

**SCALING UP IMPLEMENTATION AND USAGE OF ELECTRONIC MEDICAL
RECORDS IN MIGORI COUNTY**

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**A PROJECT REPORT SUBMITTED IN PARTIAL FULFILLMENT FOR THE AWARD
OF FELLOWSHIP IN CAPACITY BUILDING FOR SUSTAINABLE DEVELOPMENT
(HEALTH INFORMATICS) OF THE UNIVERSITY OF NAIROBI**

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DECLARATION

This project report is my original work and has not been presented for a degree in any other University.

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Supervisor's Approval

This project report has been submitted for examination with my approval as the university supervisor.

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DEDICATION

This project report is dedicated to my Dad, Mum, brothers and sisters for their love, prayers, concern and support during the period of study and implementation.

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LIST OF ABBREVIATIONS

AIDS – Acquired Immunodeficiency Syndrome

CDC – Centers for Disease Control and Prevention

EMR – Electronic Medical Record

EHR – Electronic Health Record

HIV – Human Immunodeficiency Virus

ICT – Information and Communication Technologies

IT – Information Technology

OCA – Organisational Capacity Assessment report

PLP- Participating Local Partner

UHIV – University of Nairobi HIV Program

MCHD- Migori County Health Department

CHMT – County Health Management Team

SP - Strategic Planning

HRIO – Health Records and Information Officer

TCO - Total Cost of Ownership

UNITID – University of Nairobi Institute of Tropical and Infectious Diseases

PEPFAR- President’s Emergency Plan for AIDS Relief

PROJECT SUMMARY

Introduction and implementation of new health care technologies on a bigger scale calls for a systematic approach that must include a clear plan, proper implementation process, and adequate follow-ups; and it requires thoughtful and long lasting changes in health care systems. Such an approach must involve a re-look into the scope of policy of scaling up. Failure to pay attention to such scaling up policies, the success rate and sustainability of pilot projects that have great potential of going to scale will be at stake.

The health sector in Kenya is one of the most funded programmes with multiple stakeholders and partners participating in the endeavour of ensuring a healthy nation. In Kenya, multiple stakeholders that include the National government, the donors, and county governments have put a brave fight against a number of diseases, HIV/AIDS being one of the major diseases that have received a major boost. Many healthcare interventions that aim to improve the health sector are being undertaken. With the growth of programs and projects targeted towards the fight against HIV/AIDS, there is growing importance for organizations to be more accountable for funds received and the results they report. The proposed scaling up project of sites using Kenya EMR seeks to aid the Migori County Health Department in the organized collection, tabulation, and interpretation of data and information that aims at providing a clear picture of the services rendered and to guide decision making by the management. Upon implementation, the EMR system will help in supporting the activities that aim to monitor, supervise, evaluate, research, allocation of resources, and appraisals of performance.

The need for the EMR was identified after keen analysis of the OCA report which identified the need for ICT based reporting; and with consultation with the PLP mentor who emphasized of the need for quality data for the purposes of decision making.

This project seeks to provide continuous information on HIV activities. It also aims to assess the appropriateness and adequacy of the implementation, administration and management of each programmatic component. This will help inform policy decisions towards achieving the UNAIDS 95-95-95.

According to the OCA report, the Migori County Health department had low capacity in health informatics. ICT infrastructure was inadequate, no ICT based reporting and there was minimal ICT human resources and training. This project aims to bridge the gap by implementing a system that helps in the availability of ICT based reporting.

CHAPTER ONE: INTRODUCTION AND BACKGROUND

1.1 Introduction and Background

An EMR (electronic medical record) can be considered as a digital form of the traditional paper medical records for individuals. It represents a single facility's medical record, (McDonald, 1997). An EMR contains the standard clinical and medical data that is gathered in a particular office of a provider. Being a record that is in digital format, its portability and sharing across different healthcare settings is made possible, through enterprise systems that are connected to a network. Data collected by the Kenya EMR is helpful in monitoring and evaluating progress of HIV patients and interventions, (Jung, 2006).

According to Pathfinder International, (Pathfinder, 2009), Monitoring involves routine examination of the daily activities of a program in an organization to ascertain whether or not each activity is carried out within the timelines provided, utilization of resources is being done in an efficient manner, and targets for the short-term are achieved according to the work plans of the project. On the other hand, evaluation is a process that focusses on the analysis of the gathered information which will ultimately assist the management to compare the what has been accomplished by the project with the objectives that were predetermined at the start of the project and ascertain if the objectives were achieved. Evaluation also provides more important information concerning an undertaking's cost effectiveness, impact, and potential in future, (Chebole, 2015).

The health sector in Kenya is one of the most funded programmes with multiple stakeholders and partners participating in the endeavour of ensuring a healthy nation, (NACC, 2016). A number of stakeholders are today working to eradicate various diseases, including the HIV/AIDS scourge. As such interventions continue to grow, it calls for accountability and proper reporting of the results. The accuracy of the stored records in health care organizations is important in achieving this goal, (Lehoux & Miller, 2017).

The proposed scaling up of EMR implementation and usage seeks to aid the Migori County Health Department in the organized collection, tabulation, and interpretation of data and information that aims at providing a clear picture of the services rendered and to guide decision making by the management. Upon implementation, the EMR system will help in supporting the activities that aim to monitor, supervise, evaluate, research, allocation of resources, and appraisals of performance, (Abraham, Nishihara, & Akiyama, 2011).

The need for scaling up EMR was identified after keen analysis of the OCA report which identified the need for ICT based reporting, (UoN, 2017); and with consultation with the PLP mentor who emphasized of the need for quality data for the purposes of decision making.

This project sought to provide continuous information on HIV activities. It also aimed to assess the appropriateness and adequacy of the implementation, administration and management of each programmatic component. This will help inform policy decisions towards achieving the UNAIDS 95-95-95, (NACC, 2015)

According to the OCA report, the Migori County Health department has low capacity in health informatics. ICT infrastructure was inadequate, no ICT based reporting and there was minimal ICT human resources and training. This project aims to bridge the gap by implementing a system that helps in the availability of ICT based reporting, (UoN, 2017).

This project is important in helping to evaluate success of various interventions by stakeholders e.g Maryland University, USAID PATH, APHIA Plus, USAID, MCSP and help the Migori County Health Department staff find reliable information in an accurate, simplified, economical and timely manner for the purposes of decision making, (KHMFL, 2018).

1.2 Statement of the Problem

In Migori County, only 22 Health facilities have introduced some form of electronic Medical record but as yet, as far as can be ascertained, only 4 facilities have been able to successfully achieve ICT based reporting. This still is a very insignificant number of coverage when compared to the over 220 facilities in Migori County, (KHMFL, 2018). The incorporation of electronic medical records in HIV patient care will facilitate easier access to clinical data; ensure point of care recording of the data required; and also provide the abilities for gathering and analyzing HIV patients' data that facilitated outreach to populations that are discreet. This will have a cascading effect towards ensuring that the UN AIDS target 95:95:95 is achieved through efficient and effective mechanisms of managing data that will help in evidence based decision making.

The Migori County Health Department works in partnership with various stakeholders, partners and donors in fighting against HIV/AIDS. In the course of this engagement, these stakeholders put in a lot of resources in support of various activities. As these support programs continue to grow, there is need to ensure accountability and proper reporting (Huy, Hardee, Brown, & Stouffer, 2007). The Electronic Medical Records will help to galvanise these efforts and promote accountability and efficiency at care. EMRs will result in reduction of medical errors, improve safety of patients and strengthen, complement and improve clinical decision-making for the HIV/AIDS patients, (Athena Health, 2017).

Operations in any given health facility are critical to quality of service delivered. Health services are very basic to people's lives, thus there is great need to make the services more efficient and effective as much as possible. As population increases, the health facilities in county and national governments need patient data for decision-making and planning functions, (Shortliffe & Perreault, 2001). However, on the contrary, most health facilities do not deliver consistent and reliable data due to poor/manual data handling methods they employ

(McDonald, 1997). The facilities are not able to offer quality and timely service due to manual data handling and sharing. There is therefore great need for automation through introduction of an EMR system that will aid in bridging the gap, help health facilities deliver quality service to patients; aid in easy capturing, storing and access to reliable data, and also in efficient reporting. This will ease the work of Policy makers and health practitioners, improve their service delivery capabilities and provide reliable data for use by relevant authorities.

The various programs and their respective projects have set objectives and goals that are ambitious, and to achieve them, indicators for monitoring and evaluation (M&E) are necessary, (Huy, Hardee, Brown, & Stouffer, 2007), and for our case, such indicators include the following: HIV incidence prevalence; Number of clients on ART/treatment; Number of people reached by activities for prevention in the population; Number of trained healthcare workers; and Number of distributed commodities.

According to the Kenyan Health Sector: Market Study Report, (Netherlands, 2016), there is gradual achievement of interconnectivity of ICT and Health in Kenya and there is enormous opportunity for companies that develop IT solutions for the health sector. Kenya is a highly innovative player in both the IT world and the health sector. The report recommends investments in technologies for eHealth that are easy-to-use. Thus there is need to avoid complicated IT solutions since they might be off-putting to the people intended to use them.

1.3 Purpose of the Study

The project's purpose is to improve the quality of data collection, processing, storage and provide ICT based reporting; enhance the safety and efficiency of information; reduction of operational costs; improvement of care coordination between all stakeholders; and help the County Health Department to streamline its activities based on the targets set in the fight against HIV/AIDS. This will be achieved by assessing the appropriateness and adequacy of the

implementation, administration and management of each programmatic component. This will help inform policy decisions towards achieving the UNAIDS 95-95-95.

1.4 Project Objectives

1.4.1 Goal

After implementation, the project goal is to provide ICT based reporting that is aimed at the provision of continuous information on the implementation of activities.

1.4.2 Specific Objectives

The specific objectives of this project include:

- i. To determine the extent to which the Migori County Health Department uses ICT in reporting of health care.
- ii. To determine the level of organizational support in adoption and implementation of ICT based reporting at the Migori County Health Department.
- iii. To identify the gaps in adoption and implementation of ICT based reporting at the Migori County Health Department
- iv. To strengthen capacity of staff on usage of electronic medical records for ICT based reporting at the Migori County Health Department

1.5 Research Questions

- i. What is the extent to which the Migori County Health Department uses ICT in reporting of health care?
- ii. What is the level of organizational support in adoption and implementation of ICT based reporting at the Migori County Health Department?
- iii. What are the gaps in adoption and implementation of ICT based reporting at the Migori County Health Department?

- iv. How can the capacity of staff on usage of electronic medical records for ICT based reporting at the Migori County Health Department be strengthened?

1.6 Justification/Significance

Among the African countries, Kenya is among the countries with HIV high burden – the 2015 statistics showed that approximately 1.5 million people actively lived with the HIV infection, (NACC, Kenya HIV County Profiles (Maisha), 2016). Migori county has consistently remained the fourth highest contributor of new HIV infections with the prevalence rate of HIV infections at 14.3%. The prevalence of HIV in Migori county is almost 2.5 times higher than Kenya's national HIV prevalence that stands at 6% (NACC, Kenya HIV Estimates, 2015).

There are a number of stakeholders funding the fight against HIV/AIDS and thus there is need to evaluate success of various interventions by the stakeholders such as Maryland University, USAID PATH, APHIA Plus, USAID, MCSP and help the Migori County Health Department staff find information reliably in an accurate, timely, economical and simplified manner for the purposes of decision making. This will help in accessing quality information in real-time, which in turn will help to know those that have received the interventions and the mechanisms through which such interventions have been delivered to them; the target population's response to the intervention and the determination of the interventions' effectiveness.

It is against this backdrop that it becomes necessary for the Migori County Health Department to have a reliable EMR that will help in addressing these shortfalls. Funding for the health sector in Kenya keeps dwindling and as a result, hospitals must consider efficient and effective methods of operating if they are to keep afloat and still achieve the goal of providing the much needed critical care. They may need to consider measures that assist health workers come up with appropriate methods for health care delivery.

Migori County Health Department had an overall score of 2 in the Health Informatics area. This indicated that the department had low capacity in health informatics. ICT infrastructure was inadequate, no ICT based reporting and there was minimal ICT human resources and training.

1.7 Study Delimitation

Delimitation refers to a study area and population reduction so as to make the study manageable and achievable within the timeframe and budget available. This study covered the Migori County Health department including the health care facilities within Migori County.

1.8 Definition of Terms

Going to Scale- Implementation covering the whole of the geographical area under study

QGIS (Quantum Geographic Information System) - is a geographic information system that is both free and open-source. It is used to view, edit, and analyze geospatial data.

1.9 Study Organization

This project was structured into five chapters. The first chapter presents the study's background, problem statement, study purpose, objectives, research questions, justification, delimitations of the study and significant terms definitions.

The second chapter covered the project implementation methods and management plan. The section was structured into: Key institutional issues that were addressed; project activities, roles and responsibilities of stakeholders in the implementation process; Implementers, partners and beneficiaries; strategies for communication; process of documentation; risks and assumptions; the sustainability plan; work plan; outcomes; monitoring and evaluation for the project; and ethical issues addressed.

The third chapter highlighted the data collection procedures and tools. This section therefore presents: the data collection methods, data collection procedures, validity and reliability of instruments for data collection.

The fourth chapter outlined the analysis of data, presentation and interpretation of the data collected.

The fifth and final chapter outlines the summary of the findings, conclusions, recommendations.

CHAPTER 2: PROJECT IMPLEMENTATION METHODS AND MANAGEMENT PLAN

2.1 Key institutional issues addressed

The EMR system bears great promise of addressing six key functional areas that include:

i. Clinical Information Demographic data

This functional area carries the HIV patient information and includes information to identify the patient and information about the patient's clinical encounter.

In addressing this, the EMR system: Captures the patient's demographic information that includes but not limited to: the patient's name, date of birth, and gender; Manage the patient's diagnosis and recovery process; capture the medication of the patient; Capture any allergies the patient might have; capture results out of the test the patient undergoes; Capture the patients clinical encounter data ranging from: weight, height, patient's vital signs, and BMI; and capture notes in a format that is coherent and structured.

ii. Support for Clinical Decisions

This is a functional area that is key in assisting the health care staff in the clinical decision making process with the aim of enhancing care for the patient.

In this perspective, the EMR System: points out any results out of tests that will be considered abnormal and notify the care provider; Allergies can also be reported; and proper medical care can be provided.

iii. Prescription and Entry of Orders

The entry of orders implies the process that a health worker uses electronic means to key in instructions concerning a patient's treatment and care.

The EMR system facilitates the entering, acceptance, and the management of orders by providers.

iv. Reporting of Information on Health

The EMR system is very advantageous since it improves the way health care information is reported and used. To ensure that this function is achieved, the EMR system should:

- a) Produce reports out of clinical data in order to help in the improvement of quality
- b) Produce reports that are aggregated for use by government agencies and other stakeholders.

v. Confidentiality and Security of Data

Security of health data and its confidentiality is central to the implementation of EMR systems.

To achieve this end such systems should:

- a) Implement proper access control mechanisms to ensure that health care data is only accessed to authenticated and authorised individuals.
- b) Keep EMR audit trails.
- c) Follow proper password policies.
- d) Guarantee protection of data and ensuring data is well backed up,
- e) Ensure encryption.

vi. Electronic Information Exchange

The electronic medical systems work to complement other health care systems that may include systems for the laboratories, pharmacy and even other Electronic Medical Systems. This calls for the implementation of inter-operability. This can be achieved through standardization in the capturing and transmission of patient data.

2.2 Project Activities

To achieve the objectives and to address the key issues identified, the following activities were conducted:

Table 1 Project activities

ACTIVITY	What was done
1. Preparatory phase	Baseline survey, Mapping hospitals; Interviews, Document reviews
2. Stakeholder support & consensus building	Meeting with relevant stakeholders
3. Training	Training workshop
4. Implementation	Installation of both software and hardware; usability, user acceptance, and competency testing
5. Post-Implementation	Maintenance,

The scaling up process of the EMR was initiated through gaining consensus with the Migori County Health Department Management team. The team deliberated on various project matters and a baseline survey followed which helped in identifying the hospitals that will be initially covered in the scale up process. The preliminary phase addressed the budget and specifications regarding the capabilities for software and hardware and the process of their purchase, implementation structures available and those that need to be set up, and staff identification, the roles they would perform and the training needs that match the desired competencies.

The county health department provided appropriate authorization, undertook to participate and play a role in provision of any resources needed for the project including allowing staff to be away on planning mission. Upon authorization, the CHMT held a meeting to appoint a special strategic planning (SP) team, come up with a program of activities and suggest timelines. The SP team supervised formation of planning sub-committees at departmental level

2.3 Roles and Responsibilities

In the implementation and roll out of the EMR to the targeted facilities and ultimately as this will develop a roadmap of going to scale as far as the usage of EMR is concerned, there are various stakeholders who played a key role. They include:

Table 2 Roles and Responsibilities

Stakeholder	Roles and responsibilities
CHMT	Consensus building, Overall direction on the process implementation of the project
Fellow	Change agent and implementer
IT staff/Medium Term Fellows	Provide technical support and end user EMR support; Assist in purchasing and configuring of software, hardware, operating systems; Updating the system and software; Supervising the implementation process.
<p>Facility-Based users</p> <p>1. Clerical staff – the staff that the clients have a first encounter with when they visit the facility. They may include: the receptionist, nurse or any other support staff.</p> <p>2. Data entry staff – those that enter data into the system. They may include the data clerks, or the clinical officers.</p>	<ol style="list-style-type: none"> 1. New patient registration scheduling patient visits. 2. Patients’ records retrieval. 3. Patient data entry into EMR system. 4. Clinical workflow coordination. 5. Ensuring quality data. 6. Report generation.

Stakeholder	Roles and responsibilities
3. Data managers – Health Records and Information officers, or the clinician in charge of a clinic.	
High Level Managers Those that make use of the collected information for decision making. Such as: Administrators of Facilities, Clinic heads	They are very important and must be involved in every step of the installation of EMR.

2.4 Implementers, Partners and Beneficiaries

This project consisted of diverse stakeholders who include the following:

1. PLP (Migori County Health Department)
2. UoN (University of Nairobi)
3. University of Washington
4. CDC
5. Palladium
6. Hospital Staff
7. HIV patients

2.5 Communication strategies/plans/processes

Communication is key in ensuring the success of this project. The communication strategies that were applied in this project included the involvement of all the stakeholders. This was an iterative process that involved a mix of communication strategies that included board room

meetings, workshops, interviews, face to face meetings and consultations among all the relevant stakeholders.

2.6 Documentation process

The UHIV reporting tools that include the weekly and monthly reports were used for the purpose of reporting on the progress of activities of this project. This reporting was done regularly in order to enable UNITID to submit the reports to the implementing partners that include the University of Washington and CDC/PEPFAR.

2.7 Risks and assumptions

The following are part of the risks and assumptions in the process of the implementation of this project:

1. That the funding will be available until the completion of all the activities.
2. That the project will run for the 9 months as scheduled.
3. That there will be enough IT personnel employed to manage the project during pre-implementation and post-implementation to support the EMR system.
4. That the PLP will buy into the project and support the activities.
5. That the project funding will be sufficient.
6. That there is network connectivity for internet in the selected facilities.
7. That the EMR software has already been acquired by the PLP.

2.8 Sustainability plan

A key question that must be answered in the course of the implementation of this project is how the organization will maintain the recommended EMR over time. For sustainability of the project, the following should be done:

1. In order to ensure ownership, the Health Managers should be involved in the implementation of the EMR system.

2. Implementation of the EMR systems should be should be aimed at achieving the required functioning and operating standards while minimization of the TCO (Total Cost of Ownership).
3. EMR system implementation should adopt an open source software where possible, to reduce on the costs of licensing and encourage the EMR community to contribute towards system development.
4. Minimizing the requirements for resources by ensuring that only the essential resources are acquired hence ensuring sustainability by the PLP.
5. Staff training
6. Ongoing technical support required from the IT staff or from trained staff.
7. For the purpose of garnering both political and financial support as the project goes to scale, there is need to identify project champions.

2.9 Work plan

The table below presents the work plan for the EMR scale up process:

Table 3 Work Plan

Activity	Specific Activities	Output	Responsibility	Timeframe	Cost
Stakeholder involvement	Consensus building	Acceptance of Project	Fellow	1 week	
Needs determination	Site Infrastructure readiness, budget for the various needs eg trainings required, hardware and software	Implementation activity report	Fellow	1 Week	

Activity	Specific Activities	Output	Responsibility	Timeframe	Cost
Installation of EMR	Installation of the software, Configuring it and commissioning its usage	Installed software	Fellow/Palladium	1 week	
EMR use Training	Training of EMR staff	Number of staff trained on EMR use	Fellow/Palladium	1 week	
Mentorship / Assisted usage of the EMR system	Mentorship	A count of the sessions of mentorship conducted	Fellow/ Medium term trainee	6 months/ continuous	
System Support	System maintenance, software update, antivirus software installation	Support Reports	IT personnel	Continuous	
EMR system Monitoring & evaluation	Monitoring and Evaluation	M&E Reports	PLP health team	Continuous	
Post-implementation supervision	Supervision	Supervision reports	PLP health team	Continuous	

2.10 Gantt Chart

	2018									
	January	February	March	April	May	June	August	September	October	
Activities										
Proposal Development										
EMR installation										
EMR use Training										
Assisted EMR system use/mentorship										
System Support										
EMR Monitoring and evaluation										
Post implementation supervision										

Project reporting and closure									
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2.11 Project Outcomes

Upon implementation, the EMR helped the PLP to have a system that is able to maintain the confidentiality, integrity and the validity of HIV/AIDS patients’ data; Guarantee security through proper checks to prevent access by unauthorised individuals who may misuse the HIV data collected, maintained and stored by the EMR system.

The trained staff acquired the capacity and capability to effectively and efficiently use the system and this ultimately makes available accurate and timely information. This will facilitate ICT based reporting that will ultimately help in ensuring that policy decisions in the fight against HIV/AIDS are made out of evidence based decision making.

2.12 Project Monitoring and Evaluation

Any implementation plan and process must have the Monitoring and evaluation component as an integral element.

Monitoring is considered a continuous and ongoing process focussed on the collection of data in the course of implementing a project and is aimed at determining if the implementation process is on track. Evaluation, on the other hand is used to measure the precision with which the implementation objectives are being achieved.

In determining how well the EMR project’s goals are being met, evaluation answers the following questions:

- a) Is the EMR improving care for the patient?
- b) Is the EMR improving the keeping of records?

c) Is the EMR improving reporting?

Since monitoring and evaluation is a process that is continuous, it is important that it is carried out for the EMR's entire life. This way of assessing the implementation process ensures that everything is going according to plan. Out of this, important lessons will be generated and this will go a long way in informing any additional or future roll out attempts for EMR.

Methodologies and strategies to evaluate and monitor EMR implementations may vary:

1. Key Milestones should be identified and documented.
2. Indicators and important questions that will aid the process of evaluating the project should be defined.

2.13 Ethical Issues

In the course of project implementation, any information gathered was kept in confidence and there was no prejudice for issues regarding data sources. Participation was also based on informed consent. Any information so gathered that is of benefit to our partners will be shared appropriately. Since implementation will be in Hospital environments, utmost care will be taken.

CHAPTER THREE: DATA COLLECTION PROCEDURES AND TOOLS

3.1 Introduction

This section's focus is on the process of collecting data, the procedures, tools, instruments for conducting research, and the instruments' validity and reliability.

3.2 Data Collection Methods

Both the interview and questionnaire methods for data collection were employed. (Kothari, 2004) opines that a questionnaire has questions presented in a certain order on a form. The questionnaire was given to respondents within the Migori County Health Department and they wrote down their responses on their own. To achieve the objective of this project, the questionnaire comprised both closed questions and open ended questions.

The interview method of collecting data contains the presentation of verbal and oral stimuli, (Kothari, 2004). The fellow administered personal interviews to key stakeholders in the Migori County Health Department. Their responses were used to shape the implementations of the objectives of the project.

3.3 Data Collection Procedures

Prior to collecting information, the fellow requested for and obtained authority from the Migori County Health Department to conduct the study in their organization. A pilot test of the questionnaire was conducted using randomly selected respondents. Errors and ambiguous questionnaire items were removed. The fellow booked appointments with the stakeholders who were selected as respondents to enable quick data collection.

3.4 Instruments Validity

The instruments' validity is a crucial pointer to the accuracy of the collected data. It provides the degree to which the measuring instrument's established differences imitate true differences amongst those being tested, (Kothari, 2004). To achieve this purpose, the questionnaire was piloted in order to validate the research instrument being used based on three criteria: validity

of the Criteria, Construct validity, and Content validity. The piloting was done by giving the questionnaire to ten respondents. Necessary corrections were then made to the questionnaire.

3.5 Reliability of the instruments

Attainment of a co-efficient of 0.5 or more signifies that the instrument can be used for study, (Best & Khan, 2006). In the current study, the instrument is highly reliable because the correlation coefficient that was obtained confirmed the same. Pearson's product moment correlation co-efficient was used to correlate the scores and this was taken as a reliability estimate.

3.6 Data Analysis Technique

The process of data analysis is aimed at the organization of the information collected and drawing conclusions based on the objectives, (Kothari, 2004). The collected data was edited to remove errors, coded, and finally analysed. Since the data collected was both quantitative and qualitative, coding was done and keyed into SPSS version 21.0 software. Descriptive statistics were used in analysis, more specifically frequency distribution tables, and percentages. The data was also graphically summarised and presented in form of bar charts and for quick interpretation to make it easy to understand the findings.

CHAPTER FOUR: DATA ANALYSIS, PRESENTATION AND INTERPRETATION

4.1 Introduction

This part presents the findings on the extent to which the Migori County Health Department uses ICT in reporting of health care; the level of organizational support in adoption and implementation of ICT based reporting; and the training needs and gaps in adoption and implementation of ICT based reporting.

4.2 Questionnaire Response Rate

A total of 37 questionnaires out of the distributed 40 questionnaires were filled and returned, representing a response rate of 92.5 percent. (Mugenda & Mugenda, 2003) contended that a 50 percent rate of response is satisfactory for analysis and presentation of data. Therefore, the 92.5 % rate of response for the present study is acceptable.

4.3 Demographics

4.3.1 Age of the Respondents

The respondents' ages were distributed as shown in the table below. It is clear that a majority of the respondents were aged between 25-34 years (48.6%). This distribution bears testament of a largely youthful workforce because out of the 37 respondents, 24 respondents were aged below 35 years.

Table 4 Age of respondents

	Age of respondent				Total
	18-24	25-34	35-44	45-54	
Female	4	8	4	2	18
Male	2	10	5	2	19
Total	6	18	9	4	37

4.3.2 Gender of the respondents

This item sought information of the respondents' gender. Of all the respondents, 19 were male (representing 51.4%); and 18 were female which translates to 48.6%.

Table 5 Gender of the respondents

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Female	18	48.6	48.6	48.6
Valid Male	19	51.4	51.4	100.0
Valid Total	37	100.0	100.0	

4.3.3 Length of Service

The study also sought to establish the length of service in terms of years served by the respondents at the Migori County Health Department. This is important in order to understand the ways in which the EMRs have affected their service in the county. A majority of the participants (81.1 %), had worked at the Migori County Health Department for less than five years.

Table 6 Length of Service

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Less than 1 year	7	18.9	18.9	18.9
Valid 1-4 Years	23	62.2	62.2	81.1
Valid 5-9 Years	7	18.9	18.9	100.0
Valid Total	37	100.0	100.0	

Table 7 further breaks down the number of years served by the respondents in relation to the position held at the Migori County's Health department.

Table 7 Length of serves and position held

	How long have you been working in your present organization			Total
	Less than 1 year	1-4 Years	5-9 Years	
HRIO	6	9	2	17
Assistant Pharmacy in-charge	0	1	0	1
Mentor Mother	0	5	0	5
Pharmacist	0	1	1	2
Pharmacist	0	1	0	1
Data Clerk	0	1	0	1
Clinical Officer	0	2	0	2
Postion Heald by Counselor	1	1	0	2
Peer Educator	0	1	0	1
Nurse	0	1	1	2
Senior Human Resource Officer	0	0	1	1
County Lab Coordinator	0	0	1	1
Coordinator Vector-borne & Neglected Tropical Diseases	0	0	1	1
Total	7	23	7	37

4.3.4 Positions Held by the respondents

The present study sought to establish the positions held by the respondents. Table 8 presents a summary of the various positions. It is clear from the analysis that Health Records and Information Officers (HRIOs) formed the bulk of the respondents.

Table 8 Positions Held by Respondents

	Frequency	Percent	Valid Percent	Cumulative Percent
HRIO	17	45.9	45.9	45.9
Assistant Pharmacy in-charge	1	2.7	2.7	48.6
Mentor Mother	5	13.5	13.5	62.2
Pharmacist	2	5.4	5.4	67.6
Pharmacist	1	2.7	2.7	70.3
Data Clerk	1	2.7	2.7	73.0
Clinical Officer	2	5.4	5.4	78.4
Counsellor	2	5.4	5.4	83.8
Valid Peer Educator	1	2.7	2.7	86.5
Nurse	2	5.4	5.4	91.9
Senior Human Resource Officer	1	2.7	2.7	94.6
County Lab Coordinator	1	2.7	2.7	97.3
Coordinator Vector-borne & Neglected Tropical Diseases	1	2.7	2.7	100.0
Total	37	100.0	100.0	

4.4 ICT Usage in Reporting

ICT based reporting is a key element and a major aspiration of the various policy statements in the county and in the country. Compliance to the usage of ICT based reporting

4.4.1 Categories for adoption of ICT Reporting

From the results presented in table 9 below, it is clear that people have different degrees of adoption of technology. Since the Migori County Health Department is largely comprised of young people, 62.2 % identified themselves as innovators, meaning that they will quickly adopt to new innovations and that they are willing to take risks and try new things out.

Table 9 ICT Reporting Adoption Categories

When it comes to technology, what best describes you?

	Frequency	Percent	Valid Percent	Cumulative Percent
Laggards	1	2.7	2.7	2.7
Late Majority	3	8.1	8.1	10.8
Early Majority	3	8.1	8.1	18.9
Early Adopters	7	18.9	18.9	37.8
Innovators	23	62.2	62.2	100.0
Total	37	100.0	100.0	

4.4.2 Respondents' Practical Knowledge of EHRs

The study sought to establish the respondents' level of practical knowledge of Electronic Health Records. The results are summarized in table 10 below:

Table 10 Respondents' EHRs Practical Knowledge

Rate your practical knowledge of EHRs

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Excellent	6	16.2	16.2
	Good	16	43.2	59.5
	Fair	14	37.8	97.3
	Poor	1	2.7	100.0
	Total	37	100.0	

Out of the 37 respondents, 16.2 percent consider themselves “excellent”; 43.2% of the respondents consider themselves “good” in the usage of the Electronic Health Records. A significant number (37.8%) of the respondents consider themselves fair in using the EHRs. 2.7 % of the respondents consider themselves “poor” in using the EHRs.

4.4.3 Respondents' feelings on whether there are Problems with uptake of ICT

75.7% of the respondents believe that there are problems with the uptake of ICT in reporting in the Migori County health department. 24.3 percent hold the view that presently, there are no problems in the uptake of ICT.

Table 11 Respondents' feelings on whether there are Problems with uptake of ICT

Do you think there are problems with the uptake of ICT ?

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	28	75.7	75.7
	No	9	24.3	100.0
	Total	37	100.0	

4.4.4 Unique ICT Uptake Problems

The respondents rated the following as the unique problems in the uptake of ICT usage and reporting. 29.7% identified insufficient hardware infrastructure as a problem. 18.9% felt that more staff needed training in QGIS; 10.8% felt that EHRs uptake was not to a satisfactory level. The Majority, 40.5% felt that there were problems in the uptake of all the above.

Table 12 Unique ICT Uptake Problems

Which of the following do you think has unique uptake problems?

	Frequency	Percent	Valid Percent	Cumulative Percent
EHR	4	10.8	10.8	10.8
Hardware	11	29.7	29.7	40.5
Valid QGIS	7	18.9	18.9	59.5
All	15	40.5	40.5	100.0
Total	37	100.0	100.0	

4.4.5 Factors Limiting use of ICT

The majority, 27% contend that inadequate ICT infrastructure, which includes inadequate computers limit the usage and adoption of ICT based reporting. A significant number of respondents, 21.6% felt that lack of training as a limiting factor; a similar percentage, 21.6% reported that Lack of internet connectivity or poor internet connectivity is a limiting factor. Others are; Staffing (10.8%), knowledge gap (8.1%), system breakdown 5.4%, irregular updates 2.7%, and inadequate funds 2.7%

Table 13 Factors Limiting use of ICT

Factors Limiting use of ICT by HRIOs and other staff

	Frequency	Percent	Valid Percent	Cumulative Percent
Knowledge Gap	3	8.1	8.1	8.1
Staffing	4	10.8	10.8	18.9
Inadequate ICT infrastructure / Computers	10	27.0	27.0	45.9
Irregular Updates	1	2.7	2.7	48.6
Lack of training	8	21.6	21.6	70.3
Lack of or poor internet connectivity	8	21.6	21.6	91.9
System Breakdown	2	5.4	5.4	97.3
Inadequate Funds	1	2.7	2.7	100.0
Total	37	100.0	100.0	

4.4.6 Consequences for not Using ICT in Reporting

The respondents identified the consequences ascribed to not using ICT in reporting. Among the identified consequences are: poor data quality (13%); loss of data/ misplacement of documents (7%); poor client management (5%); lagging behind (5%); increased cost (4%); inconvenience in information retrieval (3%).

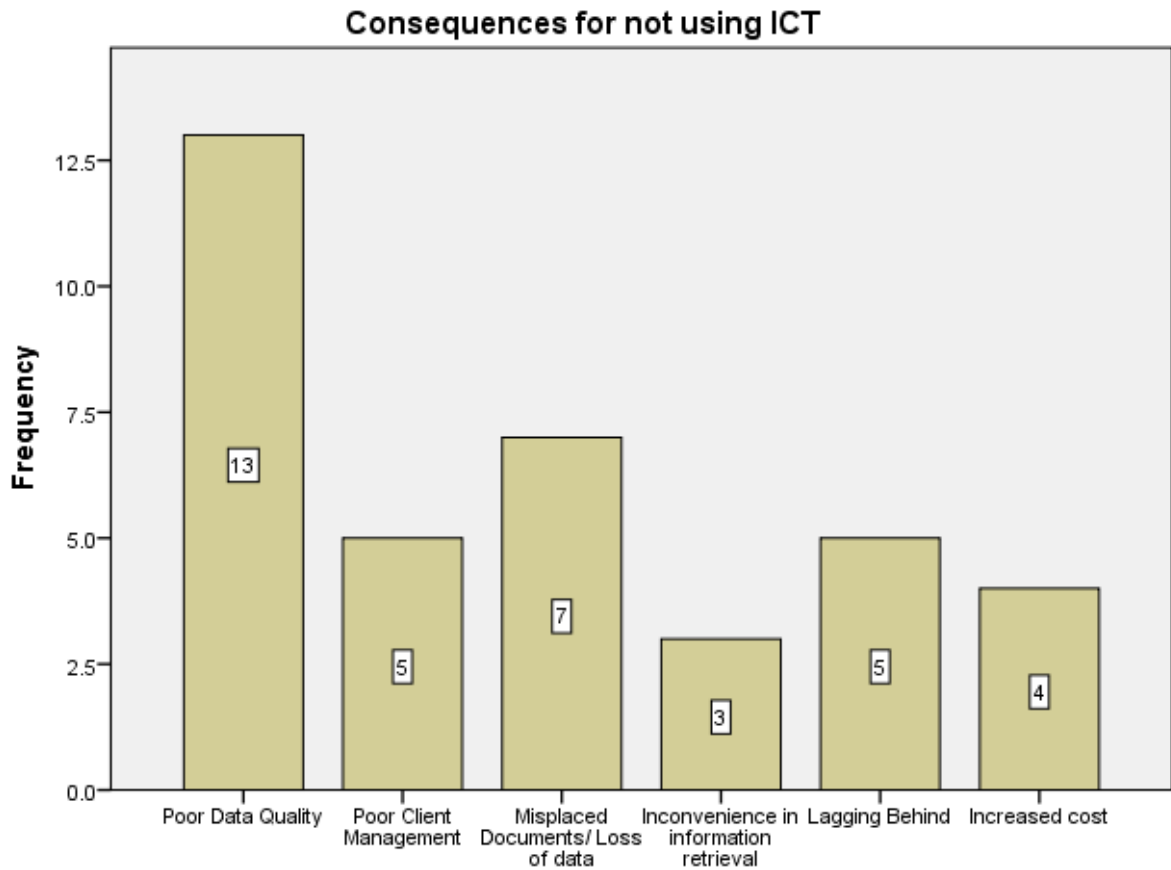


Figure 1 Consequences for not Using ICT in Reporting

4.4.7 EMR Coverage in Migori County

The study sought to establish the number of facilities using EMR within the County. Out of the 216 facilities within the county, only 22 facilities (10.16%) are using EMR for reporting purposes. 89.81% of the facilities, which translates to 195 facilities are not using EMR.

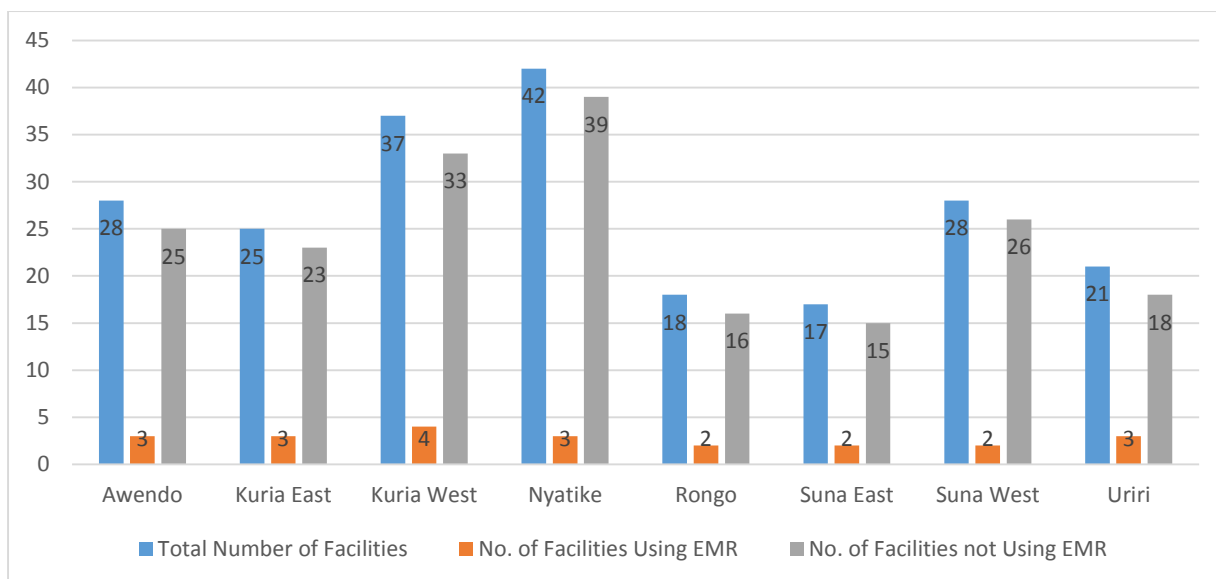


Figure 2 Distribution of EMR Coverage in Migori County

It is worthy nothing that all the sub county hospitals are covered by the EMR.

Table 14 EMR Coverage per Sub County

SUBCOUNTY	NO. OF Sub county FACILITIES COVERED	OF Facility Covered?
Awendo	3	Yes
Kuria East	3	Yes
Kuria West	4	Yes
Nyatike	3	Yes
Rongo	2	Yes
Suna East	2	Yes
Suna West	2	Yes
URIRI	3	Yes
Total	22	

4.5 Organizational Support in Adoption and Implementation of ICT Based Reporting

The researcher sought to understand the level of organizational support for the adoption and the implementation of ICT Based reporting in Migori County's health department. This was a key objective because it will ultimately help in the identification of any gaps and ways in which they can be sealed.

4.5.1 Leadership Support in ICT

A majority of the respondents, 91.9% felt that the Migori County Health Department encourages the use of new ICT tools in carrying out their day to day activities. Only 8.1% felt otherwise. This implies that the working environment is conducive for usage of ICT.

Table 15 Organization leadership encourage the use of new tools/technology/software

Does your organization leadership encourage the use of new tools/technology/software?

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Yes	34	91.9	91.9	91.9
No	3	8.1	8.1	100.0
Total	37	100.0	100.0	

4.5.2 Experimenting with New tools

Responding to the question whether the staff at the Migori County Health Department experiment with new tools for ICT, the majority (45.9%) responded in the affirmative. 27% responded that they sometimes experiment, 16% never experiment and 2.7 percent somewhat experiment with the tools.

Table 16 Experimenting with New tools

Do you experiment with new tools/software/technologies?

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Yes	17	45.9	45.9	45.9
Yes, Somewhat	1	2.7	2.7	48.6
Sometimes	10	27.0	27.0	75.7
Not very much	3	8.1	8.1	83.8
Never	6	16.2	16.2	100.0
Total	37	100.0	100.0	

4.5.2 Reasons for not Experimenting with new tools

The study also sought to understand why the participants do not experiment with new tools for ICT. The majority, 40.5% identified technological limitations as the reason behind not experimenting. 16.2% said it is expensive, 13.5% are yet to get around the use of ICT, 10.8 percent felt that there was no leadership support, 8.1% felt that it is difficult to use technology, 5.4% do not have enough time due to the enormity of the tasks that they perform and a similar 5.4% responded that they did not see any use for experimenting with new technologies.

Table 17 Reasons for not Experimenting with new tools

Why don't you experiment with new tools/software/technologies?

	Frequency	Percent	Valid Percent	Cumulative Percent
I just haven't gotten around it	5	13.5	13.5	13.5
No time	2	5.4	5.4	18.9
Don't see use for it	2	5.4	5.4	24.3
Valid Technological limitations	15	40.5	40.5	64.9
No leadership support	4	10.8	10.8	75.7
Too expensive	6	16.2	16.2	91.9
It seems too hard	3	8.1	8.1	100.0
Total	37	100.0	100.0	

4.5.3 Rate of Digital Transformation

This present study also sought to determine the rate of digital transformation in the county's health department. This is a key question that will help put the level of organizational support into perspective and understand their commitment levels to digitization of reporting in Migori County Health Department. The majority, 37.8%, felt that the pace of digital transformation was too slow. 16.2% felt that it was way too slow. Cumulatively, 54.1% of the respondents were dissatisfied with the rate of digital transformation. 29.7% felt that the rate was just right, 8.1% felt that it was a little too fast, and another 8.1% felt that it was way too fast. So this implies that the county health department's leadership should take appropriate measures to ensure that ICT reporting reaches every facility in the county.

Table 18 Rate of Digital Transformation

Pace of Digital transformation

	Frequency	Percent	Valid Percent	Cumulative Percent	
Valid	Way too slow	6	16.2	16.2	16.2
	A little too slow	14	37.8	37.8	54.1
	About right	11	29.7	29.7	83.8
	A little too fast	3	8.1	8.1	91.9
	Way too fast	3	8.1	8.1	100.0
	Total	37	100.0	100.0	

4.5.4 MCHD Approach towards use of technology

The project also sought to find out the department’s approach towards technology. This aimed at understanding the county’s approach to innovation and technology. The majority, 43.2 percent felt that the approach was average. This means that there is still room for improvement and that the county could do more to support technological advancements in all its perspectives, more so in the ICT reporting using EMR that was the centre of this study. 13.5% of the respondents felt that the approach was slow; 10.8% felt that it was ordinaryl another 10.8% felt that it was proactive. 8.1% felt the management was reluctant; 5.4 felt that it was lagging; 2.7 said that it was reactive, inconsistent and another similar percentage, 2.7 felt it was strategic.

Table 19 Department's approach towards technology

Department's approach towards technology

	Frequency	Percent	Valid Percent	Cumulative Percent
Ordinary	4	10.8	10.8	10.8
Strategic	1	2.7	2.7	13.5
Lagging	2	5.4	5.4	18.9
Reluctant	3	8.1	8.1	27.0
Average	16	43.2	43.2	70.3
Inconsistent	1	2.7	2.7	73.0
Slow	5	13.5	13.5	86.5
Reactive	1	2.7	2.7	89.2
Proactive	4	10.8	10.8	100.0
Total	37	100.0	100.0	

4.6 Gaps in adoption and implementation of ICT based reporting

Key to this study was the objective that was aimed at unearthing the gaps in the adoption and implementation of ICT based reporting at the Migori County Health Department. Bridging these gaps is key to ensuring the full adoption and implementation of ICT Based reporting at the Migori County Health Department.

4.6.1 Specific uptake problems

The respondents, when probed about the specific ICT uptake problems of EHRs, Hardware, and QGIS; the majority, 15%, felt that all the mentioned options had uptake problems. Rating the three options separately, 11% felt hardware was inadequate, 7% felt that they needed training on QGIS, 4% wanted more training and installation of the EHRs in the whole county. However, it is worth noting that there are deficiencies in all the areas and thus more has to be done to bridge those gaps

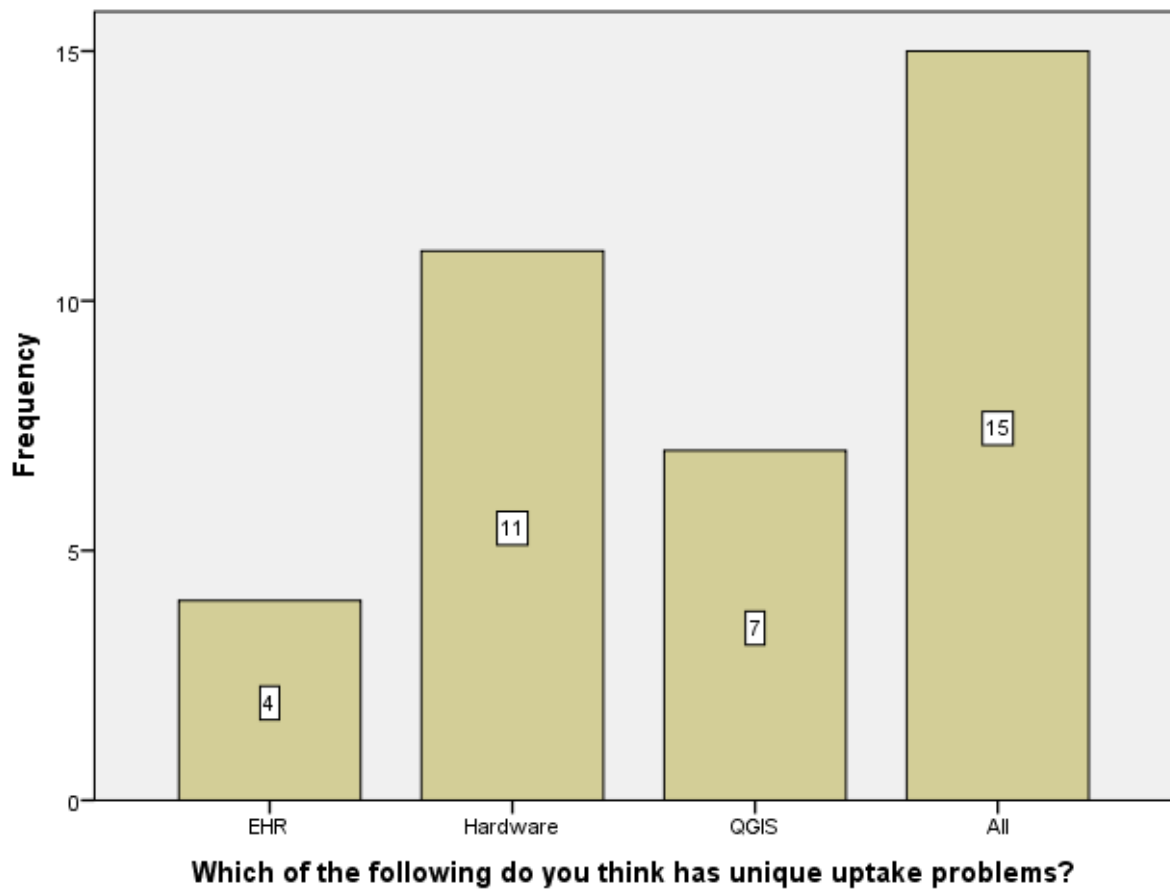


Figure 3 Specific uptake problems

4.6.2 Use of ICT Limiting Factors

The respondents identified the factors that are limiting the uptake of ICT in the County’s Health Department, albeit with varying degrees of agreement. Among the factors identified include: Inadequate ICT infrastructure and insufficient computers (10%), Lack of training (8%), lack of or poor internet connectivity (8%), inadequate staffing (4%), knowledge gap (3%), system breakdown (2%), inadequate funds (1%), and irregular updates (1%). It is important to note that this are gaps that should be addressed in order to ensure complete adoption and implementation of ICT based reporting in the county.

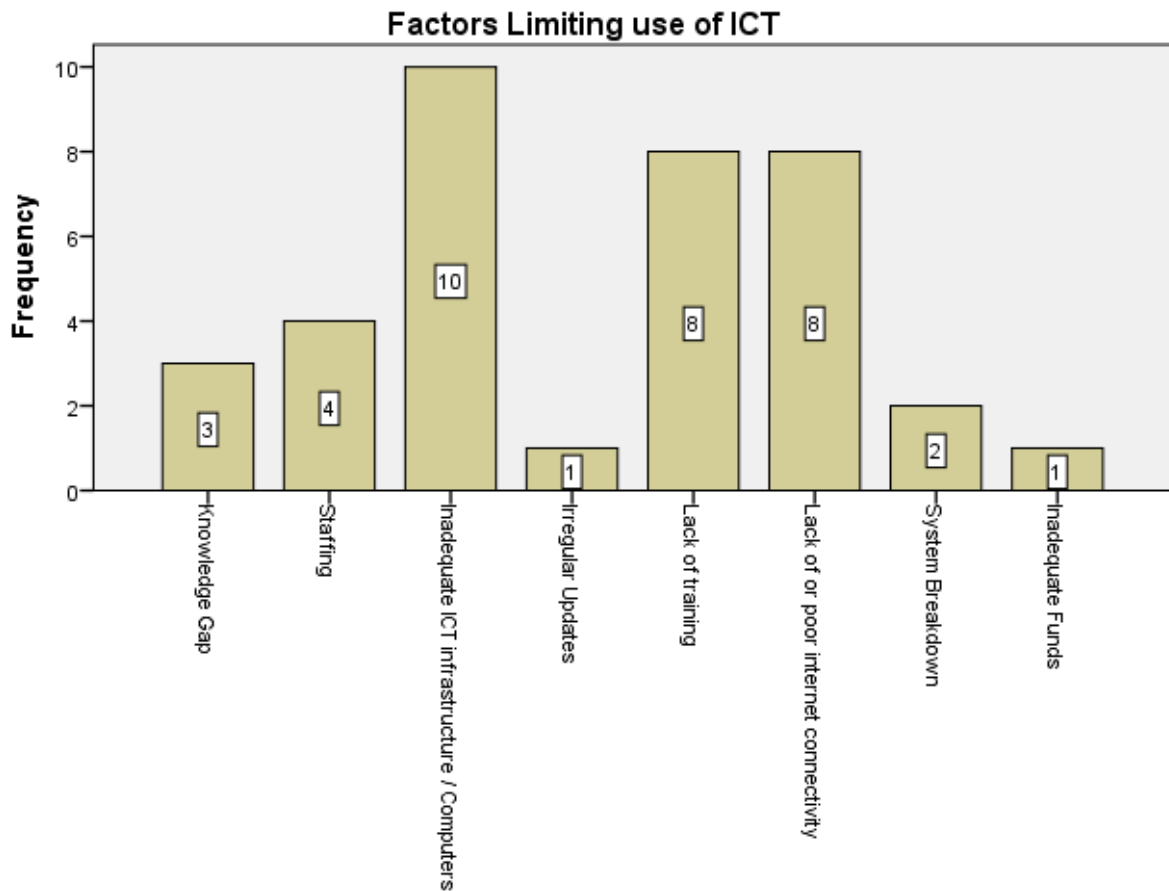


Figure 4 Factors Limiting Use of ICT

4.6.3 Reasons for not Experimenting with new technologies

The respondents gave varying reasons as to why they do not experiment with new technologies. The reasons range from: technological limitations (15%); too expensive (6%); not being well conversant with technology (5%); lack of support from organizational leadership (4%); difficult (3%); lack of time (2%); to not seeing any importance of experimenting with Technology (2%). There is therefore greater need to ensure that these issues are addressed in order to create a human resource base that is adventurous, proactive and committed towards achieving ICT based reporting.

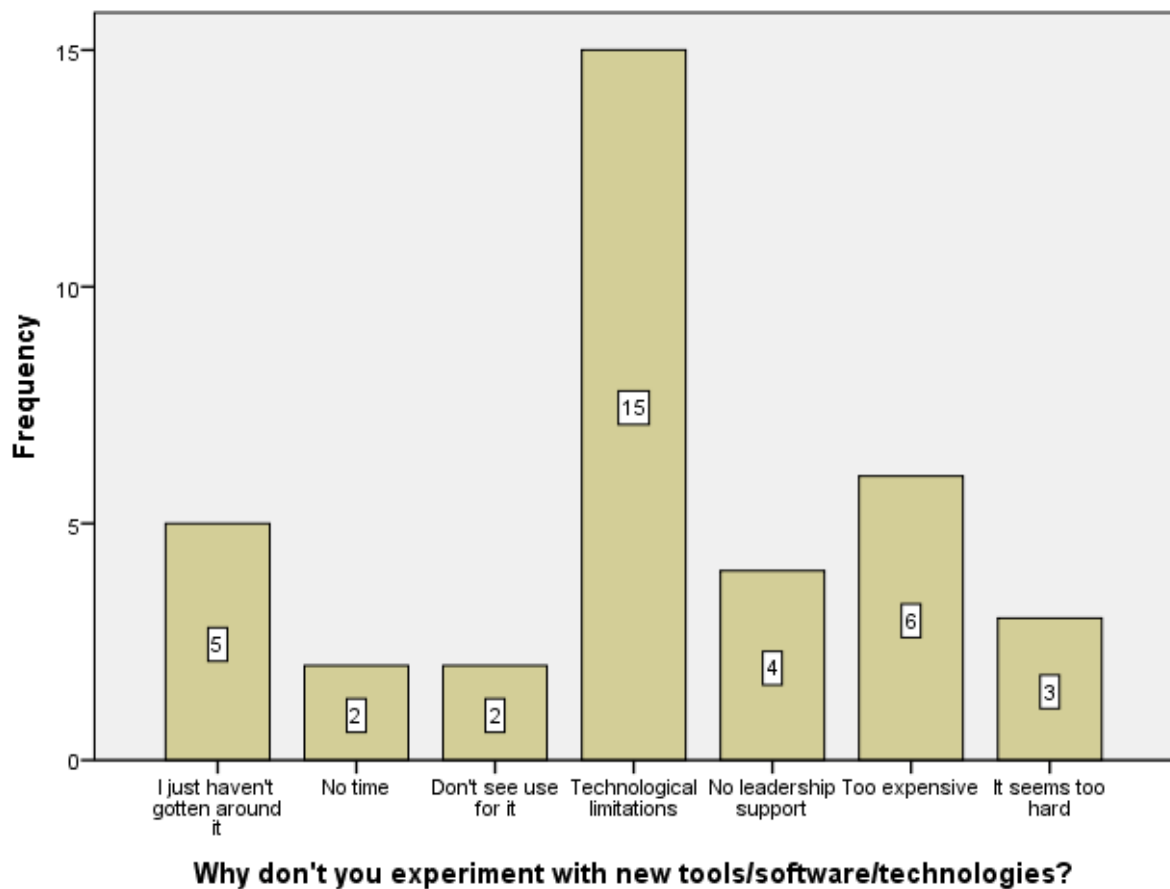


Figure 5 Reasons for not Experimenting with new technologies

4.7 Strengthening capacity of staff on usage of electronic medical records for ICT based reporting

The goal of this project was to provide ICT based reporting that is aimed at the provision of continuous information on the implementation of activities. This could only be made possible by implementing interventions that are geared towards the achievement of this goal. The implementation of the EMR is key to ensuring that this objective is made. Therefore, strengthening of the capacity of the health care staff at the county health department is very crucial in achieving this end. Activities that were conducted include training of staff and the acquisition of hardware and installation of software.

4.7.1 Training

4.7.1.1 EMR Training

As part of the implementation process, it became necessary that staff be trained on the usage of EMR. Twenty (20) staff were selected based on need basis from the different departments within the Migori County Health Department. The staff then underwent a two-day vigorous and hands-on training to equip them with the requisite knowledge and skills to enable them work comfortably with the IQ Care EMR. Upon completion of the training, the staff were requested to respond to a post-training questionnaire that was aimed at ascertaining the efficacy of the training exercise. Specifically, the questionnaire focussed on five areas that included logging into the system, searching and retrieving patient records, new patient registration, navigation, and viewing of scheduled appointments.

Table 20 EMR Post-training Questionnaire

Checkpoint	Number of Participants who could perform the tasks successfully	Number of Participants who could not perform the tasks successfully
Ability to successfully log into the EMR system	20	0
Ability to do a successful search and retrieval of patient records	20	0
Ability to successfully register new patients	20	0
Ability to do a successful patient encounter navigation	20	0
Ability to view scheduled appointments for patients	20	0

All the twenty (100%) participants were able to successfully log into the system, search and retrieve records for patients, register new patients, navigate, and view scheduled patient appointments.

4.7.1.2 QGIS Training

QGIS is a system that is used to present geographic information. It can be used to view, edit, and analyze geospatial data. Selected members of the County Health Management Team (CHMT) who were 20 in number participated in the training that lasted for two days. The distribution is shown in table 21 below. This was important because the knowledge gained out of this training could be used to help in mapping out of outbreaks and HIV incidences and also to understand geospatial data.

Table 21 Distribution of staff trained on QGIS

Position Held	Number of Participants
County Health Director	1
County HRIO & Assistant CHRIO	2
HRIOs	6
Assistant Pharmacy in-charge	1
Pharmacist	3
Clinical Officer	2
Senior Human Resource Officer	1
Senior Human Resource Officer	1
Coordinator, Vector-borne & Neglected Tropical Diseases	1
County M&E Officer	1
County AIDS Coordinator	1
TOTAL	20

After the training exercise, the participants were requested to fill a questionnaire that was aimed at ascertaining the issues that might have arisen from the training exercise. The participants identified key areas that needed to be emphasized on so that they may be able to master the usage of the QGIS.

Table 22 Issues to be addressed

Issue	Number of Participants
More time for training	17
More funding to facilitate training	10
Power outages	8
Purchase of more computers	9

It is apparent from table 22 above that the staff had a yearning for the QGIS training. However, with the limited resources, much more needs to be done. Among the issues that need to be addressed include allocating more time for the training, more funding to facilitate the training, overcome power outages by acquisition of alternative power sources, and the purchase or acquisition of more computers.

4.7.2 Acquisition of Hardware and Installation software at the facility

A desktop computer was purchased that will help to support EMR implementation. Additionally, a UPS (Uninterrupted Power Supply) was purchased. This is important because the facility will be able to protect installed hardware, data, and telecommunication equipment from damage that may be caused by blackouts and brownouts. Other hardware equipment that were acquired included the purchase of a router and cables that were used for networking.

On the part of software acquisition, IQ care is open source and readily available. Only technical expertise was required to help in training the users on its usage. Antivirus software was

purchased to help protect the computers against virus attacks. Other software that were purchased included the Microsoft office suit and the windows operating system.

CHAPTER FIVE: SUMMARY OF FINDINGS, CONCLUSIONS AND RECOMMENDATIONS

5.1 Introduction

This section summarizes the study's findings, and presents conclusions and recommendations. The study's objectives have been used in the summarization of the findings.

5.2 Summary of Findings

This project aimed at scaling up implementation and usage of the Electronic Medical Records in Migori County in order to support ICT based reporting. The project was guided by three objectives. The first objective sought to determine the extent to which the Migori County Health Department uses ICT in reporting of health care; the second objective sought to determine the level of organizational support in adoption and implementation of ICT based reporting at the Migori County Health Department. The third objective sought to identify the gaps in adoption and implementation of ICT based reporting at the Migori County Health Department. From the data that was collected and analyzed; the implementer has summarized the findings of this project in the table below.

Table 23 Summary of Findings

Objective	Findings
Extent to which the Migori County Health Department uses ICT in reporting of health care	Out of the 216 facilities within the county, only 22 facilities (10.16%) are using EMR for reporting purposes. 89.81% of the facilities, which translates to 195 facilities are not using EMR. It is worthy nothing that all the 8 sub county hospitals are covered by the EMR

Objective	Findings
	<p>It is clear from the results that the Migori County Health Department is largely comprised of young people, 62.2 % identified themselves as innovators. By description, innovators will quickly adopt to new technologies and that they are willing to take risks and try new things out.</p> <p>On the practical knowledge of EMRs, out of the 37 respondents, 16.2 percent consider themselves “excellent”; 43.2% of the respondents consider themselves “good” in the usage of the Electronic Health Records. A significant number (37.8%) of the respondents consider themselves fair in using the EHRs. 2.7 % of the respondents consider themselves “poor” in using the EHRs.</p>
<p>Organizational Support in Adoption and Implementation of ICT Based Reporting</p>	<p>From the findings, a majority of the respondents, 91.9% felt that the Migori County Health Department leadership encourages the use of new ICT tools in carrying out their day to day activities. Only 8.1% felt otherwise. This implies that the working environment is conducive for usage of ICT.</p>

Objective	Findings
	<p>When responding to Migori County Health Department’s approach towards use of technology, the majority, 43.2 percent felt that the approach was average. This means that there is still room for improvement and that the county could do more to support technological advancements in all its perspectives, more so in the ICT reporting using EMR that was the centre of this study. 13.5% of the respondents felt that the approach was slow; 10.8% felt that it was ordinary another 10.8% felt that it was proactive. 8.1% felt the management was reluctant; 5.4 felt that it was lagging; 2.7 said that it was reactive, inconsistent and another similar percentage, 2.7 felt it was strategic.</p> <p>When the participants were asked why they do not experiment with new tools for ICT, the majority, 40.5%, identified technological limitations as the reason behind not experimenting. 16.2% said it is expensive, 13.5% are yet to get around the use of ICT, 10.8 percent felt that there was no leadership support, 8.1% felt that it is difficult to use technology, 5.4% do not have enough time due to the enormity of the tasks</p>

Objective	Findings
	<p>that they perform and a similar 5.4% responded that they did not see any use for experimenting with new technologies.</p> <p>On then rate and pace of digital transformation, the majority, 37.8%, felt that the pace of digital transformation was too slow. 16.2% felt that it was way too slow. Cumulatively, 54.1% of the respondents were dissatisfied with the rate of digital transformation. 29.7% felt that the rate was just right, 8.1% felt that it was a little too fast, and another 8.1% felt that it was way too fast. So this implies that the county health department’s leadership should take appropriate measures to ensure that ICT reporting reaches every facility in the county.</p>
Gaps in adoption and implementation of ICT based reporting	<p>The respondents, when probed about the specific ICT uptake problems of EHRs, Hardware, and QGIS; the majority, 15%, felt that all the mentioned options had uptake problems. Rating the three options separately, 11% felt hardware was inadequate, 7% felt that they needed training on QGIS, 4% wanted more training and installation of the EHRs in the whole county. However,</p>

Objective	Findings
	<p>it is worth noting that there are deficiencies in all the areas and thus more has to be done to bridge those gaps</p> <p>The respondents identified the factors that are limiting the uptake of ICT in the County’s Health Department, albeit with varying degrees of agreement. Among the factors identified include: Inadequate ICT infrastructure and insufficient computers (10%), Lack of training (8%), lack of or poor internet connectivity (8%), inadequate staffing (4%), knowledge gap (3%), system breakdown (2%), inadequate funds (1%), and irregular updates (1%). It is important to note that this are gaps that should be addressed in order to ensure complete adoption and implementation of ICT based reporting in the county.</p> <p>The respondents gave varying reasons as to why they do not experiment with new technologies. The reasons range from: technological limitations (15%); too expensive (6%); not being well conversant with technology (5%); lack of support from organizational leadership (4%); difficult (3%); lack of time (2%); to not seeing any importance of experimenting with Technology (2%). There is therefore greater need to ensure that these issues are addressed in order to create</p>

Objective	Findings
	a human resource base that is adventurous, proactive and committed towards achieving ICT based reporting.
Strengthening capacity of staff on usage of electronic medical records for ICT based reporting	<p>Twenty (20) staff were selected based on need basis from the different departments within the Migori County Health Department. The staff then underwent a two-day vigorous and hands-on training to equip them with the requisite knowledge and skills to enable them work comfortably with the IQ Care EMR.</p> <p>All the twenty (100%) participants were able to successfully log into the system, search and retrieve records for patients, register new patients, navigate, and view scheduled patient appointments.</p> <p>Selected members of the County Health Management Team (CHMT) who were 20 in number participated in the training that lasted for two days.</p> <p>The staff had a yearning for the QGIS training. However, with the limited resources, much more needs to be done. Among the issues that need to be addressed include allocating more time for the training, more funding to facilitate the training, overcome power outages by acquisition of alternative power sources, and the purchase or acquisition of more computers.</p>

Objective	Findings
	<p>A desktop computer was purchased that will help to support EMR implementation. Additionally, a UPS (Uninterrupted Power Supply) was purchased. This is important because the facility will be able to protect installed hardware, data, and telecommunication equipment from damage that may be caused by blackouts and brownouts. Other hardware equipment that were acquired included the purchase of a router and cables that were used for networking.</p> <p>On the part of software acquisition, IQ care is open source and readily available. Only technical expertise was required to help in training the users on its usage. Antivirus software was purchased to help protect the computers against virus attacks. Other software that were purchased included the Microsoft office suit and the windows operating system</p>

5.3 Conclusions of the Study

The present study examined the extent to which the Migori County Health Department uses ICT in reporting of health care data; the level of organizational support in adoption and implementation of ICT based reporting; the gaps in adoption and implementation of ICT based reporting at the Migori County Health Department; and it also aimed to strengthen the capacity of staff on usage of electronic medical records for ICT based reporting. The study achieved

satisfactory results that can be used for the formulation of policy directions aimed at bridging the gaps in ICT based reporting within the health care facilities in the county.

On the usage of ICT for reporting purposes in the county health department, it is very clear that still more needs to be done. With the fact that only 22 facilities out of the 216 facilities in the county are covered with EMR, it means that the area of ICT based reporting is still wanting. More needs to be done in order to achieve maximum results. With the 22 facilities already using EMR for reporting, this can be used as the pilot study or basis. Therefore, the county is now ready to go to scale with the implementation of ICT based reporting by increasing the number of EMR covered facilities.

Of interest is the fact that the majority of the staff that deal with EMRs are tech savvy, they are young and adventurous. They have the energy and temerity to ensure ICT based reporting is achieved. It is worth noting that most of the staff are well conversant with the EMR and how it works.

The respondents are well aware of the advantages of using ICT in reporting. They believe that problems such as poor data quality, loss and misplacement of data and documents, poor client management, lagging behind, increased cost, and inconvenience in information retrieval can be addressed with the adoption and full implementation of EMR.

On the level of organizational support in adoption and implementation of ICT based reporting, the study found out that though there are some challenges, the management is largely supportive of the implementation of ICT. However, the majority differed with the approach that the management had towards achieving full EMR coverage since they had a feeling that the management's approach was average. Adding this to those who said that the approach was slow, the other respondents that felt that it was either ordinary, lagging, reluctant, or reactive; this translates to a major indictment that the management's approach towards achieving ICT

based reporting was not satisfactory. Therefore, the management needs to re-examine its approach on how it addresses this issue.

The third objective of the study was aimed at identifying the gaps in adoption and implementation of ICT based reporting. The respondents, identified some specific ICT uptake problems. These included problems in the uptake of EHRs, Hardware, and QGIS. This implies that training was needed for the staff to be acquainted with the various ICT reporting tools that include, but not limited to EMRs, Hardware, and QGIS software. It is also clear that with insufficient and inadequate hardware coverage and infrastructure, it is difficult to achieve the required scale of coverage. So more funds should be channeled towards the acquisition of hardware to support EMR implementation.

Further, the respondents identified the factors that are limiting the uptake of ICT in the County's Health Department, albeit with varying degrees of agreement. Among the factors identified include: Inadequate ICT infrastructure and insufficient computers, lack of training, lack of or poor internet connectivity, inadequate staffing, knowledge gap, system breakdown, inadequate funds, and irregular updates. It is important to note that these are gaps that should be addressed in order to ensure complete adoption and implementation of ICT based reporting in the county. Within the vast Migori county, more staff are required to support implementation of EMR. The limited number of staff is a big impediment that needs to be addressed. This should be matched with equivalent energy towards the allocation of adequate funds, acquisition of adequate hardware and software capabilities, training of staff and addressing the knowledge gap issue so as to ensure that all staff can be able to comfortably use ICT for reporting purposes.

Internet access and connectivity is a key factor that must be addressed. Without internet, then the kind of reporting that is envisaged by the implementation of EMR cannot be achieved. The leadership therefore has a task of ensuring that all the stakeholders are engaged to ensure that

this is achieved. Availability of Electricity is also a very essential ingredient. It is worth to note that not all facilities are covered with electricity. Therefore, this is an issue that is at the centre of the implementation process.

The issue of system breakdown can be achieved by ensuring availability of gadgets such as the UPS and also ensuring that proper backups are done in order to ensure that no loss of data is witnessed.

Organizational support is therefore a key gap that must be addressed as this will go a long way in creating a conducive environment. This conducive environment can be achieved by a paradigm shift to the way ICT approach is done. This calls for the management being proactive and strategic in this implementation process.

Finally, the fourth objective was aimed at strengthening capacity of staff on usage of electronic medical records for ICT based reporting. Twenty (20) staff were selected based on need basis from the different departments within the Migori County Health Department. The staff then underwent a two-day vigorous and hands-on training to equip them with the requisite knowledge and skills to enable them work comfortably with the IQ Care EMR.

All the twenty (100%) participants were able to successfully log into the system, search and retrieve records for patients, register new patients, navigate, and view scheduled patient appointments.

Selected members of the County Health Management Team (CHMT) who were 20 in number participated in the training that lasted for two days. With the limited resources, much more needs to be done. Among the issues that need to be addressed include allocating more time for the training, more funding to facilitate the training, overcome power outages by acquisition of alternative power sources, and the purchase or acquisition of more computers.

A desktop computer was purchased that will help to support EMR implementation. Additionally, a UPS (Uninterrupted Power Supply) was purchased. This is important because the facility will be able to protect installed hardware, data, and telecommunication equipment from damage that may be caused by blackouts and brownouts. Other hardware equipment that were acquired included the purchase of a router and cables that were used for networking.

On the part of software acquisition, IQ care is open source and readily available. Only technical expertise was required to help in training the users on its usage. Antivirus software was purchased to help protect the computers against virus attacks. Other software that were purchased included the Microsoft office suit and the windows operating system

5.4 Recommendations

Referring to the findings and conclusion above, the implementer makes the following recommendations:

1. Allocation/Provision of more funds for software and hardware acquisition and procurement in order to improve the ICT infrastructure help build the capacity required to achieve ICT based reporting.
2. Recruit adequate ICT staff or build the capacity of health records officers to handle ICT functions.
3. The Migori county Health Department should develop an ICT policy or standard operating procedures to guide the software and hardware use in the department.
4. Provision of physical security for ICT gadgets and provision of UPS to help mitigate the problem of damage to ICT equipment such as computers.
5. Availing power to all the facilities
6. Integrate the different software to increase efficiency and effectiveness
7. Training staff on the use of the different software and other ICT equipment.

8. There is need to build the capacity of staff in ICT based reporting
9. Ensure adequate, seamless and sufficient internet connectivity in all the facilities.
10. The leadership and management should support and motivate staff on issues related to
ICT

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APPENDICES

BUDGET

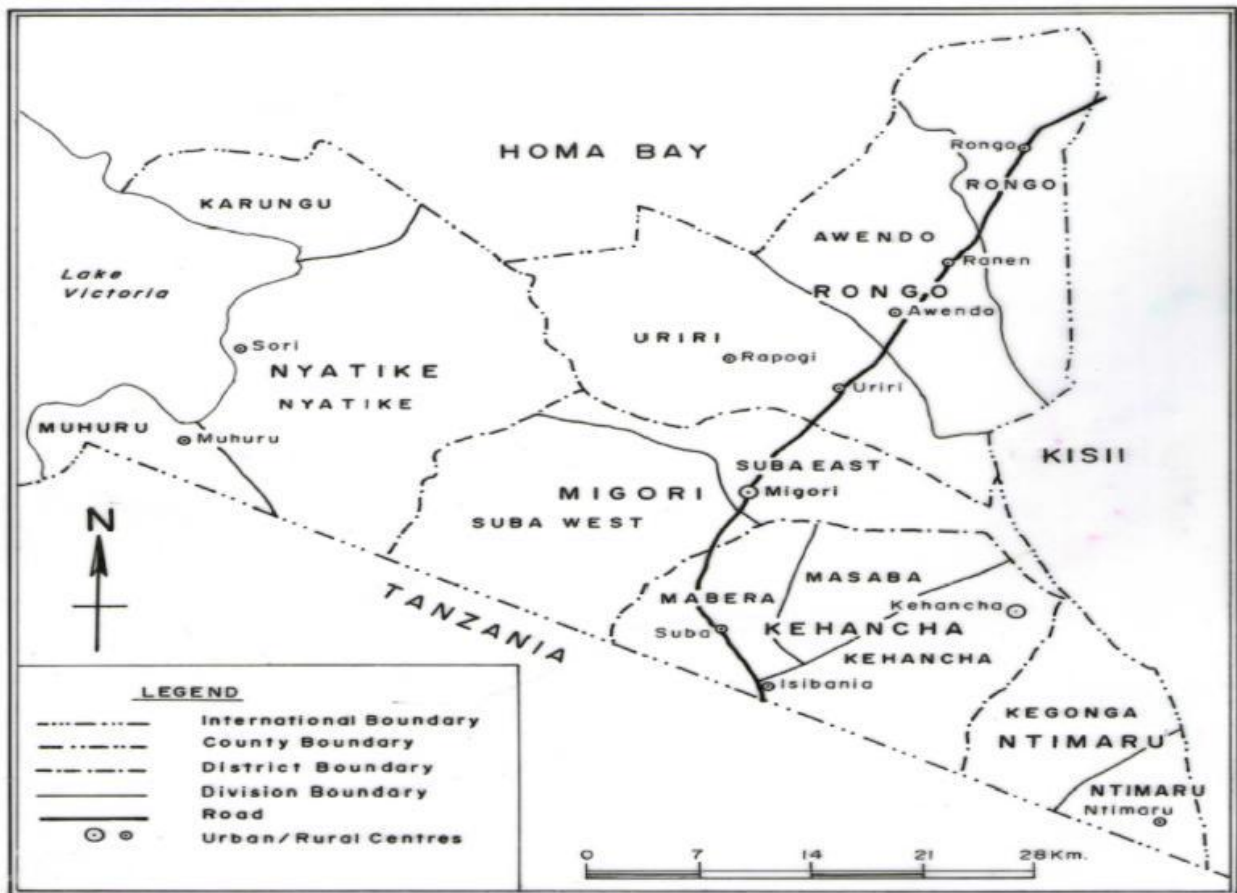
S.NO	ITEMS	JUSTIFICATION		COST
1.	Needs determination & Consensus building	Fuel/transportation means to 10 sites (Fellow, PLP Mentor, 2 Medium Term fellows)	20000	45800
		CHMT members briefing on progress/ Transport reimbursement (20 Members)	20000	
		Stationery i.e. writing materials,	2200	
		22 pens	400	
		1 flip chart	2000	
		2 marker pens	200	
		Projector hire (1 Day)	1000	
		2.	EMR installation & Support	
3.	Supporting Implementation &	Transportation means to EMR site	5000	25000
		Supervision (PLP Mentor, Medium term fellows, Fellow)	10000	

S.NO	ITEMS	JUSTIFICATION		COST
	supervision of software	Technical support team (to support migration to EMR)	10000	
4.	Microsoft office (1)	Purchase of genuine MS office software suit (Purchase will be made as per the PPOA Act PART IV - General Procurement Rules)		6000
5.	Windows Operating System (1)	Purchase of Operating System (Purchase will be made as per the PPOA Act PART IV - General Procurement Rules)		16200
6.	Kaspersky Internet Security (1)	Purchase of Antivirus (Purchase will be made as per the PPOA Act PART IV - General Procurement Rules)		3000
7.	Cables (1)	CAT 6 DLINK For Network connectivity (Purchase will be made as per the PPOA Act PART IV - General Procurement Rules)		10000

S.NO	ITEMS	JUSTIFICATION		COST
8.	UPS (1)	Purchase of UPS to protect installed hardware, data, and telecommunication equipment (Purchase will be made as per the PPOA Act PART IV - General Procurement Rules)		12000
9.	Desktop Computer (1)	Computer to support EMR implementation (Purchase will be made as per the PPOA Act PART IV - General Procurement Rules)		50000
10.	Router (1)	For Networking (Purchase will be made as per the PPOA Act PART IV - General Procurement Rules)		15000
11.	Piloting /adoption (training)	Training users on EMR use (Trainees) (2 Days)	20000	55000
		Consultant (2 Days)	20000	
		Venue Hire (2 Days)	10000	
		Stationery	5000	

S.NO	ITEMS	JUSTIFICATION		COST
12.	Holding Capacity Building Workshop & to development of final Project Report	QGIS training for CHMT members related to HIV (to help in mapping and reporting of HIV related occurrences across the county)	20000	47000
		Consultant (QGIS expert)	10000	
		Stationery	5000	
		Printing & Binding charges	6000	
		Projector hire	1000	
		Venue hire	5000	
13.	Project hand-over (CHMT and Stakeholders)	Venue hire	5000	60000
		Stationery	10000	
		Projector hire	1000	
		Transport reimbursement	30000	
		Printing, Photocopying and binding	6000	
		Honoraria/Refreshments/ Airtime/ décor	8000	
14.	Total			350000

MAP OF MIGORI COUNTY



QUESTIONNAIRE

EMR/ ICT ADOPTION QUESTIONNAIRE

Occupation..... County..... Sub-county.....

Work station..... What is your Position?

Demographics

1. What is your age?

- i. 18 - 24
- ii. 25 - 34
- iii. 35 - 44
- iv. 45 - 54
- v. 55 - 64
- vi. 65 and above

2. How long have you worked in the present organization?

- i. Less than 1 year
- ii. 1 to 4 years
- iii. 5 to 9 years
- iv. 10 to 19 years
- v. 20 and above

3. What is your gender?

- i. Female
- ii. Male

Technology Attitudes

4. How can you describe yourself?

- i. I use new technology only when I it becomes necessary

- ii. I use new technology after everyone has used it
 - iii. I use new technology after friends have used it
 - iv. I use new technology before many people do
 - v. I experiment with new technology often
5. The health industry has been transformed by technology.
- i. Agree Strongly
 - ii. Somehow Agree
 - iii. Neither agree nor disagree
 - iv. Somehow Disagree
 - v. Disagree Strongly
 - vi. I Don't know
- 6. My department/County or facility is using technology appropriately.**
- i. Agree Strongly
 - ii. Somehow Agree
 - iii. Neither agree nor disagree
 - iv. Somehow Disagree
 - v. Disagree Strongly
 - vi. Don't know

Keeping Up with Technology

7. The county Health Department has an ICT policy or plan.
- i. YES
 - ii. NO
 - iii. I don't know
8. The county health department has an ICT Coordinator

- i. Yes
- ii. No
- iii. I don't know

9. Who deals with data entry/reporting in your station of work?

- i. ICT Officer
- ii. HRIO
- iii. Other (Specify).....

10. Please rate your practical knowledge in use of EHRs

- i. Excellent
- ii. Good
- iii. Fair
- iv. Poor

11. Are there ICT uptake problems in the county? (yes) (no)

12. Are there unique uptake problems with any of the following?

(please tick all that apply):

EHR (), Hardware (), QGIS (), Other(s).....

13. State some of the factors that limit ICT use by HRIOs/other staff.....

14. State any consequences your organization may face now or in future if it does not use ICT.....

15. How aware are you of new tools/Software and technology for gathering and presenting Healthcare data?

- i. Not at all aware
- ii. Aware
- iii. Neither

- iv. Aware to some extent
- v. Very aware

16. How do you get information on new technologies? (Select all that apply.)

- i. Department chair
- ii. Training department
- iii. Technology department
- iv. Personal research
- v. Social media
- vi. Information from peers
- vii. co-workers
- viii. Family and friends
- ix. Other (kindly specify)

17. When it comes to using technology in the workplace, would you say you are keeping up or being left behind?

- i. Keeping up
- ii. Falling behind
- iii. Don't know

Organization Support

18. Does your organization leadership encourage the use of new tools/technology/software?

- i. Yes
- ii. No

19. Did you have any problems getting permission to use new tools/software and technologies?

- i. Yes
- ii. No
- iii. Other (please specify).....

20. Do you experiment with new tools/software and technologies in your work?

- i. Yes, a great deal
- ii. Yes, somewhat
- iii. Sometimes
- iv. Not very often
- v. Never

21. Why don't you experiment more often with new technology? (Select all that apply.)

- i. I have not gotten around technology
- ii. I do not have time to experiment
- iii. I do not see any use for experimenting
- iv. Technological limitations
- v. Leadership won't let me install it
- vi. Too expensive
- vii. It still seems too hard
- viii. Other (kindly specify)

22. What is the digital transformation pace of at your organization?

- i. Very slow
- ii. Too slow
- iii. Just right
- iv. Fast
- v. Too fast

23. How would you describe the approach of the organization toward innovation? (Select all that apply)

- a) Strategic/ Cutting edge
- b) Lagging
- c) Ordinary
- d) Reluctant
- e) Average
- f) Inconsistent
- g) Slow
- h) Reactive
- i) Proactive

Other

24. State the number of years of experience you have with the following?

- i. Computers in general
- ii. Healthcare software (Healthcare Information Technology, HIT)
Specify the healthcare software(s) you have used.....

25. State the level of knowledge about the following? Scale: 1- Very low 7- Very high

- i.** The Internet in general
- ii.** (Healthcare Information Technology)
- iii.** Electronic health Record

26. How important are the following EMR benefits?

- i. Reduced Medical Errors
- ii. Improved Patient Safety
- iii. Improved Quality of Care

<ul style="list-style-type: none">1. Not important at all2. Moderately Important3. Extremely Important4. Don't know
--

- iv. Improving Access to Data
- v. Job Satisfaction
- vi. Increased Productivity
- vii. Reduction of Expenses and costs

27. I will readily participate in EMR/Technology Training-Agree or disagree

- i) Yes
- ii) No