USE OF ROUTINE HEALTH INFORMATION FOR DECISION MAKING AMONG HEALTH CARE WORKERS IN MARSABIT COUNTY, KENYA

MOHAMED ASAFA AILA

A RESEARCH PROJECT SUBMITTED IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE AWARD OF THE DEGREE OF MASTER OF SCIENCE IN PUBLIC HEALTH SYSTEMS MANAGEMENT AND APPLICATION IN THE SCHOOL OF PUBLIC HEALTH AND APPLIED HUMAN SCIENCE OF KENYATTA UNIVERSITY

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DECLARATION

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

Signature: ..... **Date: ...../..../.....**

MOHAMED ASAFA AILA **Q412/26855/2018**

Department of Health Management and Informatics

SUPERVISOR:

This research project has been submitted for review with my approval as University Supervisor"

Signature: ..... **Date: ...../..../.....**

Dr. Peter Kithuka

Department of Health Management and Informatics

School of Public Health and Applied Human Science

Kenyatta University

DEDICATION

This research projected is dedicated to my family; my wife Hawo Tadele and my children Abdihakim, Imram, Mumina and Burhan who had to stay without the company of their beloved father for the period of the study.

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LIST OF ABBREVIATIONS AND ACRONYMS

CDC	Center for Disease Control
CHMT	County Health Management Team
CIDP	County Integrated Development Plan
DHIS	District Health Information System
HIS	Health Information System
HMIS	Health Management Information System
HCWs	Health Care Workers
ICT	Information Communication Technology
KII	Key Informant Interviews
MOMS	Ministry of Medical Service
MOPHS	Ministry of Public Health and Sanitation
MOH	Ministry of Health
NACOSTI	National Commission for Science, Technology, and Innovation
PRISM	Performance Routine Information System Management
RHI	Routine Health Information
SPSS	Statistical Package for Social Sciences
WHO	World Health Organization

DEFINITION OF OPERATIONAL TERMS

Health information: refers to use applications of health information and utilization of the same in health service planning and evaluation.

Decision making: is a process that helps health managers and other professionals solve problems by examining choices and deciding on the best route to take.

Data: These are facts or units of information collected in the raw form to be examined and considered in helping decision-making.

Health information use: This is the act of using health information for decision making

Surveillance ongoing systematic collection, analysis, and interpretation of outcome-specific data for use in the planning, implementation, and evaluation of public health practice.

The District Health Information System Software (DHIS-2): is a free and open-source database and application for collecting, processing, and analyzing health information.

Routine Health Information: Are health facility-based data, consolidated from the various health department and administrative sources, such as drug procurement records and service delivery records, enable health-care workers to determine resource needs, guide purchasing decisions for drugs, equipment and supplies, and staff capacity development.

ABSTRACT

Globally, health agencies have delved in strengthening health systems as a means of improving health outcomes. In Kenya today, the management of the public health facilities at different levels is more concerned about the collection and reporting of routine health data through District Health Information Software (DHIS2) but little is known on how individual facilities analyze report and disseminate the same for use in making informed decisions at the facility level. Yet in spite of the introduction of DHIS2, recent evidence has shown very low levels of data demand and use by the targeted stockholders in Kenya. Generally, there is a concerted effort by both the government and the international bodies to accelerate the collection of health data, but little efforts have been made to ensure its utilization at facility levels. The current study assessed the factors associated with the use of routine health information for decision making among health care workers. The study employed descriptive cross-sectional design. Researchers purposively stratified 201 health workers by cadre, and then probability proportionate sampling was applied to get the required number from every cadre. Both qualitative and quantitative data were collected. Quantitative data was entered into the SPSS software, descriptive statistics and Chi-square tests were used to analyze the data. Whereas qualitative data was analyzed thematically. The study found that the overall Routine Health Information (RHI) used was evidently below average at 47.1% in decision-making across six management functions. However, RHI was above averagely used for medical supply at 54%, service delivery at 57%, and identification of gaps at 56%. It was below averagely used for the formulation of plans, budgeting, and staffing decisions. It was also found that the health facilities lacked sufficient IT accessories. Nevertheless, internet access was at 71 % and electricity supply at 84 % implying access was not limited. The type of software use had a significant association with the frequent use of RHI at a p-value ($0.028<0.05$). The majority 74% of respondents had basic computer skills but 80% of respondents lacked training in health information management. The study concluded that the use of RHI in decision-making was below average and training increases the likelihoods of healthcare workers utilizing RHI. Also, computers and the types of software were likely to influence the use of RHI. The study recommends that the County government of Marsabit should embrace the adoption of the electronic medical record system in all health facilities to strengthen the practice of RHI use in decision-making across all health system blocks. In addition, the County government should increase the availability of IT accessories in health facilities to enhance data management practices. Further, the study recommends that the County should provide continuous training for HCWs by focusing computer literacy and data management through on-job training, and refresher courses.

CHAPTER ONE

INTRODUCTION

1.1 Background of the Study

Strengthening health systems is a priority for global and national health agencies as a means of improving health outcomes. This is more so in today's world, where the global health context is becoming complex and in response, national health systems are changing from disease-specific responses to comprehensive health systems (Stansfield et al., 2015). This comes as a consensus amongst the global community who assert that a systems approach is necessary for achieving better health outcomes and improving health-related developments (Solomon, 2015). One of the WHO's six attribute of health system strengthening is health information. Improving the health systems and health outcomes depends on the quality of data from health information systems (HIS) (Tara, & Heidi, 2013), which is central to health system management. It is the foundation of decision making in the other five blocks of the WHO framework (Rodriguez, 2011).

In Kenya health information system comprises of routine service data, public health surveillance, surveys, census and vital statistics (Luoma, 2010). Significant human and financial resources have been invested globally in the health information system, focusing collection of routine health services and surveillance data. However, the information generated from pursuit's health record is hardly ever used at the local level by health managers to suitably inform decision making (WHO, 2015). As a result, health systems suffer from reduced potential of evidence- based decision making and therefore the system is less responsive to the priority need of the community it serves. Utilization of information needs to be strengthened at all levels of the system, through enhancing the

culture and practice of “Data and Information use for Decision- Making” and capacity building at national, County and facility levels (MOH-policy brief, 2018).

In addition to data collection and their availability at different health system levels, Tara and Heidi (2013) highlight that there are factors which undermine the use of RHI in decision making, such as availability of technical and human capacity to manage and analyze the data, ensuring that information is available and in a format that is easily understood by relevant stakeholders and interpretation of the information and its ultimate use to improve decision making.

Data collected from the HIS can assist in making informed decisions and finally enhance health outcomes. According to Stansfield et al. (2015), many health care workers worldwide have become overwhelmed with collecting routine health data as required by government policies and partners' demands that have grown exponentially. However, data are often no longer used in planning, monitoring progress, and making an informed decision. This is a huge lost opportunity because data are critical to the improvement of health outcomes and the decision-making process. Consequently, Stansfield et al. (2015) explained that the international community is committed to strengthen the quality, relevance, and comprehensiveness of the data to aid in making data-informed decisions.

In developed countries like the United States and Australia, the choices in data collection and use of information are crucial in detecting problems, defining priorities, identifying innovative solutions, and allocating resources to improve health outcomes (Sheikhali et al., 2016; Rodriguez, 2011). This is facilitated by means of the wide adoption of

technology for collecting, analyzing, and disseminating the data to the relevant health managers (Tara, & Heidi, 2013). Similarly, in Japan, Nzanzu et al., (2014) explained that

the integration of technological and analytical innovations within the public HIS including the use of information and communication technology (ICT), help in enabling standardized data collection in real-time providing advantages for local health managers to make informed and improved decisions. Whereas in Jordan, Sheikhali et al., (2016) explained that health care workers were sufficiently trained on the use of technology innovation to collect, collate, analyze and disseminate data.

In South Africa, public health surveillance is an ongoing process that ensures timely and reliable health information to inform operational and strategic decision-making at the different tiers of health programs. However, the programs are often weak, fragmented, and centered on the disease-specific program (Nzanzu et al., 2014). Due to the multiple layers of reporting structures, delays in reporting in the release of data, substantial human, time resources required for data cleaning and analysis, challenge the use of routine health data.

Evidence-based policy-making enhances the relevance of health policy, but in developing countries like Kenya, the use of data in decision-making is pretty uncommon at the local health facilities (Solomon, 2015). Lack of data sharing between the different units limits the effective policy decision making which is compounded by the lack of capacity by the facilities to conduct deeper analysis on the available raw data (Karuri et al., 2014). This is partly due to the lack of technical know-how and capacity of the staff to merge data into meaningful reports. Marsabit County's Integrated Development Plan (CIDP) identified

gaps in health service provisions including; infrastructure, health management information system (HMIS) and health workforce (Marsabit CIDP, 2020). Similarly, Solomon (2015), poised that lack of sufficient infrastructural developments like technological innovations including mobile phone use and unreliable networks in Marsabit County, limits the dissemination of data which affects the quality of healthcare services.

As a result, there is inadequate access to quality health services and information, contributing to the high death rates in the County at 1,127 deaths per 100,000 live births and maternal mortality rate which is three times of the Country's average (Kenya National Bureau of Statistics (KNBS), (2015). The situation in Marsabit County hinders the Country's progress in the attainment of the Sustainable Development Goal (SDG 3), which aims to ensure healthy lives and well-being for all at all ages (United Nations in 2015). It is against this background that this study delved to establish the level of use of routine health information for decision making among health care workers in Marsabit County, Kenya.

1.2 Problem Statement

RHI is crucial in making informed decisions. However, there is a striking disconnect between the collection of data and the use of the same in making informed decisions, especially because collected data is not even converted into valuable information (Stansfield *et al.,* 2015). In Kenya today, the management of the public health facilities at different levels is more concerned about the collection and reporting of health data through DHIS2, than utilization of the data in decision making. Despite the introduction

of DHIS2, recent proof has shown very low levels of data demand and information use by the targeted stockholders in Kenya (Karuri et al., 2014). With the Ministry of Medical Service (MOMs) and Ministry of Public Health and Sanitation (MOPHs), (2010) reporting that only 37% of health data have been used for decision making at the national level, nevertheless, the use of RHI in decision making has not been established in Marsabit County. Generally, there is a concerted effort by both the national and local facilities to accelerate the collection of health data, but little effort has been made to ensure its utilization at the facilities. Marsabit County's integrated development plan (CIDP) identified gaps in health service provisions including; infrastructure, health management information system (HMIS) and health workforce (Marsabit CIDP, 2020). As a result, there is inadequate access to quality health services and information, contributing to the high death rates in the County. Further, the Marsabit CIDP (2020) reported that the health facilities in the County collect health data in raw form, but little is known on how individual facilities analyze, report, and disseminate the same for use in making informed decisions at the facility level. Therefore, the current study sought to determine the use of RHI by health care managers in decision-making in Marsabit County

1.3 Justification of the Study

Information for decision-making in health is crucial for positive health outcomes, and many countries around the globe including Kenya are strengthening their health information systems. However, the public health facilities in Kenya seldom use routine data to review performance gaps, make strategic plans, and monitor the progress of the facility. Data are captured for report purposes only. Generally, there is a concerted effort

by the local facilities in Marsabit County in collection of health data, but little effort has been made to ensure its utilization at the facilities. Therefore, the disconnect between the collection of data and the use of the same in making informed decisions has affected the quality of services provided in the facilities, as such, the County is recording high death rates. Therefore, there is an urgent need to address the issue to ensure healthy lives and well-being for all at all ages.

Further, with the increasing importance of health information in measuring and improving the quality of health services due to the global shift from curative to preventive health, it is important to examine how organizational, information technology and human resource factors influence data/information used in decision making in Marsabit county public health system. Therefore, through this study, the researcher was to identify the issues leading to poor use or improved use of RHI in decision-making in Marsabit County. Furthermore, there is scarce literature on the use of RHI in decision-making among health care managers. Therefore, the study will immensely contribute to the existing literature and inform policy decisions.

1.4 Research Questions

i. What is the level of use of health information in decision making by HCWs in Marsabit County?
ii. What are the information technology factors that influence health information use for decision making among HCWs in Marsabit County?
iii. What are the human resource factors that influence health information use for decision making HCWs in Marsabit County?

iv. What are the organizational factors that influence health information use in decision making HCWs in Marsabit County?

1.5 Broad Objective

To assess factors influencing the use of routine health information for decision making among health care workers.

1.5.1 Specific Objectives

i. To determine the level of use of health information in decision making among HCWs in Marsabit County.
ii. To identify information technology factors that influence health information use among HCWs in Marsabit County.
iii. To determine human resource factors that influence health information use among HCWs in Marsabit County
iv. To identify organizational factors that influence health information use among HCWs in Marsabit County.

1.6 Delimitation and Limitation

1.6.1 Delimitations

This study was carried out in Marsabit County, the choice of the study locale was informed by the CIDP which identified gaps in health service provisions including; infrastructure, health management information system (HMIS) and health workforce and lack of information on the use of RHI in decision making, which has not been established in Marsabit County (Marsabit CIDP, 2020).

In addition, there may me many factors which may influence the use of RHI in County health facilities. However, this study confined itself to information technology factors, human resource factors and organizational factors.

1.6.2 Limitations

Considering the timeline and financial constraint, this study focused only on two main level 4 sub-county referral hospitals out of the four in Marsabit County. Therefore, the study findings may not be generalized to other Counties.

1.7 Conceptual Framework

This framework was adopted from Measure Evaluation and modified PRISM conceptual framework (Belay 2013). The framework promotes the strengthening of RHIS performance through quality information and improved data use for decision-making. It postulates that improved performance results in better health system performance, which consequently improves the health status of the population. Poor information use leads to poor health system performance. The use of health data is influenced by factors such as human resources, information technology, and organizational factors. Human resource factors refer to staff training, mix of skills, IT technician and data specialist while information technology factor refers to availability and functionality of computers, internet connectivity, and power reliability. Organization factors refer to the roles and responsibilities, supervision, leadership and governance, and financing of HIS. This is illustrated in the figure below

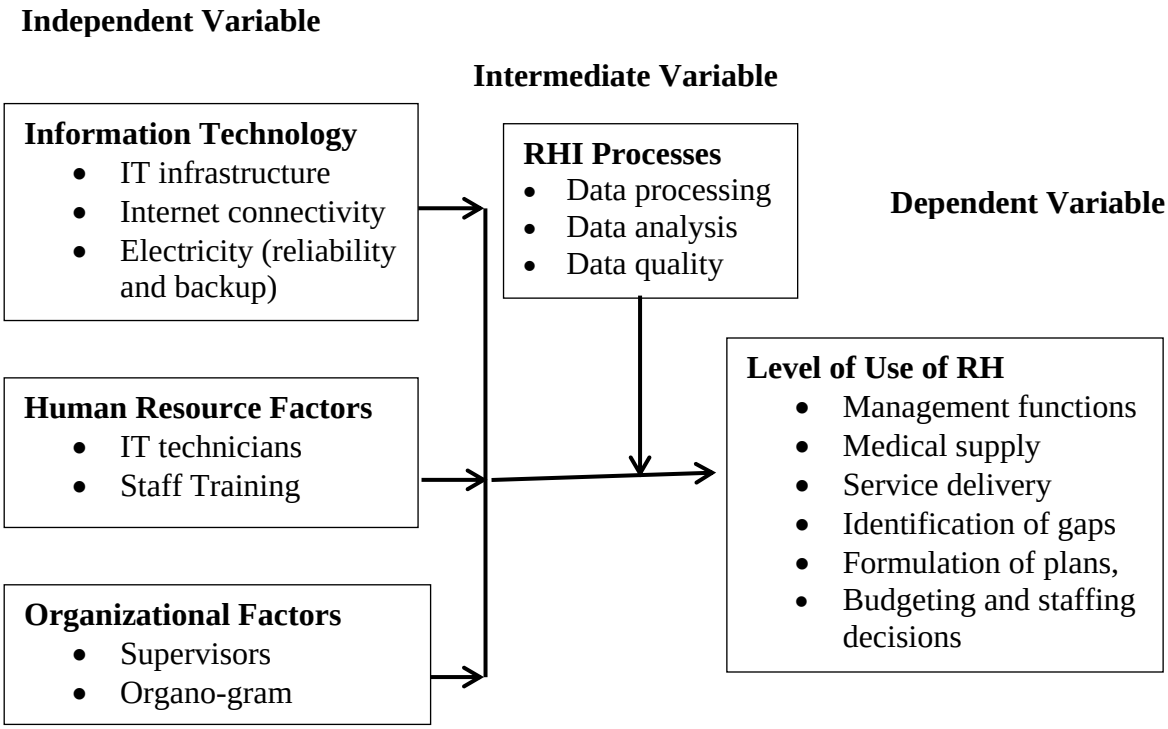

Figure 1.1: Study's Conceptual Framework

1.8 Significance of the Study

The findings and recommendations from this study will help the County health management team to understand the missing link between health data collection and health information use in decision making. This will inform the management to put measures in place which will ensure collection and utilization of health information. This will help them come up with informed policies which will help in improving health service delivery and health outcomes in the County.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

In this chapter, a review of the existing literature was being conducted based on the study's objectives. The thematic areas which were reviewed include: use of routine health data technological infrastructure and use routine health data, human resource and use routine health data, organizational factor and use routine health data and a summary of reviewed literature

2.1 Use of Routine Health Data

Health managers require quick and easy access to reliable RHI to enable them to monitor the health progress and outcomes over time, compare benchmarks, and make strategic decisions on resources and priorities for positive health outcomes. It is on this backdrop that Lange et al., (2019) conducted a study to determine the use of health data for decision-making. The researchers focused on nutrition, physical activity, and obesity data in the US. The researchers reviewed the use of CDC websites to map trends in health data to plan, track and implement decisions. The findings revealed that the use of data is often based on the topic and location. They found that when the data is user-friendly, up to date, and accessible, then practitioners and other health managers utilize it for making decisions. Similar claims are made by Karuri et al. (2014) who opined that having a reliable free and open- source web-based DHIS system has the potential to improve the use of health data in decision making. However, the study focused on web-based data which encompasses a whole nation, while the current study sought to focus on the lower-

level health facilities such as sub-county hospitals and health centers and the factor impeding the use of routine health data collected.

In another study, Aljunid et al. (2016) examined the extent of the use of health data for policy reform in Korea, China, Taiwan, Japan, and Malaysia. Primary data was collected and the results indicated that the low level of use of health information in policy formulation was due to the limited access to the data due to privacy protection, fragmented care system, and poor quality of routinely assembled data. As a result, the use of the collected data was generally poor due to the unreliability and untimely collection and dissemination of the data. Similar findings were reported by Rodriguez (2011) who affirms that there is generally low adoption of data disseminated on HIV and AIDS due to challenges in the collection and analysis of the collected data. The data were, however, collected from a wide range of Asian countries, which may limit the generalization of the findings in the local context; hence the need for the current study.

A study conducted by Jamison et al. (2006) intimated that 'what gets measured gets done. However, the researchers argue that the phrase does not apply in developing countries since there is a lot of measuring and little use of the same. The findings, sponsored by World Bank, shows that while the primary goal of HIS data is to enable the processing of valuable information for decision making, much of the data collected in the developing countries do not go to the processing stage, hence it is unrealistic for such data to have helped make valuable decisions. The researchers recommend a structured mechanism that enables health surveillance data to go beyond the collection stage. Another study conducted by Mutale et al. (2013) also found out that while most of the Western countries

have embraced technology in sharing HIS information, Sub- Saharan Africa lacks the infrastructure to take advantage of technology. For instance, the reports explain that online discussion forums are on the rise in other parts of the world especially due to their simplicity and time-consciousness. Unfortunately, such platforms are not practical in remote parts of Sub-Saharan African countries, of which the majority fall within this category. However, these reports do not present specific cases of these countries yet there are many differences in the management and also the development of health systems depending on the countries region in question. As such, there was a need for a focused local study that is cognizant of local situations. In a local study, Karuri et al (2014) reviewed the challenges facing the implementation of the web-based District Health Information Software (DHIS-2). Their findings revealed that despite the implementation of the DHIS, the utilization of data captured in this software highly relies on acceptance, and support from the targeted users at the local and national authorities. This study's scope was on the wider national use of DHIS2 while the current study limited its scope to Marsabit County since data use should start at the facility level of health impacts were to be felt nationally.

2.2 Technological Infrastructure and Use of Routine Health Data

World over, digital health is gaining momentum and is having profound effects on health systems. It is paving way for new models of care and shifting the focus of health. With digital health, technological infrastructure plays a critical role in the collection, collation, analysis, and dissemination of data. In their study, Mitchell and Kan (2019) sought to identify the challenges in health information use in this digital era in middle-income and developed countries. Their study found that as the disruptive innovation of digital health

data takes root, issues of privacy, control, and management of data are rising. This is also coupled with the limited infrastructure in terms of reliable internet connections and consistent electricity supply. Similar findings are reported by Daton (2017) who reports that innovation in health information systems is challenged by technical expertise amongst the health care managers and the lack of appropriate infrastructures like computer labs for data analysis and dissemination. The findings are, however, focused on middle and high-income countries while the current study focused on Marsabit County which like the rest of Kenya is a low-income county.

A study by Nagbe et al. (2019) adopted a multi-stage cluster sampling method to selected random health facilities in Monteserrado County in Liberia. The researchers sampled 30 facilities to examine the challenges in the use of health data in decision-making. The findings revealed that lack of proper communication and sensitization between the health care workers at the local health facilities and decision-makers contributed to the low utilization of data at the sub- national level. Further, the findings revealed that the adoption of phones for reporting is challenged by the lack of and sometimes poor cell phone networks. Additionally, for those who rely on daily reporting of data over the internet, poor connections, lack of sufficient computers, and consistent electricity supply limited the timely dissemination and use of surveillance data.

Cherubet and Odhiambo (2016) affirm that effective and efficient management of health systems globally relies on the well-functioning HMIS. Therefore, the researchers sought to establish the technological factors that affect the quality of routine management of information and its use. A cross-sectional study design showed weak informational

systems where the findings revealed that the lack of appropriate technology and skills in technological innovation hamper the use of data. Additionally, the findings show that reliance on phones and computers to disseminate data are a major challenge due to poor internet connectivity. Similar findings are recorded by Daton (2017) who asserts that limited access to the internet and computers limits the use of health data. The findings from the reviewed study were crucial in identifying the technological challenges limiting the use of health data

2.3 Human Resource and Use of Routine Health Data

The provision of efficient and effective health care services requires utilization time and reliable health information. The process involved the generation, collection, and analysis of data to help in identifying gaps and promoting planning for appropriate interventions. However, for use in health planning and priority allocation, the data should be timely, reliable, and accurate. With this in mind, Mutale et al. (2015) conducted a comparative study targeting five sub-Saharan countries. Their main purpose was to determine the challenges facing improved decision-making processes using routine health data. The study found that across the five countries, the iterative process of collecting, monitoring, analyzing, and disseminating data was crucial. They identified poor feedback loops in communication platforms and attributed this to the poor training among the health care managers charged with collecting and disseminating data and those who use the data for decision making. The study examined the challenges of data use in five different countries with different social, political, economic, and technological factors.

In addition, Ngugi, et al. (2019) conducted a cohort study to determine the challenges facing the community and demographic surveillance systems in Kaloleni and Rabai Sub Counties in Kitui County. The study revealed that the existing surveillance systems have the potential to provide data that can help in planning activities like outreach and health action days for the communities that show poor health indicators. However, the MoH community health structures and personnel were reportedly limiting the potential benefits of the surveillance system for decision-making. The criteria for selecting health care managers require approval from the community; hence often, semi-illiterate individuals are charged with collecting and analyzing data that compromises the quality of data collected, analyzed, and disseminated. The findings offer crucial insights on the challenges facing surveillance data in rural communities, but the study is focused on Kitui which might be facing different challenges from Marsabit County.

In another local study done in Gucha sub-county in Kisii County, Obwocha et al. (2016) adopted a descriptive cross-sectional study to determine the utilization of health data among health workers. Using stratified sampling, 160 health workers were selected and interviewed. The findings revealed that data and information in health facilities were managed by non-health professionals due to inadequate health information specialists. Consequently, the study found that the quality and use of the generated data were compromised. This is because those charged with the management, analysis, and dissemination of data had no health background and as such were likely to overlook important aspects of the surveillance data. The study was, however, collected in Kisii County, which is a different context from Marsabit County

2.4 Organizational Factor and Use of Routine Health Data

These factors relate to the organizational context that supports data collection, availability, dissemination, and use, such as the identified procedures and the roles and responsibilities of those that collect, analyze, disseminate, and use data. In public health, the collection of data doesn't guarantee its effective and efficient use for decision-making by health care managers. For the data to do its intended purpose there is a need for the data to be processed and communicated to the relevant individuals promptly. It is on this backdrop that Panhuis et al. (2014) conducted a systematic literature review to identify the barrier to public health data sharing. The researchers used a document that described barriers to public health data. The results revealed that the levels of data sharing are major concerns, more so due to the bureaucratic policies that guide the process of sharing data. The need for authorization in accessing and sharing data was a major challenge affecting the sharing of data on a timely basis. The findings highlight major challenges facing data dissemination, but the studies utilized secondary data in their review which has its set of challenges like author bias. To overcome this limitation, the researcher adopted primary sources of data.

In another study, Nutley and Reynolds (2016) adopted a logic model to determine the practical strategies for strengthening the use of data in decision-making processes. The researchers collected data from the regional hospital. The researchers found that lack of proportionality, where lack of careful deliberation in assessing the risk and benefit to be derived from the amount and type of data requested and the potential of its secondary use is a major challenge. Further, set timelines for releasing specific data like the weekly requirement for the dissemination of some data, monthly for others, and even longer for

others may also delay relaying of vital information that would otherwise inform decision making. This challenge is compounded by the existing platforms of disseminating data which require adherence to bureaucratic policies where authorization from supervisors delays timely relaying of data.

Kirigia and Kirigia (2011) observed that the WHO governance domains (generation of intelligence, formulating strategic policy framework, ensuring tools for implementation, building coalitions/partnerships, ensuring a fit between policy objectives and organizational structure and culture, and ensuring accountability) have largely been missing in healthcare systems of Sub- Saharan Africa. Their findings show that the supervision in these sectors is disjointed and lacked core domains of leadership. As a result, HIS data collection, processing, dissemination, and use cannot be predicted. For instance, the study finds that Sub-Saharan African countries lack policy frameworks to guide organizations at facility levels, district levels, and other administrative regions regarding data collection and utilization. The study recommended the development of common policies in a devolved manner. However, the study tends to be general and bases its conclusions on desktop research. The proposed study was guided by primary findings; hence it identified local issues in Marsabit County.

Supervision in the health sector dates as far back as the early 1900s when it was conceived as an organizational and management process. Supportive supervision is perceived as an intervention that strengthens the health system, enables health care workers to use their data effectively to offer quality service, and improves the health outcome. Factors that affect supportive supervision are social-cultural and organization

structure and therefore study by (Avortri et al., 2019) the success of supervision is anchored on a strong system of monitoring of data and information management at the facility level. In a local study, Mwatondo et al. (2016) examined the factors associated with adequate weekly dissemination of surveillance data amongst health facilities in Nairobi County. The researchers targeted 348 health facilities using stratified random sampling. The results showed that dissemination of data on the selected health facilities is done on a specified timeline with some of the facilities being found to have poor dissemination strategies. Others used posters, seminars, and workshops to ensure timely and accurate dissemination of data. However, challenges including bureaucratic procedures limited the adequate reporting of data. The findings are from Nairobi County where access to electricity, phone network services, computers, and the internet is easy. Therefore, in the current, the researcher sought to know if the same challenges face Marsabit County.

In a local study, Mwatondo *et al.* (2016) examined the factors associated with adequate weekly dissemination of surveillance data amongst health facilities in Nairobi County. The researchers targeted 348 health facilities using stratified random sampling. The results showed that dissemination of data on the selected health facilities is done on a specified timeline with some of the facilities being found to have poor dissemination strategies. Others used posters, seminars, and workshops to ensure timely and accurate dissemination of data. However, challenges including bureaucratic procedures limited the adequate reporting of data. The findings are from Nairobi County where access to electricity, phone network services, computers, and the internet is easy. Thus, there was need to establish if the same challenges face Marsabit County.

A study conducted in Kenya to assess the ability of the health information systems in 22 hospitals to support evidence-informed decisions found out that the HMIS does not deliver quality information and significant constraints exist in data quality assurance, support supervision, data infrastructure in respect to the information technology application, human resources, financial resources, and integration (Kihuba *et al*., 2014). A study by (Mbondo *et al.,* 2013) found that a rapid needs assessment on organizational Human Immunodeficiency Virus Monitoring & Evaluation (HIV M&E) capacity conducted in Kenya in 2013 indicated that the lack of written guidelines and SOPs regarding data validation and quality audits needs attention and also recognized that the absence of tools and training on the updated tools hinders the power of the HCWs to overcome challenges in delivering accurate information HIV activities in their facility.

2.5 Summary of Literature

The section has discussed literature that has been conducted globally, regionally and locally. The reviewed studies have shown that there are various factors which influence the utilization of RHI in decision making. However, much of the studies have been conducted in developed countries. Thus, there is scanty information that is available in Africa on the level of use of RHI in decision making.

In Kenya, the few studies which have been carried out have shown that most health facilities have put effort in collection of data but how this data is used at the facility level is unclear since no literature has directly focused on the use of routine health data in decision making in Marsabit County.

Further, the existing literature has revealed several possible issues that could influence use of information in health facilities for instance, inadequate skills, poor data quality, and inadequate access to equipment, supervision, negative perception and attitude of health workers. While there are many factors associated with the use or non-use of RHI in decision making, the studies have not delved much in technological factors, organizational factors and human resource factors. Therefore, the current study focused to establish how technological factors, organizational factors and human resource factors influence use of RHI indecision making.

CHAPTER THREE

MATERIALS AND METHODS

3.1 Research Design

The study employed a descriptive cross-sectional research design. Descriptive research design according to Creswell (2013) enables researchers to collect a large amount of data within a short period. In collecting primary data, both quantitative and qualitative data collection methods were sought to ensure the study generated adequate data to facilitate sound scientific conclusions.

3.2 Variables

The study had both independent and dependent variables. The following were the independent variables:

Level of use of health information in decision making- This was measured by the following indicators; use of RHI in making decisions in management functions, use of RHI in medical supply, use of RHI in service delivery, use of RHI in identification of gaps, use of RHI in formulation of plans, use of RHI in budgeting and staffing decisions.

Availability and reliability of IT hardware- These were measured by indicators like availability and functionality of computers, information storage devices, internet connectivity, electricity supply, and power backups

Human resource factors- These were measured by the number of IT technicians, specialists trained on data analysis, access, and interpretation, evaluating the mix of skills among the staff and their deployment.

Organizational factors- This was measured by assessing the availability and functionality of Hospital Information System, staff organogram, data use guideline, Standard operation procedure on RHI use, supervision support and report.

The dependent variable was the use of routine health data for decision making. To measure this variable, the researcher applied the PRISM conceptual framework from MEASURE Evaluation, developed by USAID, using observation checklist and guided by an information use index questions constructed from a set of key indicators such as; decision-making forum, annual or routine planning, feedback to health facility, analytical report production, data dissemination outside health sector, data visualization, and guideline on routine information display and use.

3.3 Study Location

The study was located in Marsabit County. The County formed the study locale because there is no evidence on how routine health data which is collected in the region has helped to improve the health status of the population. This is exacerbated with the dire situation of the health facilities in the County, an indication that collected data is not converted into valuable information for decision making. Covering a surface area of 66.923,1 square kilometers Marsabit is the largest county in Kenya as shown in the map (Appendix i). Its capital is Marsabit and its largest town Moyale. According to the 2019 census, the county has a population of 459,785. It is bordered to the North by Ethiopia, to the West by Turkana County to the South by Samburu County and Isiolo County, and to the East by Wajir County.

3.4 Study Population

The study targeted a total of 349 healthcare workers in the two level 4 referral hospitals in two main administrative units with the largest population catchment and HCWs in Marsabit County. The summary of the distribution of cadres under each facility are as displayed in table 3.1

Table 3.1: Summary the Distribution of HCWS Based on Cadres and Health Facilities

Summary of HCWs in Moyale and Saku constituencies						
Cadres	**Marsabit Referral Hospital**	**Moyale Hospital**	**Suku sub-county**	**Moyale sub-county**	**County headquarter**	**Total**
Nurses	63	52	27	46	10	198
Med.officer	5	7	1	1	0	14
Pharmacist	3	1	0	0	1	5
Public health off	0	0	16	20	1	37
HIRO	3	3	2	1	1	10
Clinical officer	13	11	3	7	3	37
Nutrition officer	4	4	2	3	1	14
Pharm tech	4	3	0	0	0	7
Lab off	11	5	2	1	1	20
Anaesthetist	2	2	0	0	0	4
CEO	1	1	0	0	0	2
Ob/gynecologist	1	0	0	0	0	1
Total	**110**	**89**	**53**	**79**	**18**	**349**

Inclusion criteria: health care workers who had been practicing for at least six months preceding the survey period. The study assumed they had experience in collecting RHI data.

Exclusion criteria: Supportive staffs and those not willing to participate

3.5 Sampling Technique and Sample Size

3.5.1 Sampling Technique

The study purposively selected two level four health facilities where both service delivery and decision-making process exist. Therefore, the referral hospitals were targeted by the research because sufficient number of HCWs to meet study objective. HCWs were stratified into respective professional cadres, and then probability proportionate sampling was applied to get the required number from each facility according to their cadre. Simple random sampling was used to select prospective respondents. The sampling frame was developed by listing all the names of staff that were to be obtained from the registry/human resource office at each facility. After which, every individual was assigned a number in each strata, then the piece of papers were randomly picked from the strata until the required proportion of each cadre was attained.

3.5.2 Sample Size

Fisher's exact finite population was used to arrive at the number of health care workers selected to participate in the study.

n= Z2P (q)/d2

When n=sample size (population>10000)

Z=normal deviation at confidence interval 95% (1.96)

P=proportion of the population with desired characteristics (50%)

q=proportion without desired characteristics (50%)

d=degree of precision (0.05)

n= (1.962) (0.5) (0.5)/0.052 =384

Applying the formula, the required sample size was 384, but because the study population of health care workers was 349 (i.e less than 10,000), therefore finite population correction was applied.

Using finite population correction for proportions, nf= n/ {1 + (n/N)}

nf= 384/ {1+(384/349)} = 183. To cater for non-response (10%) of sample size was adjusted to 201.

Therefore, the study sampled 201 respondents, distributed based on their proportions as displayed in table 3.2.

Table 3.2: Distribution Summary of HCWS Based On Proportionate Size

Summary of HCWs based on total proportionate of each cadre							
Cadres	**Marsabit Referral Hospital**	**Moyale Hospital**	**Suku sub county HC**	**Moyale sub-county HC**	**County headquarter**	**Total**	**Prob. Proportionate size**
Nurses	63	52	27	46	10	198	114
Med.officer	5	7	1	1	0	14	8
Pharmacist	3	1	0	0	1	5	3
Public health off	0	0	16	20	1	37	21
HIRO	3	3	2	1	1	10	6
Clinical officer	13	11	3	7	3	37	21
Nutrition officer	4	4	2	3	1	14	8
Pharm tech	4	3	0	0	0	7	4
Lab off	11	5	2	1	1	20	12
Anaesthetist	2	2	0	0	0	4	2
CEO	1	1	0	0	0	2	1
Ob/gynecologist	1	0	0	0	0	1	1
Total	**110**	**89**	**53**	**79**	**18**	**349**	**201**

3.6 Construction and Research Instruments

The study modified RHIS Performance Diagnostic Tool developed by MEASURE Evaluation (2019) to develop questionnaires and interview guides. Self-administered questionnaires were used to collect data from service delivery staffs while key informant interviews were conducted to collect data from the management of health facilities under study.

3.7 Pre-Testing

Pre-testing was conducted at faith-based Mission Hospital, which is within Marsabit County. The pre-test aimed to ensure the validity and reliability of the research instruments. According to Nunes, Martins, Zhou, Alajamy, and Al-Mamari (2010), pre-testing is necessary for any scientifically sound study and is aimed at making important modifications to research tools to improve their validity and reliability. 20 respondents (10% of sample size) were used to ensure that the questions elicited a required response. The tools were refined accordingly.

3.7.1 Validity

Face and internal validity of the instrument was determined through expert opinion and their inputs were taken into account in developing the study tools to enhance validity. This was done through university supervisors and the IMPACT program coordinator. Koro-Ljungberg (2008) asserts that the validation of the research instrument is very crucial since the framing of the questions and how they lead to probing requires professional perspectives. MEASURE Evaluation performance diagnostic tools was used to guide the formulation of questionnaires.

3.7.2 Reliability

A Cronbach alpha was obtained with the aid of the SPSS computer program to ensure the reliability of the study. The use of this method was feasible due to its precision and ability to use the correlation matrix to tabulate patterns of data. According to Bland and Altman (1997), a Cronbach's alpha of 0.7 and above is adequate to declare a research instrument as reliable. In this study, an alpha of 0.73 was obtained, which means the instruments used in the study were reliable (table 3.3).

Table 3.3: Reliability Test

Variable	Cronbach's alpha	Verdict
Information technology	0.79	Reliable
Human resource factors	0.69	Reliable
Organizational factors	0.71	Reliable
Average	0.73	Reliable

3.8 Data Collection Techniques

A self-administered questionnaire (see appendix V) was used to elicit a response from routine service delivery staff, on the other hand, key informant interviews were conducted for management staff (County /sub-county health management team, hospital chief executive officer and Hospital health information and record officer). The observation checklist and document review were used to verify information technology infrastructures and the existence of relevant documents (RHI reports, planning documents, meeting minutes, feedback reports/notes, guidelines). Permission was sought from the County Health Director before each of the prospective respondents were visited in their respective sections and requested to fill the self- administered questionnaire.

3.8 Data Analysis

After data collection, the instruments were checked to ascertain whether all the sections in the tools were filled. After that, the quantitative data was coded and entered in the Statistical Package for Social Sciences (SPSS) version 23. Accuracy of the data entry was confirmed before running any test by checking missing data and inspecting the minimum and maximum value for each variable. This ensured that all values for each variable were valid by not having a value that exceeds the scale used to measure.

After data entry, descriptive statistics mainly percentages and frequencies were used to summarize the data. After running the descriptive statistics and obtaining the percentages and frequencies, the researcher conducted the chi-square test was carried out to establish the significance of relationship between the study variables.

The second stage of the analysis involved analysis of qualitative data. The qualitative data was analyzed thematically; first the researcher familiarized with the data. Transcription was done and preliminary codes were generated which were used to describe the content. After generating codes, the researcher went through the list of codes and collated them in order to generate themes in line to the study objectives. The themes were reviewed to ensure that data that was within the themes cohere together meaningfully with clear distinction between the themes. The themes were described and the data obtained was used to compliment and expound on the meaning of quantitative data. Direct verbatim were also provided to augment the quantitative analysis.

3.9 Logistical and Ethical Considerations

To ensure all research protocols were adhered to, the researcher sought permission to collect data from Kenyatta University Graduate School, the Ethics Review Committee (appendix II) as well as the National Commission for Science, Technology, and Innovation. (Appendix III). In addition, approval to conduct the research in the facilities was sought from the health management office in the respective hospitals. Furthermore, all research participants were assured of their privacy and non-disclosure of the information they provided. Participants were assured that generated data would only be used for academic purposes. Generated data was analyzed and disseminated through open-access publications where the participants and the general public can download and find the results of the study.

CHAPTER FOUR

RESULTS

4.1 Introduction

The overall purpose of this study was to assess factors associated with the use of routine health information for decision-making among health care workers. In this chapter, data collected to answer the study purpose was collected and presented in tables and figures. The analysis was done both descriptively and inferentially to meet the study's specific objectives which was organized in terms of general characteristics of the respondents, extent of information use in decision making, information technology, human resource and organizational factors. Respondents involved were health workers from Marsabit county Referral Hospital and Moyale sub-county referral hospital, Marsabit County, Kenya.

4.2 Response Rate

The researcher targeted 201 HCWs who were issued self-administered questionnaires. Out of these, 195 were able to fill the questionnaires successfully and return them. This makes a response rate of 97.01%. This response rate was deemed as sufficiently representative of the target population as a response rate of more than 75% is reported by Bryman (2012) as representative.

4.2 Demographic Characteristics of the HCW Respondents

Table 4.1 presents a summary of demographic characteristics of the respondents. Majority of respondents 119(61%) were aged between 24 to 29 years while 25(12.8%) were aged between 30-35, 35(17.9%), 14(7.2%) were aged between 54-59, while 1(0.5%)

were above 60 years of age. The findings imply that the majority of health workers in Marsabit County were below 30 years. The table also shows that most of the respondents 100(51.3%) were male while 95(48.7%) were female. Further, 103(52.8%) had diplomas, 21(10.8%) had higher diplomas, 59(30.3%) had degrees, 4 (2.1%) had masters and 8(4.1%) had a certificate. In regards to the period served in Marsabit County, 54(26.9%) had worked for less than four years, 46(22.9%) had worked for 5-7 years, 42(21,5%) had been working in Marsabit county for 9-10 years while only 4 had worked for more than ten years. The respondents were also asked the type of facility they work in and 98(50.3%) indicated they work in-country referral hospital, 84(43.1%) worked in sub-county hospital, 7(3.6%) worked in health centers and only 6(3.1%) worked in dispensaries. Lastly, the majority of respondents 133(68.6%) were in routine service delivery, 41(21%) were management team, 24(12.3%) were in charge of departments while 1(0.5%) did not indicate their role in the health care system. The findings suggest that most of the respondents targeted in Marsabit County had served for more than four years, were below 30 years of age, were mainly serving in sub-county and county referral hospitals, and were mainly male.

Table 4.1: General and Demographic Characteristics

Characteristics	Category	Frequency	Percentage
Age	24-29	119	61
	30-35	25	12.8
	36-41	1	0.5
	42-47	35	17.9
	54-59	14	7.2
	>60	1	0.5
Gender	Male	100	51.3
	Female	95	48.7
Religion	Muslim	84	43.1
	Christian	55	28.2
	Traditionalist	16	8.2
	Non-response	40	20.5
Education	Certificate	8	4.1
	Diploma	103	52.8
	Higher diploma	21	10.8
	Degree	59	30.3
	Master	4	2.1
Working period in Marsabit County	1-4 years	54	26.9
	5-7 years	46	22.9

The respondents were also asked to indicate the services they provide in the health care system. Table 4.2 shows that 76(39%) of the respondents worked in outpatient, 63(32.3%) worked in inpatient, 55(28.2%) provided in-patient and out-patient services, 41(21%) provided primary health services, 37(19%) provided administrative services, 17(8.7%) provided maternity services while 18(9.2%) provided HIV care and treatment service. The respondents 15(7.7%) provided TB care and treatment, 20(10.3%) provided laboratory services, 28(`14.4%) worked in the pharmacy, 9(4.6%) provided theater services while 24(12.3%) provided recordkeeping services and 45(22.3%), and others

indicated that they provide services such as renal, research, health promotion, radiology and physiotherapy.

Table 4.2: Shows Health Services Provided By Respondents.

Service provided	Frequency	Percentage
Out-Patient service	76	39
In-patient service	63	32.3
Both Out-patient & In-patient service	55	28.2
Primary health services	41	21
Administrative services	37	19
Pharmacy services	28	14.4
Record-Keeping service	24	12.3
Laboratory service	20	10.3
HIV care and treatment service	18	9.2
Maternity service	17	8.7
TB care and treatment service	15	7.7
Theater services	9	4.6
Others	45	22.3

4.3 Health Information Systems in Decision Making

Respondents were asked about the health information recording systems used in their facility. Their responses are provided in table 4.3 that shows the majority 115(59%) of health facilities in Marsabit County use both paper-based and electronic systems. Paper-based record systems 50(25.6%) use paper-based record systems while 30(15.4%) use electronic health record systems. The findings imply that both paper-based and electronic systems were mainly adopted in the health facilities in Marsabit County. It was observed that facilities were on the transition to the Electronic Medical Record system. However, EMR installation was not fair distributed, as some of the departments such as outpatient, pharmacy, and comprehensive care unit were fully digitized while inpatient, maternity, storekeeping was fully paper-based.

Table 4.3: Type of Health Information Recording System Available

Type of HIRS	Frequency	Percent
Both paper-based and electronic systems.	115	**59.0%**
Paper-based record system	50	25.6%
Electronic health record system	30	15.4%
Total	**195**	**100.0%**

The researcher also asked the respondents whether they have records of written guidelines on routine health information display such as graphs or tables. Their responses are provided in figure 4.1 that shows 93(47.94%) had written guidelines on routine health information on display, while 34(17.5%) had written guidelines, but there was no copy while 67(34.54%) did not have any written guidelines on the routine health information display. These findings indicate that most of the health facilities in Marsabit County have written guidelines on routine health information, though not all of them put these on display.

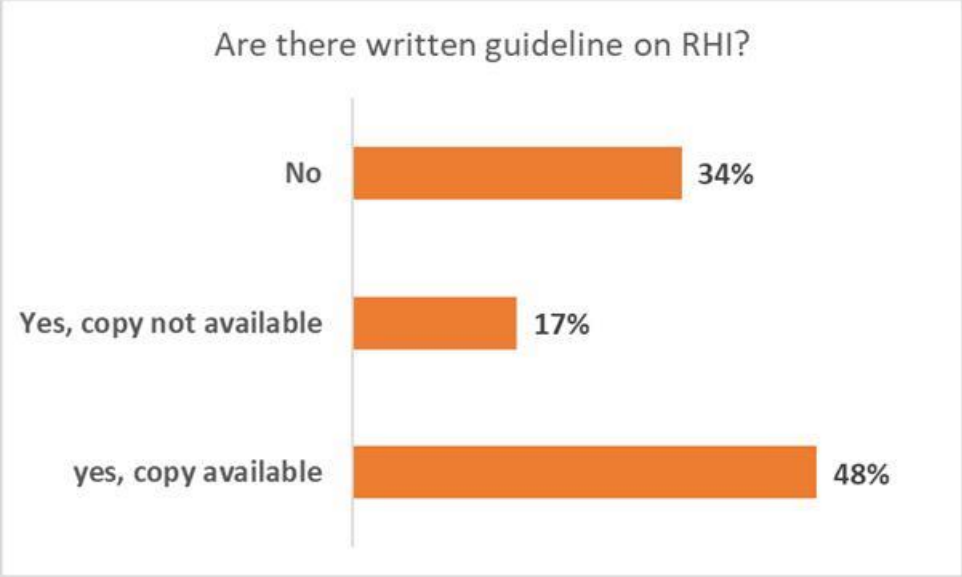

Figure 4.1: Written Guideline on RHI

The respondents were also asked whether there are established decision making forums at level 3 (County referral) and level 2 (sub-county referral) hospitals. The majority 188 (96%) claimed that there was a decision-making health management team while 7(3.5%) indicated that they do not have decision-making forums. These findings indicate that there were decision-making forums in the county and sub-county levels in Marsabit County. The health management teams were also asked whether they periodically meet to discuss the performance monitoring and management of the health facility. The majority 31(82.6%) indicated that they meet periodically whereas 5(13.8%) indicated they do not meet periodically. The findings suggest that there are meetings to discuss performance and management of health facilities.

Table 4.4: Decision Making and Performance Monitoring Meetings

Statement	N=195	Frequency	%
Decision-making forums; Is there a county/sub- county health management team?	Yes	188	96
	No	7	3.5
	N=37	Frequency	%
Do you periodically meet to discuss performance monitoring and management of the health facility?	Yes	31	82.6
	No	5	13.8

The researcher also asked the respondents (managers) how many times they performed monitoring and management meetings in the past six months. Figure 4.2 shows most of the respondents 20(54%) indicated they had conducted the meeting one time, 9(24.3%) claimed they had done it twice, 5(13.5%) indicated that they had done it thrice, 4(10.8%) indicated they had conducted the meetings more than thrice. Generally, these findings show that most of the health facilities had conducted meetings at least once in the past six months implying that the meetings are rarely every month but may go up to two months without monitoring and performance management meetings being undertaken.

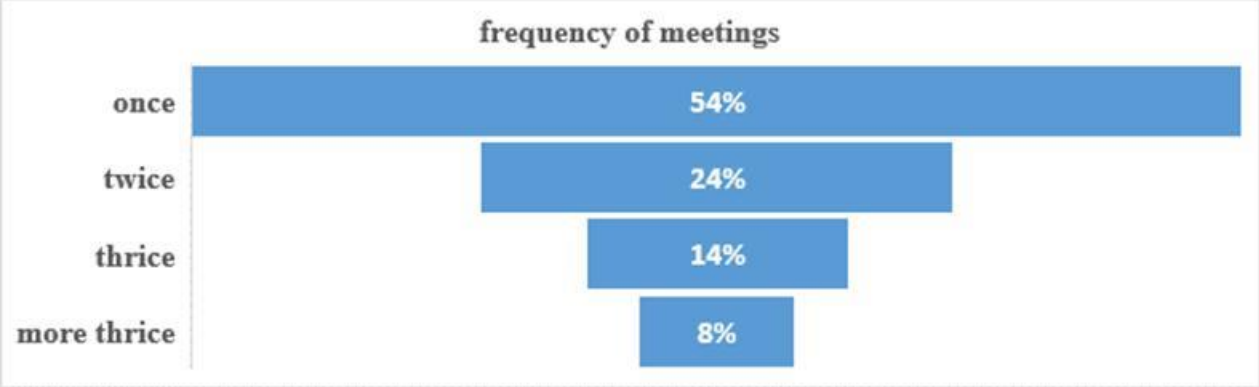

Figure 4.2: The Frequency of Performance Monitoring and Management Meetings

The researcher also asked the respondents (managers) whether there were any decisions made by the health management team using routine health information generated on different aspects of management functions as indicated in figure 4.3 below. The respondents 15(40%) used RHI to formulate plans while 13 (34.3%) indicated that they had used RHI for budget allocation and 20(54.4%) claimed they had used RHI for medicine supply, 16 (42.1%) used it for staff deployment, 21 (56.9%) used RHI for service delivery, and 20(54.9%) used it for priority setting and identifications of gaps. The average overall response for the six management functional blocks was 47.1%, it can be seen that RHI were used slightly above averagely for medical supply and drug management 54%, service delivery improvement 57%, and identification of gaps 56%. It was below averagely used for the formulation of plans, budgeting, and staffing decisions.

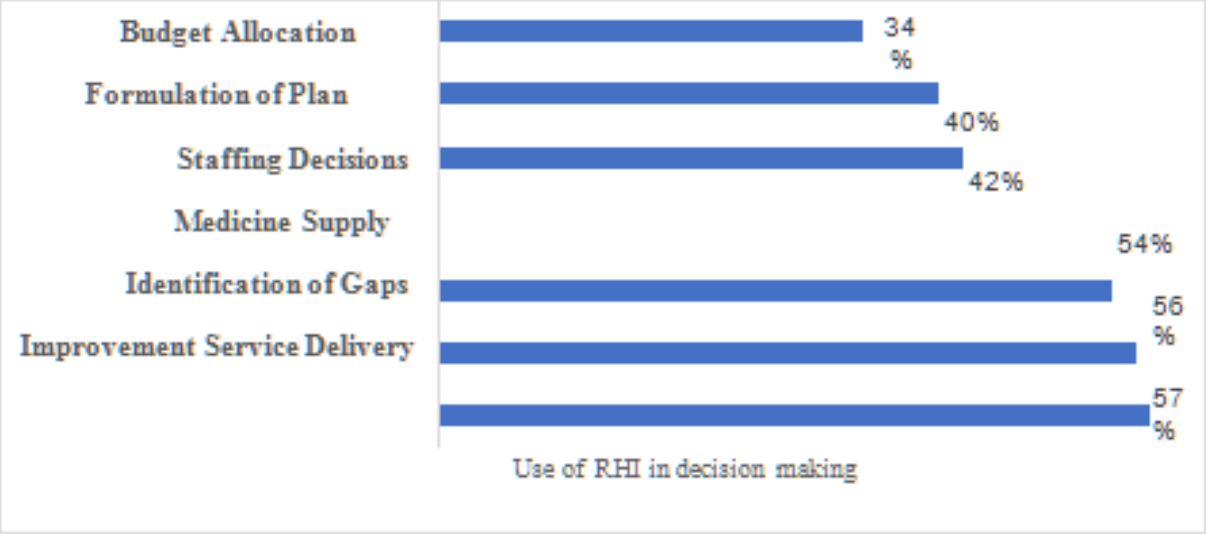

Figure 4.3 RHI Use in Decision Making Management Function based on HMT Responses

The researcher wanted to further investigate whether the use of RHI for different management functions was associated with the frequency of use of RHI data.

Table 4.5 shows that most of the respondents 10 (27%) who always used RHI in their decision- making processes used them to formulate plans while those who rarely used them 9(24.3%) did not use it for formulating plans. This was supported by the statistically significant p-value 0.014<0.05 which implies that frequent use of RHI in decision making influences the likelihood of use of the RHI in formulating plans.

The table further shows that there was a statistically significant association between budget formulation and use of RHI data in decision making implying that frequent use of RHI in health facilities could increase the likelihood of it being utilized when making budget plans. This is supported by the cross-tab findings which indicated that most 4 (10.8%) of those who had always used RHIs used it for budget preparation while most of

those who rarely used RHIs 13(35.1%) did not use it for preparing budgets. Further, most of the respondents who always use RHIs 9(24.3%) used it for medicine supply and drug management while most of those who rarely used it 13 (35.05%) did not use it for medical supply and drug management. The findings imply that use of RHI increased the likelihood of HCWs using it for medical supplies and drug management as supported by the statistically significant p-value 0.005<0.05). The table also shows that the majority of respondents 11(29.8%) who always used RHI used them for staffing decisions while most 9(24.3%) of those who rarely used RHI did not use them for staffing decisions implying that the use of RHIs increased the probability of using it in staffing decisions. these implications are supported by the statistically significant p-value 0.005<0.05. In regards to service delivery, a statistically significant p-value of 0.00<0.05 was found suggesting that frequent use of RHIs increased the likelihood of using it for service delivery improvement. This is supported by the frequency findings where most 14(37.8%) of those who always used RHI to guide their decisions also used them for service delivery and improvement whole 6(16.2%) of those who rarely used

RHIs did not use them when making service improvement decisions. Lastly, the table shows that most 16(43.2%) of those who always use RHI use it to identify gaps and priority areas while on the contrary, those who rarely use it 8(26.2%) did not use it to identify gaps and priority area. The finding suggests that the frequent utilization of RHI when making decisions can improve the likelihood of using it to identify priority areas and gaps in the health care system as supported by the statistically significant p-value 0.000<0.05.

Table 4.5: Management Functions Influencing Frequency of RHI Use

Management functions		Use of Routine RHIS					
	N=37	**Rarely**	**Sometimes**	**Always**	***df***	***X^2***	***P*-value**
Formulation of plan	Yes	8.1% (3)	16.2% (6)	27% (10)	2	14.155	0.014
	No	24.3% (9)	13.5% (5)	10.8% (4)			
Budget allocation	Yes	2.7% (1)	5.4% (2)	10.8% (4)	2	17.601	0.027
	No	35.1% (13)	16.2% (6)	32% (12)			
Medicine supply	Yes	5.4% (2)	13.5% (5)	24.3% (9)	2	21.086	0.002
	No	27% (10)	16.2% (6)	13.5% (5)			
Staffing decisions	Yes	8.1% (3)	16.2% (6)	29.8% (11)	2	22.615	0.005
	No	24.3% (9)	13.5% (5)	10.8% (4)			
Service delivery	Yes	10.8% (4)	24.3% (9)	37.8% (14)	2	18.382	0.000
	No	16.2% (6)	8.1% (3)	2.7% (1)			
Identification of gaps	Yes	10.8% (4)	27.0% (10)	43.2% (16)	2	30.241	0.000
	No	26.2 (8)	10.8% (4)	8.1% (3)			

The KIIS was asked what can be done to identify the importance of health information products for decision making. One KII discussant reported:

‘Health information products are critical for different purposes. They aid in decision-making processes on sereval issues within the health facility and the national healthcare system as a whole. For instance, it helps in making decisions on drug management as well as medical supplies. It also helps in making budget plans and identifying areas that need to be improved once the gaps are identified.'

4.4 Information Technology Factors Associated With Use of RHI

The second objective of the study aimed to determine information technology factors associated with health information use among HCWs in Marsabit County. The respondents were first asked to indicate the total quantity of equipment that were in working condition. Their responses were as provided in table 4.7. For easier presentation, the number of equipment was categorized into 0, 1-4, 5-9, and more than 10. The majority of respondents 174(86.56%) indicated that they did not have laptop computer while 19(9.7%) indicated they have between 1-4 computers, and only 2(1%) have 5-9 laptop computers. The majority of respondents 109(54.2%) indicated they do not have desktops, and 75(37.1%) have between 1-4 computers while 7(3.5%) have 5-9 computers while 4(1.9%) have more than ten desktop computers. The majority of respondents 136(67.66%) indicated that there are no printers, 58(28.3%) and only 1(0.5%) have more than ten printers. Further, the majority of respondents 178(88.55%) do not have modems and only 17(8.7%) indicated they have functional modems. The majority of respondents 145 (72.14%) indicated that they do not have an uninterruptable power supply (UPS), 48(24.6%) and only 2(1%) indicated that they have between one and four UPS. The majority of respondents 121(62.1%) also indicated that they have between one and four generators and 74(36.45%) indicated they have zero.

Table 4.6: Equipment Inventory

Equipment inventory	Quantity	N=195 Responses
Laptops	0	86.6% (174)
	1-4	9.7% (19)
	5-9	1% (2)
	>10	0
Desktops	0	54.2% (109)
	1-4	37.1% (75)
	5-9	3.5% (7)
	>10	1.9% (4)
Printers	0	67.7% (58)
	1-4	23.3 (58)
	5-9	0
	>10	0
Modems	0	88.6% (178)
	1-4	8.7% (17)
	5-9	0
	>10	0
Uninterrupted power supply (UPS)	0	72.1% (145)
	1-4	24.6% (48)
	5-9	1% (2)
	>10	0
Generator	0	36.5% (74)
	1-4	62.1% (121)
	5-9	0
	>10	0

4.5 Equipment Association with Frequency of RHI Use.

For lap tops, modems Ups and printers; the p value of more than 0.05 shows that there was no statistical association between the availability of those equipment and the use of RHI. Therefore, it can be argued that the presence or absences of these equipment are not likely to have an influence on the use of RHI data. However, Desktop and Generator had an association with frequent use of RHI at p-value of 0.003 and 0.026 respectively. These findings imply that the presence of desktop computers/generator was likely to have an

influence on the use of RHI as supported by the statistically significant p value of less than 0.05.

Table 4.7: Number of Equipment and Association with Frequency of RHI

Laptop	0	18.6% (36)	36.1% (70)	35.6% (69)	4	7.678	0.195
	1-4	0.5% (1)	3.1% (6)	5.2% (10)			
	5-9	0%	0%	1% (2)			
Desktop computers	0	11.3% (22)	22.7% (44)	23.2% (45)	4	13.744	0.003*
	1-4	7.2% (14)	13.4% (26)	15.9% (31)			
	5-9	0.5% (1)	3.0% (6)	2.6% (5)			
Modems	0	18.4% (35)	38.1% (74)	37.6 (73)	2	0.162	0.166
	1-4	1.0% (2)	1.% (2)	4.1% (8)			
UPS	0	15.6% (31)	26.3 (51)	32.5 (63)	4	7.759	0.331
	1-4	3.1% (6)	12.4(24)	8.8% (17)			
	5-9	0%	0.5% (1)	0.5% (1)			
	>10	0%	0%	0%			
Generator	0	6.7% (12)	11.3% (22)	17.5% (34)	2	6.260	0.026*
	1-4	12.9% (25)	27.8% (54)	24.2(47)			
Printers	0	13.4% (26)	28.8(56)	28.4% (55)	4	8.508	0.759
	1-4	5.7% (11)	10.3% (20)	12.9% (25)			
	5-9	0%	0%	0.5% (1)			

4.6 Computer Proficiency

The respondents were also asked to rate their computer skills. Figure 4.4 shows their ratings.

The majority 144(74.61%) claimed that their computer skills were basic level, 27(13.99%) were intermediate, 14(7.25%) had advanced computer skill and 8(4.15%) claimed they were not computer proficient. The findings suggest that the majority of the HCWs have only basic skills in computer and may have difficulties manipulating raw data to provide information/knowledge that can be used for decision-making processes.

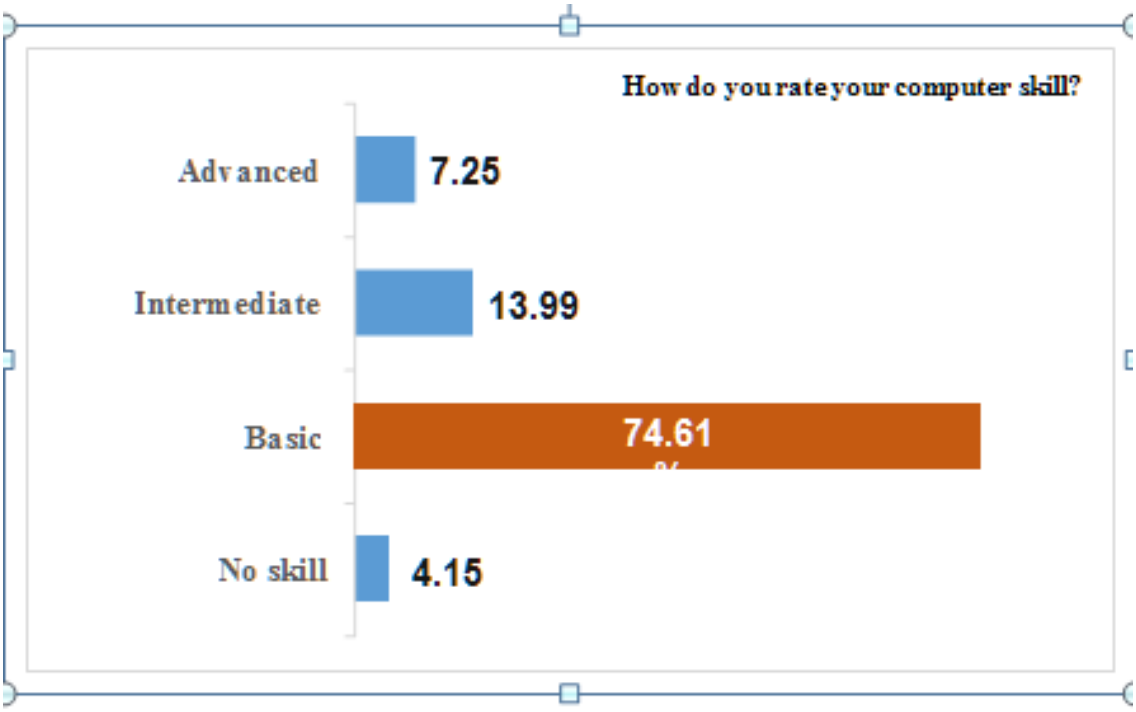

Figure 4.4: Computer Proficiency.

One KII argued "The challenges include our limited skilled personnel as most of the staffs are not computer savvy." implying low computer proficiency that may hinder frequent use of RHI.

4.7 Internet and Electricity Supply.

The researcher also asked the HCWs to indicate whether they had access to the internet, WIFI, and electricity? Figure 4.5 shows the majority 139(71.3%) indicated they have access to the internet while 121(62.1%) also indicated that they have access to Wi-Fi and 163(83.6%) claimed they have a continuous supply of electricity. These findings indicate that access to Wi-Fi, internet, and continuous power supply was not a problem in Marsabit Health facilities.

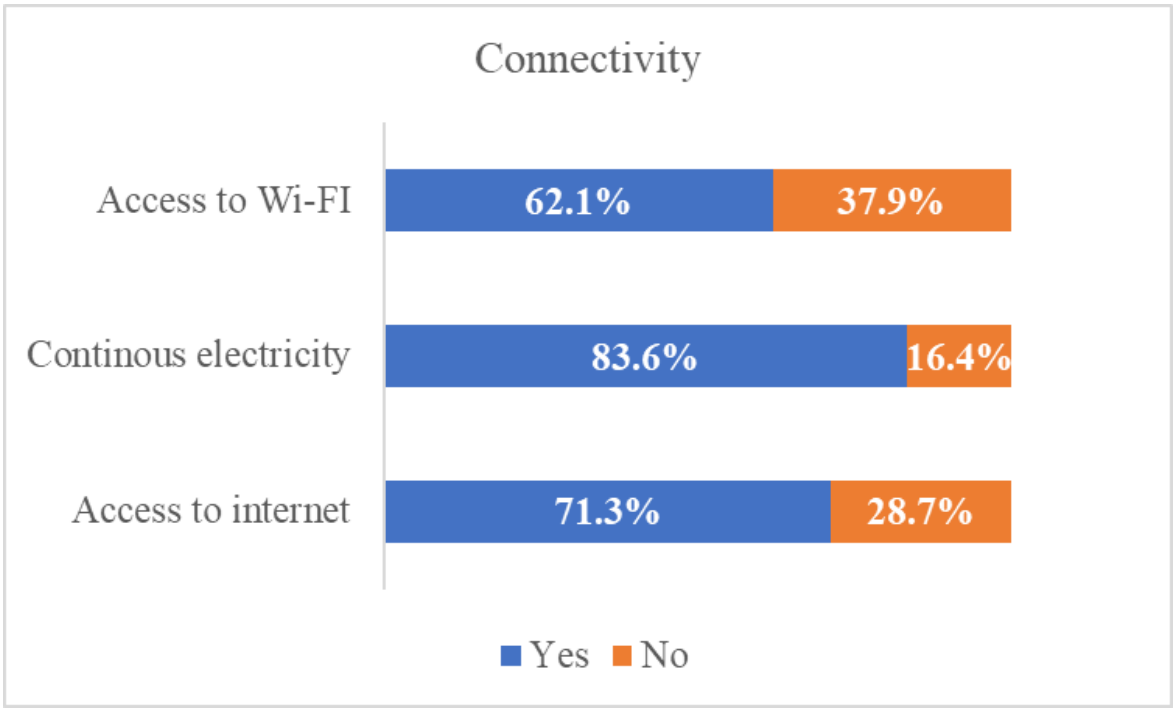

Figure 4.5: Access to Internet, WI-FI and Electricity

4.8 Types of Software

The respondents were asked to indicate the types of software used in collection of RHI. Table 4.9 shows majority of 76(39%) used DHIS2, 69(35.4%) indicated they used MedBoss while 37(19%) used both Medboss and DHIS2. Only 7(3.6%) indicated that

they had no information software while 4(2.1%) indicated that they had LIMS. Therefore, it can be deduced that the most utilized health information software was the DHIS2, Medboss, or a combination of both software. LIMS were rarely used in health facilities because it was only applicable to laboratory department.

Table 4.8: Types of Software Used In Facilities.

What type of Health information software is available?		
Software types	**Frequency**	**Percent**
Dhis2	76	**39.0**
LIMS	4	2.1
MedBoss	69	**35.4**
Dhis2 & Medboss	37	19.0
None	7	3.6
Total	**193**	**99.0**
Non-response	2	1.0
	195	100.0

Further analysis was done to determine whether the type of software available was associated with RHI use. Table 4.10, shows that the type of health information software utilized by the health facilities has a statistically significant association on its use with RHI at a p-value of 0.028<0.05. The majority of those who always use RHI 35(18.23%) and 34(12.71%) use Medboss and DHIS2 respectively, while those who use LIMS and those who lack software 2(1.04%) and 6(3.13%) respectively rarely make decisions guided by RHIs. The findings suggest that some of the software's used were not more integrated to generate data that can be used reliably in making decisions.

Table 4.9: HIS and RHI Use in Decision Making

Software	RHI use						
	N=194	**rarely**	**sometimes**	**always**	**Df**	**X^2**	**P-value**
Dhis2	76	7.8% (15)	13.5% (26)	18.2% (35)			
LIMS	4	1% (2)	0%	1% (2)			
MedBoss	69	7.3% (14)	10.4% (20)	17.7% (34)	**8**	**17.192**	**0.028**
Both Dhis2 & Medboss	37	3.1% (6)	6.8% (13)	9.3% (18)			
None	9	3.1% (6)	0.5% (1)	0%			

The KIIS were asked to indicate the challenges facing the use of RHIS. One of them argued;

'The major challenges facing the use of RHI in decision making is main issues such as too much paperwork, especially in facilities that are yet to adopt health information systems. The other challenges include our limited skilled personnel as most of the staff are not computer savvy. Poor documentation is the other challenge that is limiting the effective and efficient use of health information data.'

The other KII, argued, 'We have inadequate tools and equipment for conducting collection, analysis, and dissemination of data for decision-making processes. It is paramount that the infrastructure and the needed skills, tools, and equipment's are there to ensure timely decision making and information sharing'

4.9 Human Resource Factors and Health Information Use

The third objective of the study purposed to determine human resource factors associated with the health information use among HCWs in Marsabit County. First, the researcher aimed to examine the availability of IT technicians and designated health records officer.

The respondents were asked whether the facility has information technology technical support personnel (IT technician) and 136 (69.7%) indicated they have IT technicians with only 57(29.2%) claiming they do not have IT technicians. The findings imply that the majority of the health facilities in Marsabit County have IT technical support. The table also shows that the majority of respondents 168(86.2%) have designated health information and record officer at their facility with only 25(12.8%) indicating that they do not have a designated health information and records officer at their facility.

Table 4.10: IT Technicians and HRIOS

Access	Yes	No	No Response
Does the facility have information technology technical support personnel (IT technician)	69.7% (136)	29.2% (57)	1% (2)
Do you have a designated health information and record officer at your facility	86.2% (168)	12.8% (25)	1% (2)

The researcher also purposed to determine whether the HCWs had received training in different data management processes. Table 4.12 this shows that the majority of respondents 116(59.5%) did not have any training on routine health data management while 75(38.6%) had some form of training on data management. Similarly, the majority of respondents 157(80.5%) lacked training on data processing, 155(79.2%) lacked training in data quality, 166(85.1%) lacked training on data display and visualization, 148(75.9%) lacked training in data reporting and 153(78.5%) lacked training in the use of data for decision making. From these findings, it was evident that the majority of respondents do not have training in several aspects of data management. These findings

imply that the lack of training may have an impact on the overall use of health data in the health care system owing to the limited number of staff being trained on routine health data management.

Table 4.11: Training On Data Management

Trainings. Have you had training on	**N=195**	**Yes**	**No**	**Non-response**
RHI and data management?	F	38.6% (75)	59.5% (116)	2.1% (4)
Data processing?	F	17.4% (34)	80.5% (157)	2.1% (4)
Data quality?	F	19% (37)	79.2% (155)	1.5% (3)
Data display	F	12.8% (25)	85.1% (166)	2.1% (4)
Data report?	F	22.6% (44)	75.9% (148)	1.5% (3)
Data for decision making?	F	20% (39)	78.5 (153)	1.5% (3)

Based on these outcomes, the researcher conducted a chi-square test of goodness fit to determine whether the training aspects of health care workers on RH data management influenced their use in decision-making processes. Table 4.12 below shows that most of the respondents who have been trained on data management 38(19.79%) always use routine RHI for decision making while most of those who have no training in routine health data management 42(20.89%) rarely used RHI for decision making. The findings imply that training in routine health data management influences the likelihood of HCWs using RHI data as supported by the statistically significant p- value of $0.035<0.05$.

The table also shows that the majority of the respondents 21(10.99%) who had received training in data processing always used routine health information to make decisions while most of those who had no training in data processing 67(35.08%) rarely used RHI. The findings imply that training in data processing significantly influences the probability

of HCWs utilizing RHI in decision-making processes (p=value 0.027<0.05).It was also found that training in data quality significantly inclined the HCWs likelihood of using RHI by the statistically significant p-value 0.005<0.05. This is supported by the cross-tab findings where most of those who had training in data quality 24(12.5%) always used RHI to make decisions while most 65(33.85%) of those who lacked training in data quality rarely used RHIS while making decisions.

Most of the respondents who had training in data visualization and display 34(17.84%) always used RHI while most of those who lacked training 70(36.65%) rarely used RHIS during routine activities. These findings suggest that training in data visualization and display influenced the probability of using RHIS to make decisions. This notion is supported by the statistically significant p-value 0.015<0.05 suggesting that the use of RHIS in decision making is statistically influenced by training in data display and visualization.

The table also shows that the majority of respondents 21(10.9%) who had been trained on data reporting always used RHIS when making decisions while most of those who lacked training in reporting 59(30.73%) rarely used RHIS in making a decision. The findings imply that RHIS use in decision making is influenced by the training data reporting as supported by the statistically significant p-value 0.048<0.05.

Lastly, the findings revealed that training in data use in decision making significantly influences the likelihood of HCWs using RHIS in decision making at a p-value 0.040<0.05. The findings are supported by the cross-tab findings which revealed that most of those who had been trained on using data to make decisions 33(17.19%) always

used RHIS when making decisions while on the contrary, 63(32.81%) of those who rarely used data for decision making had no training on the use of data when making decisions.

Overall, these findings reveal that training increases the likelihood of HCWs utilizing RHIs to make decisions in health care facilities in Marsabit County. It was found that RHI data management p-value (0.035<0.05), data processing p-value (0.027<0.05), data quality p-value (0.005<0.05), data display/visualization (p=0.015<0.05), data report p-value (0.048<0.05) data use in decision making p0.04<0.05) had a statistically significant influence on the probability of using RHI when making decisions.

Table 4.12: Training and Use of RHIS

Training		**Use of RHI**					
	N=195	**Rarely**	**Sometimes**	**Always**	***Df***	X^2	***P* value**
Data managing	yes	3.7% (7)	15.7% (30)	19.8% (38)	2	29.605	0.035
	no	20.9% (42)	21.8% (44)	15.6% (30)			
Data processing	yes	2.6% (5)	4.2% (8)	10.9% (21)	2	10.958	0.027
	no	35% (67)	16.8% (32)	30.6% (58)			
Data quality	yes	1.6% (3)	5.2% (10)	12.5% (24)	2	16.393	0.005
	no	33.9% (65)	29.2% (56)	17.7% (34)			
Data display	yes	1.6% (3)	2.6% (5)	8.9% (17)	2	13.031	0.015
	no	40.2% (70)	35.6% (62)	19.5% (34)			
Data report	yes	2.0% (4)	9.9% (19)	10.9% (21)	2	21.023	0.048
	no	30.7% (59)	29.2% (56)	17.9% (33)			
Data use for decision making	yes	2.1% (4)	6.3% (12)	12% (23)	2	22.153	0.040
	no	32.8 (63)	29.7% (57)	17.2% (33)			

The researcher asked the KIIS to identify the ways that service delivery staff can be motivated to engage and understand the data they collect. One of the KIIS argued "It is important for the staff to be given adequate supervision with regular feedback. This will monitor their progress with the use of the collected data and their analyses…mentoring and training are also crucial for serving to motivate the staff to learn how to use data they collect in making decisions"

4.10 Organizational Factors and Health Information Use

The fourth objectives of the study purposed identify organizational factors associated with health information use among HCWs in Marsabit County. The respondents were given a list and asked to indicate yes or no. The table4.13 shows that the majority of respondents 120(61.5%) indicated that they did not have a staff organogram with only 72(36.9%) indicating that they have one. Contrary, the findings further reveal that the majority of respondents 106(54.4%) indicated that they have standard operating procedures while 85(43.6%) indicated the contrary. It was also found that the majority of respondents 139(71.3%) had not been assessed on training need for health information systems. The responses on support supervision of routine health information use were divided with 92(47.2%) claiming they had supervision support while 99(50.8%) claimed they had no such support. It was also found that most of the respondents 133(68.2%) had not received the supervision report from the last visit. It can also be seen that the majority of respondents 124(63.6%) indicated that their facilities do not have budgets for routine HIS supplies as well as the dissemination list of RHIS reports from the county. The respondents were generally not sure about the long-term financial plans for Routine HIS or scheduled training plans. Generally, it can be seen that only a few organizational

factors such as standard operating procedures, staff organogram, and staff routine supervision support were present in most organizations based on the responses with others such as budgeting, dissemination list, training, supervision report feedbacks lacking in the institutions.

Table 4.13: Responses on Availability of Organizational Practices

Organization Factor Do you have	**N=195**	**Yes**	**No**	**Not sure**	**Non-response**
Staff organogram?	F	36.9 (72)	61.5% (120)	-	1.5% (3)
Standard operation procedures?	F	54.4% (106)	43.6% (85)	-	2% (4)
training need assessment?	F	26.7% (52)	71.3% (139)	-	2% (4)
Support supervision?	F	47.2% (92)	50.8% (99)	-	2% (4)
Feedback report?	F	29.2% (57)	68.2% (133)	-	2.6% (5)
Budget for Routine HIS.	F	34.4% (67)	63.6% (124)	-	2% (4)
Schedule for plan training?	F	8.7% (17)	45.1(88)	44% (87)	1.5% (3)
Dissemination report?	F	32.8% (64)	64.1% (125)	-	3.1% (6)
Financial plan for HIS?	F	14.4% (28)	23.1 (45)	61% (119)	1.5% (3)

The researcher conducted a chi-square to determine whether the use of RHI was associated with organizational management practices. The table 4.14 below shows that most of those who have staff organogram 38(19.79%) always use RHI in their decisions while 55(28.65%) of those who rarely use RHI lack an organizational chart on key staff positions. The findings imply that the presence of a staff organogram increases the probability of using RHI in decision making, likely because it enhances accountability a

supported by the statistically significant p-value of 0.027<0.05. Further, the presence of a dissemination report/list was found not to have a statistically significant effect on the RHI use in decision-making processes at a p-value of 0.490>0.05. Similarly support supervision was found not have a statistically significant association on the use of RHI in decision making at p-value (0.2>0.05). However, a budget plan was found to significantly increase the likelihood of using RHI to make decisions at a p-value 0.006<0.05. Where most of those who always use RHI 28(14.58%) have budget plans while 27(14.06%) of those who rarely use RHI in decision-making processes lacked a budget plan.

The table also shows that most of the facilities that always use RHIS to make decisions 52(27.08%) have standard operating procedures while most of those that rarely use 20(10.42%) had no SOPs, suggesting that standard operating procedures increase the probability of using RHIS to make decisions as supported by the statistically significant p-value 0.048<0.05. Lastly, the table shows that most of the respondents 23(11.98%) who have been trained always use RHI in their decision-making process while most of those rarely use 57(29.69%) have not been trained. This implies that training increases the likelihood of HCWs using RHI to make decisions. This is likely due to the emphasis of the training on the importance of RHI in decision- making for the staff and the organization. The findings were supported by a statistically significant p-value of 0.002<0.05.

Table 4.14: Organizational Factors and RHIS Use

Organizational	N 192	Use of RH data					
		Rarely	**sometime**	**always**	***df***	***x²***	***P* value**
Staff organogram	yes	7.3% (14)	10.4% (20)	19.8% (38)	2	23.972	0.027*
	no	28.7% (55)	21.9% (42)	11.9% (23)			
Dissemination report	ye	6.4% (12)	11.6% (22)	15.9% (30)	2	6.363	0.490
	no	12.7% (24)	25.4% (48)	25.4% (48)			
Budget Plan	yes	4.7% (9)	10.4% (20)	27.2% (52)	2	24.681	0.006*
	no	14% (27)	23.4% (45)	19.8% (38)			
Standard operating procedures	yes	8.3% (16)	19.8 (38)	27% (52)	2	27.394	0.048*
	no	10.4% (20)	19.3% (37)	14.6% (28)			
Supervision Report	yes	4.7% (9)	10.4% (20)	14.6% (28)	2	5.01	0.200
	no	13.6% (26)	29.1% (56)	27% (52)			
Training	yes	4.7% (9)	9.4% (18)	11.9% (23)	2	12.78	0.002*
	no	29.7% (57	29.7% (52	14% (27)			

CHAPTER FIVE

DISCUSSION, CONCLUSION, AND RECOMMENDATIONS

5.1 Introduction

This chapter provides a discussion of the findings, conclusion drawn from the results in both qualitative and quantitative research, and recommendations.

5.2 Discussion

5.2.1 Level of RHI Use in Decision Making

The main findings in this area were on the types of health information recording systems used in facilities where it was found that 15% electronic medical recording and 26% was paper based while both electronic and paper-based systems were used in most facilities as reported by 59% of the respondents. This is a promising finding as Mitchell and Kan (2019) argue that digital technology is paving way for new models of care and shifting the focus of health. With digital health, technological infrastructure plays a critical role in the collection, collation, analysis, and dissemination of data. EMR increase operational efficiencies and enhance quality of health care delivery through improved management. The study revealed only 15% of facilities had EMR implying that lack of reliable systems to manage and retrieve patient records was barrier to improving service quality (Ajami and Bagheri-tadi 2013).

The findings also revealed that county and Sub- County decision forums (health management team) were established to monitor and discuss the performance and management of health facilities. As claimed by health managers 31(82.6%) had a meeting at least once every month to discuss challenges related to management of the facilities.

The findings also indicate that the mean percentage for the six blocks of management functions; formulation of plan, budget allocation, staff deployment, medicine supply, service delivery and identification of gaps were rated by health management teams to determine extent of routine health information use.

Considering the World Bank commissioned study by Jamison et al. (2006), successful RHI require high level of monitoring and evaluation with clear goals and deliverables. However, the findings of this study contradict this important check and balance where 54% of the respondents admitted that their facilities were performing monitoring meetings only once in a year, an indication that there is little seriousness as far as RHI is concerned. In fact, the effect of this poor monitoring and evaluation was evident in the fact that in most of the management functions, only less than 50% of the managers were making decisions with the help of RHI data. Important decisions relating to activities such as budget allocation and staffing were majorly made with reference to RHI, an indication of low value for such information by the management of the health facilities.

Average mean above 50% was considered as optimal routine health information use while below 50% was considered as sub-optimal routine health information use. Literature review indicate that RHI use for decision making was affected by multiple factors; The study revealed that 47.1% was the mean percentage utilization of RHI across the six-health system building blocks, hence concludes the use of RHI was sub-optimal in Marsabit county. This is concurrent with study carried in Ethiopia by Chanyalew et al. (2021) who found that the overall level of routine health information utilization for

evidence-based decision making was low of 46.9% signifying poorly used routine health information by departmental managers.

The study further assessed the association between the management function blocks with frequency of RHI use. It was found that RHI was used to formulate plans at p-value of 0.014, to prepare the budget at p-value of 0.027, for medical supply and drug management at p-value of 0.002, to decide on issues such as staff training and deployment at p-value of 0.005, for service delivery improvement at p-value of 0.000 and identifying gaps and setting priorities at p-value of 0.000. Generally, the findings imply that RHI were utilized by the health facilities for different purposes showing the potential of RHI to serve different purposes within the health care system. This was in line with the finding by Rodriguez (2011) who found that a reliable HIS was the foundation of decision making across all health system building blocks.

5.2.2 Information Technology

The major findings in this section revealed that computers such as laptops and desktops averaged 1-4 in most of the facilities, with modems, printers, and UPS being minimal as per the responses of the HCWs. Generator was reported by the majority (62.1%) indicating they have more than one functional generator.

In regards to access to the internet, Wi-Fi, or electricity, the respondents indicated they had no challenge as it was found that internet access (71.3%), Wi-Fi (62.1%), and continuous electricity supply (83.6%). A study by Mitchell and Kan (2019) who found that limited infrastructure in terms of reliable internet connections and consistent electricity supply challenges effective use of health data. Also study by Daton (2017)

who asserts that limited access to the internet and computers limits the use of health data. On the contrary, this study found that internet connectivity and power supplies were not limited. However, the use of RHI was sub-optimal in Marsabit County.

Lastly, the section found that the type of health information system in use had a significant association on the use of RHI for decision making at a p-value of 0.028<0.05). DHIS2 and MedBoss were found to be the most utilized system in routine decision-making in health facilities. Similar claims are made by Karuri, Waiganjo and Orwa et al (2014) who opined that having a reliable free and open-source web-based DHIS system has the potential to improve the use of health data in decision making. Also, Cherubet and Odhiambo-Otieno (2016) affirm that effective and efficient management of health systems globally relies on the well-functioning HMIS. They report that weak informational system where the findings revealed that the lack of appropriate technology and skills in technological innovation hamper the use of data. Similar findings are recorded by Daton (2017) who asserts that limited access to the internet and computers limits the use of health data.

5.2.3 Human Resource Factors and Health Information Use

The research found that 69.7% of the respondents indicated they had an IT technician in their facility and a majority 86.2% claimed they had a designated health records officer in their facility. The respondents also indicated that they had no training in routine health information and management 59.5%, no training in data processing 80.5%, 79.2%) indicated they had no training in data quality, 85.1% indicated they lacked training on data display, 75.9% indicated they had no training on data reporting and lastly 78.5%

indicated they did not have training on using data for decision making. The inferential statistics revealed that RHI data management was at a p-value of 0.035<0.05, data processing was at p-value 0.027<0.05, data quality was at a p- value of 0.005<0.05, data display/visualization was at a p-value of 0.015<0.05, data report was at a p-value of 0.048<0.05, data use in decision making was at p-value 0.04<0.05. Generally, data management training had a significant association with the probability of using RHI data in decision-making processes. These findings imply that lack of training may have an impact on the overall use of RHI in making decisions in the health care system owing to the limited capacity building among HCWs.

A study by Daton (2017) reports that innovation in health information systems is challenged by technical expertise amongst the health care managers and the lack of appropriate infrastructures like computer labs for data analysis and dissemination. The findings in this study revealed that the majority 74.6% of the HCWs had only basic computer skills. Ngugi, Odhiambo, Similarly, Kirimi (2013) found that the adequacy of staff for Routine Health Information System (RHIS), as well as staff training, had a significant impact on RHIS performance in Garissa County, hence underscoring the significance of human resources in HMIS. A study by Mutale et al. (2015) also blamed the lack of staff training for the poor feedback loop in routine reporting of health data.

5.2.4 Organizational Factors and Health Information Use

The study also found that 61.5% of respondents indicated that they had no staff organogram, 54.4% claimed they had standard operating procedures on data management, 71.3% claimed they had never been assessed on training needs for HMIS,

68.2% claimed there was no supervision report after supervision and 63.6% indicated that there was no budget for RHIS. Further, it was found that 61% were not sure if there were long-term financial plans to support RHIS. Overall, the findings suggest that organizational factors were not all incorporated with some such as staff training and budgeting not well-defined and some being poorly rolled out such as timely dissemination of reports, training assessment need, staff organogram, and supervision schedule.

At least 47.94% of the respondents reported they had written guidelines on RHI while 17.53% had written guidelines but no available copies. While a third (34.54%) of respondents don't have guidelines. The findings imply that in some health facilities, there were no written guidelines on RHI while others have them, but were not accessible to the staff. This limits the effectiveness of the RHIS practice due to a lack of clear guidelines on how they should be collected, why, and when. This finding was in concurrent with Moore, and Galuska (2019) who found that guidelines that focused on user-friendliness, update, and accessibility were more likely to trigger the use of RHI for decision making. Another Chinese study by Aljunid et al. (2016) also found that the low use of RHI was attributed to poor guidelines characterized by unclear privacy protection, fragmented care system, and poor quality of routinely assembled data.

The inferential statistics revealed that the presence of a staff organogram had a p-value of 0.027, budget plan p-value of 0.006, standard operating procedures p-value of 0.048, and training on routine health information p-value of 0.002 significantly associated with the use of RHI in decision making. The findings support those by Wilder (2014) found that

bureaucratic policies were a major deterrent to the use of RHI for decision-making in health facilities. This challenge was compounded by the existing platforms of disseminating data which require adherence to bureaucratic policies where authorizations from supervisors delay timely relaying of data. A study by Kirigia and Kirigia (2011) found that the supervision in the health sector was disjointed and lacked core domains of leadership, as a result, HIS data collection, processing, dissemination, and use cannot be predicted. The study supports this claim because the existence of supervision on HIS was divided with 92(47.2%) claiming they had supervision support while 99(50.8%) claimed they had no such support. Further analysis affirms that there is no statistically significant association between supportive supervision and the use of health data at a p-value of $0.2>0.05$.

5.3 Conclusions

The study affirmed that RHI is not adequately utilized in decision-making. Even though the practice was above averagely used in service delivery, gaps were identified in Medicine supply.

The study revealed computers and the types of RHI software were likely to influence the use of RHI. Therefore, insufficient IT accessories such as laptops, UPS, and printers could be a barrier to the improvement of HIMS, even though access to the internet and electricity supply was not limited.

In regards to human resources, the study also revealed training could increase the likelihood of using RHI. Since the bulk of HCWs had little training on data management

aspects coupled with low computer proficiency, this can impact the overall use of RH data

The study identified organizational factors such as RHI guidelines, staff organograms, and SOPs increase the likelihood of RHI use, unlike supervision reports and dissemination reports.

5.3.1 Study Recommendations

The study makes the following recommendations to strengthen the use of RHIs in the Health Department in Marsabit County.

1. The Health Department of Marsabit County should expand the adoption of the electronic medical record system in all facilities to strengthen the practice of RHI use in decision-making across all health system blocks. Also, come up with guidelines and policies that compel health facilities to use RHI in measurable and verifiable mechanisms and develop the culture of data demand and information use.
2. County Government of Marsabit (Health Department) should increase the availability of IT accessories in health facilities to enhance data management practices; collection, processing, interpretation, and dissemination of information.
3. County government of Marsabit (Health Department) should provide continuous mentorship and training for HCWs by focusing on computer literacy and data management through on-job training and refresher courses.
4. County government of Marsabit department of health should provide mentorship and quality improvement programs in health information organizations including;

RHI guidelines, organogram, SOPs, training need assessment, and supportive supervision

5.3.2 Recommendations for Further Study

The study recommends further research on sensitization and advocacy on the culture of data demand and information use among health care workers in Marsabit County.

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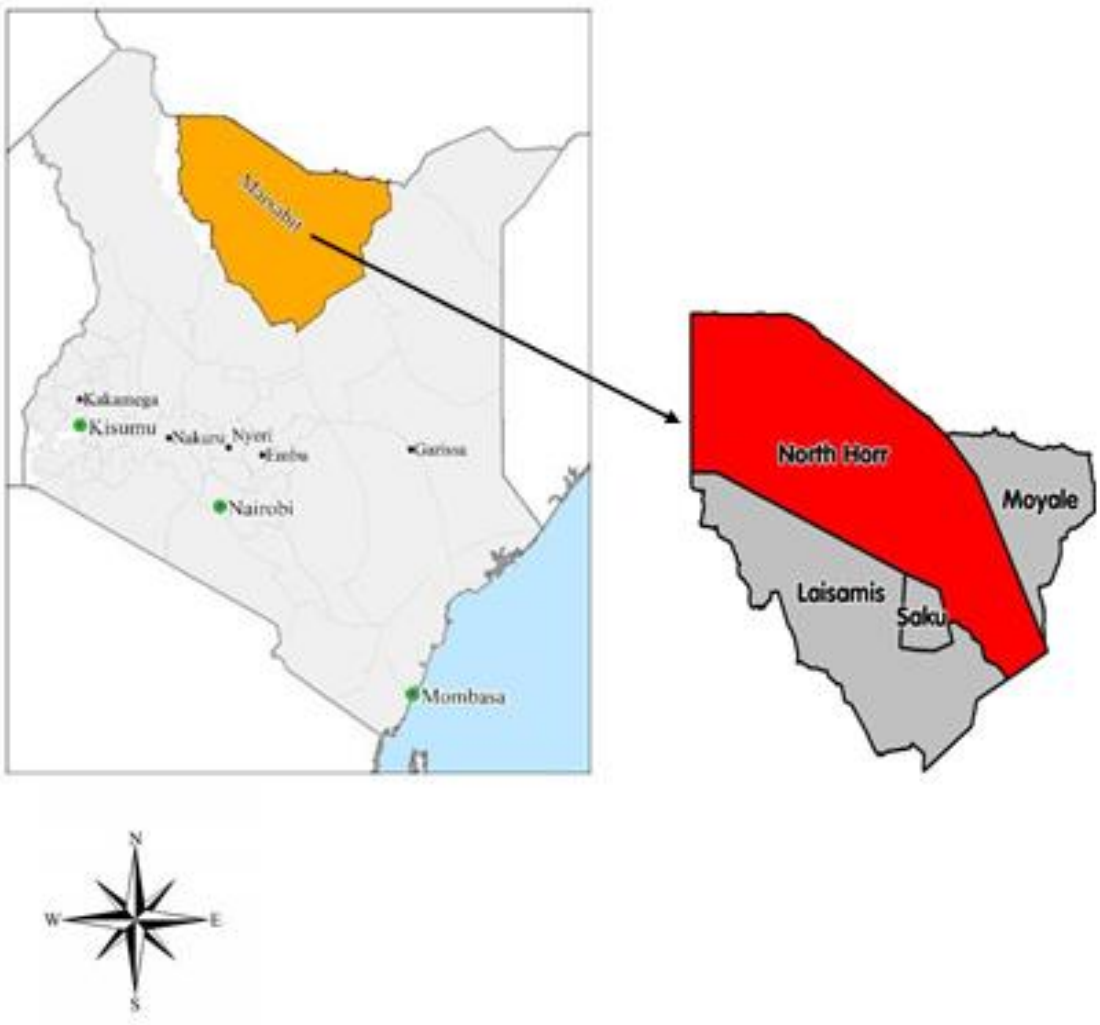
APPENDICES

Appendix I: Map of Kenya and Study Area



Source: National Environment Management Authority (NEMA), 2020 Marsabit County.

Appendix II: Approval from Kenyatta University

KENYATTA UNIVERSITY
GRADUATE SCHOOL

E-mail: dean-graduate@ku.ac.ke
Website: www.ku.ac.ke
P.O. Box 43844, 00100
NAIROBI, KENYA
Tel. 810901 Ext. 4150

Internal Memo

FROM: Dean, Graduate School
DATE: 7th July, 2020

TO: Mohamed Asafa
C/o Health Management & Informatics
REF: Q142/26855/2018

SUBJECT: APPROVAL OF RESEARCH PROJECT PROPOSAL

This is to inform you that Graduate School Board at its meeting of 1st July, 2020 approved your Research Project Proposal for the M.S.C. Degree Entitled, **Use of routine health information for decision making among health care workers in Marsabit County, Kenya"**

You may now proceed with your Data Collection, Subject to Clearance with Director General, National Commission for Science, Technology and Innovation.

As you embark on your data collection, please note that you will be required to submit to Graduate School completed Supervision Tracking Forms per semester. The Forms are available at the University's Website under Graduate School webpage downloads.

Thank you.

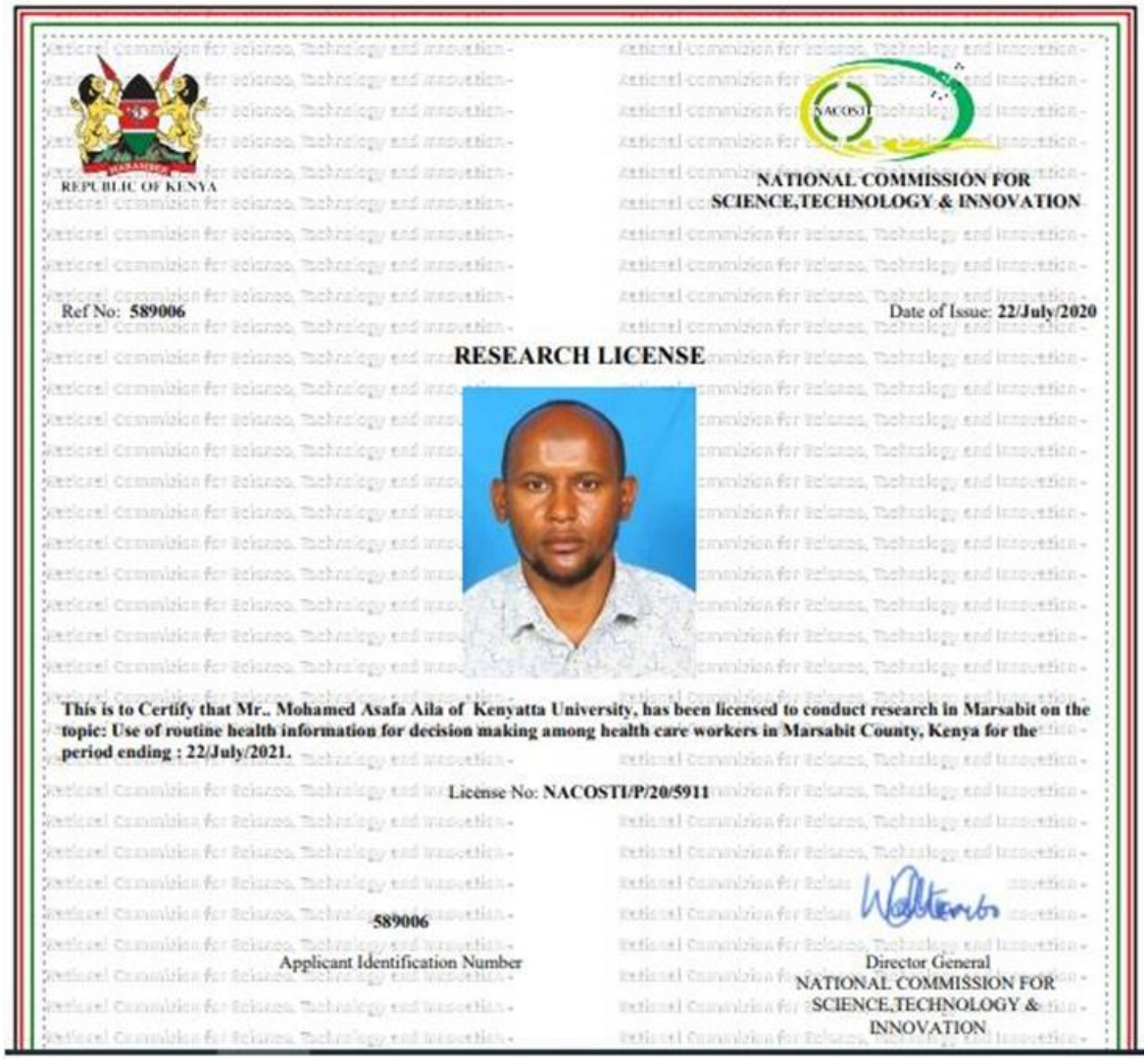
Elijah Mutua
FOR: DEAN, GRADUATE SCHOOL

c.c. Chairman, Health Management & Informatics

Supervisors:

1. Dr. Peter Kithuka
C/o Health Management & Informatics
Kenyatta University

Appendix III: Research License from NACOSTI



REPUBLIC OF KENYA

NATIONAL COMMISSION FOR SCIENCE,TECHNOLOGY & INNOVATION

Ref No: **589006**

Date of Issue: **22/July/2020**

RESEARCH LICENSE

This is to Certify that Mr.. Mohamed Asafa Aila of Kenyatta University, has been licensed to conduct research in Marsabit on the topic: Use of routine health information for decision making among health care workers in Marsabit County, Kenya for the period ending : 22/July/2021.

License No: **NACOSTI/P/20/5911**

589006

Applicant Identification Number

Director General
NATIONAL COMMISSION FOR SCIENCE,TECHNOLOGY & INNOVATION

Appendix IV: Informed Consent Form

Introduction

My name is Mohamed Asafa. I am a student from Kenyatta university conducting a study on **"use of health information for decision making among health care workers in Marsabit County"** Your participation is being requested to provide insight on the use of health data. However, it is entirely voluntary and your responses will be treated as confidential.

The study intends to generate findings/recommendations that will help the County health management team and the Ministry of Health on strategies that leads to improved health information use for evidence-based decision making at the local level. Improved health information use will eventually improve health outcomes.

You will be asked to respond to some question's either through a self-administered questionnaire or key informant interview and this will take approximately 30min.

Are you willing to participate? Yes ☐ No ☐ (Stop interview)

Appendix V: Self- Administered Questionnaire

Serial No. …….. Date: ...../. /2020

Introduction

The purpose of this questionnaire is to collect data on the "use of routine health information for decision making among health workers in Marsabit County." The feedback on findings will contribute in informing strategies and identify opportunities of improving service delivery. Please express your honest opinion; your identity remains anonymous and your responses will be kept confidential. It can only be used to drive research conclusion.

Your participation and assistance in completing this study is highly appreciated.

Instructions

Kindly respond by circling/ticking each number where applicable and by filling in the spaces provided. Please contact Mohamed for any clarification (071985486)

Respondent background information (kindly circle one)

Q1. Age of the respondent

1. 24-29
2. 30-35
3. 36-41
4. 42-47
5. 48-53
6. 54-59
7. 60 above

Q2. Sex

1. Male

2. Female

Q3. Your religion

Muslim Christian

Traditionalist

Q3. What is your professional background?

1.	Doctor	Management (director, CEO,)
2.	Clinical officer	Surveillance
3.	Nurse	epidemiologist
4.	Pharmacy	nutritionist
5.	Laboratory	public health officer
6.	Health record officer	other (specify)

Q4. What is your highest education level attained?

Certificate Diploma Higher diploma

Degree Masters PhD

Q5. For how long have you worked in the health sector with Marsabit County?

Q6. Type of facility

1. County referral hospital

2. Sub-county referral hospital.
3. Sub-county – health center
4. Sub-county dispensaries

Q7. Your role in the health care system?

1. Management
2. Department in-charge
3. Routine service provision
4. Other specify……

Q8. What services do you offer at the facility? (Circle all that apply)

1. Out-Patient service
2. In-patient service
3. Both Out-patient & In-patient service
4. Primary health services
5. Administrative services
6. Maternity service
7. HIV care and treatment service
8. TB care and treatment service
9. Laboratory service
10. Pharmacy services
11. Theater services
12. Other specify ……

A. USE OF ROUTINE HEALTH INFORMATION IN DECISION MAKING

Q9. What type of health information recording system available at your facility?

1. Paper-based record system
2. Electronic health record system
3. Both paper-based and electronic systems.

Q 10. Are there any written guidelines on Routine Health information display (graph, table.)?

1. Yes, copy available (observe)
2. Yes, but copy not available
3. No

Q11. How often do you use the routine data/health information generated for decision making?

1. Rarely
2. Sometimes
3. Always

Q 12. Decision-making forums; is there a county/sub-county health management team?

1. Yes, 2. No

Q13. Do you periodically meet to discuss performance monitoring and management of the health facility? 1. Yes, 2. No □ Go to Q16

Q14. How many times did the performance monitoring and management meetings take place during the past three months?

1. Three times
2. Two times
3. One time
4. Not once

Q15. Were there any decisions made by the health management team using routine health information generated such as for

a) Formulation of plan	1. Yes, 2. No
b) Budget preparation	1. Yes, 2. No
c) Medicine supply and drug management	1. Yes, 2. No
d) Staffing decisions (training, deployment, etc.)	1. Yes, 2. No
e) Service delivery improvement	1. Yes, 2. No
f) Identification of gaps and priority areas	1. Yes, 2. No

B. TECHNOLOGICAL INFRASTRUCTURE AND USE ROUTINE HEALTH DATA

Q16. Equipment inventory and condition			
please indicate equipment available and their working condition in the facility		Total quantity (if none, enter 0)	Total quantity that is in working condition (if none, enter 0)
a)	Laptop computer		
b)	Desktop computer		
c)	Printers		
d)	Modems		
e)	Uninterruptible power supply (UPS)		
f)	Circuit breaker		
g)	Generators		
h)	Is there access to an Internet network?	1.Yes, 2. No	
i)	Is there access to Wi-Fi (Wireless Fidelity)	1.Yes, 2. No	
j)	Is there a continuous electricity supply?	1.Yes, 2. No	
k)	What type Health information software is available (tick all that apply)	1. DHIS2 2. LIMS 3. …. 4. …..	
l)	If *no*, on average, how many days in a month is the electricity supply interrupted?	1. 20 days or more 2. 10-19 days 3. Less than 10 days	

C. HUMAN RESOURCE FACTOR INFLUENCING RHI USE

Q17. Does the facility have information technology technical support personnel (IT technician)?

1. Yes, 2. No

Q18. How do you rate your computer skills?

1. No basic skill
2. Basic skill
3. Intermediate skill
4. Advance skill

Q19. Do you have designated health information and record officer at your facility?

1. Yes, 2. No

Q20. Have you had any training in Routine health information and data management?

1. Yes, 2. No

Q21. Have you received any training in the following skills in the past three years? Have you had any training in Routine health information and data management?

a) Data processing

b) Data quality

c) Data display or visualization 1. Yes,

1. Yes,

1. Yes, 2. No

2. No

2. No

d) Data report 1. Yes, 2. No

e) Data use for decision making 1. Yes, 2. No

Q22. Who is responsible for filling out the registers at the facility? (Circle all that apply)

1. Medical office
2. Clinical officer
3. Nursing officer
4. Lab officer
5. Pharm tech officer
6. Midwife
7. Health record officer
8. Support staff
9. Data clerk
10. Other (specify)

Q23. Who is responsible for data compilation of reports submitted that are coming from the lower levels? (Circle all that apply)

1. Health record officer
2. Program officer
3. Disease surveillance officer
4. Monitoring and evaluation officer
5. Data clerk
6. Other (specify)

Q24. Who is responsible for checking the quality of reports submitted from the lower levels? (Circle all that apply)

1. Health record officer
2. Program officer
3. Disease surveillance officer
4. Monitoring and evaluation officer
5. Data clerk
6. Other (specify)

Q25. Who is responsible for data analysis (producing comparison tables, graphs, dashboards)? (Circle all that apply)

1. Health record officer
2. Program officer
3. Disease surveillance officer
4. Monitoring and evaluation officer
5. Data clerk
6. Other (specify)

D. ORGANIZATIONAL FACTOR INFLUENCING RHI USE.

Please circle one (Yes or No) where applicable		
Q26.	Do you have a document describing the Routine Health Information system **mission, roles, and responsibilities** at your facility?	1. Yes, 2. No
Q27.	Do you have **a staff organogram** or staff chart showing positions related to health information?	1. Yes, 2. No
Q28.	Do you have **standard operating procedures** on data collection & reporting, data processing, analysis, dissemination, and data quality assurance?	1. Yes, 2. No
Q29.	Were you ever assessed on training need for a health information system?	1. Yes, 2. No
Q30.	Have you received training on the health information management system in the last 3 years?	1. Yes, 2. No
Q31.	Do you have support supervision on routine health information use?	1. Yes, 2. No
Q32.	Have you received a supervision report for the last supervision visit?	1. Yes, 2. No
Q33.	Do you have a budget for Routine HIS supplies (e.g., registers, forms, guidelines)?	1. Yes, 2. No
Q34	Does the county have a schedule for plan training?	1. Yes, 2. No 3.No sure
Q35	Do you have a list/documentation of the dissemination of the RHIS monthly/quarterly reports from the county head office?	1. Yes, 2. No
Q36	Does the county office have a long-term financial plan for supporting Routine HIS activities?	1. Yes, 2. No 3.No sure

E. ROUTINE HEALTH INFORMATION PROCESSING

Q37. How often do you interact with DHIS2?

1. Always.
2. Sometimes
3. Rarely

Q38. Do you analyze the data you collect?

1. Yes (always)
2. Yes (sometimes)
3. Not all

Appendix VI: Guide Tool for Key Informants

Date of the interview: .../..../2020 Time…… Profession……

Introduction:

I'm [……] from Kenyatta University, IMPACT fellow (Improving Public Health Management for Action) training program. I am conducting a study on Use routine health information/data for decision making among health care workers in Marsabit County.

To improve health system performance there is a need for better use of health data to make an informed decision-based information resource generated by the local health system.

An important first step in this effort is to understand how routine health information is used in decision-making forums such as CHMT/SCHMT meetings and challenges faced during the generation of health information.

I am conducting interviews with key officers in the Marsabit county health sector. Your knowledge will be very valuable. The interview will only take 45min at most.

The key informant questions are:

1. Identify the importance of health information products for decision making?

2. How can we motivate service delivery staff (data producers) to engage and understand the data they collect?

3. How can we improve on analysis, interpretation and sharing data across the health system?

4. What are the challenges and motivations for using data for decision making?