HEALTH SYSTEM FACTORS CONTRIBUTING TO THE UTILIZATION OF EMR AMONG HEALTH WORKERS IN SELECTED LEVEL III AND IV HOSPITALS IN SIAYA COUNTY, KENYA

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International Academic Journal of Health, Medicine and Nursing (IAJHMN) | ISSN 2523-5508

Received: 5th July 2023

Published: 18th July 2023

Full Length Research

Available Online at: https://iajournals.org/articles/iajhmn_v2_i1_363_379.pdf

Citation: Mudavadi, O. M., Nyaberi, J. M., Nyamai, J. (2023). Health system factors contributing to the utilization of EMR among health workers in selected level III and IV hospitals in Siaya County, Kenya. *International Academic Journal of Health, Medicine and Nursing*, *2*(1), 363-379.

ABSTRACT

Health-related use of information technology is an emerging trend in health care practice. More activities in health care are being integrated with information technology to make services efficient and effective. In Siaya, a county where internet, electricity, and skilled medical personnel are not readily available, computers have emerged as one of the channels through which medical information can be availed to health workers in rural areas. The research aimed to assess the utilization of electronic medical records systems in Siaya County. The main objective of this study was to determine health system factors contributing to the utilization of EMR among health workers in Siaya County. The researcher used cross sectional descriptive study design; it targeted health care workers in sampled level III and IV hospitals. The participants of interest comprised of doctors, nurses, clinical officers, pharmaceutical technologists, laboratory technologists and health records officers. The inclusion for choosing a facility was based on the availability of relevant cadres, afunctional electronic medical records system and workload. Proportional stratified random sampling was used to ensure that all categories of health workers were included in the study. The total number of respondents were targeted to be 187 participants representing each cadre. Key interviews and checklists was used for data collection. The data was analyzed using SPSS version 24. Quantitative data was analyzed thematically using content analysis of the information from the critical participant's interviews and questionnaires. Major finding was that there was limited utilization of EMRs in Siaya County. In conclusion, the study findings show that there was limited utilization of Electronic Medical Records systems among level III and IV healthcare workers in Siaya County. Availability of technical support to healthcare workers at lower-tier health facilities are vital to the continued good utilization of EMRs. The county government should invest in Human Resources Management to ensure that trained staff in level III and IV health facilities are well remunerated to ensure continuity of services and skilled utilization of EMRs.

Key Words: Health system factors, Information technology, Electronic medical record systems, Technical support, Healthcare workers

INTRODUCTION

The potential contribution of Electronic Medical Record systems to making healthcare delivery effective is globally recognized. EMR system is a digital version of storage of medical records for an individual. It can be defined as electronic recording and storage of health care information in the forms that can be manipulated for informed decision making by the clinicians and other staff in the organization. EMR system is used by medical practitioners and researchers to improve healthcare research and quality. With the increase in Information Communication and Technology, there has been tremendous advancement towards diversifying the accessibility of healthcare to the needy population. According to WHO (World Health Organization) report 2014, in Sub Saharan Africa, most of these initiatives are weak

platforms that have failed to transit to actual practice due to various challenges. EMR system is a broad range information application and thus is used by the management to offer best practices in health care delivery including data storage and dissemination, coordination and communication between professional service providers and community health as well as computer-aided support system inpatient care, interaction, education and telemedicine (Pagliari *et al*., 2005). The application of ICT in health care provision has improved communication between health care providers with remote patients and reach out to a broader population that has reduced or limited access to health care facilities. Physicians are supposed to document all their encounters with the patients in which they are expected to record all the crucial information they gather and all the actions they take or intend to take. This documentation by the physicians is also necessary for archival purposes in which they can be used in the future when needed. However, this is always not well done by physicians who tend to focus on their primary task of taking care of the patient.

Excellent healthcare is considered the heart of the Millennium Development Goals (MDGs) because it is aligned to the global agenda for poverty reduction, universal health access, and care as well as human development (Katyal, 2018). As a way of acknowledging this, countries across the world have been seeking better and modern strategies that can improve health services provision in public health (Conrad & Schneider, 2011). Ever-evolving world characterizes the past years and in which notable areas have been robust in changing technology. The development of electronic computers in the 1950s and the eventual emergence of the commercial internet provision in the late 1980s created a platform for significant events and innovations in the ICT industry.

The need for quality information must be the reason for having a team that maintains the patient's medical history. The practice can be dated back to the establishment of the American Health Information Association (AHIMA) in 1928. It was aimed at elevating the standards of recording and storage of medical data in hospitals and other medical-related fields. The patient's medical records can also be recorded electronically. The use EMR has been there since the 1960s after the introduction of the concept of Problem-Oriented Medical Record in the practice of medicine by Larry Weed before then, physicians would record on the diagnosis and the treatment administered. The idea by Larry Weed was to come up with a record that can also be studied and verified by a third party. Regenstein Institute was the first one to come up with the first medical records system in the year 1972 (*The evolution of innovation; Strategic Management of Technology and Innovation.* 2000). It is after the recommendation by the Institute of Medicine that by the year 2000, that all physicians were advised to use computers to aid in clinical services and patients care.

In the present-day digital era, investment in the EMRs is considered to be a pivotal catalyst to the development of the healthcare across the world as many studies have demonstrated that modern technologies can contribute significantly to the health sector especially in primary health care (PHC) in developing nations (Hanseth & Bygstad, 2015). The healthcare sector is experiencing considerable pressure from both within and outside; the adoption of ICT needs to

be continuous since it is perceived a critical tool that can be used to support and create a dynamic healthcare system and innovative service provision.

There have been significant efforts across the world in responding to the demand for better healthcare, and countries have been responding to this through modern integrated models and systems. Based on the available reports, different nations have adopted ICT systems into their healthcare sectors at different rates, which according to Hanseth and Bygstad (2015), is the way into improved healthcare currently and in the future. In the United States (US), continuous investments in the health care information system have dramatically improved and revolutionized the health sector. Research by the University of Michigan, findings indicated that the adoption of modern technologies, including the EMRs have helped to cut on the cost of the operation by about 3% (Banova, 2018). The study established that integration of technology in healthcare practices contribute to improved health of patients, reduce errors in care, and save lives. The findings further found that not only has the modern technology impacted on pathological processes and practices of healthcare professionals, but it has also changed experiences for patients and has also helped to cut on the cost considerably.

Another country that has invested considerably in modern health ICT is Finland. According to Spiezia (2018), Finland is among the countries with the best healthcare and has been ranked among the countries that have the most substantial health technology economies from a global point of view. In Finland, health providers have been able to reinvent and develop the healthcare systems through the adoption of ICTs over the last century, and it is still making massive progress towards the future. According to Stone (2017), this new and developing trend has transformed the healthcare sector, which has now emerged in many aspects as a state-of-the-art among the OECD nations.

In Africa, while significant efforts have been made in the adoption of ICTs in healthcare, research shows that the region still lags compared to the developing nations. In Ethiopia, for instance, Samuel *et al.*, (2016), findings show that the adoption of modern technologies in healthcare is way low compared to those of the developed countries such as Finland. In Kenya, while the adoption of ICTs in healthcare delivery has been quiet, it is evident that it has brought with it numerous benefits. The modern communication technologies have helped to improve service delivery and management of financial resources. The manual process is vulnerable to leakages that are used by unscrupulous staff to manipulate financial assets. It can be used to enter inaccurate financial records and billings for personal gains. The adoption of modern ICTs has significantly helped in reducing human errors and corruption.

Based on the available literature, the adoption of ICT has led to numerous benefits to health provision. In a study conducted by Bukachi and Walsh (2012) on the role of ICT in healthcare, the findings indicated that increased use of ICTs in healthcare, especially in clinical decision support, increase better linkages in and among systems and hence help all the processes in healthcare. The study also concluded that, apart from providing efficiency, modern technologies also helped in ensuring secure healthcare. In a similar study, Arendt (2013) found out that innovations in patient care led to the efficient and effective delivery of healthcare. The

full use and implementation of EMR is still an ongoing process, especially in developing countries. It is because it is a demanding process and requires a lot of effort and input in terms of infrastructure and finance. However, among those health facilities that have started the use of EMR, there are still several challenges apart from the foundation and financial constraints (Jha et al., 2009).

Problem Statement

With increased innovations, first-world nations like Estonia have gone a step to make their health systems more superior with Electronic Medical Record systems leading to better health outcomes for the populace and mitigating disease burden. Profound challenges whoever has been experienced in this journey. In 2003, there were fewer physicians, nurses, and an acute care bed in the United States compared to a median OECD country. Ironically, the health expenditure in the United States was more than double that of a median OECD country. The health care system in the U.S was plagued with reduced productivity and regardless of high expenditure. The problem was the complexities in administration, fear of legal suit by patients, defensive medicine, old age population and lack of waiting lists (Andersen et al. 2006). They also pointed out that another reason for slow growth and inefficiency in the U.S healthcare system was lack of integration of information systems in service delivery. There are glaring differences in health care sector between the U.S. and other industrialized countries, with that is U.S lagging due to slow adoption of the health information system.

The Kenyan health sector has been very slow in utilizing electronic medical records system. Clinical records are mostly still on paperwork, which has led to inefficiency in healthcare delivery and management. If the governments had implemented ICT in healthcare, there would have been much time saved, reduction in medical errors, and improvement in general healthcare delivery. Lack of digitization of services in Kenya health care has led to constraints in care delivery. Some of the limitations included high cost of medical services and access, and exclusion of remote patients who had inadequate infrastructural capabilities and formed the most significant proportion of the population (Walker, 2014). Regarding the Good eHealth report, the European Union has made it the best practice to integrate EMR systems in healthcare. The report indicates that it is only through the use digital technologies that health sector can cope with the high demand for improved health services. Though the integration of EMR in health care is fragmented across the continent, its application is dynamically changing the health sector.

Most people in developing countries are unable to exploit or access the benefits of ICT in health care. The theory of society journal argues that these people fail to acquire the benefits because they are old, poor, marginalized, illiterate on both computer as well as reading and writing English language. On the other hand, there are those professionals that argue based on physician-patient relationship. They oppose the use of digital health care services because of the fear that the relationship that should exist between the medical provider and the patient might be lost, especially the documentation at the time of consultation. Undeniably, the use of computer terminals between the physician and patient can be limiting. When digitization of

health care is at early adoption, the patients may feel the doctor is more inclined to interact with the computer than them.

A shortage of literature exists on the integration of EMR in the Kenyan health sector. Among the few studies conducted, Wasonga (2015) analyzed the ICT and performance of electronic health projects in Kenya, Kanyua (2015) focused on force behind the adoption of EMRs in healthcare centers in Nairobi County, Kenya, and Mwangi (2017) analyzed the factors that influence electronic medical records integration at Kenyatta National Hospital. In other studies, Songole (2017) investigated how EMR has impacted on healthcare delivery in Kisii Teaching and Referral Hospital. The various research in Kenya found that capacity building is the key to the implementation of health information systems in public hospitals. The starting point, according to them is an investment in civic education for the adults and build on their ICT literacy level as well as reading and writing capabilities. The older generation is the most affected by the structural changes in hospitals.

In Siaya County, agencies have had episodic engagements on how to sustain usability of the systems though urgent and concrete interventions are needed. In the previous years, the Siaya County department of health has waged a vicious war on the utilization of EMR systems in health, yet challenges remain real and startling. It has become erratic that the system only gets attention during donor and implementers supervisions. According to Kenya eHealth Policy, for EMR systems to work well, need there be on the right people, right machines based on evidence in a timely and innovative manner, bringing user-friendly quality services when they are required. While the use of computers in organizations is perceived as cost-saving, some hidden costs and demands accompany their application. As such, before implementation and integration of any computers in health care system, a thorough evaluation of the ICT system should be done to ensure the adoption of the only system that will have the highest benefits to health care delivery and has best outcomes. The trend in increase of facilities with EMRs can be attributed to the recognition of ICT as a key enabler in effective service provision. Due to infrastructure limitations, most of the systems support HIV, MNCH and malaria bringing an issue of ownership and sustainability (Muinga, 2018).

The realization of quality health information in the facilities is still an ongoing process. It is because of the various factors that make the users of the EMRs have difficulty in the readiness and use of the EMRs. These factors can be grouped into either organizational or individual elements. One of the regulatory factors in the maintenance of good EMRs; is usually when the system fails due to network problems, hardware complications, and at times, software failure. It is so because most of the staff members lack the necessary IT skills that they may employ to solve such issues on their own. There is also delayed service delivery when the system fails due to the total dependency on EMR in the financial departments. When analyzed, this suspends the registration and queuing of patients by the clerks /records officers, diagnosis by the physicians who have to confirm that the patient was queued and also enter the diagnosis and treatment in the system, the carrying out of laboratory tests as requested by the physicians and even the prescription of medicine by the pharmacists. Therefore, all the users of the EMRs have to wait until the system is online again. In the context of the reviewed literature, no prior

studies on assessment on the utilization of electronic medical records systems in Siaya County. It is, therefore, to undertake this study to bridge the research gap. The research therefore sought to determine health system factors contributing to the utilization of EMR among health workers in Siaya County, Kenya.

Theoretical Review

The study was hinged on the Unified Theory of Acceptance and Use of Technology (UTAUT). In their study, Venkatesh *et al.,* (2003) finished and brought together numerous frameworks of Information Technology adoption and merged the eight well-known constituent models for example: the Technology acceptance model (Davis, 1989), the Theory of reasoned action (Davis *et al.,* 1989), the Motivational Model (Davis *et al.,* 1992), the Theory of planned behavior (Ajzen, 1991), the Theory of proposed action (Taylor and Todd, 1995), and a model combining the technology acceptance model and the Theory of proposed action (Taylor and Todd, 1995), Social cognitive theory (Compeau and Higgins, 1995), the Innovation diffusion theory (Rodgers, 1995), and the model of PC utilization (Thompson *et al.,* 1991).

Due to the TAM adoption, vast reformed TAM models were suggested, which apply to modern automation (Horton *et al.,* 2001). However, experts are challenged with a choice group of models. Therefore, to address UTAUT limitations, a new framework was established to take redress. This framework focuses on understanding usage/intent as a dependent variable (Venkatesh *et al.,* 2003). The UTAUT study framework was applied in this project in examining the use of ICT in medical care.

Venkatesh *et al.* (2003) examined the merged theoretical framework in four distinct contexts of organizations for six months duration. The research indicated notable forecasts of intent (effort expectancy, facilitating conditions, performance expectancy, and social influence). Moreover, attitude toward self-efficacy, anxiety, and using technology, were hypothesized not being directly proportional to causations of intent. Therefore, this study applied the theory to assess the difficulties facing the use of electronic health in Kenyan health projects.

RESEARCH METHODOLOGY

Research Design

This is a study plan that involves the ordering of circumstances for gathering and analyzing information in a way that aims at combining to the relevance of the study's aim (Babbie, 2015). The study employed cross sectional descriptive study design, data collection encompassed mixed-methods. In essence, the “mixed method” entails a new research methodology that engages in the advancement of integrating qualitative and quantitative information systematically in a sole survey. In this study, the design is considered relevant because of the triangulation possibility that is, using numerous means (researches, methods, and sources of data), probability of triangulation, that is, the implementation of numerous means in examining an identical happening.

Location of the study

Siaya County points out as the area of research targeting healthcare workers working in both sampled level III and IV hospitals.

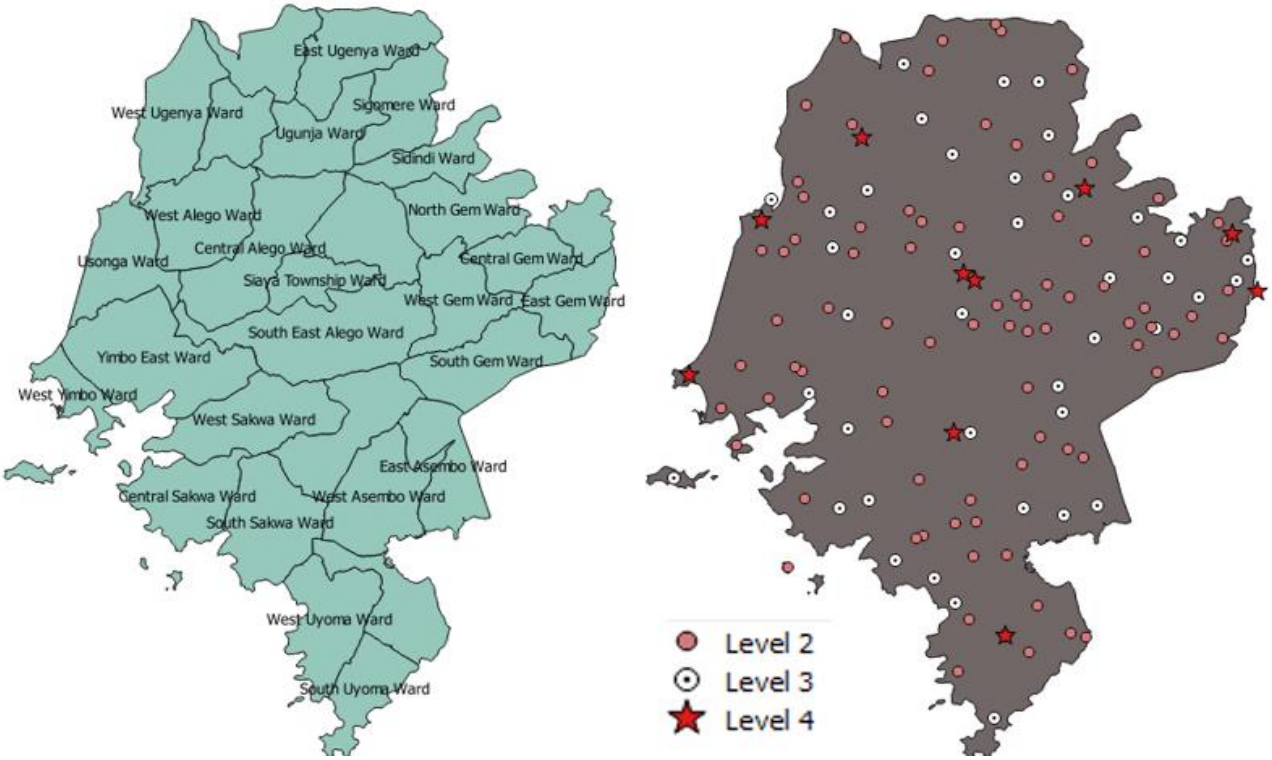

Figure 1: Map of Siaya County

Target Population

The aimed population entailed to the specific community that the investigator had an interest in examining (Mugenda & Mugenda, 2003). The sample targeted for this investigation comprised health care workers in the purposively sampled level III and IV hospitals in Siaya County. The subject consisted of professional health workers trained from medical schools. They had regular contact with EMR systems, have regular contact with patients and make most decisions relating to service delivery. The participants of interest only comprised of doctors, nurses, medical officers, pharmaceutical technologists, laboratory technologists and health records officers. According to the Ministry of Health (2019), there are 162 health facilities in Siaya County with a technical staff comprising of 59 doctors, 488 nurses, 73 clinical officers, 27 pharmaceutical technologists, 85 laboratory technologists and 16 health records and information officers. 61 of the facilities are level threes and fours.

Table 1: Sample Frame by region

	Sub county	Facility
1	Alego Usonga	Bama Hospital, Kaluo Health center
2	Bondo	Bondo Sub district hospital, Uyawi health center
3	Ugenya	Ukwala sub district hospital, Sega Mission Hospital
4	Ugunja	Ambira Sub county hospital, Ligega health center
5	Gem	Yalla sub county hospital, Aluor Mission health center
6	Rarieda	Madiany sub county hospital, Abidha health center

Sampling Procedures and Techniques

Research participants were identified through proportional stratified random sampling in the targeted 6 sub counties viewed against the entire number available from the human resource desk. Hence cadres with more staff had more sample size. This sampling method was applied to ensure that all targeted cadres were adequately represented. The study sampled 25% of the respondents from each cadre. Health facilities were selected by simple random sampling based on the availability of an electronic medical records system and workload.

Sample Population

Proportional stratified random sampling technique was utilized to determine the sample size. It entails the division of one's population into similar sub-groups, followed by taking each subgroup's easy random sample. In their proposition, Mugenda and Mugenda postulated that sample size should be economical, and representative of the people targeted Mugenda and Mugenda (2008). The proposed sample size of 10-30% of the population targeted. A 25% sample was considered representative and thus sufficient to yield reliable findings. A random selection was made to avoid the possibility of systematic biases. In essence, below is a presentation of the frame sample.

Table 2: Sample Frame by cadre

	Category	Population	Respondents
1	Medical Officers	59	15
2	Clinical Officers	73	18
3	Nurses	488	122
4	Laboratory technologists	85	21
5	Pharmaceutical technologists	27	7
6	Health records and information officers	16	4
	Total	748	187

Source: (AWP 7, Department of Health Siaya, 2018)

Construction of Research Instruments

Information was mainly composed using interview guides, checklists, and questionnaires.

Questionnaires

Surveys can be thought of as a written or oral interview. They are preferred to other techniques due to their capability to cover every aspect of the story, accessible analysis, and visualization and offer a quick way to get results. Sampled medical officers, nurses, clinical officers, pharmaceutical technologists, lab technologists and health records officers were required to understand the questionnaire before responding. Ideally, questionnaires are inexpensive and practical in collecting information from a large group in a short duration and administering to a full area scattered respondents. Another advantage of questionnaires over other data collection procedures is that they can be used for comprehensive coverage and puts less pressure on the respondents.

The administration of the questionnaires was done through pick and drop way to enhance the return rate. Notably, surveys entailed both closed and open-ended questions. To conserve time, use of structured questions was encouraged. Also, the structured questions aided facilitation in the straighter forward analytics

Interview guide

The utilization of an interview guide is to provide in-depth knowledge of EMR from professionals. The interview targeted the sub county and county health records officers. The researcher carried a one on one interview with the above professional by first notifying him through formal communication and getting an appointment. Audio recordings were being used to record the above officers, the audios were then being analyzed without editing to avoid distorting the message.

Checklist

It is a comprehensive list of things to be done or evaluated. The checklist (Appendix 3) accessed the availability of specific items and knowledge of the staff on the relevant EMR components. It entailed the availability of specific personnel of interest in the facility, availability of electricity, availability of electronic medical records and the location of the facility (for even distribution)

Validity of the Instrument

Validity entails the magnitude to which the outcome examines what they are intended to examine through the check of active correspondence of the results with other measures of a similar notion. A valid measurement turns out reliable. In this study, the tools were first discussed between the supervisor and the researcher so as to ensure the well designing of the devices and a provision of expertise. The panel from the university also ensured adequate representation of concepts that explores all matters under scrutiny by the items.

Reliability of the Instruments

According to Orodho (2009), reliability refers to the magnitude to which outcomes reproduction can be done if a repeat study under the same circumstances is carried out. Ideally, the increase of reliability is done through the inclusion of sizeable similar measurement items at stake, through testing of full range individuals samples through the use of consistent experimentation procedures. The reliability was tested through a pilot study that was carried out in Ojola Sub county hospital on 10 health care workers (5% of the sample size). Cronbach alpha was used to assess the reliability of the tool with a threshold of 0.7. From the analysis of the pilot data, the Cronbach alpha value was found to be 0.835 an indication that the tool was reliable.

Methods of data collection

The research utilized initial data, which was gathered through the use of structured questionnaires (Appendix 4). This tool is deemed to be suitable because it enables the collection of an extensive amount of information within a short duration economically, and due to its ability to guarantee confidentiality through anonymity. The questionnaires encompassed both closed and open-ended questions. Also, the survey was structured to make it easier for the respondents to fill.

Data analysis techniques and procedures

Analysis of the information gathered was conducted through the use of Statistical Package for Social Sciences (SPSS) version 24. A test of normality of continuous data was done using Kolmogorov Smirnov test where it was found where it was not normally distributed during data management. Categorical data was presented using frequencies and percentages. Chi-square test of association and Fischer' exact test was used to test associations between categorical data and the dependent variable. Binary multiple logistic regression was used to

test the predictors of utilization of electronic medical records controlling for confounders. Findings were considered significant at $p<0.05$. Data were presented using tables only.

RESULTS

Table 1 displays the health system factors that regard the utilization of EMR among healthcare workers in Siaya County. The frequency of technical support was a key health system factor regarding the utilization of Electronic Medical Records. From the respondents' perspective, about a third (32%) reported that they hardly received any technical support, 25.3% claimed that they have never received any technical support while an equal proportion of 25.8% readily received technical support. Regarding, staff adequacy, 52.8% of study participants claimed that the number of staff at respective facilities was inadequate. 47.2% reported that the number of staff was sufficient. About 32.6% of study participants reported cases of missing patient files and about half of study participants were of the view that record management was up to standard. 47.8% of the respondents said that records management was to standard while 52.2% claimed the records management was not up to standard. In regards to speed of information access, 50.6% said the speed was high, 29.2% said the speed was moderate while 20.2% said the speed was low.

Table 1: Health System factors of Utilization of EMR among Health Workers in Siaya County Kenya

Frequency of Availability of Technical Support	Freq.	Percent
Never	45	25.28
Rarely	57	32.02
Occasionally	30	16.85
Readily	46	25.84
Total	178	100
Adequacy of Staff	Freq.	Percent
Adequate	84	47.2
Inadequate	94	52.8
Total	178	100
Cases of Missing patient record	Freq.	Percent
Yes	58	32.6
No	120	67.4
Total	108	100
Record Management is up to standard	**Freq.**	**Percent**
Yes	85	47.8
No	93	52.2
Total	178	100
Speed of Information Access		
High	90	50.6
Moderate	52	29.2
Low	36	20.2

Association of Health system factors and the utilization of EMR

Results displayed in table 2 show that there was a statistically significant difference between availability of technical support χ^2 (*9.186(3)*, ***p=0.027***) and the utilization of electronic medical records. Record keeping methods χ^2 (*2.14(1), p=0.143)*, the incidence of missing patient data

χ^2 *(0.8457(1), p=0.358)*, and adequacy of staff χ^2 *(0.8313(1), p=0.362)* were not associated with the utilization of Electronic Medical Records.

Staff retention and staff capacity building have been a challenge in the utilization of electronic medical records

"Limited funding and staff attrition has somehow affected us (staffs initially trained have left for greener pastures in other areas /counties)

Physical factors such as the availability of stable electricity in certain areas have been a hindrance to full use of EMR in health facilities

"Intermittent power supply has been an issue in the majority of health facilities that do not have back-up generators" male facility in charge.

Table 2: Bivariate association of health system factors and utilization of Electronic Medical Records

Record Keeping Method	**Non-Utilization**	**Utilization**	
Computerized	63(65.63)	33(34.38)	*2.14(1), p=0.143*
Paper based	45(54.88)	37(45.12)	
Total	108(60.67)	70(39.33)	
Availability of Technical Staff	**Non-Utilization**	**Utilization**	
Not available	19(42.22)	26(57.78)	*9.186(3),* ***p=0.027***
Rarely	36(63.16)	21(36.84)	
Occasionally	21(70.0)	9(30.0)	
Readily Available	32(69.57)	14(30.43)	
Cases of Missing patient record	**Non-Utilization**	**Utilization**	
Yes	38(65.52)	20(34.48)	*0.8457(1), p=0.358*
No	70(58.33)	50(41.67)	
Total	108(60.67)	70(39.33)	
Adequacy of Staff			
Adequate	48(57.14)	36(42.86)	*0.8313(1), p=0.362*
Inadequate	60(63.83)	34(36.17)	
Speed of Information Access			
High	48(53.33)	42(46.67)	*4.1521(2), p=0.125*
Moderate	35(67.31)	17(32.69)	
Low	25(69.44)	11(30.56)	

Regression Analysis

Table 3 illustrates the regression analysis. Findings reveal that utilization of EMR decreases with increase in age. Healthcare workers aged 25-31 years were almost 3 times less likely to utilize EMR compared to those aged 18-24years (A.O.R=2.454 C.I 0.757-7.951). Healthcare workers aged 32-38 years were almost 2 times less likely to utilize EMR compared to those aged 18-24years (A.O.R=1.999, C.I 0.607-6.588). Those with limited knowledge in EMR systems were less likely to utilize EMR systems compared to those with good knowledge (A.O.R=0.145 C.I 0.052-0.400).

Table 4: Logistic regression Analysis

Factors	OR	Std.Err .	z	P value	95% CI	
age group						
25 - 31 years	2 .45414	1.471959	1.50 0.134	0.134	0.757	7.951302
32 - 38 years	1.998853	1.215985	1.14	0.255	0.6066800	6.585701
Over 38 years	0.4624766	0.3085712	-1.16	0.248	0.1250707	1.71011
Length service						
5-10yrs	2.550996	1.155256	2.07	0.039	1.050101	6.197104
>10yrs	1.178162	0.7684595	0.25	0.802	0.3281003	4.230616
Daily use of EMR	1.163519	0.4485828	0.39	0.694	0.5465143	2.477111
EMR knowledge (limited)	0.1445580	0.075141	-3.72	0.000	0.0521905	0.400399
Availability technical staff						
Rarely available	0.4963632	0.2685209	-1.29	0.195	0.1719172	1.433111
Occasionally available	0.8498396	0.5235787	-0.26	0.792	0.25405	2.842855
Readily available	0.8900551	0.5121524	-0.2	0.840	0.2881519	2.749238

In this study, technical factors, staff adequacy, records management, and speed of information access were considered health system factors. There were mixed views among study participants on the technical support the healthcare workers received while using EMR. Frequency of availability of technical support was reported to be rare by a third of respondents. A significant proportion of level III and IV health facilities staffs held the view that the speed of information access was either moderate or higher than using paper-based records. This finding highlights a key utilization acceptance among healthcare workers wherein they derive job satisfaction due to faster work processes. A focus group discussion among healthcare workers by (Ngugi et al., 2021) highlighted that the use of electronic medical records eased challenges in patient's missing files, defaulter tracing, and but not limited to generating reports that there was a great sense of job satisfaction among healthcare workers. Additionally, consistent with this study's results, Ngugi *et al.,* (2021), results highlighted that periodic system updates by program implementers improved the utility of EMR systems. Qualitative data reveal that staff who were initially trained in the use of EMR had left for greener pastures. This is consistent with findings by (Mitaki, 2019) in Migori county highlighted that staff turnover was a major health system barrier to good utilization of EMR systems. It calls for the county government to well remunerate healthcare workers.

From the interviews with key informants, the intermittent supply of electricity in health facilities was presented as a going health system concern among healthcare workers during the utilization of EMR. Whilst electricity supply might be beyond the purview of the health facility manager, the County government should ensure that such risks are mitigated by availing stand-by generators at all levels III and IV health facilities across the county. Study participants in

(Ngugi et al., 2021) focus group discussions highlighted that inconsistence electricity supply was a physical barrier coupled with EMR network-related issues.

Conclusion

In conclusion, the study findings show that there was limited utilization of Electronic Medical Records systems among level III and IV healthcare workers in Siaya County. Availability of technical support to healthcare workers at lower-tier health facilities are vital to the continued good utilization of EMRs. From the analysis, high staff turnover among healthcare workers remains an impediment to the utilization of Electronic Medical Records during the provision of healthcare services. Finally, the intermittent power supply is a going concern for the utilization of electronic medical records in level III and IV health facilities.

Recommendations

- Power back-up systems should be installed in all EMR-supported health facilities.
- The county government should invest in Human Resources Management to ensure that trained staff in level III and IV health facilities are well remunerated to ensure continuity of services and skilled utilization of EMRs
- The county government's department of health and other implementing partners should ensure that there is a framework for frequent technical support to healthcare workers using EMRs at the health facilities

REFERENCES

Abby Swanson Kazley&Yasar A. Ozcan (2007) Organizational and Environmental Determinants of Hospital EMR Adoption: A National Study.

Afolaranmi, T. O., Hassan, Z. I., Dawar, B. L., Wilson, B. D., Zakari, A. I., Bello, K. K., Ofakunrin, A. O. D., & Ogbeyi, G. O. (2020). Knowledge of electronic medical records system among frontline health care workers in Jos University teaching hospital, Plateau State Nigeria. *International Journal of Research in Medical Sciences*, *8*(11), 3837–3843. https://doi.org/10.18203/2320-6012.ijrms20204867

Aggelidis, V.P., Chatzoglou, P.D. (2009). Using a modified technology acceptance model in hospitals. International Journal of Medical Informatics

Ajami s., Ketabi s., Isfahni ss., Heidari a. (2011) Readiness assessment of electronic health records implementation.

Arendt, L. (2013). Journal of Systems and Information Technology. Barriers to ICT adoption in SMEs: how to bridge the digital divide? 10(2), 93-108. Retrieved from https:// dx.doi.org/ 10.1108/13287260810897738

Babbie, E. R. (2015). *The practice of social research*. Nelson Education.

Bangladesh Institute of ICT in Development (BIID); available at http://www.mdfbd.org/wp-content/uploads/2013/04/BIID_e-Clinic_Sumaiya.pdf.

Banova, B. (2018). *The Impact of Technology on Healthcare.* Retrieved October 22, 2018, from American Institute of Medical Sciences & Education: https://www.aimseducation.edu/ blog/the-impact-of-technology-on-healthcare

Biruk, S., Yilma, T., Andualem, M., & Tilahun, B. (2014). Health Professionals' readiness to implement electronic medical record system at three hospitals in Ethiopia: A cross sectional study. *BMC Medical Informatics and Decision Making*, *14*(1). https://doi.org/10.1186/s12911-014-0115-5

Bukachi, F., & Walsh, P. (2012). Chest 132. Information Technology for health in developing countries, 1624-1630.

Chetley, A, et al. (2006). Improving Health, Connecting People: The Role of ICTs in the Health

Conrad, D., & Schneider, J. S. (2011). Enhancing the visibility of NP practice in electronic health records. *The Journal for Nurse Practitioners*, *7*(10), 832-838.

Cox, M. L., Risoli, T., Peskoe, S. B., Turner, D. A., & Migaly, J. (2021). Quantified electronic health record (EHR) use by academic surgeons. *Surgery*, *169*(6), 1386–1392. https://doi.org/10.1016/j.surg.2020.12.009

Critical Review of Literature. *Journal of Health Informatics in Developing Countries*, Vol. 5, No. 1, pp. 197-208

Gole, I., Sharma, T., & Misra, S. B. (2017). Role of EMR in the Healthcare Sector: An Empirical Study of Pune City. *Journal of Management & Public Policy*, *8*(2).

Gostin, L. O., & Friedman, E. A. (2015). The sustainable development goals: one-health in the world's development agenda. *Jama*, *314*(24), 2621-2622.

Hanseth, O., & Bygstad, B. (2015). Flexible generification: ICT standardization strategies and service innovation in health care. *European Journal of Information Systems*, *24*(6), 645-663Chebole, G. C. (2015). Factors Influencing Adoption of Electronic Medical Record Systems in Public Health Facilities in Kenya: a Case of Nakuru County ., 88.

Haskew, J., Rø, G., Turner, K., Kimanga, D., Sirengo, M., & Sharif, S. (2015). Implementation of a Cloud-Based Electronic Medical Record to Reduce Gaps in the HIV Treatment Continuum in Rural Kenya. *PLOS ONE*, *10*(8), e0135361. https://doi.org/10.1371/journal.pone.0135361

Ilie, V., Slyke, C.V., Parikh, M.A., Courtney, J.F. (2009). Paper versus electronic medical records: the effects of access to physician's decisions to use sophisticated information technologies.

In Low- and Middle-income Countries: Findings from the Center for Health Market Innovations. *Bulletin of the World Health Organization*, Vol. 90, No. 5 (May), pp. 332–340.

Initiatives in Bangladesh: A Scoping Study. *BMC Health Services Research* 2014; available at http://www.biomedcentral.com/1472-6963/14/260http://www.biomedcentral.com/1472-6963/14/260

Kaihlanen, A.-M., Gluschkoff, K., Hyppönen, H., Kaipio, J., Puttonen, S., Vehko, T., Saranto, K., Karhe, L., & Heponiemi, T. (2020). The Associations of Electronic Health Record Usability and User Age With Stress and Cognitive Failures Among Finnish Registered Nurses: Cross-Sectional Study. *JMIR Medical Informatics*, *8*(11), e23623. https://doi.org/10.2196/23623

Katyal, S. (2018). Patterns of utilization of maternal healthcare services in Haryana, India. *Asia Pacific Journal of Health Management*, *13*(1), 17.

Kershaw, C., Taylor, J. L., Horowitz, G., Brockmeyer, D., Libman, H., Kriegel, G., & Ngo, L. (2018). Use of an electronic medical record reminder improves HIV screening. *BMC Health Services Research*, *18*(1), 14. https://doi.org/10.1186/s12913-017-2824-9

Kutney-Lee, A., Sloane, D. M., Bowles, K. H., Burns, L. R., & Aiken, L. H. (2019). Electronic Health Record Adoption and Nurse Reports of Usability and Quality of Care: The Role of Work Environment. *Applied Clinical Informatics*, *10*(1), 129–139. https://doi.org/10.1055/s-0039-1678551

Lewis, Trevor; Christina Synowiec; Gina Lagomarsino; and Julian Schweitzer (2012). E-health

Mekonnen, G. (2021). *Utilization and Determinants of Electronic Medical Record System among Health Professionals in Public Health Facilities of Harari Regional State, Eastern Ethiopia*. *12*.

Mitaki, O. (2019). *Scaling Up implementation and usage of Electronic Medical Records in Migori County*. University of Nairobi.

Mkalira Msiska, K. E., Kumitawa, A., & Kumwenda, B. (2017). Factors affecting the utilisation of electronic medical records system in Malawian central hospitals. *Malawi Medical Journal*, *29*(3), 247. https://doi.org/10.4314/mmj.v29i3.4

Mugenda, A .and Mugenda, O (.2003). Research methods; quantitative and qualitative Approaches. Africa Center for Technology (ACTS), Nairobi Kenya

Mugenda, O. M., and Mugenda, A. G. (1999) Research Methods: Quantitative and Qualitative Approaches.: Acts press

Mwangi, B. M. (2017). *Factors Influencing Adoption of ICT Strategy in the Kenyan Public Health Sector–A Case Study of the Kenyatta National Hospital* (Doctoral dissertation, United States International University-Africa).

Ngugi, P. N., Were, M. C., & Babic, A. (2021). Users' perception on factors contributing to electronic medical records systems use: A focus group discussion study in healthcare facilities setting in Kenya. *BMC Medical Informatics and Decision Making*, *21*(1), 362. https://doi.org/10.1186/s12911-021-01737-x

Oo, H. M., Htun, Y. M., Win, T. T., Han, Z. M., Zaw, T., & Tun, K. M. (2021). Information and communication technology literacy, knowledge and readiness for electronic medical record system adoption among health professionals in a tertiary hospital, Myanmar: A cross-sectional study. *PLOS ONE*, *16*(7), e0253691. https://doi.org/10.1371/journal.pone.0253691

Organization for Economic Co-operation and Development (OECD) (2010). Improving Health

Oumer, A., Muhye, A., Dagne, I., Ishak, N., Ale, A., & Bekele, A. (2021). Utilization, Determinants, and Prospects of Electronic Medical Records in Ethiopia. *BioMed Research International*, *2021*, 2230618. https://doi.org/10.1155/2021/2230618

Panir, Md. Jahid Hossain (2011). Role of ICTs in the Health Sector in Developing Countries: A

Samuel, S., Bayissa, G., Asaminewu, S., & Alaro, T. (2016). Electronic information sources access and use for healthcare services in governmental and non-governmental hospitals of western Oromia, Ethiopia: A cross-sectional study. *Ethiopian Journal of health sciences*, *26*(4), 341-350.

Sector Efficiency: The Role of Information and Communication Technologies. *OECD Health Policy Studies* (Paris, France: Organisation for Economic Co-operation and Development (OECD).

Sjaak, L. (2013). IT Infrastructure Architecture - Infrastructure Building Blocks and Concepts.

Spiezia, V. (2018). ICT Investments and Labour Demand in OECD Countries. In *Digitized Labor* (pp. 21-37). Palgrave Macmillan, Cham.

Stone, C. S. (Ed.). (2017). *Benchmarking Telemedicine: Improving Health Security in the Balkans* (Vol. 49). IOS Press.

Sumaiya, N.(2013). E-Clinic: Integration of ICT in Health Sector (Dhaka, Bangladesh: Tanvir, A., Lucas, H., Khan, S., Islam, R., Bhuiya, A., and Iqbal M.(2014).eHealth and mHealth

Technology: Toward a Unified View. *MIS Quarterly*, 27**,** 425-478.

The sector of Developing Countries: A Framework Paper. *infoDev Working Paper*, No.7 (May 31, 2006); republished and re-edited by Kerry McNamara as *infoDev Working Paper*, No. 1/2007 (October 2007); available at http://www.infodev.org/infodev-files/resource/InfodevDocuments_84.pdf.

Venkatesh, V., Morris, M., Davis, G. & Davis, F. (2003). User Acceptance of Information

Wang, J. (2013) ICT Applications in Architecture, Engineering, and Industrial Design. Education. Hershey, Pa: Engineering Science Reference.