EMRS with user-friendly interface were met					

SECTION C: INFLUENCE OF SYSTEM FACTORS ON LEVEL OF USE OF ELECTRONIC MEDICAL RECORDS.

5. To what extend do you agree on the following variables on how they influence use of electronic medical records system (EMRS) in this hospital. Use a scale of 1 to 5 where 1=strongly disagree, 2=disagree, 3= neutral, 4 agree, 5= strongly agree

	System factors	**1**	**2**	**3**	**4**	**5**
1.	I am more likely to be satisfied with an EMRS which protects both user and client information					
2.	I am more likely to be satisfied with an EMRS which can effectively run on different hardware components					
3.	I am more likely to be satisfied with an EMRS which can perform multiple tasks at the same time efficiently					
4.	I am more likely to be satisfied EMRS which is easy to maintain and easy to change errors if any					
5.	I am more likely to be satisfied with an EMRS which has a user friendly interface					
6.	I am more likely to be satisfied with an EMRS which meets all the needs of the organization					

INFLUENCE OF SYSTEM FACTORS ON LEVEL OF USE OF ELECTRONIC MEDICAL RECORDS

6. To what extend do you agree on the following variables on how they influence use of electronic medical records system (EMRS) in this hospital. Use a scale of 1 to 5 where 1=strongly disagree, 2=disagree, 3= neutral, 4 agree, 5= strongly agree

	User characteristics	**1**	**2**	**3**	**4**	**5**
1.	High level of ICT knowledge of users increases the satisfaction of EMRS by users.					
2.	New staff are more likely to be satisfied with EMRS compared to those who have worked in the hospital for many years					
3.	High experience level of EMRS users will increase their level of user satisfaction with EMRs					
4.	Positive cultural believes towards technology increases user satisfaction with EMRS.					
5.	Fear of technology has no influence on EMRS satisfaction by users					

THANKS FOR PARTICIPATING

Appendix II: Key Informant Interview Questionnaire

1. a) Are you satisfied with the Electronic Medical Records System?

   b) Give reasons for your response above

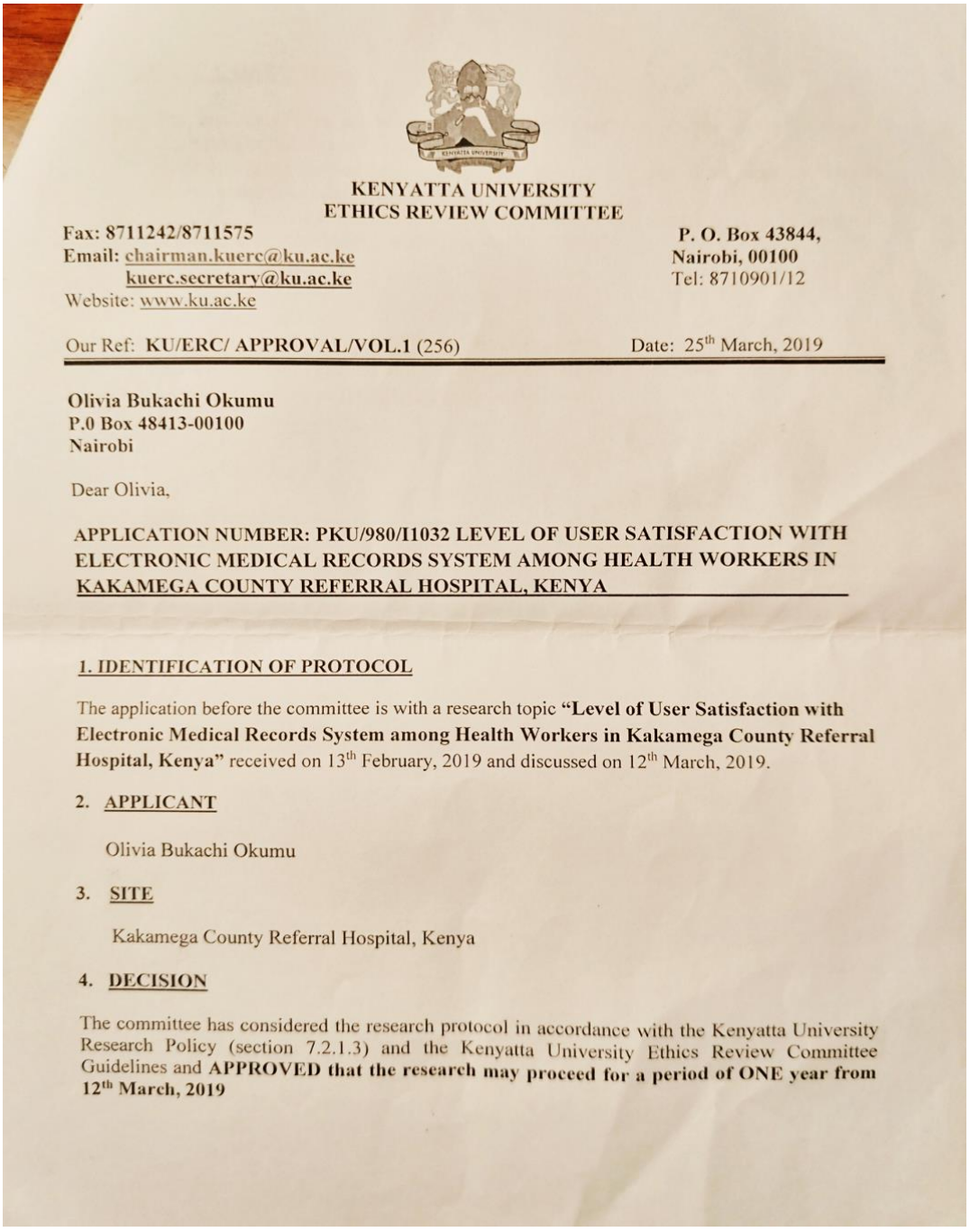
2. a)Do you think User Characteristics can affect user satisfaction levels with Electronic Medical Record System.

   b) Elaborate on the above Response.

3. a)Do you think System Factors can affect user satisfaction levels with Electronic Medical Record System.

   b) Elaborate on the above Response.

Appendix III: Authorization Letter From Kenyatta University Ethics Review Committee



KENYATTA UNIVERSITY
ETHICS REVIEW COMMITTEE

Fax: 8711242/8711575
Email: chairman.kuerc@ku.ac.ke
kuerc.secretary@ku.ac.ke
Website: www.ku.ac.ke

P. O. Box 43844,
Nairobi, 00100
Tel: 8710901/12

Our Ref: KU/ERC/ APPROVAL/VOL.1 (256) Date: 25th March, 2019

Olivia Bukachi Okumu
P.0 Box 48413-00100
Nairobi

Dear Olivia,

APPLICATION NUMBER: PKU/980/I1032 LEVEL OF USER SATISFACTION WITH ELECTRONIC MEDICAL RECORDS SYSTEM AMONG HEALTH WORKERS IN KAKAMEGA COUNTY REFERRAL HOSPITAL, KENYA

1. IDENTIFICATION OF PROTOCOL

The application before the committee is with a research topic **"Level of User Satisfaction with Electronic Medical Records System among Health Workers in Kakamega County Referral Hospital, Kenya"** received on 13th February, 2019 and discussed on 12th March, 2019.

2. APPLICANT

Olivia Bukachi Okumu

3. SITE

Kakamega County Referral Hospital, Kenya

4. DECISION

The committee has considered the research protocol in accordance with the Kenyatta University Research Policy (section 7.2.1.3) and the Kenyatta University Ethics Review Committee Guidelines and **APPROVED that the research may proceed for a period of ONE year from 12th March, 2019**

5. **ADVICE/CONDITIONS**

i. Progress reports are submitted to the KU-ERC every six months and a full report is submitted at the end of the study.
ii. Serious and unexpected adverse events related to the conduct of the study are reported to this committee immediately they occur.
iii. Notify the Kenyatta University Ethics Committee of any amendments to the protocol.
iv. Submit an electronic copy of the protocol to KUERC.

When replying, kindly quote the application number above.
If you accept the decision reached and advice and conditions given please sign in the space provided below and return to KU-ERC a copy of the letter.

KENYATTA UNIVERSITY
OFFICE OF THE CHAIRMAN
27 MAR 2019
ETHICS REVIEW COMMITTEE
P.O. BOX 43844 - 00100 NAIROBI

PROF. JUDITH KIMIYWE
CHAIRMAN ETHICS REVIEW COMMITTEE

I ....Olivia Byach.....accept the advice given and will fulfill the conditions therein.

Signature....Olivia..... Dated this day of.....27th March..... 2019.

cc.
DVC-Research Innovation and Outreach

Appendix IV: Authorization Letter From NACOSTI

NATIONAL COMMISSION FOR SCIENCE,
TECHNOLOGY AND INNOVATION

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

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

Ref No.NACOSTI/P/19/74969/29417

Date:7th June,2019.

Olivia Bukachi Okumu Kenyatta
University P.O.Box 43844-00100
NAIROBI.

RE:RESEARCH AUTHORIZATION

Following your application for authority to carry out research on "Level of user satisfaction with electronic medical records system among health workers in Kakamega County Referral Hospital,Kenya."I am pleased to inform you that you have been authorized to undertake research in Kakamega County for the period ending 7th June, 2020.

You are advised to report to the County Commissioner,the County Director of Health Services and the County Director of Education,Kakamega County before embarking on the research project.

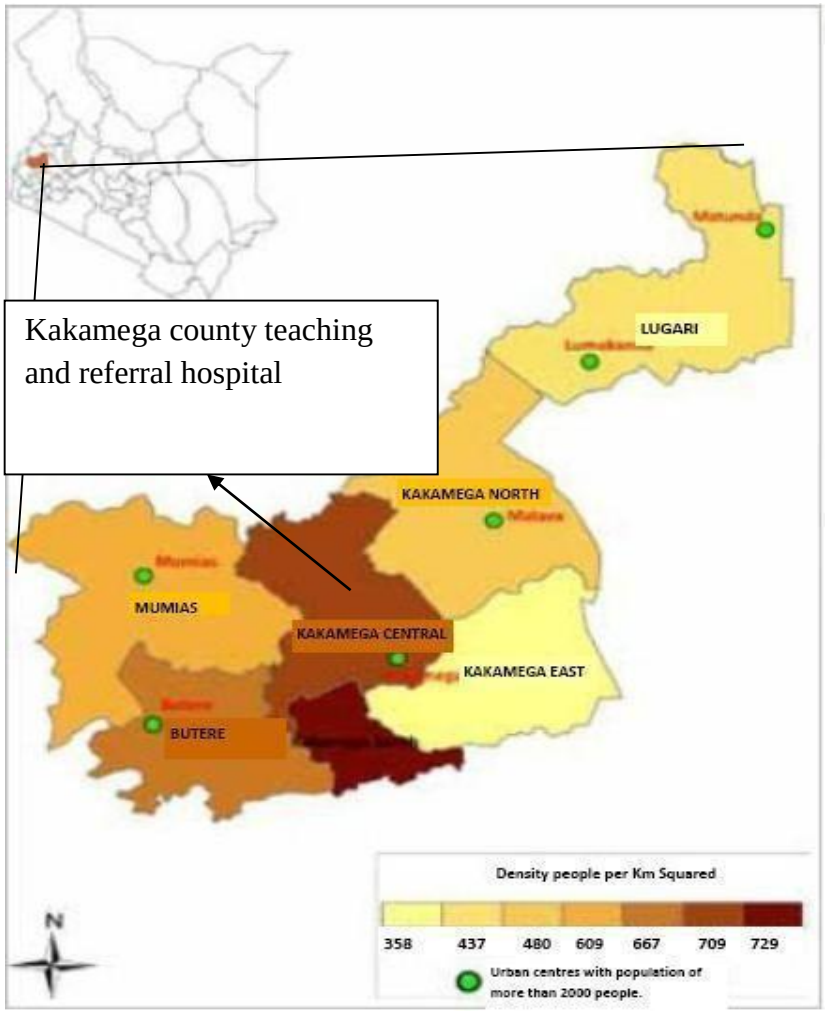
Kindly note that, as an applicant who has been licensed under the Science,Technology and Innovation Act, 2013 to conduct research in Kenya, you shall deposit a copy of the final research report to the Commission within one year of completion. The soft copy of the same should be submitted through the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

FOR:DIRECTOR-GENERAL/CEO

Copy to: The County Commissioner
Kakamega County.

The County Direcetor of Health Services
Kakamega County.

Appendix V: Map of Study Area



Map of Kakamega County adapted from http:// www.kenyampya.com