INFLUENCE OF DIGITIZATION OF MEDICAL RECORDS IN PRIVATE HOSPITALS IN NAIROBI AND NAKURU COUNTIES

BY

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UNITED STATES INTERNATIONAL UNIVERSITY – AFRICA

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STUDENT'S DECLARATION

I, the undersigned, declare that this is my original work and has not been submitted to any other college, institution or university other than the United States International University in Nairobi for academic credit.

Signed: _____   Date: _____

Margaret Gathungu (ID 652572)

This project has been presented for examination with my approval as the appointed supervisor.

Signed: _____   Date: _____

Prof. Timothy Okech, PHD

Signed: _____   Date: _____

Dean, Chandaria School of Business

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ABSTRACT

The purpose of the study was to examine the influence of digitization of medical records in private hospitals in Nakuru and Nairobi Counties. The study was guided by the following research questions: What are the factors influencing adoption of electronic medical records in private hospitals in Kenya? What is the effect of electronic medical records adoption on healthcare management in private hospitals in Kenya? What are the organizational challenges facing implementation of digital of healthcare in private hospitals in Kenya?

The researcher adopted descriptive design with the target population consisting of the patients, doctors and nurses in mid-tier private hospitals within Nairobi and Nakuru County. The study used stratified and simple random sampling to select the respondents from doctors, nurses and patients. Questionnaires and interview guide were used in data collection. Data collected was analysed using both qualitative and quantitative analysis techniques. Descriptive statistics was used to analyse quantitative data. IBM SPSS was used as the tool for quantitative data analysis. Inferential analysis was conducted which involved examining the nature of relationships between the variables under study using the Pearson correlation coefficient. Correlation and regression analyses were used in the inferential analysis. The analysed data was presented using tables, pie charts, correlation, regression and ANOVA.

The research found out that adoption of electronic medical records in private hospitals in Kenya was influenced by data security and privacy concerns, legal issues, and availability of network infrastructure. Adoption was also influenced by availability of electronic medical records. Knowledge and adoption of software packages was noted to promote adoption of electronic medical records in health facilities. Communication between various players, availability of technical personnel to install and operate the systems, the cost of electronic medical records resources required, adequate infrastructure, maintenance costs of electronic medical records was noted to affect the adoption of electronic medical records and their utilisation in the hospitals.

The study revealed that digitization of health records in private hospitals in Kenya is affected by typing speed amongst medical practitioners. It is also hindered by inadequate or lack of proper training on digitization to the medical practitioners who also forget their

training. Digitization of health records in private hospitals in Kenya is hindered by some medical practitioners who prefer writing their notes. Digitization of health records in private hospitals in Kenya faces the challenge of lack of interest among medical practitioners who feel that digitized records have minimal impact on their work.

The research revealed that digitised electronic medical records increases patients satisfaction through increased efficiency in attending to patients. Digitization of health records in private hospitals in Kenya help in the cost management policies of a hospital. Digitization of health records in private hospitals in Kenya reduces errors in diagnosis and prescription. Digitization of health records in private hospitals in Kenya enhances a doctor's diligence while attending to a patient. Digitization of health records in private hospitals facilitates provision of healthcare to patients remotely.

The study concluded that EMR adoption in private hospitals in Kenya is influenced by availability of resources and access to network infrastructure. The adoption is also influenced by confidentiality of the medical data. Adoption of EMR is also influenced by the medics' digital skills and preference. The study further concluded that adoption on EMR in private hospitals in Kenya leads to improved quality of services emanating from efficiency and accuracy. Adoption of EMR also assists in the remote response to patients.

The study recommended that private hospitals in Kenya ensure security issues amongst them being confidentiality, data integrity and availability, since they are major concerns in EMR adoption at their facility. Private hospitals should encourage communication between various players so as to boost the adoption of EMR. Private hospitals in Kenya should ensure availability of technical personnel to install and operate EMR. An EMR technology resource is a facilitator to its adoption. Private hospitals in Kenya and all other hospitals as well should ensure adequate infrastructure in order to facilitate the hospitals adoption of EMR.

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DEDICATION

To my mother Mrs. Teresiah Gathungu and my siblings without whose encouragement would have been impossible to complete the project. Thank you for your encouragement, love and care during this involving time during my studies.

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<center>**CHAPTER ONE**</center>

1.0 INTRODUCTION

1.1 Background of the Study

The advent of technologies and increasing digital adoption has generated an increase of user generated data and content. While the potential benefit of this data is obvious, systems are often challenged to make actionable insights and decisions from the data. Healthcare provision cannot be left in this paradigm shift towards digitization. The introduction of information technology into healthcare delivery, commonly referred as e-health, has brought a disruption by challenging key traditional relationships in healthcare; relationship between medical providers, patients, payers and policymakers (Nilmini Wickramasinghe, 2016).E-health encompasses telemedicine, electronic medical records, health informatics and evidence based medicine. Digital healthcare has been well adopted due to the potential of cost-cutting, efficiency, streamlining, and error reduction. This is witnessed through the increased seamless transmission of test data within the various departments, but mostly in private institutions (Waithera, Muhia & Songole, 2017).

The use of information technology among healthcare providers has improved timeliness, effectiveness, patient safety, patient centeredness, equity of healthcare, and efficiency (Institute of Medicine, 2001). The electronic medical records (EMR) have been enhanced by current developments in technology, namely the internet, to generate a comprehensive healthcare data management (Sood, Mark, Kupid, Sweeney, Kelvin, Maurice & Timothy, 2008). It is believed that these technologies are capable of transforming features of health care information management from documenting health information to storing and retaining such information. These technologies expose people to developments in healthcare as well as generating positive attitudes in relation to their own medical information management (Hannan, Pegg, Caroline, Kendie, Wesley, Josnibula & Myriam, 2000). United Kingdom, Australia and United States have robust and growing healthcare structures that have adopted EMR (Sood *et al.,* 2008).

A recent study conducted in Canada showed that about 23% of primary care doctors use electronic medical records (Schoen, Phenney, Kiwinga, Patrick, Becky & Sternly, 2006). A study conducted in Japan indicated that the majority of hospitals have adopted EMR

with only 30% stating the high computerization cost as the main challenge towards adoption of EMR (Japan Hospital Association, 2001). A study conducted in India established that despite the use of EMR in enhancing healthcare efficiency, several other factors such as time, cost, fear, training, privacy, security and absence of policy standards hinder healthcare providers from adopting EMR (Muthuswamy, 2013). A study in South Korea revealed that the rate adoption of EMR was 40.3% in small hospitals; relatively higher than the adoption rates in Japan (Park & Lee, 2014). Although it has been noted that substantial drawbacks still occur in the EMR systems, there is motivation and strong support to achieve goals linked with complete development of effective EMR systems among developed economies (Kazley & Ozcan, 2007). The developed economies are able to make substantial investments in research and development to create systems that would meet the need of a given healthcare system. For example, the high rates of adoption of EMR take-up in the Netherlands have been linked to technical support, standards, and financial incentives nationally (Canadian Medical Association, 2009). This is contrary to the healthcare structures of developing economies such as Nigeria where there is below 5% adoption of any form of hospital information technology with a population of more than 150 million (Idowu, Adagunodo& Adedoyin, 2016).

The hindrance to the implementation of hospital information technology in Nigeria is due to the high cost of adoption, corruption, inadequate human capital, and challenges relating to poor infrastructure (Ayodele, 2011). Analysis done in other less developed economies such as Mongolia and Mozambique depict that there is inadequate utilization of health information with regards to the population based decision making and local health services. The health practitioners in the less developed countries show that Health Information Systems (HISs) namely EMRs are utilized simply as systems used to report to governments not to support clinician decision making in disease management and patient monitoring (Gebre-Mariam, Borycki, Kushniruk& Ellen, 2012). In most of the countries in Sub Saharan African, management and delivery of healthcare services pose numerous challenges (Sood *et al.,* 2008). The challenges usually come in the form of lack of resources, weak healthcare infrastructure and inadequate funding (Bra, Monteiro & Sahay, 2004).

Additionally, some countries have a rudimentary level of application of healthcare technology. It is explained that although health based IT has potential benefits to

healthcare, a plethora of challenges also exist (Rao, Mirabelle, Kim, Stanly, & Phoebe, 2011). In line with the context of this study, the Academic Model for the Prevention and Treatment of HIV (AMPATH) Medical Record System (AMRS) in Kenya was the first EMR system in sub-Saharan African used in the clinical and comprehensive care of HIV patients (Siika, 2005). EMR assures swift access to health care information resulting to improved healthcare services and efficient utilization of resources (Ochieng & Hosoi, 2005). The capacities of Kenya's health systems fall short of demand. Although time and resources have been spent on research in the area of IT, the developments in EMR adoption and implementation still remains low (Mulwa, 2013).

Adoption of mobile technology in the healthcare system in Kenya has however lagged behind. Despite the high rate of mobile phone adoption and usability in Kenya, the healthcare sector has been hesitant to utilize mobile platforms to streamline data collection and healthcare process improvements. As the world, and practice of medicine, becomes more digital, patients will have increasing expectations about the efficiency and convenience of their care, (PriceWaterhouseCoopers, 2016). The report further outlines that of the sample tested of a 1,000 respondents, 66% of respondents believe that virtual visits, for instance via video calls, could replace at least a portion of in-person visits to a doctor or nurse, 7 in 10 would be willing to recommend use of apps in the future, 62% would like to be involved in developing apps that benefit patients, 3 in 5 respondents see digital solutions as a means of improving care for the chronically ill, and 44% believe that digital care solutions will become a natural part of care for the chronically ill within the next five years.

Modern patients equip themselves with self-service research obtained from all manner of sources (Venkataram, 2017). To be relevant and competitive, healthcare providers need to address the increasingly public consumer perceptions of quality, convenience and affordability. To be able to meet the unique and changing customer trends, medical practitioners across the world are moving towards more personalised care, economically rationale coverage and care choices, convenience driven access to and use of care and digitally connected to manage healthcare. In Kenya, a number of the mid-tier and large private hospitals have digitised their systems locally which have transformed the time and the quality of service that is being offered to the patients. From the check in process, to seeing the medical practitioner, to performing tests, billing and discharge process, the

process has been digitised. This creates efficiency, accuracy in the process, and assists future consultancy follow ups. However, this process is domiciled in these institutions only, creating a silo effect and thus cannot be transferred to other institutions in the event of changing practitioners or even in the event of an accident and one has to obtain services from a medical institution different from their normal hospital of choice.

The need for quality health care cannot be wished away. Human beings represent the largest and most valuable resource that a nation can have at any point in time. Consequently, a lot of resources need to be invested in the health care system to ensure that quality of preventing, detecting and treating patients is improved. There has been a spirited effort to improve the healthcare in Kenya which begun in 2013 with the devolution of healthcare management. Consequently, health care has been one of the key beneficiaries in the Kenyan budget allocation which has seen the amounts increase from Kshs. 47 billion in 2014/15 to Kshs. 59 billion in FY 2015/16 and Kshs. 60 billion in FY 2016/17 (Ministry of Foreign Affairs, 2018).

Kenya presents unique opportunities due to its precedence of early adoption of mobile technologies, a well-established mobile infrastructure and willingness of the citizens to embrace new ways of doing things and technology. This has been witnessed by the rapid growth and acceptance of Mpesa, mobile banking, agency banking, mobile loan platforms like Tala, Saida amongst others, solar connectivity through mobile technology as done by M-Kopa solar, taxi hailing done by Uber, Taxify, Mondo ride amongst others. The Kenyan population is increasing at an annual rate of 2.6% as at 2016, the number of medical practitioners, though increasing, does not match the rate of population growth (World Bank Population Growth Report). The doctor to patient ratio and nurse to patient ratio are lower than the recommended ratios prescribed by the World Health Organisation (2015). This therefore implies that new techniques need to be adopted to ensure quality care is provided to patients across the world. Adoption of digitisation then becomes the solution to this potentially explosive situation.

1.2 Statement of the Problem

Swifter EMR adoption is critical to restructure key health care industry processes, integrate health care activities, reduce overall cost of health care, improve management of

medical records, and improve quality of patient care. Notwithstanding the commitment of the government to subsidize medical equipment, the adoption of the EMR in hospitals in Kenya is still relatively low. Furthermore, among those hospitals that have adopted EMR across the world, the failure rates are very high within findings indicating that up to 80% failure rate of EMR implementations. For example, a study carried out in the United States (Lorenzi et al., 2008) verified that about 19% of EMRs are uninstalled shortly after implementation, and nearly 30% of them are not utilized to their full potential by the healthcare practitioners.

The adaptation of Electronic Medical and Personal Health Records in developing countries is low (Sood et al., 2018). A study revealed that in Nairobi hospitals, medical data is recorded manually hence subject to human error (Mulwa, 2013). He further revealed that there were cases of misplaced or lost files. Some of the patients fail to recall their patient numbers thus tracing their files become a challenge. There are also cases of multiple entries of patient files when previous files cannot be traced. Tracing lost patient files consumes a lot of time leading to wastage in working hours. The findings of the studies conducted on EMR have been inconclusive hence there is need to investigate the influence of digital medical records in private hospitals in Nakuru and Nairobi Counties.

1.3 Purpose of the Study

The purpose of this study was to examine the influence of EMR adoption in health sector in Kenya and further analyse the impact of EMR adoption on health care management.

1.4 Research questions

The following research questions were addressed in order to achieve the purpose of the study.

1.4.1 What are the factors influencing adoption of EMR in private hospitals in Kenya?

1.4.2 What is the effect of EMR adoption on healthcare management in private hospitals in Kenya?

1.4.3 What are the infrastructural related challenges facing implementation of digital of healthcare in private hospitals in Kenya?

1.5 Importance of the Study

1.5.1 Patients

The modern consumers have increasingly become more aware of their needs and wants and use this empowerment to demand for better quality service. The same applies to patients. This implies that the traditional way of providing healthcare needs a re-evaluation and changes made to make the process better, simpler and more efficient. This implies reducing the time spent in consultation, analysing results and making diagnosis and treatment. It also implies reducing error rates to almost minimal.

1.5.2 Healthcare Industry

By adoption of digitised healthcare records, an avenue for collection of statistics and trends is created. With the increase in both communicable and non-communicable diseases, lifestyle diseases, among others, it is paramount for a county and a country to be able to measure the exposure rate and make policies and measures that can be used to address these diseases. Momentarily, the process of collecting this data is onerous and costly. Due to the complexity of it all, it is done periodically. However, in instances where this data has already been recorded in a digital manner, it is easy to collect, analyse and use for decision making. Information is most useful when it is timely. As such digitisation will provide a cost-effective method of monitoring healthcare effectiveness by assessing the outcome of interventions on both an individual and systemic level.

1.5.3 Medical Practitioners

Documentation is often the communication tool used by medical providers. Documenting a patient's record with all relevant and important facts, and having that information readily available, allows providers to furnish correct and appropriate services that can improve quality, safety, and efficiency. By digitising the health records, doctors are tasked to be more accountable of their diagnosis and prescriptions. This is because with proper record keeping, it would be easy to perform a re-performance of the treatment process. This also translates to uniformity and increased attention and quality of care by the healthcare practitioners. Through the use of automated systems, templates, there is increased transparency in record keeping and also decrease in the need for clerical data entry and allowing providers to spend more time on direct patient care.

1.5.4 Academic Research

This study hopes to inform researchers and scholars on the theory and body of knowledge of Healthcare Information Systems. It is also expected that this study will make insightful contribution to university teaching. In addition, new knowledge generated through this study may benefit funding agencies, and hospital administrators.

1.6 Scope of the Study

This study focused on patients and medical practitioners in private hospitals in Kenya. Due to limitation of time and resources the study concentrated on private hospitals in Nairobi and Nakuru Counties which represented other private hospitals in Kenya. The study took place in May 2018.

Medical practitioners face time constraints due to the nature of work and the high number of patients. Consequently, obtaining a schedule from their busy timelines posed a challenge in obtaining responses. The patients on the other hand felt reluctant about disclosing their health records. The researcher mitigated the problems by using structured questionnaires to collect data so as to save on time. The researcher also assured the patients of privacy of the information that they would provide.

1.7 Definition of Terms

1.7.1 Digitisation

This is the process of converting information into a computer-readable format, in which the information is organized into bits (Digitization, 2017).

1.7.2 Healthcare

This entails maintaining and restoration of health by the treatment and prevention of diseases especially by trained and licensed professionals (health care, 2017).

1.7.3 E-health

This is the use of digital tools and exchange of information digitally in order to achieve and maintain health (PriceWaterhouseCoopers, 2016)

1.7.4 Cloud Technology

This entails storing and accessing data and programs over the Internet instead of a computer's hard drive. The information is stored on physical servers maintained and controlled by a cloud computing provider (Money Crashers, 2017).

1.7.5 Interface

This is a shared boundary across which two or more separate components of a computer system exchange information. The exchange can be between software, computer hardware, peripheral devices, humans and combinations of these. Some computer hardware devices, such as a touch screen, can both send and receive data through the interface, while others such as a mouse or microphone may only provide an interface to send data to a given system (Money Crashers, 2017).

1.7.6 End User Application

This is information system developed by end user developer in order to support them in their work (Baker, 2017).

1.8 Chapter Summary

The chapter outlined the benefits that healthcare could achieve in the form of time, efficiency, accurateness, accessibility and cost effectiveness with the adoption of digitisation. The chapter also outlined the scope of the study and definition of terms that will be in use in the research. Chapter two of the research will review the literature content on this topic. Chapter three will outline the research methodology and data collection instruments. Chapter four will outline the research findings, while chapter five will outline the conclusions that will be responses to the research questions raised in Chapter 1.

CHAPTER TWO

2.0 LITERATURE REVIEW

2.1 Introduction

This chapter presents a review of literature on the digitization of healthcare records and the impact it has on healthcare management. Studies have been conducted in the past concerning the digitization healthcare records with a focus on how they it affects healthcare management. This chapter critically analysed existing literature on digitization of healthcare records based on the research questions.

2.2 Factors Influencing Adoption of Electronic Medical Records in Private Hospitals

2.2.1 Resource Availability and EMR Adoption

The size of the organizational is amongst the most cited ICT adoption factors. This is because size of the organization is linked with its financial capability as well as adequacy of human resources (Kazley & Ozcan 2007). It is easy to achieve economies of scale in larger hospitals as well as the resources and information needed across the organization. Numerous study findings indicate a positive link between organization size and ICT adoption (Zhu *et al.,* 2003; Pan & Jang, 2008) since larger organizations tend to have more financial resources compared to smaller ones. Thus larger hospitals have higher tendency of adopting EMR compared to smaller ones.

The ownership of the hospital may also influence organizational strategy, based on the values and mission of the hospital. Based on the fact that adoption of EMR is articulated in e-health strategy of 2005, hospitals relying on public funds are expected to adopt EMR (European Union 2005). Additionally, hospitals providing general healthcare experience a higher level of competition (Kazley & Ozcan, 2007).

In most cases, general hospitals report higher rates of occupancy coupled with more social and financial pressures (Park & Lee, 2014). On the other hand, a specialized hospital only targets a specific niche thus competition among specialised hospitals tends to be lower. Additionally, the volumes of inter-departmental information in specialized

hospitals tend to be much lower compared to a general hospital where the various healthcare services act as secluded islands.

As a result, general hospital is highly likely to adopt EMR so as to attract patients. However, findings of a study on EMR adoption in hospitals reveal that there was no significant difference in adoption of EMR system between small private and public hospitals in South Korea (Park & Lee, 2014). The findings further indicated that hospitals situated in urban areas had significantly higher rates of adoption of EMR than hospitals located in the rural areas.

Task complexity is higher in hospitals adopting EMR system than that of hospitals not adopting the same. This was determined by the number of medical specialties, however it was found to be statistically insignificant (Park & Lee, 2014). Small hospitals fitted with high levels of IT infrastructure coupled with organic managerial structures highly likely to implement EMR systems than were other categories of hospitals (Park & Lee, 2014). The size of the department substantially affected the likelihood of adopting EMR (Burt and Sisk (2005); the more the number of physicians in a given department the higher the likelihood of adoption of EMR. This is because each hospital and its units experience diverse crowdedness rates and also serve different populations.

Some researchers concur that costs of adopting EMR are significant and thus regarded as a barrier to adoption EMRs, particularly for hospitals without large budgets on IT (Boonstra & Broekhuis, 2010). The cost of adopting ICT is one of the greatest barriers to EMR adoption (Kazley & Ozcan, 2007).Hospitals located in resource rich areas are more likely to adopt EMR much easily than those in resource deprived areas. Markets with higher per capita income are also able to support higher cost hospitals (Balotsky, 2005). Whereas the developed nations are at the forefront of adopting electronic health systems, developing countries such as Kenya are still at the basic stages of EMR adoption processes (Ouma & Herselman, 2008).

The disparity in the adoption of EMR between developed and developing countries are attributed to poor economic diversification, inadequate use of natural resources, poverty, and lack of supportive infrastructure. The current study would determine whether resources available influence EMR adoption by hospitals in private hospitals in Kenya.

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2.2.2 Accessibility to Network and EMR Adoption

Broadband lays a foundation upon which different applications of EMR are built. Service and applications namely data transfer, telemedicine, and health information access usually depend on the internet (Muchangi & Nzuki, 2014). Countries such as Sweden, Europe, Netherlands, Finland, United Kingdom, Denmark, Norway, France, Switzerland, Belgium, and Germany perform well in terms of households with broadband connection with over 70% (OECD, 2013). This shows the readiness of these countries towards implementing internet-based EMR application and services namely online searching of health information by clinicians and patients as well as telemedicine.

Successful implementation of EMR demands broadband Internet connectivity that has high speed capability for transfer and retrieval data (Ouma & Herselman, 2008). The low internet penetration rates coupled with low bandwidth hinder the adoption EMR in developing economies (Muchangi & Nzuki, 2014). For example, low internet bandwidth is noted as a major challenge in Africa countries. Problems of Internet connectivity exists in Nigeria with few service providers providing very poor services due to bandwidth constraints (Ayo *et al.,* 2008). Due to poor internet penetration and inadequate ICT infrastructure in Tanzania, most of areas in the country are not able to support internet deployment that further hinders adoption of EMR (Omary et al., 2009).

Provided that internet penetration continues to be low in the developing countries, implementation of EMR will still lag behind in comparison to the developed countries with high EMR adoption rates namely Denmark whose broadband connection per household is 83.9% (OECD, 2013). However, to fully attain the benefits of internet for healthcare information access a number of issues have to be addressed, that are, poor internet skills among the healthcare professionals which prevent them from understanding the difference between unbiased and biased information, to distinguish evidence-based claims, and to understand the information meant for health professionals (Qureshi et al., 2013).

2.2.3 Capacity Building and EMR Adoption

Technology adoption entails creating an environment as well as a context in which change can be realized and sustained in the long term. With an EMR adoption an

organization has to provide needed resources and training, create the supporting environment, articulate a clear direction as well as clear expectations, include them in the process, reinforce desired new behaviour and engage its people. This does not involve checking things off a list, but rather determining the synergy among the impacted groups, providing them what they want, and coordinating efforts to achieve the desired outcome (McCarthy & Eastman, 2010). The end result is to get users to actively support and sustain the deployment of EMR which is a lot more than function/feature training or a communication plan.

Managing the people side of adoption of EMR requires a savvy technology adoption plan that links training, sponsorship, workflow harmonization, communication, user support as well as reinforcement with the priorities of the business and excellently coordinates all of these activities with the user in mind in an environment that supports intended change of behavior (McCarthy & Eastman, 2010). Whether the management believes in the benefits of EMRs and level supports its use, has been revealed to have a significant influence on the rate of adoption of EMR (Boonstra & Broekhuis, 2010). However, the majority of the studies do not consider that managers will be committed to the adoption of EMR. ICT training among medical practitioners is stated as a major determinant of EMR adoption (Ochieng& Hosoi, 2005; Martins & Oliveira, 2008).

It has been observed that some health providers are keener in paper-based documents to using computers (Martins & Oliveira, 2008). If the service providers are unable to embrace computer technology during service provision, the EMR systems adoption can rapidly decline in the healthcare. Consequently, training in computer skill among service providers can be a major role to increase EMR systems adoption (Pinaire, 2009). ICT skills required to instill positive attitudes towards EMR that leads to greater EMR adoption in Japan (Ochieng & Hosoi, 2005). Thus, developed economies in a bid to promote ICT skills amongst medical practitioner have integrated ICT training in health related courses offered at different academic levels.

The doctors prefer to have personal letter format and modify it depending on their needs (Randeree, 2007). Some doctors may use the lack of customizability to avoid EMRs. Yet, more effort is needed from the EMRs developers to improve their customizability. However, such customization may increase the costs of EMRs' implementation;

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potentially creating financial barriers (Boonstra & Broekhuis, 2010). Lack of technical support and training make many physicians complain of poor vendors' services, namely lack of follow-up with technicalities and a general lack of support and training for challenges related to the EMRs (Randeree 2007).

Physicians struggle to acquire appropriate technical training and support for the systems from the vendor (Ludwick & Doucette, 2009). Since medical practitioner are not technical experts and healthcare information systems are essentially complex, medical practitioners perceive a need for appropriate technical support and training are hesitant to adopt EMRs without it. Two-thirds of medical practitioners pointed that a lack of technical support was a barrier to their adoption of EMRs (Ludwick & Doucette, 2009), while some medical practitioners stated a lack of access to developers/vendors technical support (Boonstra & Broekhuis 2010).

2.3 The Effect of Digitization of Health Records on Healthcare Management

2.3.1 Enhanced Patient Safety Effects of EMR Adoption

The safety of the patient refers to freedom from accidental injury brought by medical care (Miller, Elixhauser, Zhan& Meyer, 2001). Error refers to the failure of an intended action to be completed as planned or the use of a wrong plan to realize a given aim (Miller *et al.,* 20103). The safety of the patient could be easily breached in the form of errors in medication-related miscalculations and the absence of strict standards on drug doze, frequency and choice. Additionally, medication errors are the major causes of error-related deaths among inpatient (Sakowski *et al.,* 2008).

EMR applications are reported to have a significant positive relationship with improved patient safety outcomes (Siegrist & Kane, 2003). EMR systems increase patient safety through minimizing mortality rates and complications as well as by reducing medical errors (Amarasingham *et al.,* 2009). The age-related mortality rate could potentially be lowered by 18% while sick days for employee could fall by forty million with the application of EMR in disease management and prevention (Taylor *et al.,* 2005).

The digitization of healthcare records is also beneficial to medical practitioners because it creates an opportunity for them to conduct remote monitoring of the medical conditions

of patients (Skolnik, 2011). Remote monitoring also called home-telehealth is a product of digitization of medical records whereby healthcare practitioners use technology to monitor the health status outside the normal clinical settings (Handel & Hackman, 2010). The monitoring platform makes use of fixed-line technology. Through this platform, the patient uses a specified device to conduct a routine medical test and send the data to a healthcare practitioner.

Such information improves the effectiveness of the work conducted by the healthcare practitioner as well as the management of patient health. Healthcare practitioners can also use bio-sensing wearable in order to capture health and wellbeing data concerning the patient which in turn allows remote monitoring of the medical condition of patents (Acharya *et al.,* 2013). This improves speed of service delivery, convenience as well as effectiveness of the service offered by the healthcare practitioners. Data accessed from bio-sensing wearable is then uploaded onto electronic patient record which is then used to monitor the patient health in a real time basis (Zaleski, 2009). This enables medical practitioners to prevent crises as well as improve the quality of their service delivery.

The digitization of healthcare records also improves the speed, accurate and convenience with which medical practitioners conduct their work. One of the attributes of digital healthcare records is the fact that they facilitate the transfer and sharing of information concerning the patient between different medical facilities (Caligtan, 2011). This means that a medical practitioner from one healthcare facility has access to crucial information about their patient and his or her medical history from other medical facilities that have handled the patient (Sterling, 2010). This information sharing capability improves the speed with medical practitioners are able to diagnose healthcare conditions of patients thus in turn bringing forth improvement in the quality of healthcare offered by the medical facility.

The digitization of healthcare records plays an important role in improving the manner in which medical practitioners handle their different roles and responsibility within the medical field. Specifically, the adoption of electronic healthcare records makes it possible for the medical practitioners to carry out their tasks much faster and at a higher level of precision as compared to a situation in which manual records. According to Mantas et al. (2012) when an electronic healthcare record system is used, most of the basic functions

within the medical field are conducted via an electronic platform. In this regard, the medical doctor is charged with the responsibility of using computers to record the signs and symptoms exhibited by patients during medical visits, the results of physical examination of patients, the prescriptions made for the patient and also referrals as appointment.

All the aforementioned actions must be undertaken via an electronic platform. The use of computers to conduct such processes contributes significantly towards improving the overall quality of medical services offered to patients (Deloitte, 2014). One of the benefits of an electronic system is the fact that it provides an audit trail providing details of the flow of information about patient right from the point the patient was admitted in the hospital to the point when the patient was discharged. Such information is useful in the sense that it aids in the course of providing treatment for the patient in future.

EMR may reduce omission errors while EMR adoption may lessen the number of serious medication errors and adverse drug effects (Walsh et al., 2005; Overhage et al., 1997). Additionally, physician prescribing behavior could be enhanced with widespread use of EMR (Sakowski et al., 2008). Also, EMR can be more effective in safeguarding critical information, providing effective solutions, and monitoring patients compared to humans while it can be problematic for humans to find the right information from the piles of data on papers collected from patients.

Particularly, there is always the risk for errors at any one of medication process namely prescribing, administration, dispensing, and monitoring phases (Reckmann *et al.,* 2009), thus the use of EMR could be one crucial step in avoiding such costly mistakes. As adoption of EMR systems rises, it is predicted that the way healthcare service is provided will be constantly redesigned and ultimately errors will be had to make (Hillestad et al., 2005) or better, they will be eradicated altogether (Mekhjian *et al.,* 2002). However, findings from other studies show conflicting results. It has been established that BCMA system was unable to determine severe errors in medication (Sakowski *et al.,*2008) while the use of CPOE decreased potential, not actual, adverse drug events (Bates et al., 1998). It was further established that only EMR could considerably influence safety of the patient, while patient archiving, communication systems and nurse charts did not affect patient safety significantly (Parente & McCullough, 2009).

2.3.2 Better Quality of Care

Every healthcare system aims at providing high quality of care (Miller et al., 2015). The application of EMR is perceived as key determinants in enhancing the quality of services in the healthcare industry. Quality of care refers to "the degree to which health services for individuals and populations increase the likelihood of desired health outcomes and are consistent with current professional knowledge" (Institute of Medicine, 2011, p. 244).

One of the effects of digitization healthcare records is the fact that they create an opportunity for patients to carry out self-management. Patient self-management is achieved through remote monitoring, treatment adherence and education. Digitization of healthcare records creates an opportunity for the patients to access their records and understand their progress in health and wellbeing through patient portals (Campbell et al., 2012). Through patient portals, patients get an opportunity to understand different prescription and hence they are able to get high quality medical services.

Digitization of healthcare records also creates an opportunity for the patients to form patient communities (Hersh, 2010). Through such communities, patients are able to engage with one another, understanding the quality of services offered by different medical service. Interaction between patients enables them to share information in order to identify the healthcare service providers which provide high quality services. The formation of patient communities also empowers patients by bringing them together. Thus, patients are able to demand for better services leading to improvement in service delivery from different medical facilities.

Digitization of healthcare records also affects patients by shifting the balance of power from medical practitioner and instead creating a situation in which medical practitioners and patients have shared power (Wyatt, 2010). Additionally, owing to the use of electronic medical record systems, patients and the medical practitioner become co-creators of the service being offered. This development is important in the sense that it leads to improvement in the quality of medical services offered by the client. The digitization of healthcare records also improves education of patients (Rada, 2008). The digitization of healthcare records makes it possible for information on health-related issues to be available online for all patients to see and learn from such information.

According to Deloitte (2017) 75% of the UK population has access to health-related information available online for informative and educational purposes (Deloitte, 2014). The digitization of medical records allows for the development of educational digital platforms such as apps, websites, Open Online Course (OOCs) and texts through which information and education on medical and health-related matters can be delivered to patients.

Additionally, studies have found a positive relationship between adoption of health information technology and improved performance on some AHRQ quality of care indicators (McCullough et al., 2010; Kazley & Ozcan, 2008). However, other studies have also found conflicting results on the effect of EMR, for example, a study found that the introduction of health information technology systems may result to cultural changes in hospitals that could primarily affect productivity and, therefore, the quality of the heath care rendered in the hospitals (Mekhjian *et al.,* 2002).

2.4 Technology-Related Challenges Facing Adoption of EMR

2.4.1 Training Challenges

Firms are required to invest in the training of employees so that they can be conversant with the operation of the electronic medical system. The frequent upgrades required on the electronic medical record system are yet another cost that must be incurred by the medical facility (Sterling, 2010). All the aforementioned require a huge investment of financial resources. Inadequate financial resources in some medical facilities are therefore, one of the challenges facing the digitization of healthcare records.

The usability of electronic medical record system is yet another challenge facing the digitization of healthcare records. A number of medical practitioners continue to exhibit significant level of resistance towards the use of electronic medical record system on the grounds that the system is not user-friendly. Medical practitioners argue that the system would adversely affect the flexibility with which they carry out their respective tasks (MIM, 2016). One of the problems associated with the electronic medical record system is the fact that it has a pull-down menu which prevents medical practitioners from writing customized notes regarding the patient's health and wellbeing (Williams & Samarth, 2011). This according to medical practitioners undermines their work. Additionally, the

system is designed in such a way that it only permits medical practitioners to conduct tests that have been paid for. This also is viewed negatively medical practitioners because it prevents them from conducting testing that would enable to accurately diagnose the problem facing the patient's health and wellbeing.

2.4.2 Security of the System

Another challenge facing the digitization of healthcare record system is emanates from the security of patients' records (Gasch & Gasch, 2010). The electronic medical record system contains sensitive information about patients' health and wellbeing. If such information gets into the wrong hands, the patient's psychological and physical wellbeing can be adversely affected (Caligtan, 2011). It is, therefore, important to ensure that the health and wellbeing of the student is protected. Unfortunately, such system face the risk of being hacked thus creating a loophole for the medical records of patients to get into the wrong hands. The security problem is, therefore, another challenge facing the digitization of medical records.

Privacy issues present one of the challenges facing the digitization of healthcare records. The adoption of digital platforms creates a situation in which a patient's all medical and personal information is simply click away. This shows that any person has the potential to gain access to the private and confidential information concerning the health of a particular patient thus creating a huge privacy breach (Deloitte, 2014). The nature of technological platforms is such that they can be easily hacked and the information stored therein be accessed by unauthorized persons. Whereas measures have been undertaken to make sure that the data stored within electronic health records is protected from access to unauthorized, such security can be fully granted because of the limitations of technological platforms which create a loophole for any technology savvy person to gain unauthorized entry into a particular system.

2.4.3 Limited Interoperability

Limited interoperability between health information exchange platforms and the existing electronic health record systems also presents a challenge to the digitization of health records (Sterling, 2010). The essence of establishing digital healthcare records is to ensure that there is quick and seamless exchange of information between different

healthcare service providers. Such exchange of information is useful in the sense particularly in diagnosing a patient's health condition which in turn improves the quality of healthcare offered (Gasch & Gasch, 2010). However, such platforms are limited in the sense that they make it difficult for medical practitioners to share information amongst each other because of the limited interoperability. This further lowers the effectiveness of such platforms particularly in facilitating diagnosis of a patient's health problem and providing the necessary medical care to the patient in question.

2.4.4 Power Interruption

The digitization of healthcare records also faces the challenge of electricity particularly in the developing countries. The effective implementation and management of electronic healthcare records requires the presence of un-interrupted electricity. Indeed, the presence of un-un-interrupted supply is very important because electronic healthcare record system cannot operate in the absence of power. Unfortunately, in most developing countries like Kenya, un-interrupted power supply is not possible. The frequent power outages in such countries negatively affect the operation of electronic medical records (Blumenthal& Tavenner, 2010). It is, therefore, difficult for the medical service providers to operate their services accurately because of unreliable power supply. Indeed, unreliable power supply makes the process of establishment of electronic healthcare records counterproductive. In situations where there is a medical emergency, power outages can have devastating effects especially if the medical practitioner is unable to access historical and medical data concerning the patient that would aid in diagnosing the sickness situation of the patient.

2.4.5 Limited Computers

Digitization of medical records also faces the challenges associated with equipping of hospitals with a sufficient number of computers. The electronic healthcare records system is essentially a network of computers which facilitate the flow of information between different medical facilities. This makes it possible for medical practitioners from different healthcare facilities to exchange information about patients, their health records, illnesses, the number of times they have visited particular medical facilities the kind of medical treatment they have sought from such facilities. Such information is useful in the diagnosis of the problem facing medical. It is, therefore, essential for the healthcare

facilities to have an adequate number of computers in order to facilitate the seamless sharing of data among consumers (Gasch & Gasch, 2010). One of the challenges facing the digitization of healthcare records in the developing countries is the inadequate of computers. Some of the healthcare facilities do not have a sufficient number of computers in order to facilitate the seamless operation of electronic health records system.

2.4.6 Resistance

The digitization of healthcare records also faces the challenges of resistance among medical doctors. Resistance change is one of the biggest challenges facing the digitization of healthcare records. Digital technology is quite intimidating. Therefore, some medical doctors feel intimidated by the digital technology which compels them to exhibit resistance towards the adoption of digital medical records. Indeed, digitization of medical records presents overwhelming advantages to the medical fraternity. Some of the benefits accrued to digitization of healthcare records fall into academic as well as economic categories (Blumenthal& Tavenner, 2010). Medical doctors who are of middle age or above middle age feel intimidated by the digital technology because they were not trained on how to use digital technology previously. Their inadequacy of knowledge on the matters relating to the digital technology makes it difficult for the doctors to accept and work within a digitized healthcare system.

The medical school curriculum is quite conservative and so that means that medical doctors had only been taught on how to handle medical related issues. Software training on the hand does not incorporate modern medical practice which involves the use of digital technology. Consequently, doctors who have not had any training on the digital technology may feel that the adoption electronic healthcare record system threatens their employment position (Fasano, 2013). This feeling of threat is one of the factors that have caused increased resistance to the adoption of electronic healthcare record system. This situation is further exacerbated by the fact that today in most developed countries such as the UK and the US doctors' job interviews include questions which test the doctors' knowledge and skills in using medical practice software (Sterling, 2010). While this move is very important in the sense that it promotes the adoption of electronic health record system, it also tends to bring forth increased resistance for the new platform among medical doctors. Medical doctors who are from the middle age group and above consider

such requirements as a strategy aimed at threatening their position in the medical field of practice.

Resistance to the adoption of electronic healthcare records has not been restricted to medical doctors only. It has also been exhibited among other personnel who have for a long time worked in the manual medical records field. Some of the personnel that have been quite resistant to the adoption of electronic healthcare records are store clerks. The role of store clerks in the medical field is to oversee the paper processing of medical records as well as documents of the records of patients admitted in a particular hospital (Porter & Lee, 2013). The manual process of making medical records entails collecting the manual records, indexing the records, storing the manual medical records and ensuring that such records can be easily accessed when there is need for retrieving the data. Store clerks have for a long time been in charge of this process (Sterling, 2010). However, with the development of digital platforms, such roles are increasingly being replaced by computers and automated processes. This, therefore, means that employment opportunities for store clerks are becoming increasingly minimal. Resistance to the adoption of electronic healthcare records is, therefore, also a result of the fear among store clerks that they would lose their employment positions courtesy of introduction of electronic platforms.

The introduction of electronic healthcare records also faces a high level resistance from another section of workers in the medical field in charge of carrying out medical transcription. According to Caligtan (2011) owing to the development of electronic healthcare record system, the data entry process has become increasingly easy. There has also been increase in the use of templates in the data entry process. Additionally, the development of voice recognition technology has also significantly contributed to the automation of the data entry process. Such technologies which are associated with the electronic health care record system have led to a significant reduction in the demand for medical transcribers. As a result, there has also been an increase in the level of resistance for the digitization of medical records from stakeholders in the medical transcription field. The resistance for digitization of medical records has greatly undermined the adoption of electronic healthcare record systems.

2.6 Chapter Summary

This chapter has reviewed literature on what other scholars have done in relation to the adoption on EMR on hospitals in Kenya. The review has indicated that there are significant benefits that can accrue from digitization of health records. The adoption however will face several challenges; hence more research is required. The next chapter, chapter three, discusses research methodology.

CHAPTER THREE

3.0 RESEARCH METHODOLOGY

3.1 Introduction

This chapter describes the research design and methodology used in the study. The chapter highlights the following: research designs, population sample design, sampling frame, sampling techniques, sample size, data collection, research process, data analysis techniques and chapter summary.

3.2 Research Design

Research design is a grand plan of approach to a research topic (Kothari, 2009). Research design is regarded as the foundation for understanding the world of researcher and the participants as it gives the context or roadmap for generating, analysing and interpreting the variables (Preece, 2009). This study employed descriptive research design. Descriptive design was selected as the design enables the researcher to construct questions that help solicit the desired information, identify the means by which the research conducted and data were summarized in a way that provides the designed descriptive information (Bryman, 2009). This design permits the use of multiple sampling techniques. This design permits the use of multiple research instruments, therefore, questionnaire, and interview guide were used to analyze adoption of EMR in private hospitals in Kenya.

3.3 Population and Sample Design

3.3.1 Population

Population is defined as the entire group of individuals' events or objects having common observable characteristics (Best & Khan, 2011). In this study, the target population was private hospitals in Kenya. However due to time constraint coupled with logistical challenges, the study focused only on the health facilities in Nairobi and Nakuru Counties. Nairobi County is the capital city of the country while Nakuru County is the fourth largest county (Kenya Census, 2009) hence a good representation of the country's 47 counties. Nairobi County has 30 private hospitals while Nakuru County has 24 private

hospitals (Kenyapharmtech). The number of doctors, nurses and patients that frequent private hospitals in the two counties was estimated at 8,600, 19,678 and 26,722 respectively (Ministry of Health, 2017).

3.3.2 Sampling Design

Sampling design guides the researcher in determining the most appropriate sample. It guides the process of grouping units to the frame, to establish the sample size and allocate the sample to the categories in the sampling frame and final section of the sample (Mugenda, 2012).

3.3.2.1 Sampling Frame

Sampling frame implies the list of elements from which the participants are selected (Best & Khan, 2011). In this study, the sampling frame comprised of all the private hospitals within Nairobi and Nakuru that was obtained from (Ministry of Health, 2017).

3.3.2.2 Sampling Techniques

Sampling is the procedure a researcher uses to gather people, places or things to study (Kothari, 2009). It is a process of selecting a number of individuals or objects from a population such that the selected group contains elements of the characteristics found in the entire group (Mugenda, 2012). In the study, stratified and simple random sampling was used to select the respondents from doctors, nurses and patients. This type of sampling is used when the researcher wants to highlight specific subgroups within the population (Vogt, Gardner and Haeffele, 2012). This method was selected as the healthcare industry has different, unique and pertinent stakeholders. The bands were divided into three categories consisting of doctors, nurses and patients. This method was also simple and it was easily applicable to the population and ensured that each participant had an equal chance of participating in the study.

3.3.2.3 Sample Size

A sample is a finite part of statistical population whose properties are studied to gain information about the whole (Kombo & Tromp, 2013). When dealing with people, it can

be defined as asset of respondents (people) selected from a larger population for the purpose of survey (Kombo & Tromp, 2013). According to Kombo and Tromp (2013) Slovin's formula is used when nothing about the behaviour of a population is known at all. Slovin's formula is written as:

$n = N / (1 + Ne^2)$

n = sample

N = Total population

e = Error tolerance

=55000/(1+55000*0.1*0.1)

=55000/3501

=132

Table 3.1: Sample Size Distribution

	Number per hospital	Total number of hospitals	Total sample	
Nairobi County				**69**
Doctor in charge	1	23	23	
Nurse in charge	1	23	23	
Patient	1	23	23	
Nakuru County				**63**
Doctor in charge	1	21	21	
Nurse in charge	1	21	21	
Patient	1	21	21	
Total sample				**132**

Source, Author

3.4 Data Collection Method

Primary data was used in this study. Primary data was collected using questionnaire and interview guide. A questionnaire was used for data collection because it offers considerable advantage in administration. It was used to collect quantitative data while interview guide was used to collect qualitative data. It comprised of open and closed ended questions. Section A sought information on the demographic information regarding gender, age, academic qualification and years of experience. Section B sought

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information on factors influencing adoption of EMR in private hospitals in Kenya. Section C dealt with effects of adoption of EMR in private hospitals in Kenya. Section D comprised of the technological challenges affecting adoption of EMR in private hospitals in Kenya.

Interview guide is an oral questionnaire administered face to face and which gives immediate feedback. Semi-structured interview guide was used to collect data from doctors and nurses in charge of the health facilities in Nairobi and Nakuru Counties. The interview guide suited this study because it is flexible and adaptable (Kothari, 2004). The interview guide was suitable for this category of people because of the medics' busy schedule and as such may not have time to sit down to fill a questionnaire. The use of interview guides for doctors and nurses in charge of the health facilities in Nairobi and Nakuru Counties enabled the researcher to elicit in-depth information on implications of digitization of healthcare services in Kenya. The researcher set questions which were intended to achieve the study objectives. The questions were open ended to allow the respondents to express their views and additional experiences not captured in the guide.

Descriptive statistics was used to analyse quantitative data. IBM SPSS was used as the tool for quantitative data analysis.

3.5 Research Procedure

Validity of the research instrument shows whether the research instrument is measuring what it is supposed to measure (Orodho, 2009). It is the degree to which results obtained from the analysis of data actually represents the phenomenon under study. If such data is a true reflection of the variable, then the inferences based on such data are deemed accurate and meaningful. The items in the questionnaire were subjected to both face and content validity. Face validity ensured that the instruments reflected the content of the concepts under study (Kothari, 2004). Content validation enables the researcher to assess whether the content of the measurement technique was in consonance with the known literature on the topic, thus covering the whole conceptual space (Creswell, 2014). A pre-test was carried out to determine validity of the instruments.

Reliability refers to the degree to which a particular measuring procedure gives similar results over a number of repeated trials. It is a measure of the degree to which a research instrument produces consistent results after repeated trials (Orodho, 2009). The questionnaire in this study was tested for reliability using the method of split-half. This was adopted in the grouping of data by dividing the items which are in closed form into odd and even numbers and the results checked against each other. The questionnaire items that were used in split half method included all closed ended questions with multiple choices. The researcher used Spearman Rho correlation coefficient to find out the reliability using correlation coefficient score as outlined in Chapter 4.

The researcher personally administered the questionnaires to the participants. The researcher explained the purpose, clarified points and motivated the respondents to answer questions carefully. The participants answered the questionnaires while the researcher waited for same day collection. The essence of collecting the questionnaires on the same day was to avoid loss of the questionnaires through misplacement or forgetfulness. The researcher also conducted face to face interviews with the doctors in charge of the health facilities in Kenya. This was arranged during the preliminary visit to the facilities while seeking permission to collect data. The interviews took thirty minutes each. Information was recorded by taking notes.

3.6 Data Analysis Methods

Data analysis according to Creswell (2014), involves the process of sorting the data, coding, cleaning and processing and result interpretation. The raw data collected from the field were screened to facilitate analysis. Quantitative data was categorized and entered into a computer spread sheet in a standard format to allow for computation of descriptive statistics. Thereafter the data was coded and analyzed with the use of a computer in Statistical Package for Social Sciences (SPSS) version 20 and Excel Programs to produce frequencies, descriptive and inferential statistics. Descriptive statistics were utilized in summarizing data.

Qualitative data on the other hand derived from interview guide was coded. The researcher prepared data for analysis. First, the data from the interviews was transcribed verbatim. Next, the researcher grouped topics into meaningful segments. The segments

were then coded and grouped into categories. The steps were repeated to obtain more categories from the data sets. As expressed by Creswell (2012), the researcher simultaneously combined categories into themes and presented narrations of the experiences of the patients and medical practitioner on the adoption of EMR in private hospitals in Kenya.

3.7 Chapter summary

In this chapter the methodology has been discussed alongside research design, population and sample design, data collection, research procedure and data analysis. The next chapter discusses the results and findings.

CHAPTER FOUR

4.0 RESULTS AND FINDINGS

4.1 Introduction

This study aimed at examining the implementation of digitization of healthcare records in Kenya. This chapter is divided into the following sections: response rate, demographic characteristics of the respondents, and presentation of findings according to the research questions.

4.2 Response Rate and Background Information

4.2.1 Response Rate

In regards to the response rate of the patients, a total of 44 questionnaires were distributed out of which 44 questionnaires were filled and collected by the researcher. However, after conducting data screening it was established that 2 questionnaires had incomplete responses hence only 42 were recorded as valid questionnaires. The results are presented in Table 4.1. This gave a response rate of 95.54%. Ninety-five percent of the class patients' response rate was fit for analysis as stated by Mugenda (2012).

Table 4.1: Response rate of the Patients

Respondents	Frequency	Percentage (%)
Actual number patients	42	95.45
Expected number of patients	44	100

As regards the doctors' response rate, a total of 44 questionnaires were distributed, filled and collected by the researcher. During data screening, it was established that 1 questionnaire had incomplete responses thus only 43 were recorded as valid questionnaires. This gave a response rate of 97.27%. The results are presented in Table 4.2. According to Mugenda (2012), a response rate of 97.27% is excellent for analysis. Thus, the doctors' response rate of 97.27% was excellent for analysis.

Table 4.2: Doctors' Response Rate

Respondents	Frequency	Percentage (%)
Actual number students	43	97.27
Expected number of students	44	100

As regards the nurses' response rate, a total of 44 questionnaires were distributed out of which 44 questionnaires were filled and collected by the researcher. During data screening, it was established that 3 questionnaires had incomplete responses thus only 41 were recorded as valid questionnaires. This gave a response rate of 93.18%. The results are presented in Table 4.3. A 93% response rate is excellent for analysis as stated by Mugenda (2012).

Table 4.3: Nurses' Response Rate

Respondents	Frequency	Percentage (%)
Actual number nurses	41	93.18
Expected number of nurses	44	100

4.2.2 Demographic Information of the Respondents

The demographic characteristics of the respondents were categorized into: gender, age bracket, academic qualifications and monthly income as presented in the following subsections.

4.2.2.1 Gender of Patients

Concerning the demographic characteristics of the patients, the study found that 52.4% of the patients were male while 47.6% were female as shown in Figure 4.1.
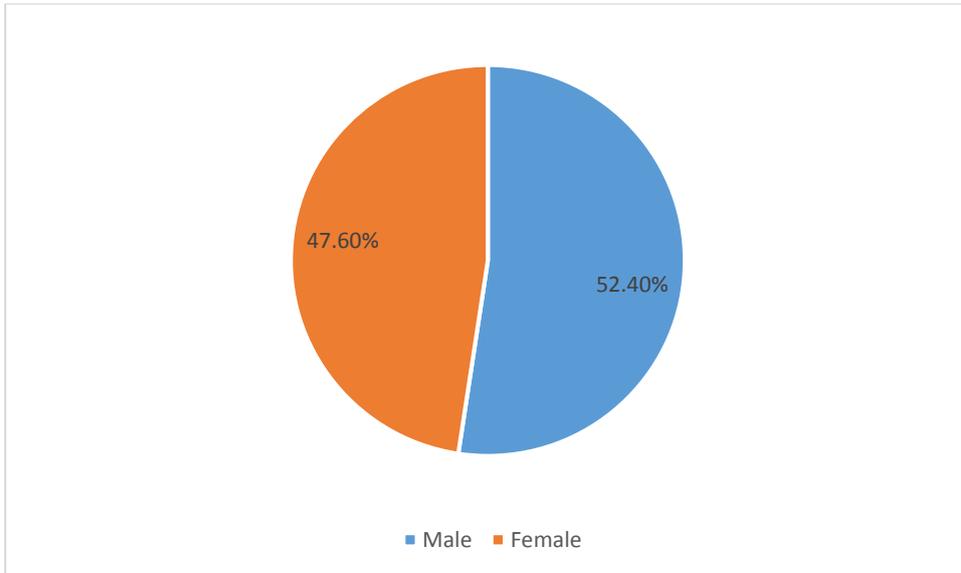
Figure 4.1: Gender of the Patients

4.2.2.2 Age of Patients

The study found out that the majority of the patients (33.3%) were in the age bracket of 28-32, 14.2% were in the age bracket of 23-27, 14.2% were in the age bracket of 33-37, 7.1% of the patients were in the age bracket of 18-22, 7.1% of the patients were in the age bracket of 38-42, 7.1% of the patients were in the age bracket of 43-47, 7.1% of the respondents were in the age bracket of 48-52, 4.7% of the patients were in the age bracket of 53-57, 2.6% of the respondents were in the age bracket of 57-61 and above 61 as summarized in Figure 4.2.
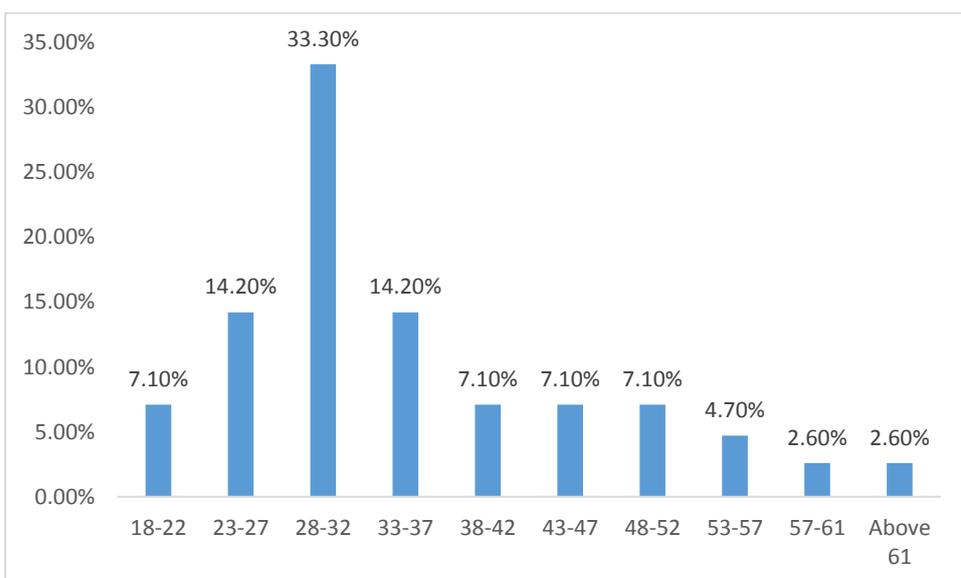
Figure 4.2: Age Bracket of the Patients

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4.2.2.3 Level of Education of Patients

The study found out that about 40.5% of the patients had a diploma, 16.7% of the patients had a certificate, 30.9% of the patients had bachelors, 4.7% of the patients had masters, 7.1% secondary education as the highest academic qualification as shown in Figure 4.3
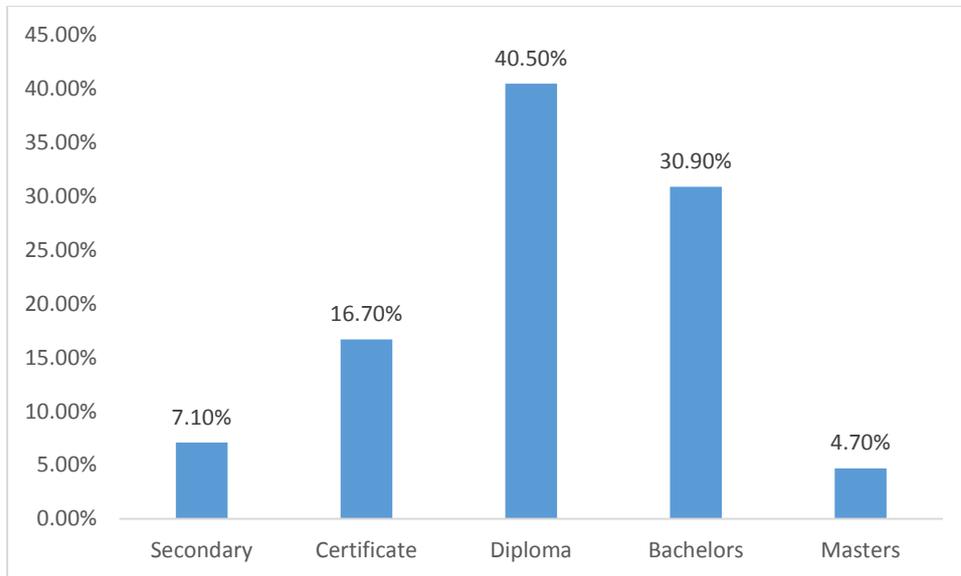
Figure 4.3: Education of the Patients

4.2.2.4 Monthly Income of Patients

The study found out that about 69% of the patients had a monthly income of Kshs 50,001-100,000, 23.9% of the respondents had a monthly income of 100,001-300,000, 7.1% of the respondents had a monthly income of 500,001-700,000 while none of the respondents had income of above 700,000 as shown in Figure 4.4
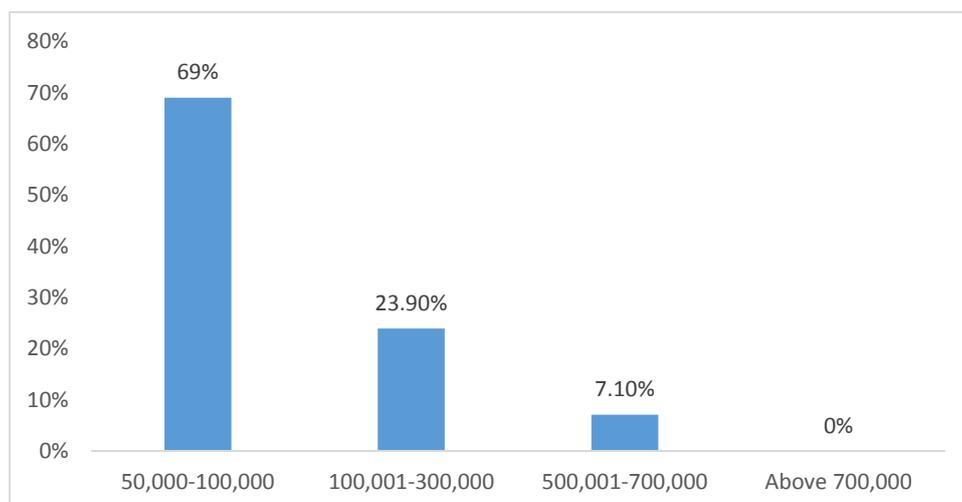
Figure 4.4: Income of the Patients

4.2.2.5 Gender of Doctors

Regarding the demographic characteristics of the doctors, the study found out that 88.4% of the doctors who took part I the study were male while 11.6% were female as shown in Figure 4.5
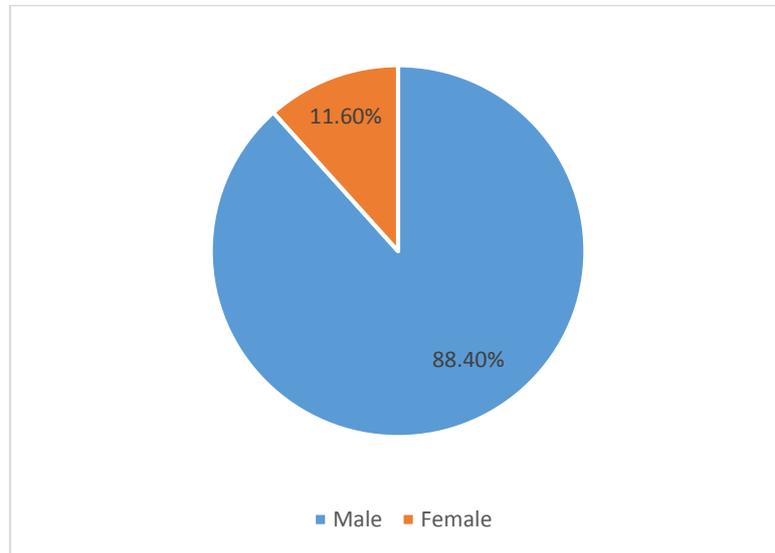
Figure 4.5: Gender of Doctors

4.2.2.6 Age of Doctors

The findings also indicate that the majority of the doctors 23.4% were in the age bracket of 38-42, 20.9% of the doctors were in the age bracket of 33-37, 18.6% of the doctors were in the age bracket of 43-47, 18.6% of the doctors were in the age bracket of 48-52, 6.9% of the doctors were in the age bracket of 57-61 while remaining age brackets scored zero as shown in Figure 4.6
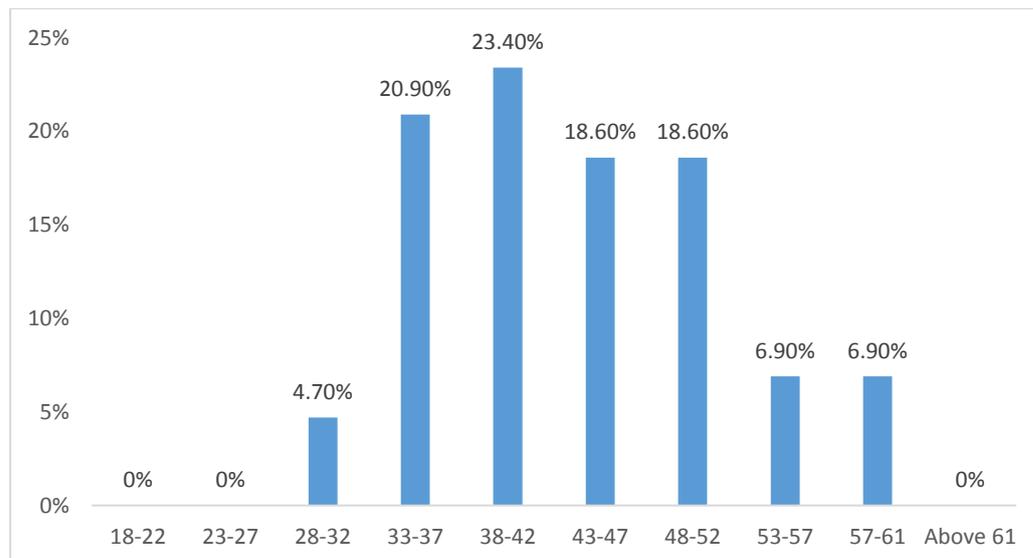
Figure 4.6: Age Bracket of Doctors

4.2.2.7 Education of Doctors

The study found out that all the doctors who took part in this study had a bachelor's degree as shown in Figure 4.7
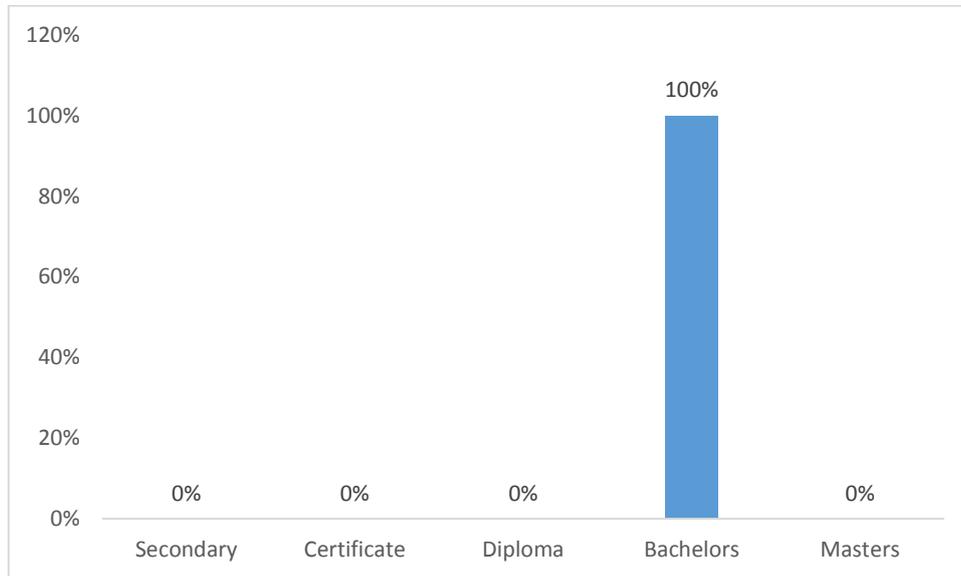
Figure 4.7: Education of Doctors

4.2.2.8 Monthly Income of Doctors

The study found out that about 53.5% of the doctors had a monthly income of Kshs 100,001-300,000 while 46.5% of the respondents had a monthly income of 500,001-700,000 as shown in Figure 4.8
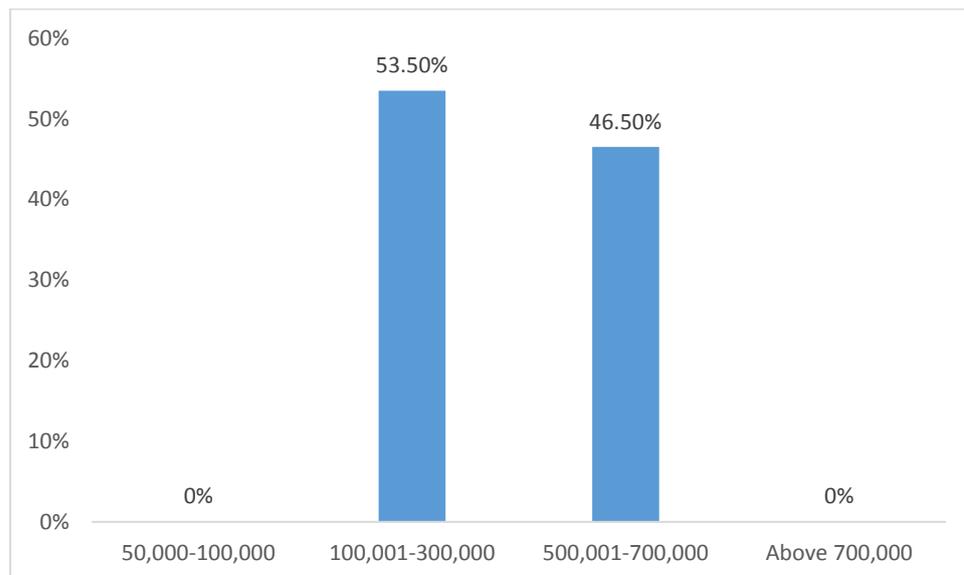
Figure 4.8: Income of Doctors

4.2.2.9 Working Experience of Doctors

The findings show that about 34.9% of the doctors had working experience of 9-11 years, 26.5% of the doctors had working experience of 6-8 years, 16.3% of the doctors had working experience of 3-5 years, 16.3% of the doctors had working experience of above 11 years while 9.3% of the doctors had working experience of 0-2 years as shown in Figure 4.9
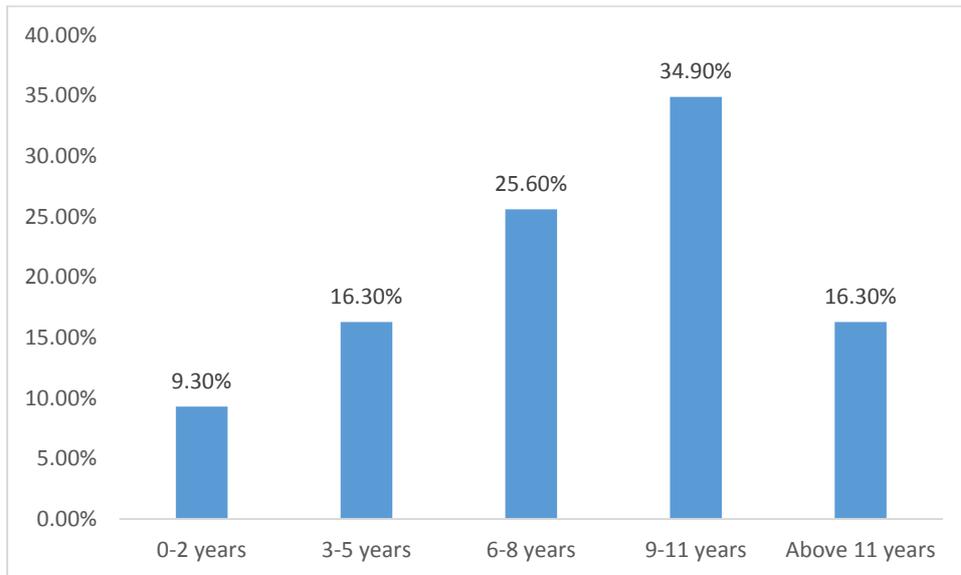
Figure 4.9: Working Experience of Doctors

4.2.2.10 Gender of Nurses

About the demographic characteristics of the nurses, the study found that 51.2% of the nurses were female while 48.8% of the nurses were male as shown in Figure 4.10
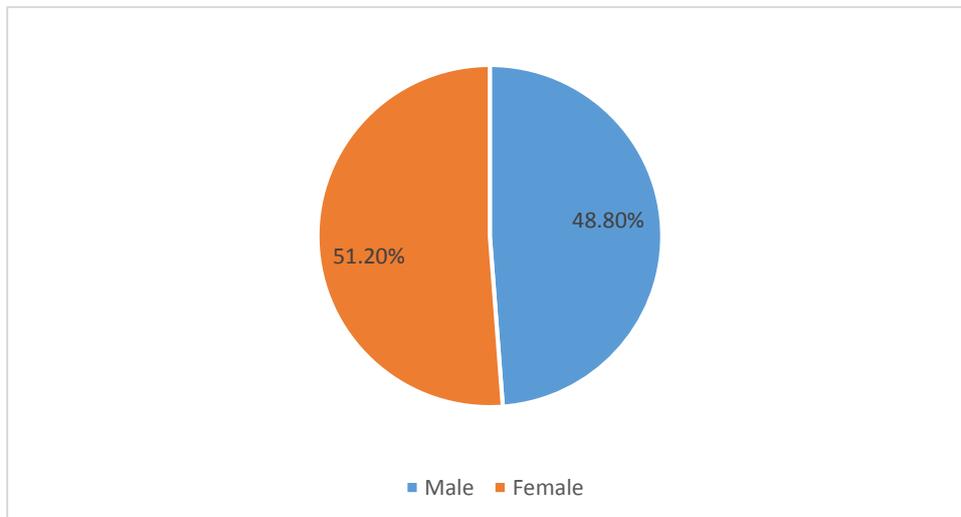
Figure 4.10: Gender of Nurses

4.2.2.11 Age of Nurses

The majority of the nurses (36.6%) were in the age bracket of 43-47, 19.5% of the nurses were in the age bracket of 38-42, 17.1% of the nurses were in the age bracket of 33-37, 12.2% of the nurses were in the age bracket of 28-32, 9.7% of the nurses were in the age bracket of 23-27 while the remaining age brackets scored zero as shown in Figure 4.11
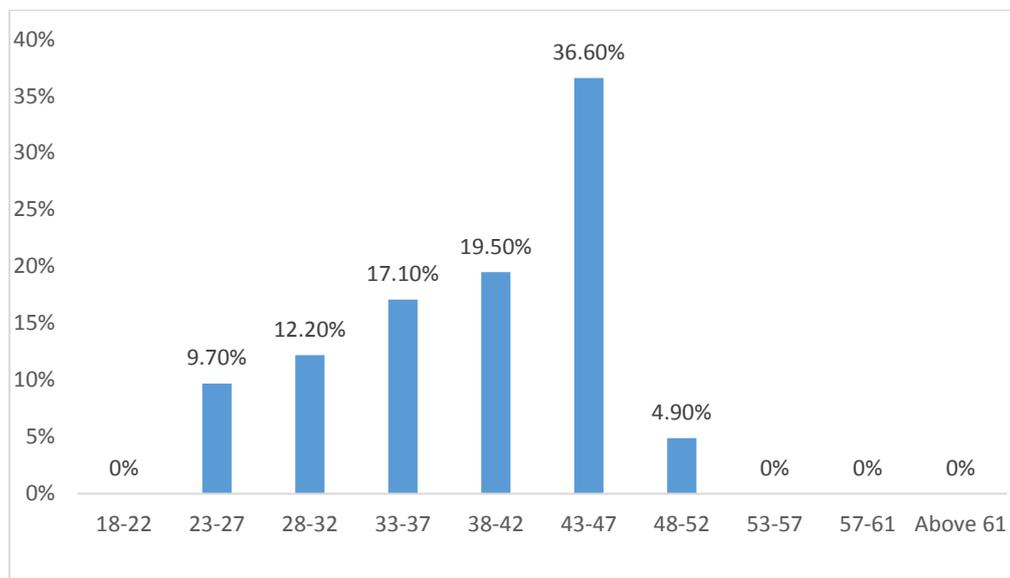
Figure 4.11: Age Bracket of Nurses

4.2.2.12 Education of Nurses

About 82.9% of the nurses had a diploma, 12.2% of the nurses had a certificate, 4.9% of the nurses had bachelors while none of the nurses had masters or secondary education as the highest academic qualification as shown in Figure 4.12
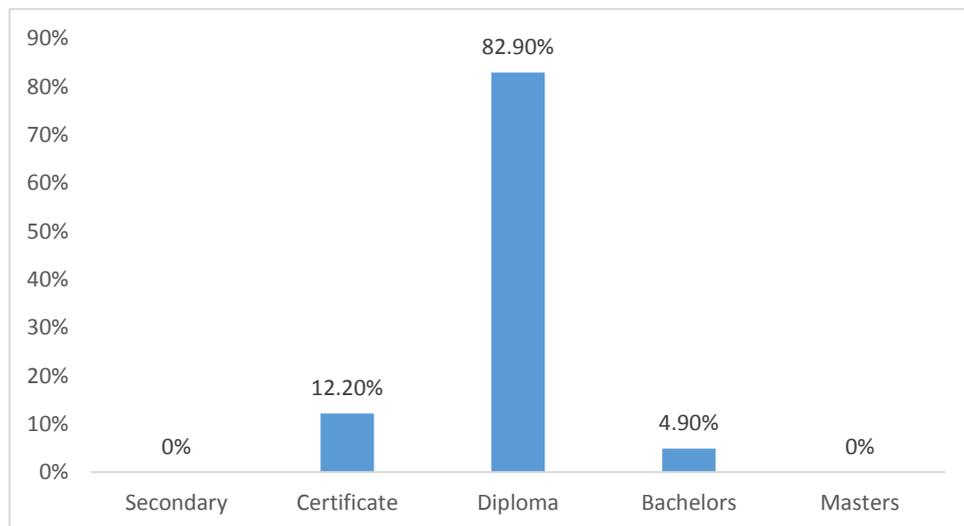
Figure 4.12: Education of Nurses

4.2.2.13 Monthly Income of Nurses

Approximately 95.1% of the nurses had a monthly income of 50,000-100,000 while 4.9% of the nurses had a monthly income of 100,001-300,000 as shown in Figure 4.13
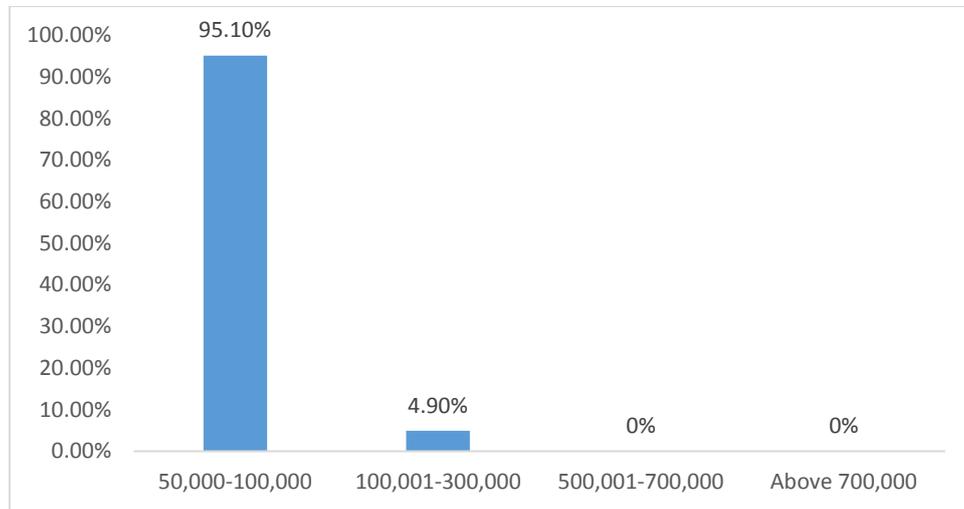
Figure 4.13: Income of Nurses

4.2.2.14 Working Experience of Nurses

Approximately 34.9% of the nurse had working experience of 9-11 years, 25.6% of the nurses had working experience of 6-8 years, 16.3% of the nurses had working experience of 3-5 years, 13.9% of the nurses had working experience of above 11 years while 9.3% of the nurses had working experience of 0-2 years as shown in Figure 4.14
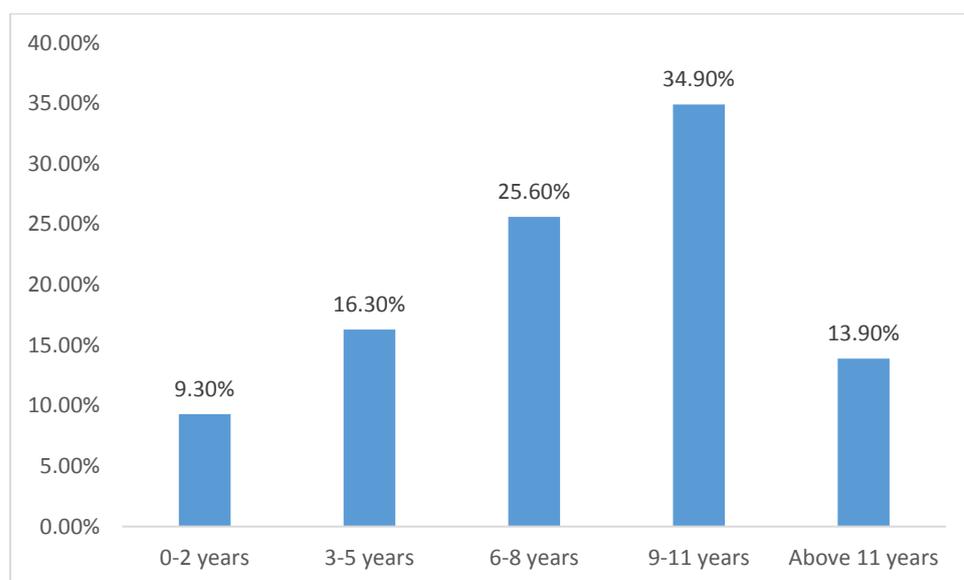
Figure 4.14: Experience of Nurses

4.3 Factors Influencing Adoption of Electronic Medical Records

The first research question sought to determine the factors influencing adoption of EMR in private hospitals in Kenya. Amongst the factors considered included were availability of resources and access to network infrastructure. These have been analyzed in the following sub-sections.

4.3.1 Availability of Resources and Adoption of EMR

The respondents were asked if they had electronic medical record system in their institutions. The findings indicate that 89% of the respondents had electronic medical record system in their institutions while 11% of the respondents did not have as summarized in Figure 4.15.
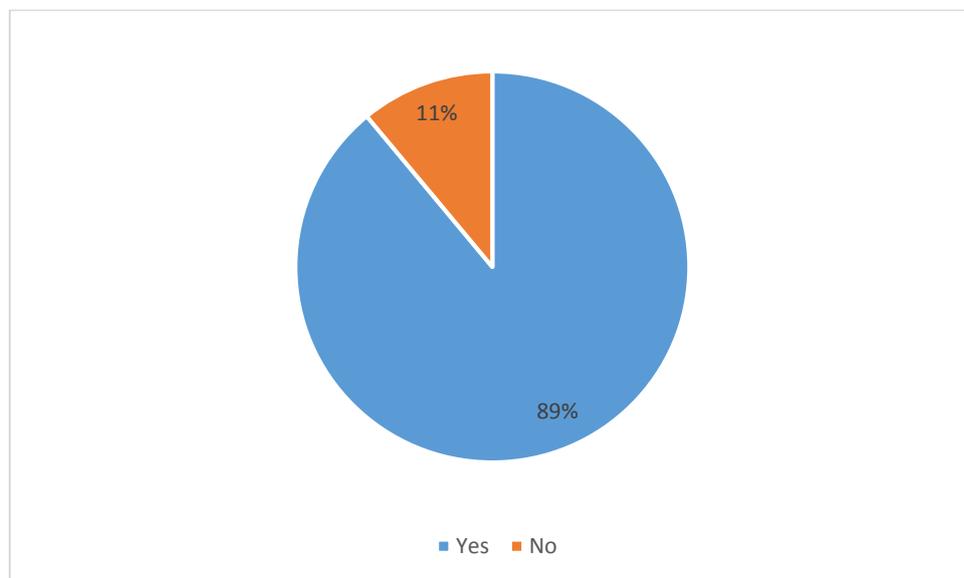
Figure 4.15: Availability of Electronic Medical Record Systems

4.3.1.1 Influence of Availability of Resources on Adoption of EMR

From the questionnaire, the respondents indicated their responses according to the Likert scale having ratings of (1) strongly disagree and (5) strongly agree. The study found that 75% of the respondents agreed that availability of technical personnel to install and operate. About 65% of respondents agreed that EMR technology resources are a facilitator to its adoption. Nearly 75% of the respondents agree that cost of EMR resources and facilities purchase influence its adoption. Approximately 80% of the respondents agreed that adequate infrastructure facilitates the hospital adoption of EMR.

Nearly 65% of the respondents agreed that maintenance costs of EMR technology facilities influence its adoption and utilization in their institution as shown in Table 4.5

Table 4.4: Influence of Availability of Resources on Adoption of EMR

Influence of availability of resources on Adoption of EMR	1	2	3	4	5
Availability of technical personnel to install and operate promotes its adoption	0%	5%	20%	40%	35%
EMR technology resources is an facilitates its adoption	5%	20%	10%	30%	35%
Cost of EMR resources and facilities purchase is the greatest influence its adoption	0%	5%	20%	40%	35%
Adequate infrastructure affects the hospital adoption of EMR	0%	5%	15%	45%	35%
Maintenance costs of EMR technology facilities infuences its adoption and utilization in our institution	0%	20%	15%	30%	35%

4.3.2 Access to Network Infrastructure and Adoption of EMR

From the questionnaire, the respondents indicated their responses according to the Likert scale having ratings of (1) strongly disagree and (5) strongly agree. The study found out that 73% of the respondents agreed that security issues, including confidentiality, integrity and availability, are the major concerns in EMR adoption at their facility. About 75% of the respondents agreed that legal concept such as security and privacy concerns affect the implementation of EMR. Nearly 80% of the respondents agree that adequate Internet bandwidth is a notable facilitator to adopt of EMR. About 80% of the respondents agreed that availability of EMR software packages promotes adoption in health facilities. Approximately 60% of the respondents agreed that communication between various players affect the adoption of EMR as shown in Table 4.5

Table 4.5: Influence of Access to Network Infrastructure on EMR Adoption

Influence of Access to Network Infrastructure on EMR Adoption	1	2	3	4	5
Security issues, including confidentiality, integrity and availability, are the major concerns in EMR adoption at our facility	5%	2%	20%	28%	45%
Legal concept such as security and privacy concerns affect the implementation of EMR	0%	10%	15%	36%	39%
Adequate Internet bandwidth is a notable challenge to adopt of EMR	1%	4%	15%	31%	49%
Availability of EMR software packages facilitates adoption in health facilities	0%	0%	20%	55%	25%
Communication between various players affect the adoption of EMR	5%	20%	15%	20%	40%

4.3.3 Inferential Analysis

4.3.3.1 Correlation

Correlation analysis was conducted. The findings indicated that there is a positive correlation between resources availability and adoption of EMR (r=0.553, p value=0.003). Therefore, an increase in the resource availability led to an increase in adoption of EMR. Concerning access to network infrastructure and adoption of EMR (r = 0.884, p-value < 0.001). This implies that an increase in access to network infrastructure led to an increase in adoption of EMR. This indicates that access to network infrastructure and resource availability could be selected for statistical analysis namely regression analysis as shown in Table 4.6.

Table 4.6: Correlation analysis on Factors Influencing EMR Adoption

		Y
X1	Pearson Correlation	.553**
	Sign. (2-tailed)	.003
	N	126
X2	Pearson Correlation	.884**
	Sign. (2-tailed)	.001
	N	126
Y	Pearson Correlation	1
	Sign. (2-tailed)	
	N	

Key: X1-Resource availability, X2-Access to Network Infrastructure, Y-EMR adoption

4.3.3.2 Regression Analysis

The model summary in Table 4.6 indicates that the R square of 0.352 depicts that 35.2% of variation in adoption of EMR technology is explained by resource availability and access network infrastructure. A 0.322 value of the Adjusted R Square implies that in exclusion of the constant resource availability and access network infrastructure explained change in EMR adoption by 32.2% as shown in Table 4.7

Table 4.7: Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Sig. F Change
1	.594[a]	.352	.322	.5177	.000
a. Predictors (Constant) , Resource Availability, Access Network Infrastructure					

The Analysis of Variance (ANOVA) was done for EMR adoption against resource availability and access network infrastructure. At 95% confidence level (F=11.703, p value = 0.05) hence significant. The findings are shown in Table 4.8.

Table 4.8: ANOVA

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	12.549	4	3.137	11.703	.000[b]
	Residual	23.055	128	.268		
	Total	35.601	132			

a. Dependent Variable: EMR adoption

b. Predictors: (Constant), Resource Availability, Access Network Infrastructure

The regression weights indicate that the predictors, resource availability (β=0.156) and access to network infrastructure (β=0.342) have positive influence on the adoption of EMR technology in private hospitals in Kenya. This implied that a unit increase in resource availability led to an increase in EMR adoption in private hospitals by 15.6%. A unit increase in access to network infrastructure led to an increase in EMR adoption in private hospitals by 34.2% as shown in Table 4.9

Table 4.9: Regression Weights

Model	Unstandardized Coefficients		Standardized Coefficients	T	Sig.
	B	Std. Error	Beta		
1 (Constant)	3.159	.365		10.525	.000
Resource availability	.086	.044	.156	2.115	.000
Access to network infrastructure	.700	.065	.324	-12.775	.000

4.4 Effect of EMR Adoption on Healthcare Management

The second objective of the study was to determine the effect of EMR adoption on healthcare management in private hospitals in Kenya. The findings are discussed in the subsequent subsections.

4.4.1 Ease of Accessing Medical Services

The result shows that 73% of the respondents agreed that digital healthcare has made it easy for them to seek medical attention regularly. 75% of the respondents agreed that through digital healthcare they are able to contact my doctor on phone, via email, etc

anytime they need medical opinion. 80% of the respondents agreed that they are able to monitor their condition using digital medical records. 77% of the respondents agreed that they can easily access their medical records in most of the hospitals around. 60% of the respondents supported the statement that transferring their medical records has become easy and fast. 75% of the respondents agreed that they do not spend a lot of time in following up their medical records. 60% of the respondents supported the statement that the time they spent in the hospital during a visit has reduced with the onset of digitization while65% of the respondents agreed that they do not have worries when they travel since they can easily access their medical records from any hospital as shown in Table 4.10

Table 4.10: Ease of Access and Adoption of EMR

Statement	1	2	3	4	5
Digital healthcare has made it easy for me to seek medical attention regularly	5%	2%	20%	28%	45%
Through digital healthcare I am able to contact my doctor on phone, via email, etc anytime I need medical opinion	0%	10%	15%	36%	39%
I am able to monitor my condition using digital medical records	1%	4%	15%	31%	49%
I can easily access my medical records in most of the hospitals around	0%	0%	20%	55%	25%
Transferring my medical records has become easy and fast	5%	20%	15%	20%	40%
I do not spend a lot of time in following up my medical records	0%	5%	20%	35%	40%
The time I spent in the hospital during a visit has reduced with the onset of digitization	0%	10%	30%	35%	25%

4.4.2 Improved Healthcare Service Provision

The study found out that about 65% of the respondents agreed that their health condition has improved steadily due to the regular medical services they get since the digitization of medical records, 80% of the respondents supported the statement that they rarely miss

their appointments with the doctor since the digitization of medical records in the nearby hospital, 75% of the respondents agreed that communication with the doctor has never been this easy since the digitization of medical records in this hospital while 65% of the respondents agreed that their medical results have never been mixed up with another patient's in the system. The findings are summarized in Table 4.11

Table 4.11: Improved Healthcare Service Provision

Improved Healthcare Service Provision	1	2	3	4	5
My health condition has improved steadily due to the regular medical services I get since the digitization of medical records	10%	10%	15%	25%	40%
I rarely miss my appoints with the doctor since the digitization of medical records in the nearby hospital	0%	5%	15%	30%	50%
Communication with the doctor has never been this easy since the digitization of medical records in this hospital	0%	5%	20%	40%	35%
I trust the hospital will safeguard my medical records	0%	5%	20%	40%	35%
My medical results have never been mixed up with another patient's in the system	0%	20%	15%	30%	35%

4.4.3 Inferential Analysis

4.4.3.1 Correlation

Correlation analysis was conducted. The findings indicated that there is a positive correlation between ease of access and adoption of EMR (r=0.663, p value=0.002). Therefore, an increase in the adoption of EMR led to an increase in ease of accessibility. Concerning improved healthcare and adoption of EMR (r = 0.884, p-value < 0.001). This implies that an increase in adoption of EMR led to an increase in improved healthcare. This indicates that improved healthcare and ease of access could be selected for statistical analysis namely regression analysis.

Table 4.12: Correlation analysis on the Influence of EMR on Healthcare Management

		Y
X1	Pearson Correlation	.663**
	Sign. (2-tailed)	.002
	N	126
X2	Pearson Correlation	.984**
	Sign. (2-tailed)	.003
	N	126
Y	Pearson Correlation	1
	Sign. (2-tailed)	
	N	

Key: X1-Ease of Access, X2- Improved Healthcare, Y-EMR adoption

4.4.3.2 Regression Analysis

The model summary in Table indicates that the correlation coefficient (R=0.511) indicates that 51.1% of the changes in changes in EMR adoption can be explained by ease of access and improved healthcare. Furthermore, the adjusted R square of .302 depicts that in exclusion of the constant, 30.2% of variation in adoption of EMR technology is explained ease of access and improved healthcare as shown in Table 4.13

Table 4.13: Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Sig. F Change
1	.511ᵃ	.309	.302	.5077	.000
a. Predictors (Constant) , Ease of Access, Improved Healthcare					

The Analysis of Variance (ANOVA) was done for EMR adoption against improved healthcare and ease of access. At 95% confidence level (F =11.77, p<0.05) hence significant. The findings are shown in Table 4.14

Table 4.14: ANOVA

<div align="center">ANOVA^a</div>

Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	12.549	4	3.137	11.77	.000^b
	Residual	23.055	128	.268		
	Total	35.601	132			

a. Dependent Variable: EMR adoption
b. Predictors: (Constant), Ease of Access, Improved Healthcare

The regression weights indicate that all the predictors, ease of access (β=0.276) and improved healthcare services (β=0.428) have positive influence on the adoption of EMR technology in private hospitals in Kenya. A unit increase in adoption of EMR led to an increase in ease of accessing medical records by 27.6% while a unit increase in EMR adoption led to an increase in improved healthcare by 42.8% as shown in Table 4.15.

Table 4.15: Regression Weights

Model		Unstandardized Coefficients		Standardized Coefficients		
		B	Std. Error	Beta	T	Sig.
1	(Constant)	3.106	.266		10.625	.000
	Ease of access	.075	.031	.276	2.215	.000
	Improved healthcare	.800	.072	.428	11.775	.000

4.5 Technological Challenges Facing Adoption on EMR

4.5.1 Resistance and adoption of ERMR

The study found out that 75% of the respondents agreed that some of the medical practitioners prefer keeping medical records manually, 72% of the respondents agreed that some medical practitioners have negative attitudes towards EMR, 65% of the respondents agree that some medical practitioners believe that EMR interfere with their work while 70% of the respondents agreed that some medical practitioners do not like EMR and its adoption as shown in Table 4.16.

Table 4.16: Resistance and Adoption of EMR

Resistance and Adoption of EMR	1	2	3	4	5
Some of the medical practitioners prefer keeping medical records manually	0%	5%	20%	40%	35%
Some medical practitioners have negative attitudes towards EMR	5%	20%	13%	30%	32%
Some medical practitioners believe that EMR interfere with their work	0%	15%	20%	30%	35%
Some medical practitioners do not like EMR and its adoption	0%	15%	15%	45%	25%

4.5.2 Training Challenges and Adoption of EMR

The findings are summarized as follows, about 80% of the respondents said they had never been trained, 75% of the respondents said they had forgotten their training, 75% of the respondents said they had no interest in learning, 65% of the respondents said they were slow in typing as shown in Figure 4.18.

Figure 4.16: Training Challenges Facing Adoption of EMR

Training challenges	1	2	3	4	5
I have never been trained	0%	5%	15%	30%	50%
I have forgotten my training	0%	5%	20%	40%	35%
I have no interest in learning	0%	5%	20%	40%	35%
I am slow in typing	0%	20%	15%	30%	35%

4.5.3 Inferential Analysis

4.5.3.1 Correlation

Correlation analysis was conducted. The findings indicated that there is a negative correlation between resistance and adoption of EMR (r=-0.456, p value=0.001). Therefore, an increase in the resistance led to a decrease in adoption of EMR. Concerning training challenges and adoption of EMR (r = -0.701, p-value < 0.001). This implies that an increase in training challenges led to a decrease in adoption of EMR. This indicates

that resistance and training challenges could be selected for statistical analysis namely regression analysis as shown in Table 4.17

Table 4.17: Correlation analysis on the Technological Challenges

		Y
X1	Pearson Correlation	-.456**
	Sign. (2-tailed)	.001
	N	126
X2	Pearson Correlation	-.701**
	Sign. (2-tailed)	.001
	N	126
Y	Pearson Correlation	1
	Sign. (2-tailed)	
	N	

Key: X1-Resistance, X2- Training challenges, Y-EMR adoption

4.5.3.1 Regression Analysis

The model summary in Table indicates that the correlation coefficient (R=0.695) indicates that changes in adoption of EMR in private hospitals can be explained by resistance and training challenges. Furthermore, the adjusted R square of 0.399 depicts that in exclusion of the constant, 39.9% of variation in adoption of EMR technology is explained by resistance and training challenges as shown in Table 4.18

Table 4.18: Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Sig. F Change
1	.695ª	.455	.399	.6547	.000
a. Predictors (Constant) , Training challenges, Resistance					

The Analysis of Variance (ANOVA) was done for EMR adoption against improved healthcare and ease of access. At 95% confidence level (F= 11.782, p<0.05) hence significant. The findings are shown in Table 4.19.

Table 4.19: ANOVA

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	11.115	4	3.335	11.782	.000[b]
	Residual	20.154	128	.207		
	Total	35.661	132			

a. Dependent Variable: EMR adoption
b. Predictors: (Constant), Training challenges, Resistance

The regression weights indicate that all the predictors, training challenges (β=-0.356) and resistance (β=-0.224) have negative influence on the adoption of EMR technology in private hospitals in Kenya. A unit increase in resistance led to a decrease in adoption of EMR by 22.4% while a unit increase in training challenges led to a decrease in EMR adoption by 35.6% as shown in Table 4.20.

Table 4.20: Regression Weights

Model	Unstandardized Coefficients B	Std. Error	Standardized Coefficients Beta	T	Sig.
1 (Constant)	3.249	.398		10.525	.000
Training challenges	.068	.067	-.356	-2.115	.000
Resistance	.690	.087	-.224	-11.065	.000

4.6 Chapter Summary

This chapter has discussed the response rate, demographic characteristics of the respondents and presentations of findings based on the research questions in relation to the implementation of digitization of healthcare records in Kenya. The next chapter presents the summary of findings, discussions, conclusion, and recommendations.

CHAPTER FIVE

5.0 DISCUSSIONS, CONCLUSIONS, AND RECOMMENDATIONS

5.1 Introduction

The summary of the study findings have been presented in this chapter, followed by discussions of the findings. Conclusions have also been highlighted alongside recommendations for improvement and recommendations for further studies.

5.2 Summary

The study sought to determine the extent to which the cloud technology and other advancements in technology can be utilized in provision of healthcare records seamlessly and efficiently through the use of a mobile interface. In order to achieve this objective the study sought to answer the following research questions: What is the effect of digitization of healthcare on healthcare management in Kenya? What is the effect of digitization of healthcare on patients and medical practioners in Kenya? What are the challenges facing digitization of healthcare in Kenya?

The study adopted descriptive design. The target population consisted of the patients, doctors and nurses in the private hospitals with Nairobi and Nakuru County. The study used stratified and simple random sampling to select the respondents. A sample of 44 doctors, 44 patients and 44 nurses were targeted in the study. Data were collected using questionnaires and interview guide. Data collected were analyzed using both qualitative and quantitative analysis techniques. Descriptive statistics was used to analyze quantitative data. IBM SPSS was used as the tool for quantitative data analysis. Inferential analysis was conducted which involved examining the nature of relationships between the variables under study using the Pearson correlation coefficient. The analyzed data was presented using tables, pie charts and correlation, regression and ANOVA.

The study found that 52.4% of the patients were male while 47.6% were female. The majority of the patients (33.3%) were in the age bracket of 28-32, 14.2% were in the age bracket of 23-27, 14.2% were in the age bracket of 33-37, 7.1% of the patients were in the age bracket of 18-22, 7.1% of the patients were in the age bracket of 38-42, 7.1% of the

patients were in the age bracket of 43-47, 7.1% of the respondents were in the age bracket of 48-52, 4.7% of the patients were in the age bracket of 53-57 and 2.6% of the respondents were in the age bracket of 57 and above.

The study found out that 88.4% of the doctors who took part I the study were male while 11.6% were female. The findings also indicate that the majority of the doctors 23.4% were in the age bracket of 38-42, 20.9% of the doctors were in the age bracket of 33-37, 18.6% of the doctors were in the age bracket of 43-47, 18.6% of the doctors were in the age bracket of 48-52, 6.9% of the doctors were in the age bracket of 57-61 while remaining age brackets scored zero. All the doctors who took part in this study had a bachelor's degree. 53.5% of the doctors had a monthly income of Kshs 100,001-300,000 while 46.5% of the respondents had a monthly income of 500,001-700,000. About 34.9% of the doctors had working experience of 9-11 years, 26.5% of the doctors had working experience of 6-8 years, 16.3% of the doctors had working experience of 3-5 years, 16.3% of the doctors had working experience of above 11 years while 9.3% of the doctors had working experience of 0-2 years.

The study found that 51.2% of the nurses were female while 48.8% of the nurses were male. The majority of the nurses (36.6%) were in the age bracket of 43-47, 19.5% of the nurses were in the age bracket of 38-42, 17.1% of the nurses were in the age bracket of 33-37, 12.2% of the nurses were in the age bracket of 28-32, 9.7% of the nurses were in the age bracket of 23-27 while the remaining age brackets scored zero. About 82.9% of the nurses had a diploma, 12.2% of the nurses had a certificate, 4.9% of the nurses had bachelors while none of the nurses had masters or secondary education as the highest academic qualification, 95.1% of the nurses had a monthly income of 50,000-100,000 while 4.9% of the nurses had a monthly income of 100,001-300,000. Approximately 34.9% of the nurse had working experience of 9-11 years, 25.6% of the nurses had working experience of 6-8 years, 16.3% of the nurses had working experience of 3-5 years, 13.9% of the nurses had working experience of above 11 years while 9.3% of the nurses had working experience of 0-2 years.

The study found out that 73% of the respondents agreed that security issues, including confidentiality, integrity and availability, are the major concerns in EMR adoption at their facility. About 75% of the respondents agreed that legal concept such as security and

privacy concerns affect the implementation of EMR. Nearly 80% of the respondents agree that adequate Internet bandwidth is a notable facilitator to adopt of EMR. About 80% of the respondents agreed that availability of EMR software packages promotes adoption in health facilities. Approximately 60% of the respondents agreed that communication between various players affect the adoption of EMR. The study found that 75% of the respondents agreed that availability of technical personnel to install and operate the EMR software affects adoption of EMR. About 65% of respondents agreed that availability of EMR technology resources is a facilitator to its adoption. Nearly 75% of the respondents agree that cost of EMR resources and facilities purchase influence its adoption. Approximately 80% of the respondents agreed that adequate infrastructure facilitates the hospital adoption of EMR.

The study found that 30% of the respondents were slow in typing, 26% of the respondents said they had forgotten their training, 18% of the respondents said they prefer writing their notes, 12% of the respondents said they had never been trained, 10% of the respondents said it had no impact on their work while 4% said they have no interest in learning. The study found out that 75% of the respondents agreed that some of the medical practitioners prefer keeping manual medical records, 72% of the respondents agreed that some medical practitioners have negative attitudes towards EMR, 65% of the respondents agree that some medical practitioners believe that EMR interfere with their work while 70% of the respondents agreed that some medical practitioners do not like EMR and its adoption.

5.3 Discussion

5.3.1 Factors Influencing Adoption of EMR in Private Hospitals in Kenya

The study revealed that adoption of EMR in private hospitals in Kenya is influenced by availability of resources. Other studies have revealed that the size of the organization is amongst the most cited ICT adoption factors. This is because size of the organization is linked with its financial capability as well as adequacy of human resources (Kazley & Ozcan 2007). It is easy to achieve economies of scale in larger hospitals as well as the resources and information needed across the organization. Numerous study findings indicate a positive link between organization size and ICT adoption (Zhu et al., 2003; Pan & Jang, 2008) since larger organizations tend to have more financial resources compared

to smaller ones. Thus larger hospitals have higher tendency of adopting EMR compared to smaller ones.

The ownership of the hospital may also influence organizational strategy, based on the values and mission of the hospital. Based on the fact that adoption of EMR is articulated in e-health strategy of 2005, hospitals relying on public funds are expected to adopt EMR (European Union 2005). Additionally, hospitals providing general healthcare experience a higher level of competition (Kazley & Ozcan, 2007).

In most cases, general hospitals report higher rates of occupancy coupled with more social and financial pressures (Park & Lee, 2014). On the other hand, a specialized hospital only targets a specific niche thus competition among specialised hospitals tends to be lower. Additionally, the volumes of inter-departmental information in specialized hospitals tend to be much lower compared to a general hospital where the various healthcare services act as secluded islands.

As a result, general hospital is highly likely to adopt EMR so as to attract patients. However, findings of a study on EMR adoption in hospitals reveal that there was no significant difference in adoption of EMR system between small private and public hospitals in South Korea (Park and Lee, 2014). The findings further indicated that hospitals situated in urban areas had significantly higher rates of adoption of EMR than hospitals located in the rural areas.

Task complexities were higher in hospitals adopting EMR system than that of hospitals not adopting the said systems. This was determined by the number of medical specialties, however it was found to be statistically insignificant (Park & Lee, 2014). Small hospitals fitted with high levels of IT infrastructure coupled with organic managerial structures highly likely to implement EMR systems than were other categories of hospitals (Park & Lee, 2014). The size of the department substantially affected the likelihood of adopting EMR (Burt and Sisk (2005); the more the number of physicians in a given department the higher the likelihood of adoption of EMR. This is because each hospital and its units experience diverse crowdedness rates and also serve different populations.

Some researchers concur that costs of adopting EMR are significant and thus regarded as a barrier to adoption of EMRs, particularly for hospitals without large budgets on IT (Boonstra & Broekhuis, 2010). The cost of adopting ICT is one of the greatest barriers to EMR adoption (Kazley & Ozcan, 2007).Hospitals located in resource rich areas are more likely to adopt EMR much easily than those in resource deprived areas. Markets with higher per capita income are also able to support higher cost hospitals (Balotsky, 2005). Whereas the developed nations are at the forefront of adopting electronic health systems, developing countries such as Kenya are still at the basic stages of EMR adoption processes (Ouma & Herselman, 2008).

The disparity in the adoption of EMR between developed and developing countries are attributed to poor economic diversification, inadequate use of natural resources, poverty, and lack of supportive infrastructure. The current study would determine whether resources available influence EMR adoption by hospitals in private hospitals in Kenya.

The study also found out that access to network infrastructure play a crucial role in the adoption of EMR in private hospitals in Kenya. Broadband lays a foundation upon which different applications of EMR are built. Service and applications namely data transfer, telemedicine, and health information access usually depend on the internet (Muchangi & Nzuki, 2014). Countries such as Sweden, Europe, Netherlands, Finland, United Kingdom, Denmark, Norway, France, Switzerland, Belgium, and Germany perform well in terms of households with broadband connection with over 70% (OECD, 2013). This shows the readiness of these countries towards implementing internet-based EMR application and services namely online searching of health information by clinicians and patients as well as telemedicine.

Successful implementation of EMR demands broadband Internet connectivity that has high speed capability for transfer and retrieval data (Ouma & Herselman, 2008). The low internet penetration rate coupled with low bandwidth hinders the adoption EMR in developing economies (Muchangi & Nzuki, 2014). For example, low Internet bandwidth is noted as a major challenge in African countries. Problems of internet connectivity exist in Nigeria with few service providers providing very poor services due to bandwidth constraints (Ayo et al., 2008). Due to poor internet penetration and inadequate ICT

infrastructure in Tanzania, most of areas in the country are not able to support internet deployment that further hinders adoption of EMR (Omary et al., 2009).

Provided that internet penetration continues to be low in the developing countries, implementation of EMR will still lag behind in comparison to the developed countries with high EMR adoption rates namely Denmark whose broadband connection per household is 83.9% (OECD, 2013). However, to fully attain the benefits of internet for healthcare information access a number of issues have to be addressed, that are, poor internet skills among the healthcare professionals which prevent them from understanding the difference between unbiased and biased information, to distinguish evidence-based claims, and to understand the information meant for health professionals (Qureshi et al., 2013).

5.3.2 Effect of Digitization of Health Records on Healthcare Management in Kenya

The adoption of EMR has improved healthcare services in private hospitals in Kenya. It has also increased efficiency in attending to patients. It also helps in the cost management policies of a hospital. In support of the findings, Handel and Hackman (2010) observes that one specific benefit of digitization of the healthcare records is the fact that it creates an environment for the establishment of an integrated healthcare management (Moumtzoglou & Kastania, 2014). Cáceres (2013) further points that electronic health records bring forth improvement in medical services. The use of electronic health records makes it possible for doctors to attend to more patients per hour without having to strain. One of the roles of electronic health records is to enable doctors to gain access to specific information about clients such as their age, gender and historical information like their frequency of exercise, hereditary medical conditions and past ailments aids doctors in identifying the specific medical conditions and needs of patients thus being able to serve patients effectively at the high level of quality (Sterling, 2010).

The use of electronic records enhances access to medical services. By accessing the specific information concerning the needs of clients, it is possible for the medical personnel to address the specific needs of patients which in turn brings forth improvement in the quality of medical services. Another way through which the use of electronic health records affects healthcare management is by ensuring that there is no misplacement of

patient medical records. Electronic health records are more secure than manual records because it is not possible to misplace records kept electronic (MIT Critical Data, 2016).

The use of electronic health records also improves the efficiency with which healthcare management is conducted. Specifically, the use of electronic health records makes it possible for the management of healthcare facilities to reduce the amount of space used within the platform. The use manual records requires the management of a healthcare service provider to set aside an entire floor for the sole purpose of storing medical files that have been recorded manually (Menvielle et al. 2017). Such requirement leads to an increase in the cost of running a medical facility in addition to making it difficult for medical practitioners to retrieve the required information concerning patients. However, the establishment of electronic medical records plays an important role in improving the efficiency with which medical records are kept (Mantas et al., 2012). It makes it possible for the medical healthcare managers to reduce the amount of space used within the organization. This in the long run brings forth improvement in the overall effectiveness with which the healthcare management is conducted.

The adoption of electronic medical records saves hospitals among other medical facilities the high cost of engaging in the contracts to supply stationery. Such contracts consume huge resources from the hospitals and, therefore, the adoption of the digitized medical records plays an important role in eliminating such costs. According to (Waters & Murphy (2012) this in turn leads to improvement in the quality of healthcare offered to clients. Developing countries such as Kenya, Malawi and Uganda have a large number of shark contractors who overvalue the contracts for the supply of hospital-related stationery. As a result, the hospitals end up incurring huge expenses (Appleby & Tarver, 2006). This in turn increases the cost of managing medical facilities. The development of digital medical records, therefore, serves the purpose of reducing the cost of managing healthcare facilities by eliminating loopholes for shark contractors to fleece medical facilities by using overpriced medical stationary contracts.

5.3.3 Technological Challenges Affecting Adoption of EMR in Private Hospitals in Kenya

The technological challenges faced included training challenges among medical practitioners. In support of the findings of the study, Williams and Samarth (2011) identified one of the problems associated with the electronic medical record system is the fact that it has a pull-down menu which prevents medical practitioners from writing customized notes regarding the patient's health and wellbeing (Williams and Samarth, 2011). This according to medical practitioners undermines their work. Additionally, the system is designed in such a way that it only permits medical practitioners to conduct tests that have been paid for. This also is viewed negatively medical practitioners because it prevents them from conducting testing that would enable to accurately diagnose the problem facing the patient's health and wellbeing.

Firms are required to invest in the training of employees so that they can be conversant with the operation of the electronic medical system. The frequent upgrades required on the electronic medical record system are yet another cost that must be incurred by the medical facility (Sterling, 2010). All the aforementioned require a huge investment of financial resources. Inadequate financial resources in some medical facilities are therefore, one of the challenges facing the digitization of healthcare records.

The adoption of EMR also faces the challenge of resistance among medical practitioners. Resistance change is one of the biggest challenges facing the digitization of healthcare records. Digital technology is quite intimidating. Therefore, some medical doctors feel intimidated by the digital technology which compels them to exhibit resistance towards the adoption of digital medical records. Indeed, digitization of medical records presents overwhelming advantages to the medical fraternity. Some of the benefits accrued to digitization of healthcare records fall into academic as well as economic categories (Blumenthal& Tavenner, 2010). Medical doctors who are of middle age or above middle age feel intimidated by the digital technology because they were not trained on how to use digital technology previously. Their inadequacy of knowledge on the matters relating to the digital technology makes it difficult for the doctors to accept and work within a digitized healthcare system.

The medical school curriculum is quite conservative and so that means that medical doctors had only been taught on how to handle medical related issues. Software training on the hand does not incorporate modern medical practice which involves the use of digital technology. Consequently, doctors who have not had any training on the digital technology may feel that the adoption electronic healthcare record system threatens their employment position (Fasano, 2013). This feeling of threat is one of the factors that have caused increased resistance to the adoption of electronic healthcare record system. This situation is further exacerbated by the fact that today in most developed countries such as the UK and the US doctors' job interviews include questions which test the doctors' knowledge and skills in using medical practice software (Sterling, 2010). While this move is very important in the sense that it promotes the adoption of electronic health record system, it also tends to bring forth increased resistance for the new platform among medical doctors. Medical doctors who are from the middle age group and above consider such requirements as a strategy aimed at threatening their position in the medical field of practice.

Resistance to the adoption of electronic healthcare records has not been restricted to medical doctors only. It has also been exhibited among other personnel who have for a long time worked in the manual medical records field. Some of the personnel that have been quite resistant to the adoption of electronic healthcare records are store clerks. The role of store clerks in the medical field is to oversee the paper processing of medical records as well as documents of the records of patients admitted in a particular hospital (Porter & Lee, 2013). The manual process of making medical records entails collecting the manual records, indexing the records, storing the manual medical records and ensuring that such records can be easily accessed when there is need for retrieving the data. Store clerks have for a long time been in charge of this process (Sterling, 2010). However, with the development of digital platforms, such roles are increasingly being replaced by computers and automated processes. This, therefore, means that employment opportunities for store clerks are becoming increasingly minimal. Resistance to the adoption of electronic healthcare records is, therefore, also a result of the fear among store clerks that they would lose their employment positions courtesy of introduction of electronic platforms.

The introduction of electronic healthcare records also faces a high level resistance from another section of workers in the medical field in charge of carrying out medical transcription. According to Caligtan (2011) owing to the development of electronic healthcare record system, the data entry process has become increasingly easy. There has also been increase in the use of templates in the data entry process. Additionally, the development of voice recognition technology has also significantly contributed to the automation of the data entry process. Such technologies which are associated with the electronic health care record system have led to a significant reduction in the demand for medical transcribers. As a result, there has also been an increase in the level of resistance for the digitization of medical records from stakeholders in the medical transcription field. The resistance for digitization of medical records has greatly undermined the adoption of electronic healthcare record systems.

5.4 Conclusions

5.4.1 Factors Influencing Adoption of EMR in Private Hospitals in Kenya

The study concludes that security issues, including confidentiality, integrity and availability, are the major concerns in EMR adoption at their facility. Legal concept such as security and privacy concerns affect the implementation of EMR. Adequate Internet bandwidth is a notable facilitator to adopt of EMR. Availability of EMR software packages promotes adoption in health facilities. Communication between various players affects the adoption of EMR. Availability of technical personnel to install and operate. EMR technology resources is a facilitator to its adoption. The cost of EMR resources influences its adoption. Adequate infrastructure facilitates the hospital adoption of EMR. Maintenance costs of EMR technology facilities influence its adoption and utilization in their institution.

5.4.2 Effect of Digitization of Health Records on Healthcare Management in Kenya

Based on the findings the study concludes that digitised EMR increases patient satisfaction, Digitization of health records in private hospitals in Kenya increases efficiency in attending to patients. Digitization of health records in private hospitals in Kenya system help in the cost management policies of a hospital. Digitization of health records in private hospitals in Kenya reduces errors in diagnosis and prescription. Digitization of health records in private hospitals in Kenya enhances a doctor's diligence

while attending to a patient. Digitization of health records in private hospitals in Kenya provide healthcare to a patient remotely.

5.4.3 Technological Challenges Affecting Adoption of EMR in Private Hospitals in Kenya

The study concludes that digitization of health records in private hospitals in Kenya is affected by training challenges and resistance among medical practitioner. Digitization of health records in private hospitals in Kenya is also hindered by some medical practitioners who forget their training. Digitization of health records in private hospitals in Kenya is hindered by some medical practitioners who prefer writing their notes. Digitization of health records in private hospitals in Kenya is further hindered by some medical practitioners who have never been trained. Digitization of health records in private hospitals in Kenya faces the challenge of lack of interest among medical practitioners who feel that digitized records have minimal impact on their work.

5.5 Recommendations

5.5.1 Recommendations for Improvement

5.5.1.1 Factors Influencing adoption of EMR in Private Hospitals in Kenya

Based on the conclusion of the study it is recommended that private hospitals in Kenya ensure security issues, including confidentiality, integrity and availability, since they are major concerns in EMR adoption at their facility. Private hospitals should encourage communication between various players so as to boost the adoption of EMR. Private hospitals in Kenya should ensure availability of technical personnel to install and operate EMR. Private hospitals in Kenya should ensure adequate infrastructure in order to facilitate the hospital's adoption of EMR.

5.5.1.2 Effect of EMR Adoption on Healthcare Management in Private Hospitals in Kenya

Based on the conclusion of the study it is recommended that private hospitals in Kenya should ensure that medical practitioners are up to date with the digitized medical records so as to improve its effectiveness particularly in monitor their condition and also access

medical records. Private hospitals in Kenya should also ensure that medical practitioners in their hospitals have unlimited to the gadgets that enable them access digitized health records by supplying adequate computers, tablets and smartphones to every medical practitioner.

5.5.1.3 Technological Challenges Affecting EMR adoption in Private Hospitals in Kenya

Based on the conclusion of the study it is recommended that private hospitals in Kenya should constantly train medical practitioners since some of the medical practitioners had forgotten their previous trainings on digital medical records. Private hospitals in Kenya should also create awareness campaign on digital health records among medical practitioners by educating them on the benefits of EMR in their facilities this will help in addressing the negative attitude that some medical practitioners have regarding EMRs.

5.5.2 Recommendations for Further Studies

This study only focused on tier 2 private hospitals in Nairobi and Nakuru Counties hence it is suggested that another study be carried in all private hospitals in the 47 counties in Kenya so as to analyse digitization of medical records in all the private hospitals in Kenya. The study also concentrated in private hospitals in Kenya thus it is recommended that another study be conducted in public hospitals in Kenya in order to determine the influence of EMR on healthcare management in Kenya since public hospitals serve the majority of Kenyans.

REFERENCES

Acharya, T., Gold, M. R., McLaughlin, C. G., Devers, K. J., Berenson, R. A., & Bovbjerg, R. R. (2013). Obtaining providers' buy-in and establishing effective means of information exchange will be critical to HITECH's success. *Health Affairs,* 31: 514-526.

Amarasingham, H., Grossman, J. M., Zayas-Cabán, T., & Kemper, N. (2009). Information gap: Can health insurer personal health records meet Patients' and physicians' needs? *Health Affairs,* 2: 377-389.

Appleby, B., & Tarver, R. (2006). Electronic prescribing improves medication safety in community-based office practices. Journal of General Internal Medicine, 25: 530-536.

Ayo, C., Ayodele, A., Tolulope, F., & Ekong, U. (2008). A framework for ecommerce implementation: Nigeria a case study. *Journal of Internet Banking and Commerce,* 13(2),1-11.Retrieved on 13th July 2018 from http://www.arraydev.com/commerce/jibc/

Balotsky, E. (2005). "Is it resources, habit or both: Interpreting twenty years of hospital strategic response to prospective payment", *Health Care Management Review,* 30(4), 337-346.

Best,J.W. & Kahn, J. (2011) *Research in education.* New Delhi: Prentice Hall of India

Blumenthal, B., & Tavenner, D. (2010). The adoption of technology orientation in healthcare delivery: Case study of a large-scale hospital and healthcare system's electronic health record. *International Journal of Pharmaceutical and Healthcare Marketing*, 4: 355-   374

Bra, W., Monteiro, F., & Sahay, T. (2004). Technology utilization to prevent medication errors. *Current Drug Safety*, 5(1): 13-18.

Boonstra, A. & Broekhuis, M. (2010).Barriers to the acceptance of electronic medical records by physicians from systematic review to taxonomy and interventions. Boonstra and Broekhuis BMC Health Services Research, 10, 231. Retrieved on 24-06-2018 from http://www.biomedcentral.com/1472-6963/10/231.

Bryman, A. (2009). *Social Research Methods*. (4th Edition) New York: Oxford University Press.

Burt, G., & Sisk, M. (2005). Aspects of privacy for EHRs. International Journal of Medical Informatics, 80(2), 26-31.

Caligtan, F. (2011). Lived experiences of clinical preceptors: A phenomenological study. *Nurse Education Today,* 30: 804-808.

Campbell, T., Monostori, L., & Ueda, K. (2006). Design of complex adaptive systems: Introduction. *Advanced Engineering Informatics*, 20: 223-225.

Canadian Medical Association, (2009). The Patient Protection and Affordable Care Act, public health, and the elusive target of human rights. *Journal of Law, Medicine & Ethics,* 39: 340-354.

Creswell, J. W. (2014). *Research Design: Qualitative, Quantitative and Mixed Methods Approaches* (4th ed.). London: Sage Publications Ltd.

Deloitte (2014). *System of Systems: The Electronic Health Record and the Systems that make them up*. Retrieved from: https://ndiastorage.blob.core.usgovcloudapi.net/ndia/2014/system/17002ThursTrack2 Britten.pdf

Digitization. (2017). Adoption of electronic health care records: Physician heuristics and hesitancy. *Procedia Technology*, 5: 706-715.

European Union (2005). eEurope 2005: An Information Society for all. Retrieved from http://ec.europa.eu/information_society/eeurope/2002/news_library/documents/eeurop e2 005/eeurope2005_en.pdf

Fasano, U. (2013). Cognitive ergonomics, socio-technical systems, and the impact of healthcare information technology. *International Journal of Industrial Ergonomics,* 41: 336-344.

Gasch, K., & Gash, L. (2010). Healthcare professionals' organizational barriers to health information technologies: A literature review. *International Journal of Medical Informatics,* 80: 849-862.

Gebre-Mariam, E., Borycki, Kushniruk, H., & Ellen, R. (2012). Interoperable electronic prescribing in the United States: A progress report. *Health Affairs,* 28: 393-403.

Handel, N., & Hackman, G. (2010). Beyond the basics: Refills by electronic prescribing. *International Journal of Medical Informatics,* 79: 507-514.

Health Care. (n.d.). Retrieved August 16, 2018, from Merriem Webster: https://www.merriam-webster.com/dictionary/health%20care

Hersh, G. (2010). Electronic health records: Promises and realities: A 3-part series part I: The digital sea change, ready or not. *Annals of Emergency Medicine,* 56(2): 17-20

Hillestad, H., Serbanati, L., Ricci, F. L., Mercurio, G. & Vasilateanu, A. (2005). Steps towards a digital health ecosystem. *Journal of Biomedical Informatics,* 44: 621-636.

Idowu, T., Adagunodo, B., & Adedoyin, D. (2016). Health information exchange in Memphis: Impact on the physician patient relationship. *Journal of Law, Medicine & Ethics,* 38(1): 50-57.

Institute of Medicine, (2011). The lived experience of new nurses: Importance of the clinical preceptor. *The Journal of Continuing Education in Nursing,* 43: 555-565.

Japan Hospital Association (2001). An introduction to moustakas's heuristic method. *Nurse Researcher*, 19(3): 6-11.

Kazley, J. & Ozcan, U. (2008). Understanding phenomenology: The lived experience. *British Journal of Midwifery,* 16: 308-311.

Kazley, A. S., & Ozcan, Y. A. (2007). Organizational and environmental determinants of hospital EMR adoption: A national study. *Journal of Medical Systems,* 31(5), 375-384.

Kenya Census (2009). Worldometers.

Kombo, D. & Tromp, A. (2013): *Proposal and Thesis Writing: an introduction*. Nairobi: Paulines publications Africa

Kothari, C.R. (2009) *Research Methodology: Methods and Techniques*. New Age International, 401 p.

Lorenzi, N. M., Kouroubali, A., Detmer, D. E., & Bloomrosen, M. (2009). How to successfully select and implement electronic health records (EHR) in small ambulatory practice settings.*BMC medical informatics and decision making,* 9(1), 15.

Ludwick, D.A. & Doucette, J. (2009). Primary Care Physicians' Experience with Electronic Medical Records: Barriers to Implementation in a Fee-for-Service Environment. *International Journal of Telemedicine and Applications* 2009, 853524.

Mantas, H., Kirchmer, M., Gutierrez, F., & Laengle, S. (2012). Process mining for organizational agility. *Industrial Management*, 52(1): 19-24.

Martins, M. & Oliveira, T. (2008). "Determinants of information technology diffusion: A study at the firm level for Portugal", *The Electronic Journal Information Systems Evaluation*, 11, (1), 27-34.

McCarthy, C. & Eastman, D. (2010). *Change Management Strategies for an Effective EMR Implementation.* Chicago: HIMSS Mission.

McCullough, L., Pam, I., & Pterson, Y. (2010). Rethinking medical professionalism: The role of information technology and practice innovations. *Milbank Quarterly,* 86: 327-358.

Menvielle, K., Kumar, S., & Bauer, K. (2017). The business case for implementing electronic health records in primary care settings in the United States. *Journal of Revenue & Pricing Management,* 10: 119-131

Mekhjian, G., Shapiro, J. S., Mostashari, F., Hripcsak, G., Soulakis, N., & Kuperman, G. (2002). Using health information exchange to improve public health. *American Journal of Public Health,* 101: 616-623.

Miller, R.H. & Sim, I. (2004). Physicians" Use of Electronic Medical Records: Barriers and Solutions. *Health Affairs*, 23(2), 116-126.

Mim, H. (2016). How to successfully select and implement electronic health records (EHR) in small ambulatory practice settings. *BMC Medical Informatics & Decision Making*, 9(1): 1-13.

MIT Critical Data, (2016). Impact of electronic medical record on physician practice in office settings: A systematic review. *BMC Medical Informatics Decision Making*, 12(2): 1-10.

Ministry of Foreign Affairs. (2018). Kenyan Healthcare Sector Report. Retrieved from Kenyan Healthcare Sector Report:

Ministry of Health. (2017). *Reinforcement of Health Infrastructure in Kenya.* Nairobi: Government Printer.

Money Crashers. (2017). Retrieved from What is Cloud Computing and How Does It Work? – Definition & Overview: https://www.moneycrashers.com/cloud-computing-basics/

Muchangi, D. M. & Nzuki, D. (2014).Determinants of Electronic Health in Developing Countries. *International Journal of Arts and Commerce,* 3 (3), 49- 60.

Mugenda, O.M. (2012). *Research methods dictionary*. Nairobi: ARTS Press

Mulwa, F. (2013). Medical informatics: Past, present, future. *International Journal of Medical Informatics,* 79: 599-610

Muthuswamy, Y. (2013). Sharing with care: An information accountability perspective. Internet Computing, *IEEE,* 15(4): 31-38

Nilmini W. I. T. (2016). *Contemporary Consumer Health Informatics; Healthcare Delivery in the Information Age*. Switzerland: Springer.

Nilmini, W., & Indrit, T. (2016). Contemporary Consumer Health Informatics: Healthcare Delivery in the Information Age. In D. M. Shalini Bhartiya, Accessibility Issues in Interoperable Sharing Health Records: Physician's Perspectives (p. 465). Switzerland: Springer.

Nilmini, W., Indrit , T., & Tan, J. (2016). Contemporary Consumer Health Informatcis: Healthcare Delivery in the Information Age. In A. S. Ruwini Edirisinghe, Remote Monitoring and Mobile Apps (p. 465). Switzerland: Springer.

Nilmini, W., Latif, A., Chris, G., & Joseph, T. (2014). *Lean Thinking for Healthcare.* New York: Springer.

Ochieng, O. G., & Hosoi, R. (2005). Factors influencing diffusion of electronic medical records: a case study in three healthcare institutions in Japan. *Health Information Management,* 34 (4), 120-129.

OECD (2013). Key ICT Indicators. Retrieved from http://www.oecd.org/sti/broadband/oecdkeyictindicators.htm.

Omary, K., Lawler, E. K., Hedge, A., & Pavlovic-Veselinovic, S. (2009). Cognitive ergonomics, socio-technical systems, and the impact of healthcare information technology. *International Journal of Industrial Ergonomics,* 41: 336-344.

Omary, Z., Lupiana, D., Mtenzi, F. & Wu, B. (2009). *Challenges to E-Healthcare Adoption in Developing Countries: A Case Study of Tanzania.* First International Conference on Networked Digital Technologies, Ostrava.

Orodho, J.A. (2009a). *Essentials of educational and social science research methods.* Nairobi: Masola Publishers.

Ouma, S., & Herselman, M. E. (2008).E-health in rural areas: Case of developing countries. *International Journal of Biological and Life Sciences,* 4(4): 194- 200. Retrieved from http://www.unapcict.org/ecohub /resources/e-health-inrural-areas-case-of-developing countries-1

Pan, M. J., & Jang, W. Y. (2008). Determinants of the adoption of enterprise resource planning within the technology-organization-environment framework: Taiwan"s communications. *Journal of Computer*

Park, Y-T. & Lee, J. (2014). Factors Affecting Electronic Medical Record System Adoption in Small Korean Hospitals. *Healthc Inform Res*, 20 (3): 183-190.

Parente, M., & McCullough, T. (2009). The complexity paradigm: Implications for information systems and their strategic planning. *Journal of Computer Science,* 4: 382-392.

Pinaire, K. (2009). "An Overview of Barriers to the Adoption of Electronic Medical Records,"). *Information Systems*, 48: 94- 102.

Porter, M.E. & Lee, T.H. (2013). The Strategy that Will Fix Health Care. *Harvard Business Review.* October 2013

Preece, J. (2008) Context matters: whose concept of growth and development are we talking about? Compare: *A Journal of Comparative and International Education*, 38(3): 267-280.

PriceWaterhouseCoopers. (2016). *The digital patient is here, but is healthcare ready.* Sweden: PwC.

Qureshi, Q.A., Shah, B., Najeebullah, Kundi, G. M., Nawaz, A., Miankhel, A. K., Chishti, K. A., Qureshi, N. A. (2013). Infrastructural Barriers to e-Health Implementation in Developing Countries. *European Journal of Sustainable Development,* 2(1), 163-170.

Rada, W. (2008). The relationship between local hospital IT capabilities and physician EMR adoption. *Journal of Medical Systems,* 33: 329-335

Randeree, E. (2007). Exploring Physician Adoption of EMRs: A Multi-Case Analysis. *Journal of Medical System*, 31(6): 489-496.

Rao, S.R., Mirabelle, G., Kim, S., Stanly, R. & Phoebe, P. (2011). "Electronic Health Records in Small Physician Practices: Availability, Use, and Perceived Benefits," *Journal of the American Medical Informatics Association,* 18 (3): 271-275.

Reckmann, T., Ross, S. E., Schilling, L. M., Fernald, D. H., Davidson, A. J., & West, D. R. (2009). Health information exchange in small-to-medium sized family medicine practices: Motivators, barriers, and potential facilitators of adoption. *International Journal of Medical Informatics,* 79: 123-129

Sakowski, M. (2000). Focus on Research Methods: Combining Qualitative and Quantitative Sampling, Data Collection and Analysis Techniques in Mixed – Method Studies. *Nursing and Health*, 23: 246 – 255.

Schoen, C., Osborn, R., Squires, D., Doty, M., Rasmussen, P., Pierson, R., & Applebaum, S. (2012). A survey of primary care doctors in ten countries shows progress in use of health information technology, less in other areas. *Health Affairs*, 31(12): 2805-2816.

Siegrist, H. & Kane. M. (2003). Mistake-proofing healthcare: Why stopping processes may be a good start. *Business Horizons,* 53: 149-156.

Siika, E. (2005). Addressing resistance to workflow automation. *Journal of Leadership, Accountability and Ethics,* 9: 115-123.

Skolnik, H. (2011). Crossed wires: How yesterday's privacy rules might undercut tomorrow's nationwide health information network. *Health Affairs,* 28: 450-452.

Sood, Y., Mark, R., Kupid, E., Sweeney, W., Kelvin, l., Maurice, K. & Timothy P. (2008). Electronic Medical Records: A Review Comparing the Challenges in Developed and Developing Countries. Proceedings of the 41st Hawaii International Conference on System Sciences

Sterling, G. (2010). Adopting electronic medical records in primary care: lessons learned from health information systems implementation experience in seven countries. *International Journal of Medical Informatics,* 78(1): 22-31.

Tansel, A., Kim, Tabitha, U. & Simon, B. (2013). Innovation through patient health records. Procedia*: Social and Behavioral Sciences*, 75, 183-188.

Taylor, Y., Greysen, S. R., Wassermann, T., Payne, P., & Mullan, F. (2005). Teaching health policy to residents: Three-year experience with a multi-specialty curriculum. *Journal of General Internal Medicine,* 24: 1322-1326.

Vogt, I., Gardner, H., & Haeffele, T. (2012). A typology of mixed methods research designs. *Quality & Quantity*, 43: 265-275.

Walsh S. P., White K. M., Young R. M. (2005). Over-connected? A qualitative exploration of the relationship between Australian youth and their mobile phones. *Journal of Adolescence,* 31(1). 77-92.

Waithera , L., Muhia , J., & Songole , R. (2017). Impact of Electronic Medical Records on Healthcare Delivery in Kisii Teaching and Referral Hospital. *Med Clin Rev.,* 3: 4-21.

Waters, G., & Murphy, F. (2012). Effective information security requires a balance of social and technology factors. *MIS Quarterly Executive,* 9: 163-175.

Williams, J. & Samarth, T. (2011). If electronic medical records are so great, why aren't family physicians using them? *The Journal of Family Practice,* 51: 638–641.

World Bank Population Growth Report. (2017).What is a regional health 98 information organization (RHIO)? World Bank.

Wyatt, T. (2010). Information systems strategy: Past, present, future? *The Journal of Strategic Information Systems*, 21, 125-153.

Venkataram, S. (2017). *Transforming the digital patient experience.* New York: Deloitte LLP.

Zhu, K., Kraemer, K., & Xu, S. (2003). Electronic business adoption by European firms: a cross- country assessment of the facilitators and inhibitors. *European Journal of Information Systems*, 12: 251-268.

APPENDICES

Appendix 1: INTRODUCTORY LETTER

Dear Sir/Madam,

RE: REQUEST TO PARTICIPATE IN A RESEARCH STUDY

I am Margaret Gathungu, a post graduate student at USIU-Africa. I am carrying out survey entitled: "Digitization of medical records in private hospitals in Kenya". The purpose of this research is to assess the impact of digitization of healthcare on patients and medical practitioners. To complete the study, I will need to collect relevant information from you. I am therefore requesting permission to collect and use your information which will be achieved by using the accompanying questionnaire. Kindly note that any information you give will be treated with confidentiality and at no instance will it be used for any other purpose other than advancing money remittance business in Kenya only. Your assistance will be highly appreciated.

Yours truly,

Margaret Gathungu.

Appendix 2: Questionnaire for the patients

<u>SECTION A: GENERAL INFORMATION</u>

1. Indicate your gender: Male   ☐

                      Female   ☐

2. Highest level of education?

Secondary level   ☐

Certificate   ☐

Diploma   ☐

Bachelors   ☐

Masters   ☐

Others (Specify)   ……………………………………………

3. Age bracket?

18-22 ☐   23-27 ☐   28-32 ☐   33-37 ☐   38-42 ☐   43-47 ☐

48-52 ☐   53-57 ☐   57-61 ☐   Above 61 ☐

4. Indicate your monthly income:

50,000-100,000 ☐   101,000-300,000 ☐   301,000-500,000 ☐

501,000-   700,000 ☐   Above 700,000 ☐

5. Has your medical record been digitized? Yes ☐   No ☐

SECTION B: FACTORS INFLUENCING ADOPTION OF EMR

1. Indicate your level of agreement or disagreement on the statements below regarding the effect of digitization of medical records on a scale of $1-5$, where:

   1 = strongly disagree, 2 = disagree, 3 = neither agree nor disagree, 4 = agree and 5 = strongly agree

Influence of Access to Network Infrastructure on EMR Adoption	1	2	3	4	5
Security issues, including confidentiality, integrity and availability, are the major concerns in EMR adoption at our facility					
Legal concept such as security and privacy concerns affect the implementation of EMR					
Adequate Internet bandwidth is a notable challenge to adopt of EMR					
Availability of EMR software packages facilitates adoption in health facilities					
Communication between various players affect the adoption of EMR					

2. Indicate your level of agreement or disagreement on the statements below regarding the effect of digitization of medical records on a scale of $1-5$, where:

   1 = strongly disagree, 2 = disagree, 3 = neither agree nor disagree, 4 = agree and 5 = strongly agree

Influence of Resource Availability on Adoption of EMR	1	2	3	4	5
Availability of technical personnel to install and operate promotes its adoption					
EMR technology resources is an facilitates its adoption					
Cost of EMR resources and facilities purchase is the greatest influence its adoption					
Adequate infrastructure affects the hospital adoption of EMR					
Maintenance costs of EMR technology facilities infuences its adoption and utilisation in our institution					

SECTION C: IMPACT OF DIGITAIZATION OF HEALTHCARE ON MEDICAL PRACTIONERS

3. Do you have an Electronic medical record system in your institution?

a. Yes ☐

b. No ☐

4. Indicate your level of agreement or disagreement on the statements below regarding the effect of digitization of medical records on a scale of 1 – 5, where:

1 = strongly disagree, 2 = disagree, 3 = neither agree nor disagree, 4 = agree and 5 = strongly agree

STATEMENT	1	2	3	4	5
Digitised EMR increases patient satisfaction.					
An EMR system increases efficiency in attending to patients.					
An EMR system can help in the cost management policies of a hospital.					
An EMR system can help reduce errors in diagnosis and prescription					
An EMR can enhance a doctor's diligence while attending to a patient					
Digital records can help you provide healthcare to a patient remotely					
Clinicians are adequately trained to adopt and use EMR.					
I would trust and rely on medical reports from another doctor who is not from the same institution as mine.					
The government has put all the necessary requirements to regulate EMR					
The infrastructure in my hospital is adequate to facilitate effective use of EMR					
Electricity and a backup generator is always available in my hospital					
There are enough computers to be used by the various clinicians in my hospital					
The computers in my hospital are fast and modern					
There is a reliable internet access and a Local Area Network in my hospital					
There is physical security to safeguard against theft of hospital assets					
I believe patient data in the EMR is secure					
The ICT department is competent to run an EMR system					

SECTION D: TECHNOLOGICAL CHALLENGES INFLUENCING ADOPTION OF EMR

Resistance and Adoption of EMR	1	2	3	4	5
Some of the medical practitioners prefer keeping medical records manually					
Some medical practitioners have negative attitudes towards EMR					
Some medical practitioners believe that EMR interfere with their work					
Some medical practitioners do not like EMR and its adoption					

Training challenges	1	2	3	4	5
I have never been trained					
I have forgotten my training					
I have no interest in learning					
I am slow in typing					

The end.

Thank you for participating

Appendix 3: Interview guide for medical practitioners

1. Indicate your gender: Male ☐   ☐ Female

2. Highest level of education?

Certificate ☐

Diploma ☐

Bachelors ☐

 Masters ☐

PhD ☐

Others (Specify)   …………………………………….

3. Age bracket

18-22 ☐   23-27 ☐   28-32 ☐   33-37 ☐   38-42 ☐   43-47 ☐

48-52 ☐   53-57 ☐   57-61 ☐   Above 61 ☐

4. How   long ☐   have you worked in this hospital?

0-2 years ☐

3-5 years ☐

6-8 years ☐

9-11 years ☐

Above 11 years ☐

SECTION B: FACTORS INFLUENCING ADOPTION OF EMR

5. Indicate your level of agreement or disagreement on the statements below regarding the effect of digitization of medical records on a scale of 1 – 5, where: 1 = strongly disagree, 2 = disagree, 3 = neither agree nor disagree, 4 = agree and 5 = strongly agree

Influence of Access to Network Infrastructure on EMR Adoption	1	2	3	4	5
Security issues, including confidentiality, integrity and availability, are the major concerns in EMR adoption at our facility					
Legal concept such as security and privacy concerns affect the implementation of EMR					
Adequate Internet bandwidth is a notable challenge to adopt of EMR					
Availability of EMR software packages facilitates adoption in health facilities					
Communication between various players affect the adoption of EMR					

6. Indicate your level of agreement or disagreement on the statements below regarding the effect of digitization of medical records on a scale of 1 – 5, where: 1 = strongly disagree, 2 = disagree, 3 = neither agree nor disagree, 4 = agree and 5 = strongly agree

Influence of Resource Availability on Adoption of EMR	1	2	3	4	5
Availability of technical personnel to install and operate promotes its adoption					
EMR technology resources is an facilitates its adoption					
Cost of EMR resources and facilities purchase is the greatest influence its adoption					
Adequate infrastructure affects the hospital adoption of EMR					
Maintenance costs of EMR technology facilities infuences its adoption and utilisation in our institution					

SECTION C: IMPACT OF DIGITAIZATION OF HEALTHCARE ON MEDICAL PRACTIONERS

7. Do you have an Electronic medical record system in your institution?

    c. Yes   ☐

    d. No   ☐

8. Indicate your level of agreement or disagreement on the statements below regarding the effect of digitization of medical records on a scale of 1 – 5, where:

1 = strongly disagree, 2 = disagree, 3 = neither agree nor disagree, 4 = agree and 5 = strongly agree

STATEMENT	1	2	3	4	5
Digitised EMR increases patient satisfaction.					
An EMR system increases efficiency in attending to patients.					
An EMR system can help in the cost management policies of a hospital.					
An EMR system can help reduce errors in diagnosis and prescription					
An EMR can enhance a doctor's diligence while attending to a patient					
Digital records can help you provide healthcare to a patient remotely					
Clinicians are adequately trained to adopt and use EMR.					
I would trust and rely on medical reports from another doctor who is not from the same institution as mine.					
The government has put all the necessary requirements to regulate EMR					
The infrastructure in my hospital is adequate to facilitate effective use of EMR					
Electricity and a backup generator is always available in my hospital					
There are enough computers to be used by the various clinicians in my hospital					
The computers in my hospital are fast and modern					
There is a reliable internet access and a Local Area Network in my hospital					
There is physical security to safeguard against theft of hospital assets					
I believe patient data in the EMR is secure					
The ICT department is competent to run an EMR system					

SECTION D: TECHNOLOGICAL CHALLENGES INFLUENCING ADOPTION OF EMR

Resistance and Adoption of EMR	1	2	3	4	5
Some of the medical practitioners prefer keeping medical records manually					
Some medical practitioners have negative attitudes towards EMR					
Some medical practitioners believe that EMR interfere with their work					
Some medical practitioners do not like EMR and its adoption					

Training challenges	1	2	3	4	5
I have never been trained					
I have forgotten my training					
I have no interest in learning					
I am slow in typing					

The end.

Thank you for participating