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**ASSESSING DETERMINANTS OF HEALTH MANAGEMENT INFORMATION
SYSTEM (HMIS) AMONG HEALTH WORKERS**

CASE STUDY: KISWA HEALTH CENTRE III AND KISENYI HEALTH CENTRE IV

A dissertation presented to

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NANYONJO Martha

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Supervisor: Byabasaija Sliver

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SCHOOL OF POSTGRADUATE STUDIES AND RESEARCH
Master's dissertation

DECLARATION

I have read the rules of Uganda Martyrs University on plagiarism and hereby state that this work is my own.

It has not been submitted to any other institution for any another degree or qualification either in full or in parts

Throughout the work I have acknowledged all sources used in its compilation.

Name of researcher: NANYONJO MARTHA

Researcher's Signature _____

This work has been produced under my supervision

Name of supervisor: **Mr. Byabasaija Sliver**

Signature of supervisor: 

Date of submission: 24th September, 2024

Submitted to: School of Postgraduate Studies and Research

DEDICATION

I dedicate this piece of work to my siblings for the support and encouragement they have accorded towards me especially during this course.

ACKNOWLEDGEMENT

I would like to express my gratitude to my supervisor, for his constructive comments, guidance, patience, and supervision through the learning process of this research report. I would like to thank all the study participants, the management and health care providers of Kiswa Health Centre and Kisenyi Health Centre that will provide data to this report.

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ABBREVIATIONS

ANC: Antenatal care

CI: Collaborative improvement

DHMISs: District Health Management Information Systems

GST: General Systems Theory

HC III: Health Centre III

HC IV: Health Centre IV

HIS: Health Information System

HMIS: Health management Information System

M.O.H: Ministry of Health

MCH: Maternal and child Health

MDGs: Millennium Development Goals

OR: Odds ratios

PDSA: Plan-do-Study-Act

SD: Standard deviations

W.H.O: The World Health Organisation

ABSTRACT

Health management information system (HMIS) data are important for guiding the attainment of health targets in low- and middle-income countries. However, the rate of use for the HMIS is often poor. This paper assessed determinants of health management information system (HMIS) data among health workers in Kiswa Health Centre III and Kisenyi Health Centre IV. The study which was conducted from 2021 to 2023. A cross-sectional conducted to assess the skills and knowledge of health workers involved in HMIS data management and the challenges in the technological infrastructure that hindered the effective utilization of HMIS in Kiswa Health Centre III and Kisenyi Health Centre IV of Kampala district.

It was observed from the study that most of the clients were familiar with the functionalities of the HMIS, confident with the ability to use the HMIS effectively and had received training on how to use the HMIS.

Majority of the respondents agreed that using the HMIS improved their work efficiency and are very likely to recommend the use of the HMIS to a colleague in the healthcare industry. The power supply and internet connectivity at the two health centres was generally reliable to support HMIS use. Respondents found the HMIS software to be moderately user-friendly and rarely did hardware malfunctions occur when using the HMIS as mentioned by most of the respondents. In regards to the security and privacy measures in place for organization's HMIS most respondents were confident about it followed by those that were neutral about the subject in question.

Most Respondents were of the view that increased funding for HMIS in their organization improved patient follow up and turn up and storage of patients' information/data recording. Respondents mainly received training or guidance on ethical considerations related to HMIS mostly on quarterly, monthly and annual basis.

The study went ahead to establish the relationship between the level of education and HMIS use by the respondent by cross tabulation of level of education and use of HMIS to support decision making which revealed that there was a likelihood of a relationship between the two variables a likelihood value of (21.8) and was statistically significant at $p\text{-value} = (0.039)$. Additionally, there was a likelihood of a relationship between professional training and use of HMIS to support decision making at a likelihood value of (35.6) and was statistically significant at $p\text{-value} = (0.024)$

It was recommended that the responsible authorities should implement motivational strategies for health workers, fostering a sense of accountability and commitment to encourage the production of high-quality data and information for evidence-based decision-making and to allocate sufficient funds to the HMIS section to streamline data processing activities, including effective support supervision.

CHAPTER ONE:

INTRODUCTION

1.0 Introduction

This chapter gives a brief an overview of the background, problem statement, research objectives and research questions of the study

1.1 Background of the Study

When the Health Information System (HIS) was initially established, its primary focus was on central planning and generating information about the activities of health units. This information was mainly used for reporting to international donors. In addition to the HIS, non-governmental organizations conducted community-based surveys to gather supplementary data. In contrast, the Health Management Information System (HMIS) aimed to provide information specifically for decision-making and improving the performance of operational health services. The HMIS required all health units, including non-governmental ones, to collect, process, and report routine data that aligned with national policies, health program objectives, and the needs of health professionals at the unit level. The design of the HMIS identified key management questions that the information should address. It employed a systems framework, focusing on inputs, procedures, outputs, and outcomes, to enable immediate management decisions, rather than relying solely on higher-level feedback. The goal was to integrate the system by using a single data source and standardized forms within health facilities, bringing together all relevant health program and administrative information, thereby avoiding duplication and parallel reporting (Gladwin, Dixon, & Wilson, 2002; Gladwin *et al.*, 2003)

Quality data from Health Management Information Systems (HMIS) are important for tracking the effectiveness of malaria control interventions. However, HMIS data in many resource-limited settings do not currently meet standards set by the World Health Organization (WHO). The study further noted that presence of a health technician, and of dedicated staff for data management, was associated with lower inaccuracy in reporting of clinic attendance in children aged under five years. Factors associated with data inaccuracy included high workload and the unavailability

of required data collection tools. The results suggest that improvement in working conditions for clinic personnel may improve HMIS data quality. Upgrading from paper-based forms to a web-based HMIS may provide a solution for improving data accuracy and its utility for future evaluations of health interventions. (Moukéné *et al.*, 2021)

According to (Ouedraogo *et al.*, 2019), Health management information system (HMIS) data are important for guiding the attainment of health targets in low- and middle-income countries. However, the quality of HMIS data is often poor. High-quality information is especially important for populations experiencing high burdens of disease and mortality, such as pregnant women, newborn, and children. It was found that there was poor agreement between MCH estimates obtained from the HMIS and the survey, indicating that the HMIS may over-report the coverage of key MCH services, namely, antenatal care, skilled birth attendance and postnatal care. The quality of MCH data within the HMIS at the zonal level in Jimma, Ethiopia, could be improved to inform MCH research and programmatic efforts.

Reliable Health Management and Information System (HMIS) data can be used with minimal cost to identify areas for improvement and to measure impact of healthcare delivery. However, variable HMIS data quality in low- and middle-income countries limits its value in monitoring, evaluation and research. There was variable HMIS data quality by data element, with some indicators with high quality and also consistency in reporting trends across districts. Over-reporting was observed for ANC-related data requiring more complex calculations, i.e., knowledge of gestational age, scheduling to determine ANC standard visits, as well as quality indicators in ANC. Ongoing data quality assessments and training to address gaps could help improve HMIS data quality. (Nshimiyiryo *et al.*, 2020)

From a study by (Muhindo & Joloba, 2016), the Ministry of Health instituted the national HMIS in response to global and national call for greater accountability and results-based management. The goal being to provide timely reliable health information that would inform decision making in the sector to aid provision of better health care services to the people of Uganda. However, there are already concerns about the functionality of the system characterized by late and inadequate reporting. This study concluded that failure to use HMIS data, poor culture of accountability, lack of incentives for performance, strategic planning and vertical programs-

HIV/AIDS are the strategic contextual challenges to this menace. Data utilization at all levels in the system will be the linchpin in realization of timely collection and reporting of data and to this end.

In Uganda, the primary source of malaria surveillance data is the Health Management Information System (HMIS). However, HMIS data may be incomplete, inaccurate or delayed. Collaborative improvement (CI) is a quality improvement intervention developed in high-income countries, which has been advocated for low-resource settings. Collaborative improvement (CI) intervention did facilitate improvement in data quality, but through unexpected mechanisms. The CI intervention was implemented as planned, but the PDSA (Plan-do-Study-Act) cycles were driven largely by the CI mentor, not the health workers. (Hutchinson *et al.*, 2021)

1.2 Statement of the Problem

Health information plays a crucial role in enhancing community health by bringing attention to existing problems and identifying opportunities for improvement. It serves as a valuable tool in guiding policy changes and enhancing the effectiveness of health programs. Despite significant investments made in District Health Management Information Systems (DHMISs), such as the current District Health Information System (DHIS2), which aims to strengthen routine information and empower decision-makers at different levels of the healthcare system, a report by Health Metric network (2020) revealed that only 51% of health workers utilize data. The report highlighted various factors contributing to this low utilization, including insufficient and diverse human capacity for data collection, analysis, and the lack of standardized database and printing resources (Sergon *et al.*, 2008;Barro, Dicko, De Lame, & Staccini, 2020;).

Numerous initiatives have been implemented to enhance the health information system, and research indicates a growing recognition of the role played by data and information in healthcare decision-making. This confirms that information holds a significant position among various influences and drivers. Existing literature generally portrays information use as unproblematic; however, this study focused on the factors that necessitate information, the factors influencing the choice of information use, and the issues surrounding it. It is worth noting that this area remained relatively unexplored, as there is limited documented evidence and literature available on how this data is effectively utilized.

The Ministry of health Annual report 2021 indicated that close to 32% of data collected on Health Management Information System indicators from Kiswa Health Centre III and Kisenyi Health Centre – IV are thought to be incomplete, inaccurate, and not timely reported within the stipulated first 7 days of each month. As a standard, of quality data Ministry of Health emphasizes the need for complete, accurate, consistent and timely data as vital pillars of data quality if the country is to achieve the 95% coverage on all Health Management Information System indicators for proper planning and decision-making(MOH, 2021) .

1.3 Objectives

1.3.1 General objective

To assess the determinants of Health Management Information System (HMIS) data among health workers in Kiswa Health Centre III and Kisenyi Health Centre IV, Kampala

1.3.2 Specific objectives

- I. To assess the skills and knowledge of health workers involved in HMIS data management in Kiswa Health Centre III and Kisenyi Health Centre IV, Kampala.
- II. To assess the challenges in the technological infrastructure that hinder the effective utilization of HMIS
- III. To establish the relationship between individual characteristics like level of education, professional training, the period spent at the facility among health workers and the use of HMIS to support decision making.

1.4 Research questions

- I. What are the skills and knowledge of health workers involved in HMIS data management in Kiswa Health Centre III and Kisenyi Health Centre IV, Kampala?
- II. What are the challenges in the technological infrastructure that hinder the effective utilization of HMIS.
- IV. What is the relationship between individual characteristics like level of education, professional training, the period spent at the facility among the health workers and the use of HMIS to support decision making.

1.5 Scope of the study

1.5.1 Content scope

This study was assessing the determinants of health management information system (HMIS) data among health workers in Kiswa Health Centre III and Kisenyi Health Centre IV, Kampala. The independent variables of this study were the factors affecting HMIS use whereas the dependent variable was HMIS use

1.5.2 Geographical scope

The study was covering two facilities which included the Kiswa Health Centre-III in Nakawa division (lat. 0.28138, long. 32.54553) and Kisenyi Health Centre-IV in central division (lat 0.30741, long. 32.56929) of Kampala district.

1.5.3 Time scope.

The study is to consider health workers available at the facility for the period of the study from 2004 to 2023 since this is when the HMIS was being utilised and is still being utilised in these health centres. For data collection, we considered a period of 6 months since it was sufficient for us to collect and analyse data so as to respond to my research objectives.

1.6 Significance of the study

This study will guide in the understanding of the determinants that affect data quality as collected by HMIS. This in turn helps to single out the strengths and weaknesses of the system such that both policy makers and health administrators could make targeted improvements towards achieving quality data. In addition, the knowledge gaps that will be filled by this study will be crucial for obtaining high quality HMIS data that can be used by health workers for evidence-based decision-making in healthcare. Lastly, study results obtained will serve to improve the accuracy, completeness, and timely data that researchers rely upon to conduct studies and evaluate health care programs. By examining the determinants, we can improve our tools of data collection and management and change our practices to enable the collection of quality data.

1.7 Justification

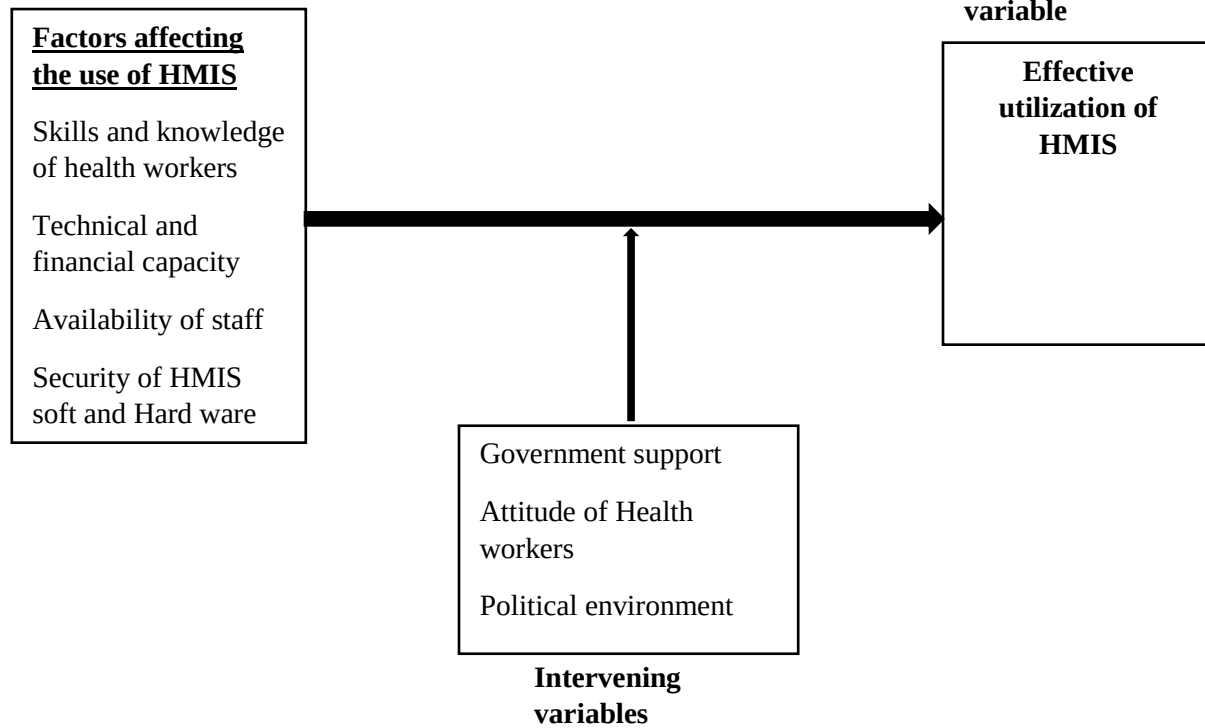
Data quality in the health sector in Uganda has remained a challenge and affected both the private and governmental health sector alike. The ministry of health Uganda supported Kiswa Health Centre- III and Kisenyi Health Centre IV in training, mentoring and provision of data gathering tools so that they could collect, analyse, and report to Ministry of Health through the District Health Information System. Despite all these efforts, data from these health centres is usually inaccurate, late, incomplete and there is poor accessibility to these reports. This therefore makes it hard for the stakeholders to use such important data to make informed decisions to improve programme performance. Failure to get quality data means disaster to the organization since funding can easily be stopped by the donor. It is against this background that my study focused on identifying the skills, knowledge and technological challenges affecting use of HMIS at the selected health facilities, determine the root cause and possible solutions to the challenges presented in the two facilities.

1.8 Conceptual Framework

For the conceptual framework, the dependent variable was effective utilization of HMIS and the independent variables were the factors affecting the use of HMIS such as skills and knowledge of health workers, technical and financial capacity, availability of staff, security of HMIS soft and Hard ware. However, there were also intervening variables that would facilitate the effective utilisation of the HMIS such as government support, Attitude of Health workers and political environment among others which played a role in explaining why and how the independent variables affect the dependent variable as further illustrated below.

Figure 1: Conceptual Framework

Independent Variables



CHAPTER TWO:

LITERATURE REVIEW

2.0 Introduction

In this chapter, a comprehensive review of literature relevant to the study was presented. Theories related to data, systems, and organization were examined and organized based on the study objectives. The purpose of literature review therefore was to permit the researcher to acquire insight into issues under search, validate the importance of the issues and place issues or problems in perspective so as to institute the most appropriate methodology and research instrument. Considering that HMIS data was the outcome variable of interest, the literature review in this study was focusing on theories on data and systems and the correlation between factors affecting quality of data which include internal and external factors.

2.1 General System Theory

The Health Management Information System (HMIS) was responsible for collecting, analysing, and disseminating health information to support evidence-based decision making in the health sector. However, there were several weaknesses in the current HMIS in Uganda, including inadequate capacities of staff, unskilled personnel handling data, and multiple data collection systems. The reliability, timeliness, accuracy, completeness, consistency, and precision of data were important dimensions of the HMIS. Challenges such as data entry problems, changes in data without capturing the updates, documentation errors, and lack of organizational culture fit can affect data quality. The study aimed to fill the gap in assessing the determinants of HMIS data at level III and IV health facilities in Uganda. Internal and external factors due to the end users and work environment respectively affected the effectiveness of the HMIS. These were investigated by the study.

Healthcare delivery remains a highly information-driven set of processes. Numerous studies indicate that providing excellent patient care relies on accurately documenting the medical history, health status, ongoing medical conditions, and treatment plans of each patient. Effective management of healthcare organizations necessitates dependable, precise, up-to-date, secure, and

pertinent clinical and administrative information. It can be argued convincingly that the healthcare industry is among the most information-intensive sectors (L Glandon, 2008). As information technology continues to advance at a rapid pace, it is important to understand that technology alone cannot solve all organizational goals. Instead, it should be viewed as a set of tools that support broader objectives. Rather than rushing to computerize, it is crucial to prioritize analysing the information needs within the larger context of the organization. Aligning the healthcare organization's management goals with its information technology strategy is vital. Despite the need for caution, there is great potential for effective design, implementation, and management of healthcare management information systems to yield positive outcomes (Smaltz, 2005; L Glandon, 2008)

The study was guided by the General Systems Theory (GST) proposed by Von Bertalanffy in 1950. The GST states that all systems, regardless of their type or level of organization, share common characteristics that allow them to function as unified entities rather than just collections of individual parts. According to Von Bertalanffy, a system is defined by the interactions among its components and the complexity of those interactions. The key principle of the GST is its emphasis on understanding and analysing these interactions. This perspective recognizes that organizations, including Health Management Information Systems, should be seen as living organisms that can adapt to environmental changes (Katz, 1964; Von Bertalanffy, 1950).

The GST provides a framework for viewing organizations in a holistic manner, considering them as socio-technical systems. It acknowledges the two main components of an organization: the social component, which includes people, and the technical component, which involves technology. This implies that for a Health Management Information System to succeed, there needs to be a proper alignment between the technology used and the intended users or beneficiaries. The application of systems theory in the implementation of a Health Management Information System highlights the importance of considering the unique characteristics of each organization and preserving them during the development and implementation process (Von Bertalanffy, 1950).

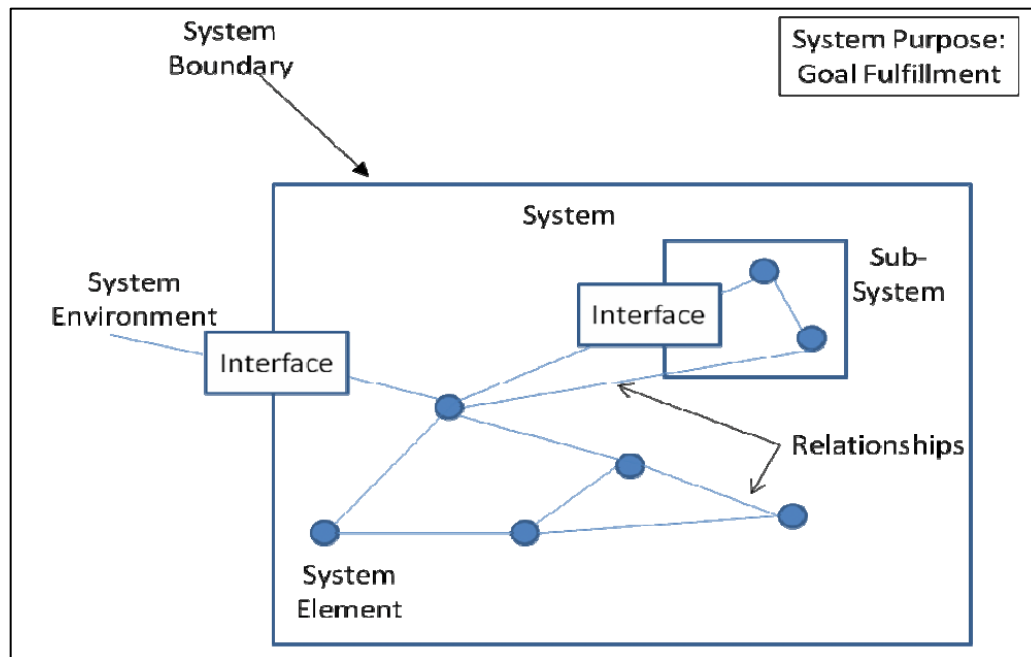


Figure 2: Visualization of the General Systems Theory (von .1950)

Further development of systems theory by Emery and Trist in 1965 recognized organizations as socio-technical systems, comprising two main components: the social component (people) and the technical component (technology)(EMERY & Trist, 1969). This perspective highlights the importance of a match between the technology used in a Health Management Information System and its intended beneficiaries or users for its successful establishment. The application of systems theories in the implementation of a Health Management Information System has emphasized certain elements.

2.2 Theoretical review

Efficient functioning of a Health Information System (HIS) relies on the operational status of all its components. These components encompass patient management, activity tracking, clinical processes, pharmacy services, laboratory operations, and billing functions (Health, 2006).

2.3 Conceptual background

Data refers to information that is organized in a way that can be understood and used by people or machines. It can be represented as numbers, words, or other forms. To make data useful, there

needs to be an agreement on how it represents information. When data is put together to be sent or shared, it is called a message. On the other hand, information is specific knowledge about things like facts, events, people, or ideas. For instance, when a doctor determines a patient's diagnosis, that's information. Knowledge, on the other hand, is general information about concepts in a specific field, like diseases or treatment methods. It's different from specific information about individuals. An information system is a part of an organization that processes and stores data, information, and knowledge. It includes all the technology and people involved in managing information, like computers, printers, telephones, and the staff who use them (Winter *et al.*, 2011).

Uganda's health sector reform was part of a broader effort to improve the public sector, and it involved a type of decentralisation known as devolution. This means that power was transferred from the central government to the district administration, allowing them to make decisions at a local level. However, due to limited financial resources, the districts still relied on support from the central government. The Ministry of Health expected the districts to create their own plans that aligned with national policies and guidelines, while also considering their own specific priorities and needs. In 1997, Uganda had 45 districts, without any intermediate levels, but this has since changed with the addition of more districts. Each district is further divided into counties, sub-counties, parishes, and villages (Jeppsson, Birungi, Östergren, & Hagström, 2005; Jeppsson & Okuonzi, 2000).

Prior to 1993, Uganda had a centralised health information system (HIS) that mainly focused on reporting diseases and deaths. The data flow was one-way, with information only moving from individual health units to the district and national levels. However, since then, the Ministry of Health (MOH) has implemented a health management information system (HMIS) that places importance on using information at the collection point. This shift is also happening in other low-income countries, where primary health care (PHC) managers are expected to have better skills in handling data and information across all levels of the healthcare system. The World Health Organization (WHO) recognises the need for district-oriented health information systems and acknowledges that the lack of robust information support is a persistent challenge for effective management. Efforts to strengthen national information systems have often yielded little

improvement and, in some cases, even exacerbated the existing problems (Gladwin, Dixon, & Wilson, 2003).

The Health Management Information system (HMIS) recently implemented in healthcare centres within Uganda's central region necessitated the adoption of digital technology by healthcare workers as an integral component of the Health Information System (HIS). This system possesses the capacity to facilitate seamless information exchange among various software applications while ensuring data confidentiality. Moreover, it should empower healthcare facilities to electronically collect, store, and manage data for both point-of-care services and research purposes (Khubone et al., 2020). base on global level

2.4 Dimension of Health Management Information System

Hyde (1992) indicated that effective and appropriate clinical coding practices ensured data quality in health records whether in undertaking simple coding for primary health care services or for more sophisticated hospital health care services. A thorough knowledge of the classifying systems, key components of data quality that is data reliability, timeliness, accuracy, completeness, consistency, precision and validity were important (Halpin & Adams, 1977) (Lippeveld, Sauerborn, Bodart, & World Health, 2000). However, no such study to this effect had been done in Uganda regarding quality of clinical coding of data at level III and IV health facilities in the country a gap this study intended to fill.

2.4.1 Reliability

Another study conducted by (Day, Halpin, & Thorn, 2016) in Toronto Canada showed that data processing was at the heart of all operational systems and it comes in various profiles as well as practices from routine transactions triggered by users, enormous calculations and alterations done at the end of a specific period of data management and reporting. These are continuous processes that should work "like a clock," moreover in actual practice there was nothing steady in the world of data electronic system or computer software that guarantees the reliability and consistence of data quality because of numerous data system application and manipulations where errors can stem from the changes in the processes responsible for regular data quality. However, negligible changes were considered too regular so long as it bore no consequences on

the final outcome of data quality. Such concepts were often not sufficiently tested due to the common misconception that small changes cannot have much impact nonetheless they affect data quality in the long run (Day et al., 2016).

2.4.2 Timeliness

Organizations that successfully adopted Enterprise Resource Planning System recognize the importance of adequate education and training for end-users in using the new system (Bajwa, Singh, & De, 2020). Buy in from users was recognized as an important requirement for implementation success however data suggests that end-users were often not involved in the planning for implementation. Similarly, adherence and readiness for the Enterprise Resource Planning system implementation by the end-users seemed to be neglected (Motwani, Mirchandani, Madan, & Gunasekaran, 2002). The study focused on Enterprise Resource Planning System and their influence on the successful implementation of Health Management Information System.

2.4.3 Accuracy

Study carried by (Scott et al., 2017) revealed that there were aspects in health data management that cause accurate data to become inaccurate over time without any physical changes made to it and moreover the data values were not even modified but their accuracy takes a plunge. It was established that this often occurred when the real-world object described by the data changes but the data collection processes failed to capture the change making the status of old or existing data to become obsolete and incorrect.

Meta-analysis conducted in Thailand on 60 randomized patient registers with 1,891 records from the Veterans Health Administration's computerized patient record system established that 84 percent of records contained documentation errors ranging from data inaccuracy, incompleteness, and inconsistencies in addition to imprecision, with an average of 7.8 documentation mistakes per patient (Worswick et al., 2013).

(Safian, 2012) stated that lack of organizational culture fit led extensive customizations that in turn caused increased project time, disrupted schedules, and created new bugs in the system.

They further argued that customization within any culture should therefore be minimized in order to achieve the full benefits of an Enterprise Resource Planning system.

Accordingly, much research on corporate values and organizational symbolism was dominated by a preoccupation with a limited set of meanings, symbols, values, and ideas presumed to be manageable and directly related to effectiveness and the implementation of Health Management Information System. This was in many ways understandable but there were two major problems following from this emphasis. One was that many aspects of organizational culture were simply disregarded. It seemed strange that the (major part of the) literature should generally disregard such values as bureaucratic- 'meritocratic' hierarchy, unequal distribution of privileges and rewards, a mixture of individualism and conformity, male domination, emphasis on money, economic growth, consumerism, advanced technology, exploitation of nature, and the equation of economic criteria with rationality. Instrumental reason dominated quantifiable values and the optimization of means for the attainment of pre-given ends defined rationality (Shehab, Sharp, Supramaniam, & Spedding, 2004). The literature above didn't create a linkage between corporate values and the implementation of HMIS which was the Centre of focus in the study.

2.4.4 Completeness

Study conducted by (Sezgin & Ozkan, 2016) in United States of America (USA) argued that good data entry into health management information system (HMIS) tools supported by sufficient instructions somewhat mitigate data entry problems. The same study further observed that in an ideal fantasy world routine data recording and entry may become as easy to the user as possible when the fields are clearly labeled and organized, and data entry duplications eliminated. However, it should also be remembered that health care data which was not continuous, consistent and complete as well as accurate and timely which reduced data quality in return and hence generated health data must ensure information consistence and continuity between those caring for the patient today and weeks later or years to come (Mutale et al., 2013).

Therefore, effective, and efficient health information exchange could reduce or eliminate duplication of data and the redundancy of the system processes to obtain information. The risk of data errors ultimately led to higher data quality, cost saving in health care service delivery especially where accurate, complete and timely data was generated to inform policy decision

making support to eradicate health management information system (HMIS) duplicative processes (Halpin & Adams, 1977).

2.4.5 Consistency

Consistency specified that two data values drawn from separate data sets must not conflict with each other although consistency does not necessarily imply correctness. Even more complicated was the notion of consistency with a set of predefined constraints. More formal consistency constraints could be encapsulated as a set of rules that specify consistency relationships between values of attributes either across a record or message or along all values of a single attribute. A deviation from consistent data set reduced data quality (Aldholay, Isaac, Abdullah, Abdulsalam, & Al-Shibami, 2018).

The meta-analysis established that the processes that were used to manipulate the data inside the health care data files and database affected the data quality in long run because the process was not effectively manipulated as such distorting entire system processes resulting into the registered proportion of data errors (Worswick et al., 2013). It also revealed that some of those processes were routine whereas others were because of periodic system upgrades, re-designing of database, mass data updates and different ad-hoc activities. Regrettably, in real practice most of these health procedures often lacked time and resources as well as the necessary and reliable meta-data to understand all data quality implications (Fenton, Low, Abrams, & Butler-Henderson, 2017). Furthermore, it was not surprising that internal data processing always led to numerous data issues thus reducing the quality of health care data (Fenton et al., 2017).

According to the study carried by (Fenton et al., 2017), it stated that wrong precision of data sets had greatly affected quality of data in different institutions and organizations. This further worsened by poor data quality specifications which always do not reflect the real data requirements as such, data were compared in compliance with some theoretical model yet remain incorrect from the real actual use.

A similar study done by (Monawe, Chawani, Kapokosa, & Moyo, 2015) in Zimbabwe indicated that data reliability considerations consist of whether the record was cohesive in terms of the field contents or if the information makes sense and was usable in a real world context which

was regarded at any of the steps in the lifecycle of origin of data source, production of an export data, import into another system and downstream processing. A record with good integrity had data in all appropriate fields and the data was conforming to best current practice standards. Data values should be within specified bounds but once it loses this metric, it affects data quality in different dimensions.

According to (Monawe et al., 2015) the quality of data was directly proportional to the amount of time spent to analyze and profile the data as well as uncover the true data content. It should be noted that in most cases, the source data itself was never perfect making the existing erroneous data to mutate and spread out during conversion like a virus (Monawe et al., 2015).

2.4.6 Precision

(Epstein, Dexter, & Patel, 2015) in the similar study argued that timeliness greatly affected data quality. In relation to this concept and effort to improve data timeliness, more and more data was exchanged between the data systems through real-time (or near real-time) interfaces. He further emphasizes that as soon as the data enters one database, it triggers procedures necessary to send transactions to other downstream databases thus quickening overall data processing. Proving enormous benefit as instantaneous propagation of data to all relevant databases with the millions of little data pieces flying from database to database across vast distances with lightning speed, making the whole process quick and easier in terms of reliability, consistent and precision as well as timeliness.

Another study conducted by (Young, Garner, Clarke, & Volmink, 2017) in Bulgaria revealed that some of the understated issues regarding data quality were when data processing was incidentally conducted at the erroneous time hence making correct database may yield wrong results.

Suffice to note, most of internal factors affecting data quality were not for studies carried out in Uganda and given the fact that Uganda had different socio-economic status with where this study was carried. It left a gap that this study bridged thus making the study inevitable at KCCA level IV health facility where quality of data in urban setting was far below recommended coverage target.

2.5 Overview of Health Management Information System

Health information systems refer to any system that captures, stores, manages or transmits information related to the health of individuals or the activities of organizations that work within the health sector (Nutley, 2012). The division of Health Information System (HIS) was charged with the responsibility of collecting routine data from various sources, analyzing, and disseminating health information to all stakeholders for evidence-based decision making. The information that was disseminated was used for planning and management of health services and programs. The demand for evidence towards the achievement of the millennium development goals (MDGs), coupled with the increasing need for both multilateral and bilateral donors to demonstrate their contribution towards health development also created increased demand for information Ministry of Health (MOH, 2015).

2.6 Role of HMIS in health sector

The role of the Health Information System in the health sector was not just routine collection of health service data and dutiful conveyance of the same to higher levels of the health care system, but to facilitate evidence-based decision-making at all levels especially at the point of collection (Odhiambo-Otieno, 2005). One of the key challenges in the Uganda health sector identified in First Medium-Term Plan of Vision 2030 document was weak health information systems.

Health information system policy, Kenya 2012 – 2030 identified various weaknesses that exist in current information systems that include inadequate capacities of Health Information System staff, unskilled personnel handling data and many parallel data collection systems amongst others. Overall, the current Health Information System provided limited information for monitoring health goals and empowering communities and individuals with timely and understandable information on health. Issues of access and intensity of use of health services were always of significant concern in the health sector in Kenya Ministry of Health (MOH, 2014).

To make management possible, health care providers needed information about the current situation of the health of the population. Acquiring reliable information, a well-functioning health information system (HIS) for gathering, processing, analyzing, and using health

information was necessary World Health Organization (WHO, 2007). Despite the rapid growth of requirements for data recording and reporting within the health information system, there was not much evidence that the information is used (Hotchkiss et al., 2012). Information systems were developed to meet the needs of multiple information users throughout a health system. Information users had different information needs, need information at different levels of detail and had different roles in the decision-making process (Davies et al., 2021).

All these factors were considered when data were synthesized and communicated into information products for stakeholders at the different levels of the health system. Making data available through the development of targeted information products that respond to specific data users' information needs were important (Aqil et al., 2019).

A study done in India showed that most common types of decisions reported by respondents at the facility, state and district levels included those related to program management, planning and budgets while staff working in health clinics made decisions about medical, drug supply and emerging epidemics. Health Management Information System (HMIS) data, district-level surveys and state/district departmental reports were the most often cited data used for decision making (Harrison and Nutley, 2010).

Another study in Tanzania, respondents reported that they used health information to make decisions regarding clinical services, the need for staff training, and the development of organizational policies. Most respondents cited high workload, lack of incentives, inadequate technical skills, and insufficient knowledge about existing data sources as hindrance to health information use (Harrison and Bakari, 2018).

A similar study done in Uganda by MEASURE Evaluation (2019) showed that staff in most of the facilities reported using Health Management Information System data for medical supply and drug management, staffing decisions, and service improvement. Health Management Information System data quality however, was often compromised by being incomplete and inaccurate; therefore, staff did not always rely on it for decision making. Lack of computers and frequent power failures reduced staff's ability to access data and delayed the reporting process. Staff's capacity to analyze, interpret and use data was limited. Data accuracy and timeliness affected data quality and use. The processes of checking data accuracy and providing feedback on the

submitted monthly reports were not implemented making it difficult for staff to understand importance of collected data not only for improving their own performance but also for the department or higher level or as a whole (Aqil, 2018). Factors contributing to sustainable production and use of good-quality data were technical factors (for example data-collection sheets, processes), IT devices, data analysis, environmental, organizational, and behavioral factors Health Metrics Network (HMN, 2018).

2.7 Factors influencing HIMS data use within the health facility

The factors that affected HMIS were primarily related to the end-user, namely health professionals who interact with the system on the daily basis. These factors have a direct impact on the usability and effectiveness of the system. These factors include the perceived usefulness and ease of use of the system by health professionals, as well as their knowledge and skills in using the system. When health professionals perceived the system to be useful and easy to use, and possessed the necessary knowledge and skills, they were more likely to fully utilize the system's potential. These internal factors were critical in designing, implementing, and evaluating an HMIS, as they ultimately determined the success or failure of the system. In this study, these factors were investigated to determine the extent to which they affect HMIS in the study target health centers.

2.7.1 Perceived Usefulness

The health workers perception towards the utilization of HMIS affected the collection of quality, quantity, and accuracy of data. These health workers didn't consider data collection using HMIS as a priority or they had negative attitudes towards the process, they were less likely to collect and report accurate data. On the other hand, the system was perceived as an important and useful tool of data collection, then completeness of data could be realized. This all depends on the worker's subjective belief that the system could be effective for their work and increase productivity (Alipouret *al.*, 2019; Hsiao *et al.*, 2011)

2.7.2 Perceived Ease of Usage

This means the degree to which a person believes that they required as little effort as possible to utilize the system. If the health workers perceived the system as easy to utilize in the collection and management of data, then its usage was higher than when the workers didn't expect that usage of the system was user friendly. As a system that wasn't easy to use led to user frustration, errors, and ultimate abandonment of its usage. In hindsight, perceived usage of a system was subjective and depended on a variety of factors such as user knowledge and skills as well as the systems design and functionality (Alipouret *al.*, 2019; Davis, 1989).

2.7.3 Knowledge and Skills

In order for a worker to use HMIS effectively, there is need to have the knowledge of its functionalities. This is obtained through training undertaken by experts of the system in use. That way, workers were not only capable of using the system for the conventional purposes but were also in the position of trouble shooting in the event issues arise during system usage. Equivocally, technical skills such as data entry and analysis were important in utilizing the system to ensure data accuracy and quality (Keshvari et al., 2018). Health professionals needed to understand how the system fits into the overall health information management processes and how it was used to support decision-making at different levels of the health system. Understanding the organizational context helped to ensure that HMIS was used appropriately and effectively (Holtz & Krein, 2011)

2.8 Factors beyond the system of the health facility related to HMIS use

These lie outside the control of the end-users but rather were due to the work environment and the system being used. These factors affected the HMIS's effectiveness and usefulness in numerous ways. Some of the external factors that were investigated in this study were availability and accessibility of infrastructure and resources, such as reliable power supply, internet connectivity, and hardware and software components. Additionally, the social, economic, and political environment within which the HMIS was implemented affected its success. Other factors that affected HMIS include privacy and security concerns, ethical considerations.

2.8.1 Availability and accessibility of infrastructure and resources

The use of HMIS involves the collection of data electronically which offers automation and reduces labour intensive repetitive tasks. However, employing an electronic system has both opportunities and challenges alike. To have an effective HMIS, there must be an existing infrastructure and several resources that were reliable and accessible. Resources like internet connectivity and reliable power supply impact the usage of HMIS (Pace & Staton, 2005, Fareed, Swoboda, Lawrence, Griesenbrock, & Huerta, 2022;). The quality and quantity of the hardware used in collection and the software embedded on this hardware affects the effectiveness of HMIS. As per a study done in Nigeria, it was found that data collation and submission was delayed due to the use of substandard electronic and existing software glitches (Edet, Whyte, Ogu, Obomanu, & Harry, 2017).

2.8.2 Economic and political environment

Economic and political environment included examples such as inadequate funding and lack of policy support through weak governance structures which all negatively affected the HMIS's effectiveness. Scant funding to the public health remained to be a bottleneck in the implementation and adoption of HMIS despite its potential for transformation of data management (Tomines, Readhead, & Teutsch, 2013). To allow for agile improvements, funding of HMIS must be given priority to realize its effectiveness as observed in more developed countries like Canada (K. A. Mc Cord & Hemkens, 2019). Weak governance and policy support also hamper the progress of adhering to a robust HMIS. For example, a study performed in Kenya found that instead of adhering to the electronic systems put in place, the paper based manual system was left in place to run parallel to the new electronic system. This gave end-users the option to stick to the old paper manual option instead of adopting to the new. In addition, the administration had not paved way for the new system to rhyme with the existing work flow (Paton & Muinga, 2018).

2.8.3 Privacy data security and ethical considerations

The collection of data through electronic means, such as through Health Management Information Systems (HMIS), raised concerns about privacy, security, and ethical considerations,

similar to manual collection of paper records by health professionals (Ozair, Jamshed, Sharma, & Aggarwal, 2015). Regulatory bodies or ethical committees required additional informed consent from data owners to ensure they were aware and accepted the electronic collection of their data, with the assurance that it was kept safe from unauthorized access (Kimberly A Mc Cord et al., 2018;. Implementing effective HMIS required constructive dialogues to address these paramount issues, particularly in developing countries like Uganda, where electronic data collection through HMIS was a new approach.

2.9 Summary of the literature review

The Health Management Information System (HMIS) was responsible for collecting, analysing, and disseminating health information to support evidence-based decision making in the health sector. However, there were several weaknesses in the current HMIS in Uganda, including inadequate capacities of staff, unskilled personnel handling data, and multiple data collection systems. The reliability, timeliness, accuracy, completeness, consistency, and precision of data were important dimensions of the HMIS. Challenges such as data entry problems, changes in data without capturing the updates, documentation errors, and lack of organizational culture fit can affect data quality. The study aimed to fill the gap in assessing the determinants of HMIS data at level III and IV health facilities in Uganda. Internal and external factors due to the end users and work environment respectively affected the effectiveness of the HMIS. These were investigated by the study.

CHAPTER THREE

METHODOLOGY

3.0 Introduction

This chapter described the methods that were used in conducting the study. It gave details regarding the research design, area of the study, study population, sampling procedures, sample size, sampling techniques, data collection methods and instruments, quality control methods, data management and processing, data analysis, ethical considerations, and limitations of the study.

3.1 Research Design

A cross-sectional study design was utilised in conducting this research. The researcher collected data from many different health workers who met at the health centres and kept observing the trends of the variables in the conceptual framework, which helped during the analysis of findings and final report presentation. The research explored the different determinants that affected HMIS data quality. A cross-sectional study was adopted due to its ability to capture detailed contextual analysis of a restrictive number of conditions or events and their associations.

3.2 Study area

The study area was Kampala central division (Kisenyi Health centre IV) and Nakawa division (Kiswa Health Centre III) of Kampala district.

3.3 Study Population

This refers to the targeted respondents that were involved in the study that the researcher saw as a sufficient representative to generate meaningful data for the research to easily influence the decision on the variables being investigated. The study population comprised of health workers in Kiswa Health Centre III and Kisenyi health Centre IV. This study population was chosen based on their active involvement in health care data collection, management, and processing functions within their line of duty. Looking at the study population, some of the responses were based on the interviewees' experiences. Therefore, those found at the time of this assessment

contributed significantly to the nature of the results and hence variations expected with a different set of respondents.

3.4 Sample size determination

According to the National health facility master facility list published by the Ministry of Health Uganda, a Health Centre III like Kiswa serves a patient population of about 20,000 patients whereas a Health Centre IV like Kisenyi serves a patient population of about 100,000 patients (MOH, 2018) which gave us a total of 120,000 patients served in the study target areas. Contrary to the WHO requirements, of having at least 4.45 skilled health workers per every 1000 patients (Organization, 2016), Uganda has 1 skilled health worker for every 1000 patients (Wemos, 2019). This means that our target population was $120,000/1000 = 120$ target population size of skilled health workers. To determine the sample size, we utilized Krejcie and Morgan (1970) method per the table below (Krejcie & Morgan, 1970)

Table 1:Krejcie and Morgan Table

Required Sample Size [†] Per Krejcie and Morgan from: The Research Advisors								
Population Size	Confidence = 95.0%				Confidence = 99.0%			
	Degree of Accuracy/Margin of Error				Degree of Accuracy/Margin of Error			
	0.05	0.035	0.025	0.01	0.05	0.035	0.025	0.01
10	10	10	10	10	10	10	10	10
20	19	20	20	20	19	20	20	20
30	28	29	29	30	29	29	30	30
50	44	47	48	50	47	48	49	50
75	63	69	72	74	67	71	73	75
120	92	104	111	119	102	110	115	119
150	108	126	137	148	122	135	142	149
200	132	160	177	196	154	174	186	198
250	152	190	215	244	182	211	229	246
300	169	217	251	291	207	246	270	295
400	196	265	318	384	250	309	348	391
500	217	306	377	475	285	365	421	485
600	234	340	432	565	315	416	490	579
700	248	370	481	653	341	462	554	672
800	260	396	526	739	363	503	615	763
900	269	419	568	823	382	541	672	854
1,000	278	440	606	906	399	575	727	943
1,200	291	474	674	1067	427	636	827	1119
1,500	306	515	759	1297	460	712	959	1376
2,000	322	563	869	1655	498	808	1141	1785
2,500	333	597	952	1984	524	879	1288	2173
3,500	346	641	1068	2565	558	977	1510	2890
5,000	357	678	1176	3288	586	1066	1734	3842
7,500	365	710	1275	4211	610	1147	1960	5165
10,000	370	727	1332	4899	622	1193	2098	6239
25,000	378	760	1448	6939	646	1285	2399	9972
50,000	381	772	1491	8056	655	1318	2520	12455
75,000	382	776	1506	8514	658	1330	2563	13583
100,000	383	778	1513	8762	659	1336	2585	14227
250,000	384	782	1527	9248	662	1347	2626	15555
500,000	384	783	1532	9423	663	1350	2640	16055
1,000,000	384	783	1534	9512	663	1352	2647	16317
2,500,000	384	784	1536	9567	663	1353	2651	16478
10,000,000	384	784	1536	9594	663	1354	2653	16560
100,000,000	384	784	1537	9603	663	1354	2654	16584
264,000,000	384	784	1537	9603	663	1354	2654	16586

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A population size of 120 (purple column line 6) gave us a sample size of 92 with a margin of error of 5% based on a confidence interval of 95% confidence interval. The study therefore utilized a sample size of 92 health workers per below distribution.

Table 2: Sampling procedure

Cadre	Number	Sampling method/formula
Health Centre In charge	2	Purposive sampling
Medical officers	2	Purposive sampling
Other skilled health workers	88	Purposive sampling
Total	92	Krejcie and Morgan table

3.5 Data Collection methods

The study was conducted using both qualitative and quantitative data collection methods. The quantitative method of data collection involved the use of self-administered structured questionnaires to collect information on the factors associated with data quality among the health workers at the two health facilities of Kiswa HC III and Kisenyi HCIV. The questionnaire was designed to collect qualitative as applicable to the factor in question and position of the health worker.

3.5.1 Data Collection Instruments

Self-Administered questionnaire

A self-administered questionnaire was applied to collect data from the respondents who were participating in this study. This method was chosen since some of the study variables can only be derived from respondent's opinions, feelings, and view. The questionnaire survey method was

selected because of the nature of data to be collected and the time available as well as the objectives of the study.

Interview questionnaire

To capture qualitative data, an interview was conducted with a few of the respondents mainly the top management health workers who had more precise and accurate information about the work around the system or policy at a senior level. With the aid of the interview as a data collection instrument, the researcher was able to explain questions the respondent hadn't understood and was able to ask for elaboration of replies.

3.6 Quality Control Methods

3.6.1 Training of research assistants

Two research assistants were recruited and trained on data collection. Since the respondents were facility health workers who formed the bulk of the study respondents, who beyond reasonable doubt were believed to understand and speak fluent English hence there was no need to translate the data collection tools into the common local language Luganda.

3.6.2 Supervision and monitoring

The accuracy of observers was increased when the individuals knew that their reliability was being monitored. Therefore, the principal researcher doubled as the supervisor of the data collection process with the help of other personnel recruited to help with the supervision of the research assistants when the researcher was engaged in the data abstraction process.

3.7 Data Management and Processing

The following processes and approaches were used for data management and analysis to certify data correctness and minimise errors.

Data editing: the editing of the administered questionnaires was to ensure completeness, accuracy, consistency, and precision of the collected data in relation to study objectives.

Data coding: perfectly sheaved and edited data was coded 1 to “n”, entered into the computer and analysed using SPSS and Epi info to derive graphical representations for each analysed data

These included the quantitative and qualitative data analysis technique. For quantitative data, since they were measurable, exploratory analysis was performed on all variables to identify any inconsistencies and missing data.

3.8 Data Analysis

The descriptive analysis was also done on all variables to determine the proportions for all continuous data variables, the mean, and their standard deviations (SD) were calculated. For all the objectives, the outcome of the study was quality of data at both health centres measured by timely reporting of complete, accurate and reliable data in addition to consistency. Linear regression model was used to estimate the odds ratios (OR) and their 95% confidence interval for quality of data comparing them with the independent variables. All variables in the bi-variate analysis with $p < 0.05$

$P > 0.01$ OR < 0.05 or potential confounders was included in the multi-variate analysis. For all statistical analysis, SPSS version 20 was used to analyse how or the extent to which these factors under assessment influence quality of data. The results from the analysis were presented in form of frequency tables, pie charts and bar graphs. As regarding qualitative data, the various responses from the respective respondents were categorized into common answers which were descriptive responses obtained from interviews and open-ended questions. The data was presented in accordance with the objectives of the study and was said to validate findings from quantitative data. Some themes and appropriate reactions from the respondents were stated to support the quantitative findings in form of direct quotations of the respondent's views and opinions.

3.9 Ethical Considerations

Permission and approval to conduct the study was obtained from UMU faculty of Agriculture. In addition, administrative approvals were obtained from both Kiswa Health Centre III and Kisenyi Health Centre IV. Informed consent was obtained from respondents after explaining adequately

the aim, procedures, and anticipated benefits of the study. This ensured that this study was conducted in an ethical manner with respect and protection for participants. The Informed Consent Form (ICF) was signed as evidence of the consent. The consent form was also specifying that the participation was voluntary and therefore, participants were able to withdraw their participation at any point of time of the survey without any consequence. Additionally, the consent form included the aims, data collection procedures, data security and data management strategies, data reporting, and dissemination of the study results. All participants were made aware of their rights as a participant: (a) that they were free to withdraw from the study at any time and (b) that they were consenting to participate in the study by completing the questionnaires.

The respondents were assured that the information they passed on was kept as confidential information, and that it was used in such a way that it could not be traced back to a particular respondent. The respondents were also assured of maximum respect during the entire process of data collection. Lastly, a consent/assent form was availed to the respondents for signing after an elaborative explanation.

3.10 Limitations of the study

The study was limited to only two health facilities in Kampala district so I made sure that I collected enough data that could give us a true picture of what was happening in other health facilities

Time was limited due to the busy work schedule but was able to do data collection from my target population through flexibility

The other main challenge was shortage of enough funds to smoothly carry out the research, however, I was able to solicit enough resources to enable the smooth running of the study

CHAPTER FOUR

RESULTS PRESENTATION

4.0 Introduction

This chapter presents the findings of the study, presented for each of the study objectives 1, 2 and 3 respectively.

4.1 Respondents' demographic characteristics

4.1.1 Distribution of respondents by age, level of education, professional training and period spent at the facility

Table 3 (4.1.1) Respondents demographic characteristics

Respondents demographic characteristics				
		Facility name		
Variable	Categories	Kisenyi	Kiswa	Total
Age of respondent	18-22	4 (50%)	4 (50%)	8
	23-27	23 (59.0%)	16 (41.0%)	39
	28-32	11 (64.7%)	6 (35.3%)	17
	33-37	8 (57.1%)	6 (42.9%)	14
	38-42	4 (66.7%)	2 (33.3%)	6
	43-47	5 (60.7%)	1 (39.3%)	6
	Missing			2
Level of education	Ordinary	14 (63.6%)	8 (36.4%)	22
	Diploma	13 (54.2%)	11 (45.8%)	24
	Degree	23 (65.7%)	12 (34.3%)	35

Respondents demographic characteristics				
		Facility name		
Variable	Categories	Kisenyi	Kiswa	Total
	Postgrad	3 (60%)	2 (40%)	5
	Others	2 (50%)	2 (50%)	4
	Missing			2
	Midwife	4 (66.7%)	2 (33.3%)	6
Professional training	Data clerk	14 (51.9%)	13 (48.1%)	27
	Data officer	2 (25%)	6 (75%)	8
	Clinician	6 (54.5%)	5 (45.5%)	11
	Medical officer	1 (100%)	0	1
	Peer	13 (76.5%)	4 (23.5%)	17
	Laboratory tech	3 (75%)	1 (25%)	4
	Counsellor	12 (75%)	4 (25%)	16
	Missing			2
	>1 year	6 (60%)	4 (40%)	10
Period spent at the facility	1-5 years	31 (58.5%)	22 (41.5%)	53
	6-10 years	16 (69.6%)	7 (30.4%)	23
	11+ years	2 (50%)	2 (20%)	4
	Missing			2

Source: Primary Data (2023)

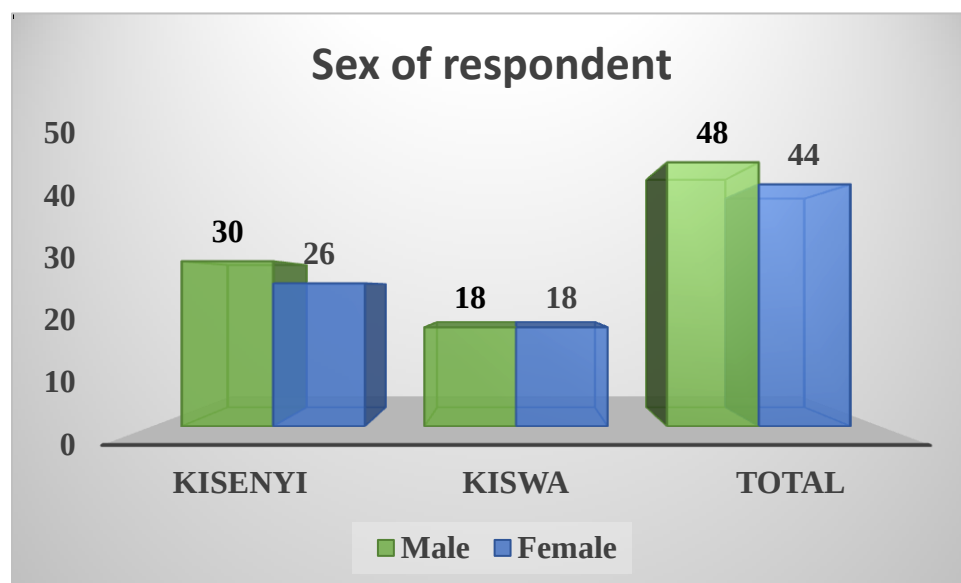
For the variable of age of respondents in table 4.1 above, 4 (50%) respondents were under the age group of 18-22, 23(59.0%) respondents were under the age group of 23-27, 11(64.7%) were under the age group of 28-32, 8(57.1%) were under the age group of 33-37, the largest age group was 38-42 4(66.7) %respondents and 5(60.7%) were under the age group of 43-47 at Kisenyi HCIV. For Kiswa HC111, 4(50%) respondents were under the age group of 18-22, 16(41.0%) respondents under the age group of 23-27, 6(35.3%) respondents under the age group of 28-32, 6(42.9%) respondents under the age group of 33-37, 2(33.3%) respondents under the age group of 38-42 and 1(39.3%) respondent was under the age group of 43-47 where as two participants responses were missing the age group because this variable wasn't in the interview questionnaire.

Variable of level of education in table 3 above, 14(63.6%) respondents had an ordinary certificate 13(54.2%) respondents had a diploma, 23(65.7%) respondents had a degree, 3(60%) respondents had a post graduate, 2(50%) respondents had other level of education from Kisenyi HCIV. On the other hand, 8(36.4%) respondents had an ordinary certificate, 11(45.8%) respondents were at diploma level, 12(34.3%) respondents had a degree, 2(40%) respondents were at postgraduate level of education and 2(50%) had other levels of education from Kiswa HC111. On the other hand, only 2 participant's responses were missing on the level of education since this wasn't among the responses on the interview questionnaire.

For the variable of professional training in table3 above, 4(66.7%) respondents were midwives, 14 (51.9%)respondents were data clerks, 2(25%) respondents were data officers, 6(54%) respondents were Clinicians, 1(100%) respondent was a Medical officer, 13(76.5%) respondents were Peers, 3(75%) respondents were laboratory technicians, 12(75%) respondents were counsellors in Kisenyi HCIV while on the other hand, 2(33%) respondents were Midwives, 13(48.1%) respondents were Data clerks, 6(75%) respondents were Data officers, 5(45.5%) respondents were Clinicians, 4(23.5%) were Peers, 1(25%) were Laboratory Technicians, 4(25%) respondents were counsellors, there were no respondents on the professional training of Medical officer at Kiswa HCIII and 2 participants responses were missing because this variable wasn't on the interview questionnaire.

For the variable of period spent at the facility according to table 3 above, 6(60%) respondents spent >1 year, 31(58.5%) respondents spent 1-5 years, 16(69.6%) respondents spent 6-10 years, 2(50%) respondents spent 11 years at Kisenyi HCIV and on the other hand, 4(40%) respondents had spent >1 year, 22(41.5%) had spent 1-5 years, 7(30.4%) had spent 6-10 years and 2(20%) had spent 11 years at Kiswa HCIII. Two participants responses were missing because this variable wasn't on the interview questionnaire.

Figure 3(4.1.1) Sex of the respondent



Source: Primary Data (2023)

Basing on Figure 3(4.1.1) above, the largest percentage of males came from Kisenyi HC IV 30 (62.5%) and only 18 (37.5%) males from Kiswa. On the other hand, 26 (59.1%) of the females came from Kisenyi HC IV and the other females 18 (40.9%) came from Kiswa HC III.

4.2 Relationship between individual characteristics and the use of the HMIS to support decision making

Table 4.(4.2): Cross tabulation of individual characteristics with use of the HMIS to support decision making

			How often do you use the HMIS to support decision making at different levels of the health system					
Characteristic	Categori es		Da ily	We ekl y	Mon thly	Ra rel y	Likeli hood Ratio - Value	P- Val ue; Al ph a (0. 05)
Level of education	Ordinary	Count	11	2	2	7	21.8	0.0 39
		Expecte d Count	9. 1	4.7	4	4.2		
	Diploma	Count	8	7	4	5		
		Expecte d Count	10	5.1	4.3	4.6		
	Degree	Count	17	7	6	4		
		Expecte d Count	14 .1	7.3	6.1	6.5		
	Postgrad	Count	1	3	1	0		

		Expected Count	2.1	1.1	0.9	1		
	Others	Count	0	0	3	1		
		Expected Count	1.7	0.9	0.7	0.8		
Professional training	Midwife	Count	4	0	1	1	35.6	0.024
		Expected Count	2.5	1.3	1.1	1.1		
	Data clerk	Count	12	9	2	3		
		Expected Count	10.8	5.6	4.7	5		
	Data officer	Count	1	4	2	1		
		Expected Count	3.3	1.7	1.4	1.5		
	Clinician	Count	4	2	2	3		
		Expected Count	4.6	2.3	2	2.1		
	Medical officer	Count	1	0	0	0		
		Expected Count	0.4	0.2	0.2	0.2		

	Peer	Count	6	2	2	7		
		Expected Count	7.1	3.6	3.1	3.2		
	Laboratory tech	Count	2	2	0	0		
		Expected Count	1.7	0.9	0.7	0.8		
	Counselor	Count	7	0	7	2		
		Expected Count	6.7	3.4	2.9	3.1		
Period spent at the facility	>1 year	Count	9	0	1	0	18.3	0.032
		Expected Count	4.2	2.1	1.8	1.9		
	1-5 years	Count	20	13	8	11		
		Expected Count	21.6	11.1	9.3	9.9		
	6-10 years	Count	7	6	5	5		
		Expected Count	9.6	4.9	4.1	4.4		
	11+ years	Count	1	0	2	1		

		Expected Count	1.7	0.9	0.7	0.8		
How familiar are you with the functionalities of the HMIS	Very familiar	Count	22	13	8	5	10.9	0.09
		Expected Count	20	10.2	8.6	9.2		
	Somewhat familiar	Count	14	4	8	10		
		Expected Count	15	7.7	6.5	6.9		
	Not familiar	Count	1	2	0	2		
		Expected Count	2.1	1.1	0.9	1		
Have you ever received training on how to use the HMIS	Yes	Count	24	15	8	7	6.5	0.09
		Expected Count	22.4	11.5	9.7	10.3		
	No	Count	13	4	8	10		
		Expected Count	14.6	7.5	6.3	6.7		

Source: Primary Data (2023)

From the table 5.(4.2)above, a cross tabulation of individual characteristics with use of the HMIS to support decision making showed results as explained below;

A cross tabulation of level of education and use of HMIS to support decision making showed that there was a likelihood of a relationship between the two variables a likelihood value of (21.8) and was statistically significant at p-value= (0.039)

There was a likelihood of a relationship between professional training and use of HMIS to support decision making at a likelihood value of (35.6) and is statistically significant at p-value=(0.024)

Furthermore, there was a likelihood of a relationship between period spent at the facility and use of HMIS to support decision making at a likelihood value of (18.3) and was statistically significant at p-value=(0.032)

It was revealed that there was no likelihood of a relationship between the familiarity of the functionalities of the HMIS and HMIS use at a likelihood ratio of (10.9) and was not statistically significant at p-value=(0.09)

Lastly, it was shown that there was no likelihood of a relationship between having received training on how to use the HMIS and the exact use of HMIS to support decision making at a likelihood ratio of (6.5) and was not statistically significant at p-value=(0.09).

4.3 Skills, knowledge and Perception of health workers on HMIS usage

4.3.1 Respondents' skills, knowledge, and Perception on HMIS usage findings

Table 6(4.3.1) Respondents' skills, knowledge, and Perception on HMIS usage findings

Knowledge and Skills				
		Facility name		
Variable	Categories	Kisenyi	Kiswa	Total
How familiar are you with the functionalities of the HMIS	Very familiar	28 (58.3%)	20 (41.7%)	48
	Somewhat familiar	24 (64.9%)	13 (35.1%)	37
	Not familiar	3 (60%)	2 (40%)	5
	Missing			2
Have you ever received training on how to use the HMIS	Yes	32 (58.2%)	23 (41.8%)	55
	No	23 (65.7%)	12 (34.3%)	35
	Missing			2
How often do you use the HMIS in your work	Daily	34 (63%)	20 (37.0%)	54
	Weekly	10 (50%)	10 (50%)	20
	Monthly	5 (100%)	0	5
	Rarely	6 (54.5%)	5 (39.3%)	11
	Missing			2
How confident are you in your ability to use the HMIS effectively	Very confident	27 (57.4%)	20 (42.6%)	47
	Somewhat confident	23 (63.9%)	13 (36.1%)	36
	Not confident	5 (71.4%)	2 (28.6%)	7
	Missing			2
How do you compile	Electronically	5 (41.7%)	7 (58.3%)	12

Knowledge and Skills				
		Facility name		
Variable	Categories	Kisenyi	Kiswa	Total
this data	Manually (use of Tools/registers)	27 (60%)	18 (40%)	45
	Both	23 (68.8%)	10 (30.3%)	33
	Missing			2
When do you submit your HMIS 105 report to the division	Within first week of the month	40 (65.3%)	23 (36.5%)	63
	2-3 weeks into the month	8 (44.4%)	10 (55.6%)	18
	More than 3 weeks	7 (77.8%)	2 (22.2%)	9
	Missing			2
How do you perceive the usability of the HMIS	Very easy to use	20 (58.8%)	14 (41.2%)	34
	Somewhat easy to use	19 (59.4%)	13 (40.6%)	32
	Neutral	12 (66.7%)	6 (33.3%)	18
	Somewhat difficult to use	4 (66.7%)	2 (33.3%)	6
	Missing			2
How has the HMIS contributed to improving healthcare service delivery in your facility	Significantly	38 (63.3%)	22 (36.7%)	60
	Somewhat	16 (55.2%)	13 (44.8%)	29
	Not significantly	1 (100%)	0	1
	Missing			2

Source: Primary Data (2023)

In regards to familiarity with the functionalities of the HMIS, 28(58.3%) respondents were very familiar, 24(64.9%) respondents were somewhat familiar and 3(60%) respondents were not familiar at Kisenyi HCIV whereas for Kiswa HC111, 20(41.7%) respondents were very familiar, 13(35.1%) respondents were somewhat familiar and 2(40%) respondents were not familiar with the functionalities of the HMIS. Two participants responses were missing because this variable wasn't on the interview questionnaire. At Kisenyi HCIV, 32(58.2%) had a response of yes that

they received training on how to use HMIS, 23(65.7%) had a response of no. They never received training on how to use HMIS whereas for Kisumu HCIII, 23(41.8%) had a response of yes that they received training on how to use HMIS and 12(34.3%) had a response of no. They have never received training on how to use HMIS. On the other hand, only 2 participants responses were missing since this variable wasn't among the responses on the interview questionnaire. (Table4.3.1)

At Kisumu HCIV in table 4.3.1 above, 34(63%) respondents were using HMIS in their work daily, 10(50%) respondents were using HMIS in their work weekly, 5(100%) respondents were using HMIS in their work monthly, 6(54.5%) respondents were rarely using HMIS in their work. On the other hand, 20(37.0%) respondents were using HMIS in their work daily, 10(50%) weekly, no respondents were using HMIS monthly and 5(39.5%) respondents were rarely using HMIS in their work at Kisumu HCIII. On the other hand, only 2 participants responses were missing since this variable wasn't among the responses on the interview questionnaire.

In line with the confidence in their ability to use the HMIS effectively, 27(57) respondents were very confident, 23(63.9%) respondents were somewhat confident, 5(71.4%) respondents were not confident at Kisumu HCIV and on the other hand 20(42.6%) respondents were very confident, 13(36.1%) respondents were somewhat confident and 2(28.6%) respondents were not confident in their ability to use the HMIS effectively at Kisumu HCIII. On the other hand, only 2 participants responses were missing since this variable wasn't among the responses on the interview questionnaire. (Table4.3.1)

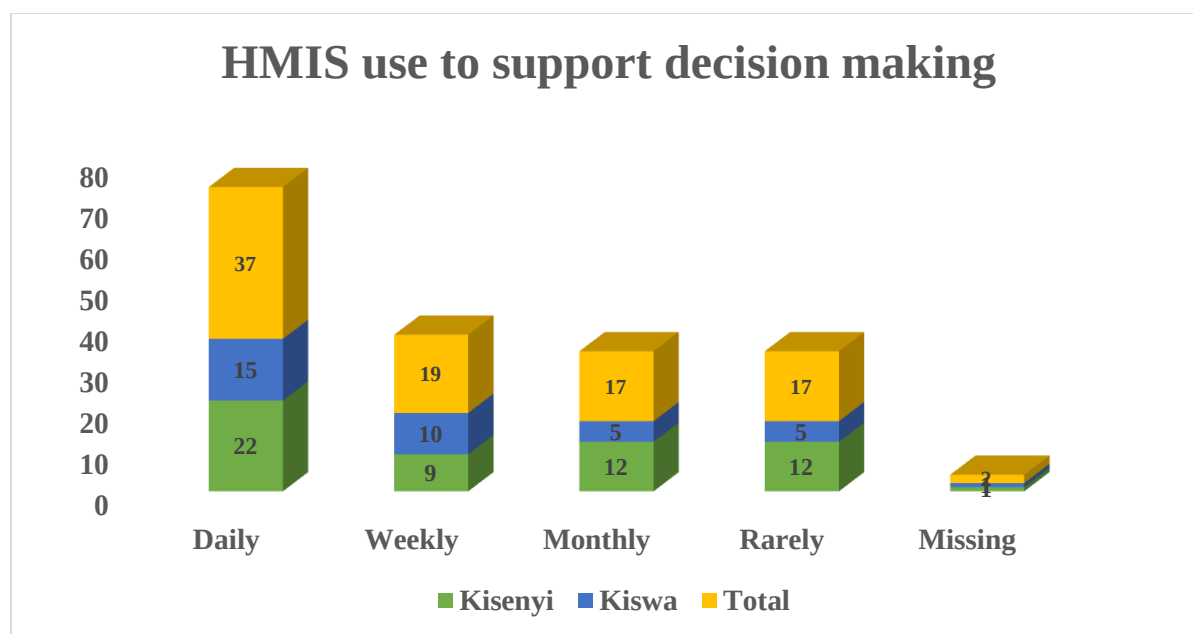
For the variable of how respondents compile this data in table 4.3.1above, 5(41.7%) respondents were compiling data electronically, 27(60%) respondents were using manual (tools/ registers) to compile data, 23(68.8%) respondents were compiling data by using both manually (tools/ registers) and electronically at Kisumu HCIV while on the other hand, 7(58.3%) respondents were compiling data electronically, 18(40%) respondents were compiling data manually using tools/registers and 10(30.3%) respondents were compiling data using both electronic and manual (tools/ registers) at Kisumu HCIII. On the other hand, only 2 participants responses were missing since this variable wasn't among the responses on the interview questionnaire.

For the variable of submitting the 105 report to the division in table 4.3.1 above, 40(65.3%) respondents were submitting within the first week of the month, 8(44.4%) respondents were submitting 2-3 weeks into the month and 7(77.8%) respondents were submitting at more than 3 weeks at Kisenyi HCIV while for Kiswa HC111 23(36.5%) respondents were submitting within first week of the month, 10(55.6%) respondents were submitting 2-3 weeks into the month and 2(22.2%) respondents were submitting 105 report to the division at more than 3 weeks. On the other hand, only 2 participant's responses were missing since this variable wasn't among the responses on the interview questionnaire.

According to table 4.3.1 above, for the variable of how you perceive the usability of the HMIS 20(58.8%) respondents were perceiving HMIS as very easy to use, 19(59.4%) respondents were perceiving the usability of the HMIS as somewhat easy to use, 12(66.7%) were neutral and 4(66.7%) respondents were perceiving the usability of HMIS as somewhat difficult to use at Kisenyi HCIV. On the other hand, at Kiswa HC111, 14(41.2%) respondents were perceiving HMIS as very easy to use, 13(40.6%) respondents were perceiving the usability of the HMIS as somewhat easy to use, 6(33.3%) were neutral and 2(33.3%) respondents were perceiving the usability of HMIS as somewhat difficult to use. On the other hand, only 2 participants responses were missing since this variable wasn't among the responses on the interview questionnaire

For the variable of how has the HMIS contributed to improving healthcare service delivery in your facility in table 4.3.1 above, 38 (63.3%) responded that HMIS significantly contributed to improving healthcare service delivery, 16(55.2%) responded that HMIS somewhat contributed to improving healthcare service delivery, 1(100%) responded that HMIS did not significantly contribute to improving healthcare service delivery at Kisenyi HCIV. On the other hand, 22(36.7%) responded that HMIS significantly contributed to improving healthcare service delivery, 13(44.8%) responded that HMIS somewhat contributed to improving healthcare service delivery and no one responded that HMIS did not significantly contribute to improving healthcare service delivery at Kiswa HC111. Only 2 participant's responses were missing since this variable wasn't among the responses on the interview questionnaire.

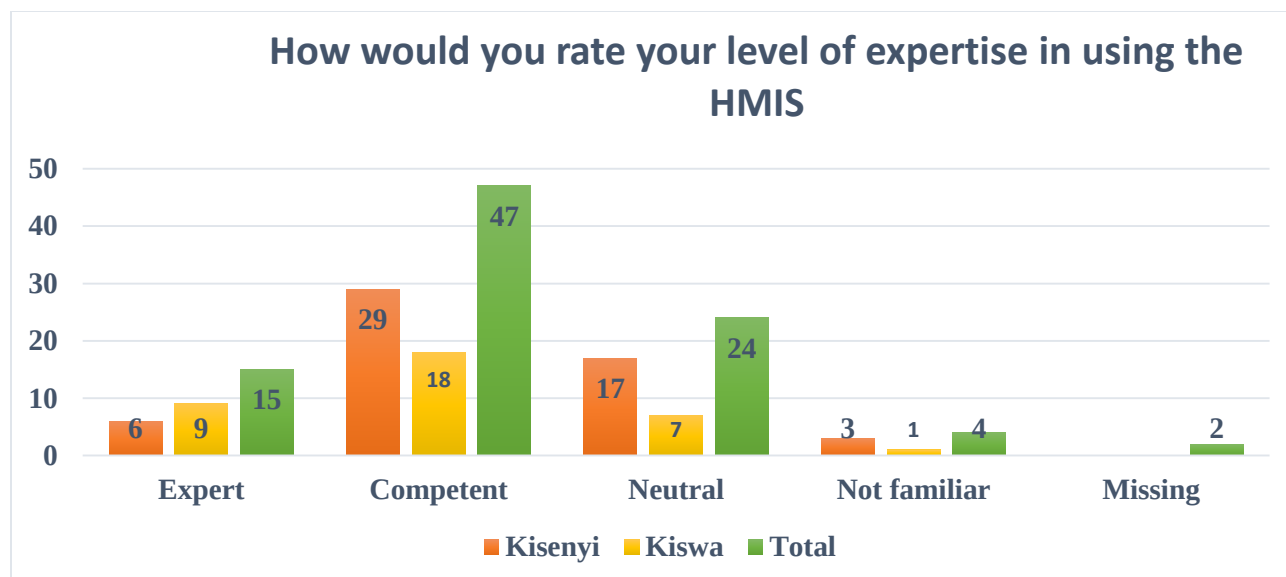
Figure 4(4.3.1) HMIS use to support decision making



Source: Primary Data (2023)

According to figure 4.3.1 above, 22(59.5%) respondents were using the HMIS daily to support decision making at different levels of the health system, 9(47.4%) respondents were using the HMIS weekly to support decision making at different levels of the health system, 12(70.6%) respondents were using the HMIS monthly to support decision making at different levels of the health system, 12(70.6%) respondents rarely used the HMIS to support decision making at different levels of the health system at Kisenyi HCIV. On the other hand, 15(40.5%) respondents were using the HMIS daily to support decision making at different levels of the health system, 10(52.6%) respondents were using the HMIS weekly to support decision making at different levels of the health system, 5(29.4%) respondents were using the HMIS monthly to support decision making at different levels of the health system and 5(29.4%) respondents were rarely used the HMIS to support decision making at different levels of the health system at Kiswa HC III. Only 2 participants responses were missing since this variable wasn't among the responses on the interview questionnaire.

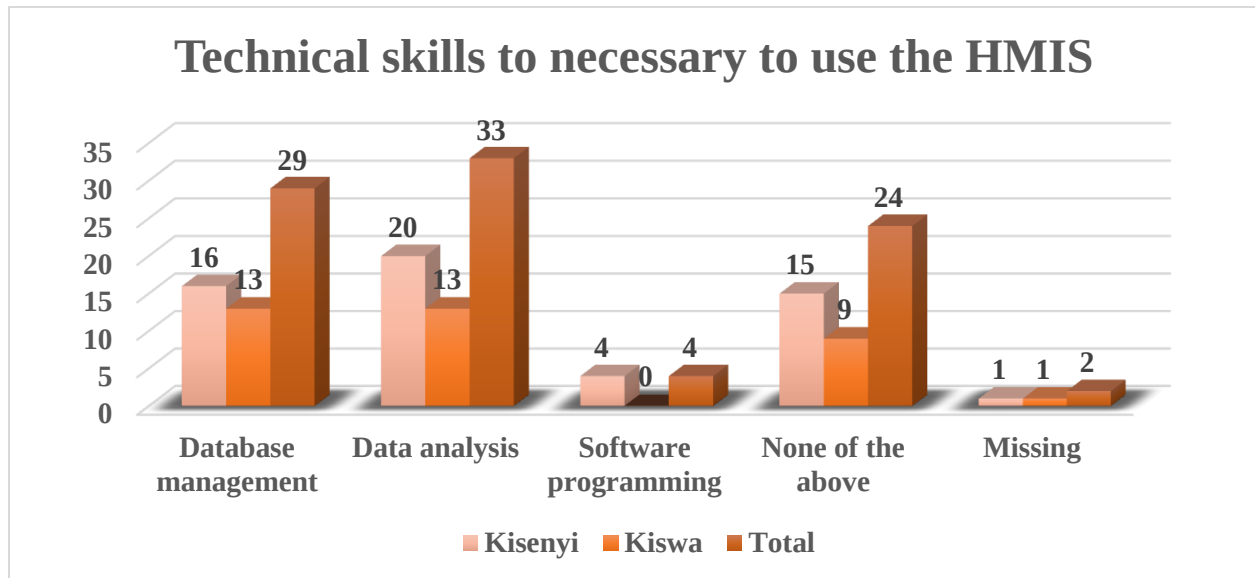
Figure 5(4.3.2) Level of expertise in using the HMIS



Source: Primary Data (2023)

Based on the above figure 4.3.2 showing the level of expertise in using the HMIS, at Kisenyi HCIV 6(40%) respondents were experts, 29(61.7%) respondents were competent, 17(70.8%) respondents were neutral and 3(75%) respondents were not familiar. On the other hand, for Kiswa HC111, 9(60%) respondents were experts, 18(38.3%) respondents were competent, 7(29.2%) respondents were neutral and 1(25%) were not familiar at all in using HMIS. On the other hand, only 2 participants responses were missing since this variable wasn't among the responses on the interview questionnaire.

Figure 6(4.3.3) Technical skills to necessary to use the HMIS



Source: Primary Data (2023)

Based on the figure 6(4.3.3) showing the technical skills necessary to use the HMIS, 16(55.2%) respondents were possessing Database management skills, 20(60.6%) respondents were possessing data analysis skills, 4(100%) respondents were possessing software programming skills and 15(62.5%) respondents didn't possess any of the skills mentioned at Kisenyi HCIV whereas for Kiswa HC III, 13(44.8%) respondents were possessing database management skills, 13(39.4%) respondents were possessing data analysis skills, no one was possessing the software programming skills and 9(37.5%) respondents didn't possess any of the skills mentioned. On the other hand, only 2 participants responses were missing since this variable wasn't among the responses on the interview questionnaire.

4.3.2 Perception of HMIS usage

Table 7(4.3.2) Perception of HMIS usage findings

Usability and Response Frequencies				
		Responses		Percent of Cases
		N	Percent	
Changes to improve usability of HMIS	Training or orientation of data entry staff in using the HMIS	35	35.0%	41.2%
	Affordable and Reliable internet speed	13	13.0%	15.3%
	Reduce on number of HMIS tools	1	1.0%	1.2%
	Simple and precise HMIS Tools	18	18.0%	21.2%
	Timely Provision of computers and HMIS tools	11	11.0%	12.9%
	Employ more people	2	2.0%	2.4%
	Real time data checks	2	2.0%	2.4%
	paper HMIS tools consistent with electronic version	3	3.0%	3.5%
	Reduce on paper work	12	12.0%	14.1%
	Ability for HMIS to work offline	2	2.0%	2.4%
	Low electricity prices	1	1.0%	1.2%
Total		100	100.0%	117.6%

Source: Primary Data (2023)

According to Table 4.3.2 above on the multiple responses of what changes would you suggest to improve the usability and effectiveness of the HMIS, 35(35.0%) responses were given on training or orientation of data entry staff in using the HMIS, 13(13.0%) responses were given on affordable and reliable internet speed, 1(1.0%) responses were given on reducing on the number of HMIS tools, 18(18.0%) multiple responses were given on simple and precise HMIS tools, 11(11.0%) responses were given on timely provision of computers and HMIS tools, 2(2.0%) responses were given on employ more people, 2(2.0%) responses were given on real time data checks, 3(3.0%) responses were given on paper HMIS tools consistent with electronic version, 12(12.0%) responses were given on reduce paper work, 2(2.0%) responses were given on ability for HMIS to work offline and 1(1.0%) responses were given on low electricity prices were suggested as changes to improve the usability and effectiveness of the HMIS.

4.3.3 Respondents Perceived Usefulness

Table 8(4.3.3) Respondents' perceived usefulness findings

Perceived Usefulness				
		Facility name		
Variable	Categories	Kisenyi	Kiswa	Total
On a scale of 1-5, how strongly do you agree with the statement: "Using the HMIS improves my work efficiency"?	Strongly disagree	5 (83.3%)	1 (16.7%)	6
	Disagree	2 (100%)	0	2
	Neutral	6 (54.5%)	5 (45.5%)	11
	Agree	23 (51.1%)	22 (48.9%)	45
	Strongly agree	19 (73.1%)	7 (26.9%)	26
	Missing			2
On a scale of 1-5, how strongly do you agree with the statement: "The HMIS provides me with valuable information to make informed	Strongly disagree	4 (80%)	1 (20%)	5
	Disagree	0	1 (100%)	1
	Neutral	9 (50%)	9 (50%)	18

Perceived Usefulness				
		Facility name		
Variable	Categories	Kisenyi	Kiswa	Total
decisions	Agree	24 (58.5%)	17 (41.5%)	41
	Strongly agree	18 (72%)	7 (28%)	25
	Missing			2
On a scale of 1-5, how strongly do you agree with the statement: "The HMIS helps me to better understand my patients' health status"?	Strongly disagree	3 (75%)	1 (25%)	4
	Disagree	3 (75%)	1 (25%)	4
	Neutral	10 (52.6%)	9 (47.4%)	19
	Agree	23 (63.9%)	13 (36.1%)	36
	Strongly agree	16 (59.3%)	11 (40.7%)	27
	Missing			2
On a scale of 1-5, how strongly do you agree with the statement: "The HMIS has improved the quality of healthcare provided to patients"?	Strongly disagree	3 (60%)	2 (40%)	5
	Disagree	2 (100%)	0	2
	Neutral	8 (47.1%)	9 (52.9%)	17
	Agree	28 (59.6%)	19 (40.4%)	47
	Strongly agree	14 (73.7%)	5 (26.3%)	19
	Missing			2
On a scale of 1-5, how likely are you to recommend the use of the HMIS to a colleague in the healthcare industry	Very unlikely	1 (16.7%)	5 (83.3%)	6
	Unlikely	1 (50%)	1 (50%)	2
	Neutral	10 (71.4%)	4 (28.6%)	14
	Likely	20 (62.5%)	12 (37.5%)	32

Perceived Usefulness				
		Facility name		
Variable	Categories	Kisenyi	Kiswa	Total
	Very likely	23 (63.9%)	13 (36.1%)	36
	Missing			2

Source: Primary Data (2023)

Basing on Table 7 above, 5(83.3%) respondents strongly disagreed with the statement: using the HMIS improves their work efficiency, 2(100%) respondents disagreed with the statement: using the HMIS improves their work efficiency, 6(54.5%) respondents were neutral with the statement: using the HMIS improves their work efficiency, 23(51.1%) respondents agreed with the statement: using the HMIS improves their work efficiency, 19(73.1%) respondents strongly agreed with the statement: using the HMIS improves their work efficiency at Kisenyi HCIV. On the other hand, 1(16.7%) respondents strongly disagreed with the statement: using the HMIS improves their work efficiency, no respondent disagreed with the statement: using the HMIS improves their work efficiency, 5(45.5%) respondents were neutral with the statement: using the HMIS improves their work efficiency, 22(48.9%) respondents agreed with the statement: using the HMIS improves their work efficiency and 7(26.9%) respondents strongly agreed with the statement: using the HMIS improves their work efficiency at Kiswa HCI11. Two participants responses were missing since this variable wasn't among the responses on the interview questionnaire.

According to Table 7 above, 4(80%) respondents strongly disagreed on the statement: "The HMIS provides me with valuable information to make informed decisions, no respondent disagreed to the statement, 9(50%) respondents were neutral on this statement, 24(58.5%) respondents agreed on the statement: "The HMIS provides me with valuable information to make informed decisions and 18(72%) respondents strongly agreed on the statement: "The HMIS provides me with valuable information to make informed decisions at Kisenyi HCIV. On the other hand, 1(20%) respondents strongly disagreed on the statement: "The HMIS provides me

with valuable information to make informed decisions, 1(100%) respondents disagreed on the statement: “The HMIS provides me with valuable information to make informed decisions, 9(50%) respondents were neutral on this statement, 17(41.5%) respondents agreed on the statement: “The HMIS provides me with valuable information to make informed decisions and 7(28%) respondents strongly agreed on the statement: “The HMIS provides me with valuable information to make informed decisions at Kiswa HC III. Two participants responses were missing since this variable wasn’t among the responses on the interview questionnaire.

According to table 7 above, 3(75%) respondents strongly disagreed to the statement: “The HMIS helps us to better understand our patient’s health status”, 3(75%) respondents disagreed to the statement: “The HMIS helps us to better understand our patient’s health status”, 10(52.6%) respondents were neutral to the statement: “The HMIS helps us to better understand our patient’s health status”, 23(63.9%) respondents agreed to the statement: “The HMIS helps us to better understand our patient’s health status”, 16(59.3%) respondents strongly agreed to the statement: “The HMIS helps us to better understand our patient’s health status” at Kisenyi HCIV. On the other hand, 1(25%) respondents strongly disagreed to the statement: “The HMIS helps us to better understand our patient’s health status”, 1(25%) respondents disagreed to the statement: “The HMIS helps us to better understand our patient’s health status”, 9(47.4%) respondents were neutral to the statement: “The HMIS helps us to better understand our patient’s health status”, 13(36.1%) respondents agreed to the statement: “The HMIS helps us to better understand our patient’s health status”, 11(40.7%) respondents strongly agreed to the statement: “The HMIS helps us to better understand our patient’s health status” at Kiswa HCIII. Only two participants responses were missing since this variable wasn’t among the responses on the interview questionnaire.

Basing on Table 7 above, 3(60%) respondents strongly disagreed, 2(100%) respondents disagreed, 8(47.1%) respondents were neutral, 28(59.6%) respondents agreed, 14(73.7%) respondents strongly agreed to the statement above at Kisenyi HCIV. On the other hand, 2(40%) respondents strongly disagreed, no respondents disagreed, 9(52.9%) respondents were neutral, 19(40.4%) respondents agreed, 5(26.3%) respondents strongly agreed to the statement above at Kiswa HCIII. Two participants responses were missing since this variable wasn’t among the responses on the interview questionnaire.

According to table 7 above, 1(16.7%) respondents were very likely, 1(50%) respondents were unlikely, 10(71.4%) respondents were neutral, 20(62.5%) respondents were likely and 23(63.9%) respondents were very likely to recommend the use of the HMIS to a colleague in the healthcare industry at Kisenyi HCIV. On the other hand, 5(83.3%) respondents were very likely, 1(50%) respondents were unlikely, 4(28.6%) respondents were neutral, 12(37.5%) respondents were likely and 13(36.1%) respondents were very likely to recommend the use of the HMIS to a colleague in the healthcare industry at KiswahHCIII. Two participants responses were missing since this variable wasn't among the responses on the interview questionnaire.

Table 9(4.3.4) The Likert scale

Using the HMIS improves my work efficiency	The HMIS provides me with valuable information to make informed decisions	The HMIS helps me to better understand my patients' health status
1. Agree 2. Strongly agree 3. Neutral 4. Strongly disagree 5. Disagree	1. Agree 2. Strongly agree 3. Neutral 4. Strongly disagree 5. Disagree	1. Agree 2. Strongly agree 3. Neutral 4. Strongly disagree 5. Disagree
The HMIS has improved the quality of healthcare provided to patients	Recommend the use of the HMIS to a colleague in the healthcare industry	
1. Agree 2. Strongly agree 3. Neutral 4. Strongly disagree 5. Disagree	1. Very likely 2. Likely 3. Neutral 4. Very unlikely 5. Unlikely	

Table 10(4.3.4) The Likert scale

From the Likert scale above, it was observed that most respondents were in positive agreement that using the HMIS improved their work efficiency, the HMIS provided them with valuable information to make informed decisions, The HMIS helped them to better understand their patients' health status and that the HMIS has improved the quality of healthcare provided to patients.

In regards to recommending the use of the HMIS to a colleague in the healthcare industry, most respondents were supportive of the idea.

4.4 The challenges in the technological infrastructure that hinder the effective utilization of HMIS

4.4.1 Internet and power supply

Table 11(4.4.1) Respondents' internet and power supply findings

Internet and Power Supply				
		Facility name		
Variable	Categories	Kisenyi	Kiswa	Total
On a scale of 1-5, how would you rate the reliability of power supply in your workplace	Not at all reliable	1 (33.3%)	2 (66.7%)	3
	Slightly reliable	4 (44.4%)	5 (55.6%)	9
	Moderately reliable	15 (55.6%)	12 (44.4%)	27
	Very reliable	23 (63.9%)	13 (36.1%)	36
	Extremely reliable	12 (80%)	3 (20%)	15
	Missing			2
How often do internet connectivity issues prevent you from submitting or accessing data using the HMIS	Rarely	15 (55.6%)	12 (44.4%)	27
	Sometimes	30 (63.8%)	17 (36.2%)	47
	Often	8 (57.1%)	6 (42.9%)	14
	Very often	2 (100%)	0	2
	Missing			2
On a scale of 1-5, how user-friendly do you find the HMIS software	Not user-friendly at all	2 (40%)	3 (50%)	5
	Somewhat user-friendly	9 (50%)	9 (50%)	18
	Moderately user-friendly	27 (67.5%)	13 (32.5%)	40
	Very user-friendly	16 (64%)	9 (36%)	25
	Extremely user-friendly	1 (50%)	1 (50%)	2
	Missing			2
On a scale of 1-5, how often do you experience technical difficulties when using the HMIS software	Very frequently	3 (50%)	3 (50%)	6
	Somewhat frequently	15 (71.4%)	6 (28.3%)	21
	Occasionally	14 (53.8%)	12 (46.2%)	26
	Rarely	20 (58.8%)	14 (41.2%)	34
	Never	3 (100%)	0	3
	Missing			2
On a scale of 1-5, how often do hardware malfunctions occur when	Very frequently	4 (57.1%)	3 (42.9%)	7
	Somewhat frequently	11 (64.7%)	6 (35.3%)	17
	Occasionally	10 (47.6%)	11 (52.4%)	21

Internet and Power Supply				
		Facility name		
Variable	Categories	Kisenyi	Kiswa	Total
using the HMIS	Rarely	26 (66.7%)	13 (33.3%)	39
	Never	4 (66.7%)	2 (33.3%)	6
	Missing			2

Source: Primary Data (2023)

From the above table (4.4.1) for the variable how would you rate the reliability of power supply in your workplace, 1(33.3%) respondents rated the reliability of power supply in their workplace as not at all reliable, 4(44.4%) respondents rated it as slightly reliable, 15(55.6%) respondents rated it as moderately reliable, 23(63.9%) respondents rated it as very reliable and 12(80%) respondents rated it as extremely reliable at Kisenyi HCIV. On the other hand, 2(66.7%) respondents rated the reliability of power supply in their workplace as not at all reliable, 5(55.6%) respondents rated it as slightly reliable, 12(44.4%) respondents rated it as moderately reliable, 13(36.1%) respondents rated it as very reliable and 3(20%) respondents rated it as extremely reliable at Kiswa HCIII. Two participants responses were missing since this variable wasn't among the responses on the interview questionnaire.

Basing on Table(4.4.1),15(55.6%) respondents rarely faced internet connectivity issues, 30(63.8%) respondents sometimes faced internet connectivity issues, 8(57.1%) respondents often faced internet connectivity issues and 2(100%) respondents very often faced internet connectivity issues preventing them from submitting or accessing data using the HMIS at Kisenyi HCIV. On the other hand, 12(44.4%) respondents rarely faced internet connectivity issues, 17(36.2%) respondents sometimes faced internet connectivity issues, 6(42.9%) respondents often faced internet connectivity issues and no respondents faced internet connectivity issues very often at Kiswa HCIII. Two participants responses were missing since this variable wasn't among the responses on the interview questionnaire. This shows that majority of the respondents mentioned that they faced moderate speed and reliable internet connectivity issues at the health facility.

According to Table 4.4.1, 2(40%) respondents found HMIS software as not user-friendly at all, 9(50%) respondents found it somewhat user-friendly, 27(67.5%) respondents found HMIS

software as moderately user-friendly and 16(64%) respondents found it extremely user-friendly at Kisenyi HCIV. On the other hand, 3(50%) respondents found HMIS software as not user-friendly at all, 9(50%) respondents found it somewhat user-friendly, 13(32.5%) respondents found HMIS software as moderately user-friendly and 9(36%) respondents found it extremely user-friendly at Kiswa HCIII. Two participants responses were missing since this variable wasn't among the responses on the interview questionnaire.

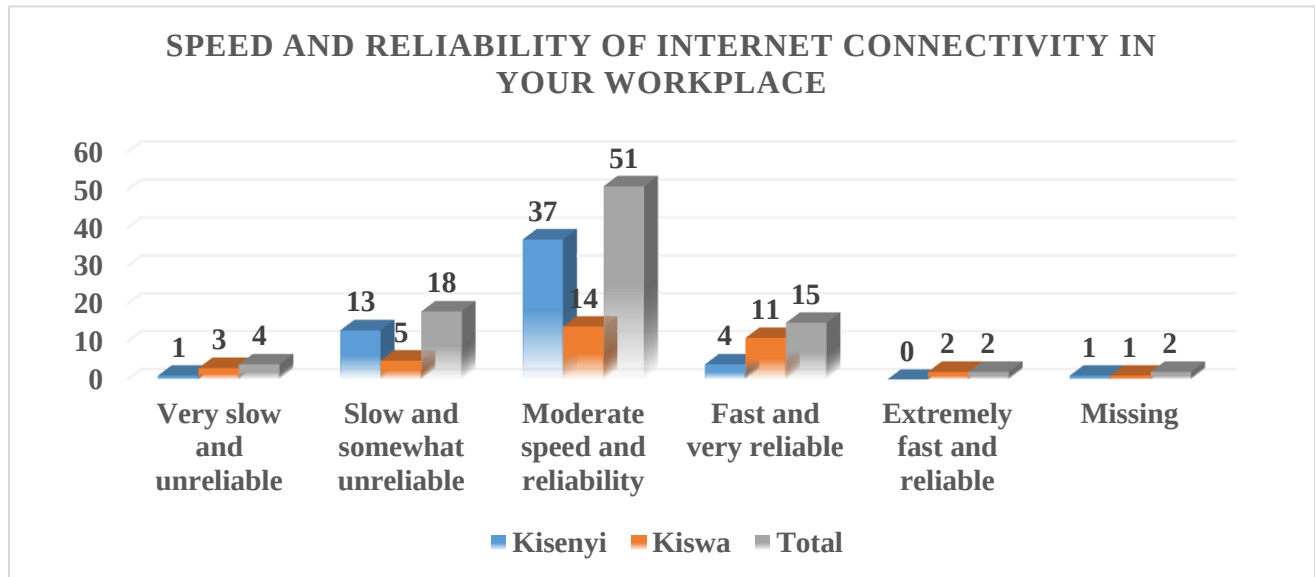
Basing on Table 4.4.1 above, 3(50%) respondents were experiencing technical difficulties very frequently when using HMIS software, 15(71.4%) respondents were experiencing technical difficulties somewhat frequently when using HMIS software, 14(53.8%) respondents were experiencing technical difficulties occasionally when using HMIS software, 20(58.8%) respondents rarely experienced technical difficulties when using HMIS software, 3(100%) respondents never experienced technical difficulties when using HMIS software at Kisenyi HCIV. On the other hand, 3(50%) respondents were experiencing technical difficulties very frequently when using HMIS software, 6(28.3%) respondents were experiencing technical difficulties somewhat frequently when using HMIS software, 12(46.2%) respondents were experiencing technical difficulties occasionally when using HMIS software, 14(41.2%) respondents rarely experienced technical difficulties when using HMIS software, zero respondents never experienced technical difficulties when using HMIS software at Kiswa HCIII. 1Two participants responses were missing since this variable wasn't among the responses on the interview questionnaire.

According to table 4.4.1 above, 4(57.1%) respondents very frequently faced hardware malfunctions while using HMIS, 11(64.7%) respondents somewhat frequently faced hardware malfunctions while using HMIS, 10(47.6%) respondents occasionally faced hardware malfunctions while using HMIS, 26(66.7%) respondents rarely faced hardware malfunctions while using HMIS, 4(66.7%) respondents never faced hardware malfunctions while using HMIS at Kisenyi HCIV whereas 3(42.9%) respondents very frequently faced hardware malfunctions while using HMIS, 6(35.3%) respondents somewhat frequently faced hardware malfunctions while using HMIS, 11(52.4%) respondents occasionally faced hardware malfunctions while using HMIS, 13(33.3%) respondents rarely faced hardware malfunctions while using HMIS, 2(33.3%) respondents never faced hardware malfunctions while using HMIS at Kiswa HCIII. On

the other hand, only 2 participants responses were missing since this variable wasn't among the responses on the interview questionnaire.

4.4.2 Speed and reliability of internet connectivity in your workplace

Figure 7(4.4.2) Speed and reliability of internet connectivity in your workplace

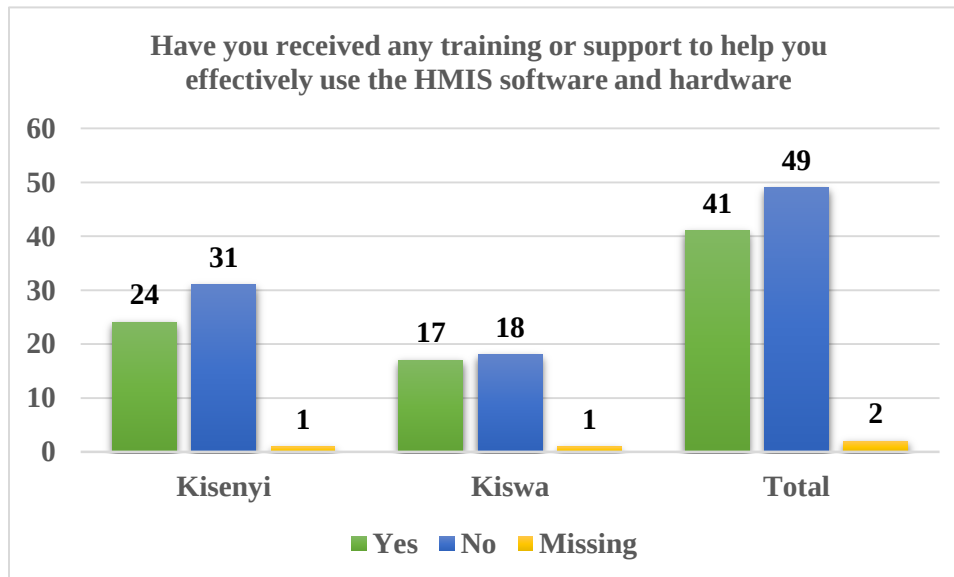


Source: Primary Data (2023)

The figure7 (4.4.2) above on rating the speed and reliability of internet connectivity in your workplace, 1(25%) respondents rated the speed and reliability of internet as very slow and unreliable, 13(72.2%) respondents rated it as slow and somewhat unreliable, 37(72.5%) respondents rated it as moderate speed and reliability, 4(26.7%) respondents rated it fast and very reliable, no respondents rated the speed and reliability of internet as extremely fast and reliable at Kisenyi HCIV. On the other hand, 3(75%) respondents rated the speed and reliability of internet as very slow and unreliable, 5(27.8%) respondents rated it as slow and somewhat unreliable, 14(27.5%) respondents rated it as moderate speed and reliability, 11(73.3%) respondents rated it fast and very reliable, 2(100%) respondents rated the speed and reliability of internet as extremely fast and reliable at Kiswa HI1I. Two participants responses were missing since this variable wasn't among the responses on the interview questionnaire.

4.4.3 Training or support to effectively use the HMIS software and hardware

Figure 8(4.4.3) Training or support to effectively use the HMIS software and hardware



Source: Primary Data (2023)

In regards to training or support to in effectively using the HMIS software and hardware figure 8 above, 24(58.5%) respondents received training or support to help them effectively use the HMIS software and 31(63.3%) respondents did not receive any training or support to help them effectively use the HMIS software at Kisenyi HCIV while on the other hand, 17(41.5%) respondents received training or support to help them effectively use the HMIS software and 18(36.7%) respondents did not receive any training or support to help them effectively use the HMIS software at Kiswa HCIII. On the other hand, only 2 participants responses were missing since this variable wasn't among the responses on the interview questionnaire.

4.4.4 Privacy, security and technical considerations

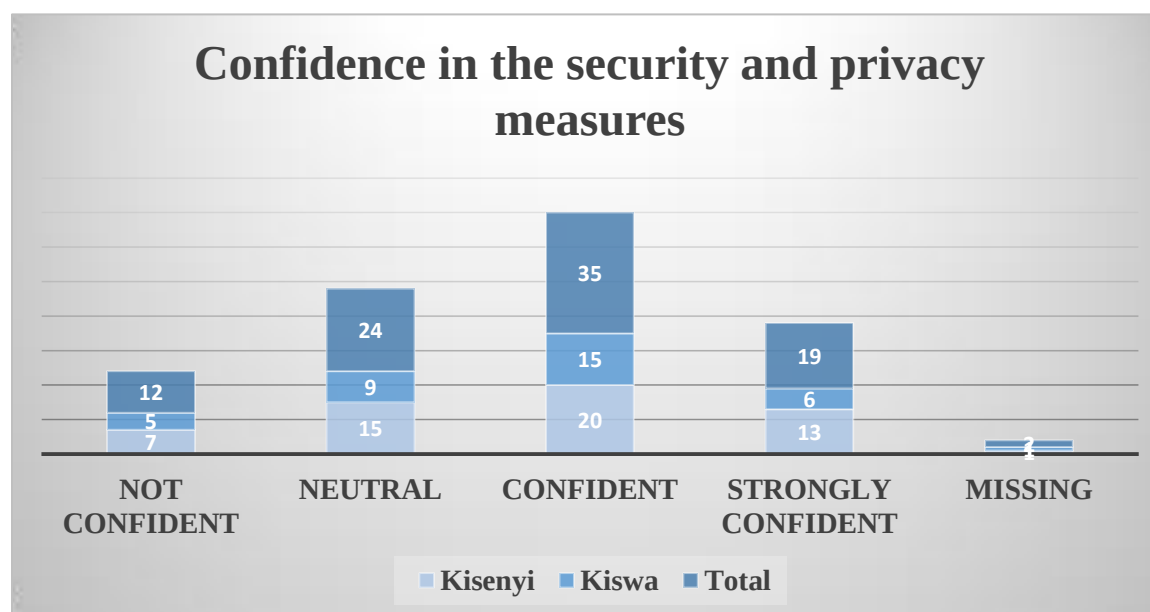
Table 12(4.4.4) Respondents' privacy, security and technical considerations

Privacy, Security and Technical Consideration				
		Facility name		
Variable	Categories	Kisenyi	Kiswa	Total
How frequently do you receive training or guidance on ethical considerations related to HMIS	Monthly	10 (41.7%)	14 (58.3%)	24
	Bimonthly	3 (100%)	0	3
	Quarterly	23 (63.9%)	13 (36.1%)	36
	Annually	14 (70%)	6 (30%)	20
	After two years	5 (71.4%)	2 (28.6%)	7
	Missing			2
On a scale of 1-5, how well do you think data ownership and sharing is currently handled in your organization's HMIS	Well	18 (66.7%)	9 (33.3%)	27
	Very well	24 (57.1%)	18 (42.9%)	42
	Neutral	12 (60%)	8 (40%)	20
	Not well	1 (100%)	0	1
	Missing			2

Source: Primary Data (2023)

In regards to Table 13(4.4.4) above, 10(41.7%) respondents received training or guidance on ethical considerations related to HMIS monthly, 3(100%) respondents received training or guidance on ethical considerations related to HMIS bimonthly, 23(63.9%) respondents received training or guidance on ethical considerations related to HMIS quarterly, 14(70%) respondents received training or guidance on ethical considerations related to HMIS annually, 5(71.4%) respondents received training or guidance on ethical considerations related to HMIS after two years at Kisenyi HCIV. On the other hand, 14(58.3%) respondents received training or guidance on ethical considerations related to HMIS monthly, no respondents received training or guidance on ethical considerations related to HMIS bimonthly, 13(36.1%) respondents received training or guidance on ethical considerations related to HMIS quarterly, 6(30%) respondents received training or guidance on ethical considerations related to HMIS annually, 2(28.6%) respondents received training or guidance on ethical considerations related to HMIS after two years at Kiswa HCIII. Two participants responses were missing since this variable wasn't among the responses on the interview questionnaire. 18 (66.7%) respondents thought data ownership and sharing is currently handled well, 24(57.1%) respondents thought data ownership and sharing is currently handled very well, 12(60%) respondents were neutral on the thought of data ownership and sharing currently handled, 1(100%) respondents thought data ownership and sharing currently isn't handled well at Kisenyi HCIV. On the other hand, 9(33.3%) respondents thought data ownership and sharing is currently handled well, 18(42.9%) respondents thought data ownership and sharing is currently handled very well, 8(40%) respondents were neutral on the thought of data ownership and sharing currently handled, and no respondents thought data ownership and sharing currently isn't handled well at Kiswa HCIII. Two participants responses were missing since this variable wasn't among the responses on the interview questionnaire.

Figure 9(4.4.4.1) Confidence in the security and privacy measures in place for the organization's HMIS



Source: Primary Data (2023)

The figure 9 (4.4.4.1) above shows the respondents' confidence in the security and privacy measures in place for the organization's HMIS as follows; 7(58.3%) respondents were not confident in the security and privacy measures in place, 15(62.5%) respondents were neutral on the security and privacy measures in place, 20(57.1%) respondents were confident in the security and privacy measures in place and 13(68.4%) respondents were strongly confident in the security and privacy measures in place at Kisenyi HCIV. On the other hand, 5(41.7%) respondents were not confident in the security and privacy measures in place, 9(37.5%) respondents were neutral on the security and privacy measures in place, 15(42.9%) respondents were confident in the security and privacy measures in place and 6(31.6%) respondents were strongly confident in the security and privacy measures in place at Kiswa HCIII. Two participants responses were missing since this variable wasn't among the responses on the interview questionnaire.

Table 14(4.4.4.2) Multiple responses under privacy, security and technical considerations

Ethical Considerations Frequencies				
		Responses		Percent of Cases
		N	Percent	
Ethical consideration in HMIS design	User friendly	16	18.4%	21.3%
	Accuracy of the HMIS	4	4.6%	5.3%
	Data privacy and confidentiality	51	58.6%	68.0%
	Use of trained personnel	12	13.8%	16.0%
	Informed consent	2	2.3%	2.7%
	Involving all stakeholders	2	2.3%	2.7%
Total		87	100.0%	116.0%
Data Privacy and Security Frequencies				
		Responses		Percent of Cases
		N	Percent	
Ensuring privacy data and security	Lock and key	30	25.2%	34.9%
	Cabins	4	3.4%	4.7%
	Use of password protected data entry accounts	70	58.8%	81.4%
	HMIS made more electronic	1	0.8%	1.2%
	Software update	1	0.8%	1.2%
	Regular data backups	5	4.2%	5.8%
	Training on data security	8	6.7%	9.3%
Total		119	100.0%	138.4%

Source: Primary Data (2023)

According to table 11(4.4.4.2) above, under the variable of in your opinion, what ethical considerations should be considered when designing, implementing, and using an HMIS 16(18.4%)multiple responses were given on HMIS should be user friendly, 4(4.6%)responses were given on accuracy of the HMIS, 51(58.6%)responses were given on data, privacy and confidentiality, 12(13.8%) responses were given on use of trained personnel, 2(2.3%)responses were given on informed consent, 2(2.3%)responses were given on involving all stakeholders by the participants on when designing, implementing and using HMIS. For the variable of what measures do you think should be put in place to ensure data privacy and security in HMIS, 30(25.2%) multiple responses were given on lock and key, 4(3.4%) responses were given on cabins, 70(58.8%) multiple responses were given on use of password protected data entry accounts, 1(0.8%) responses were given on HMIS made more electronic, 1(0.8%) responses were given on software update,5(4.2%)responses were given on regular data backups, 8(6.7%) responses were given towards training on data security as measures that should be put in place to ensure data privacy and security in HMIS at both Kisenyi HCIV and Kiswa HCIII.

4.4.5 Economic and political environment

Table 15(4.4.5) Respondents' economic and political environment findings

Economic and political environment				
Variable	Categories	Facility name		Total
		Kisenyi	Kiswa	
How has increased funding for HMIS in your organization improved patient care health outcomes	Improved patient follows up and turn up	15 (46.9%)	17 (53.1%)	32
	Enough HMIS tools and data capture devices	2 (50%)	2 (50%)	4
	Storage of patients' information/data recording	26 (76.5%)	8 (23.5%)	34
	Timely reporting	5 (71.4%)	2 (28.6%)	7
	Monitoring of patients	0	1 (100%)	1
	Missing			14
Have you encountered any challenges in complying with government policies related to HMIS? If so, can you describe them	Short data submission deadline into the HMIS	6 (100%)	0	6
	Excessive workload	4 (80%)	1 (20%)	5
	Lack of easy access to data	1 (50%)	1 (50%)	2
	Lack of training for use of new HMIS tools	2 (50%)	2 (50%)	4
	Limited funding	1 (50%)	1 (50%)	2
	Missing			73
	Missing			2
How frequently does your organization review and update its HMIS-related policies and procedures to stay current with changes in national policies or regulations	Once a month	5 (38.5%)	8 (61.5%)	13
	Daily	3 (33.3%)	6 (66.7%)	9
	Yearly	21 (91.3%)	2 (8.7%)	23
	Whenever necessary	9 (75%)	3 (25%)	12
	Every 4 years	1 (25%)	3 (75%)	4
	2-3 Months	6 (75%)	2 (25%)	8
	10 Years	3 (60%)	2 (40%)	5
	Rarely	0	1 (100%)	1
	Weekly	0	2 (100%)	2
	Missing			15

Source: Primary Data (2023)

In regards to Table 16(4.4.5) above, 15(46.9%) responded that increased funding for HMIS led to improved patient follow-up and turn up, 2(50%) responded that increased funding for HMIS led to enough HMIS tools and data capture devices, 26(76.5%) responded that increased funding for HMIS led storage of patient's information/data recording, 5(71.4%) responded that increased funding for HMIS led to timely reporting and no one responded on how increased funding for HMIS led to monitoring of patients at Kisenyi HCIV. On the other hand, 17(53.1%) responded that increased funding for HMIS led to improved patient follow-up and turn up, 2(50%)

responded that increased funding for HMIS led to enough HMIS tools and data capture devices, 8(23.5%) responded that increased funding for HMIS led storage of patient's information/data recording, 2(28.6%) responded that increased funding for HMIS led to timely reporting and one responded on how increased funding for HMIS led to monitoring of patients at Kiswa HCIII. 14 respondents didn't provide any answer to this variable at both Kisenyi HCIV and Kiswa HCIII.

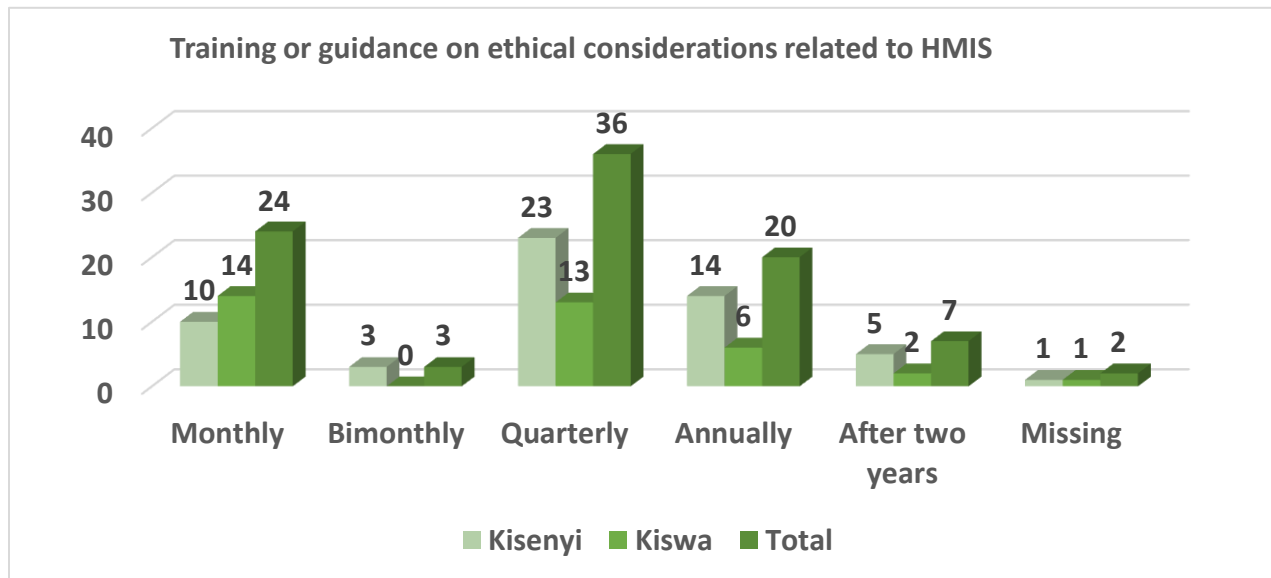
6(100%) respondents encountered a challenge of short data submission deadline into the HMIS, 4(80%) respondents encountered a challenge of excessive workload, 1(50%) respondents encountered a challenge of lack of easy access to data, 2(50%) respondents encountered a challenge of lack of training for use of new HMIS tools, 1(50%) respondents encountered a challenge of limited funding at Kisenyi HCIV. On the other hand, no respondent encountered any challenge in complying with government policies related to HMIS, 1(20%) respondents encountered a challenge of excessive workload, 1(50%) respondents encountered a challenge of lack of easy access to data, 2(50%) respondents encountered a challenge of lack of training for use of new HMIS tools and 1(50%) respondents encountered a challenge of limited funding at Kiswa HCIII and 73 respondents didn't provide answers for this variable, they left it blank from both facilities.

Still under Table 17(4.4.5) above, 5(38.5%) responded that review and update of HMIS related policies and procedures to stay current with changes in national policies was done once a month, 3(33.3%) responded that review and update of HMIS related policies and procedures to stay current with changes in national policies was done daily, 21(91.3%) responded that review and update of HMIS related policies and procedures to stay current with changes in national policies was done yearly, 9(75%) responded that review and update of HMIS related policies and procedures to stay current with changes in national policies was done whenever necessary, 1(25%) responded that review and update of HMIS related policies and procedures to stay current with changes in national policies was done every four years, 6(75%) responded that review and update of HMIS related policies and procedures to stay current with changes in national policies was done every 2-3 months, 3(60%) responded that review and update of HMIS related policies and procedures to stay current with changes in national policies was done every 10 years, zero responded that review and update of HMIS related policies and procedures to stay current with changes in national policies was rarely and weekly done at Kisenyi HCIV. On the

other hand, 8(61.5%) responded that review and update of HMIS related policies and procedures to stay current with changes in national policies was done once a month, 6(66.7%) responded that review and update of HMIS related policies and procedures to stay current with changes in national policies was done daily, 2(8.7%) responded that review and update of HMIS related policies and procedures to stay current with changes in national policies was done yearly, 3(25%) responded that review and update of HMIS related policies and procedures to stay current with changes in national policies was done whenever necessary, 3(75%) responded that review and update of HMIS related policies and procedures to stay current with changes in national policies was done every four years, 2(25%) responded that review and update of HMIS related policies and procedures to stay current with changes in national policies was done every 2-3 months, 2(40%) responded that review and update of HMIS related policies and procedures to stay current with changes in national policies was done every 10 years, 1(100%) responded that review and update of HMIS related policies and procedures to stay current with changes in national policies was rarely done and 2(100%) responded that review and update of HMIS related policies and procedures to stay current with changes in national policies was weekly done at Kisumu HCIII and 15 participants were missing because they didn't respond to this variable that is they left it empty.

4.4.6 Receiving training or guidance on ethical considerations related to HMIS

Figure 10(4.4.6) Frequency of receiving training or guidance on ethical considerations related to HMIS



Source: Primary Data (2023)

Based on the above figure10 (4.4.6), a total of 24 respondents received training monthly on ethical considerations related to HMIS, 6 respondents received training bi-monthly on ethical considerations related to HMIS, a total of 36 respondents received training quarterly on ethical considerations related to HMIS, 20 respondents received training annually on ethical considerations related to HMIS, and 7 respondents received training after two years on ethical considerations related to HMIS at Kisenyi HCIV and Kiswa HC111. Two respondents were missing because this variable wasn't on the interview questionnaire.

4.4.7 Funding challenges associated with HMIS

Table 18(4.4.7) Funding challenges associated with HMIS

Funding challenges Frequencies				
		Responses		Percent of Cases
		N	Percent	
Challenges due to limited funding	Poor data record keeping	25	24.3%	30.9%
	Unreliable internet connectivity	17	16.5%	21.0%
	Inadequate training and capacity building	8	7.8%	9.9%
	Stockout of HMIS Tools	29	28.2%	35.8%
	Much workload	12	11.7%	14.8%
	Limited storage space for HMIS tools	1	1.0%	1.2%
	Late reporting	9	8.7%	11.1%
	Shortage of power	2	1.9%	2.5%
Total		103	100.0%	127.2%

Source: Primary Data (2023)

From table 13(4.4.7) above, the variable of can you describe any specific challenges your organization has faced due to insufficient funding for the HMIS, 25(24.3%) multiple responses were given on poor data record keeping, 17(16.5%) multiple responses were given on unreliable internet connectivity, 8(7.8%) responses were given on inadequate training and capacity building, 29(28.2%) responses were given on stock out of HMIS tools, 12(11.7%) responses were given on much workload, 1(1.0%) responses were given on limited storage space for HMIS tools, 9(8.7%) responses were given on late reporting, 2(1.9%) responses were given on shortage of power as challenges the organizations faced due to insufficient funding for the HMIS.

4.4.8 Receiving training or guidance on ethical considerations related to HMIS

Table 19(4.4.8) In charge interview questionnaire findings

In-charge Responses				
		Facility name		
Variable	Categories	Kis eny i	Ki sw a	T ot al
On a scale of 1-5, how would you rate your knowledge and understanding of the Health Management Information System	Very knowledgeable	1	1	2
What specific skills do you possess that are relevant to effectively utilizing the HMIS	Data management	0	1	1
	Computer skills	1	0	1

In-charge Responses				
		Facility name		
Variable	Categories	Kis eny i	Ki sw a	T ot al
Can you describe any training or educational programs you have participated in to enhance your HMIS-related knowledge and skills	DHIS2 Use workshop	0	1	1
	Microsoft excel	1	0	1
How do you perceive the importance and relevance of using the HMIS in your day-to-day work	Informed decision making	0	1	1
	Data safety	1	0	1
What are your views on the usability and user-friendliness of the HMIS	User friendly	0	1	1
	Continuous training	1	0	1
In what ways does attitude and perception of HMIS usage among health workers affects the accuracy and completeness of data captured in the system	Too much workload that affects accuracy	0	1	1
	Time consuming	1	0	1
From your perspective, what are the main benefits or advantages of using the HMIS in your work	Provides reliable data	0	1	1
	Easy decision making	1	0	1
Have you observed any improvements or positive outcomes resulting from the utilization of the HMIS in	Easy to track performance	1	0	1

In-charge Responses				
		Facility name		
Variable	Categories	Kis eny i	Ki sw a	T ot al
your healthcare facility	Easy reporting	0	1	1
On a scale of 1-5 how would you rate the reliability and availability of internet connectivity in your healthcare facility	Available and reliable	1	1	2
Can you identify any challenges or issues related to internet connectivity that affect your ability to use the HMIS effectively	Slow internet	1	1	2
How does power supply impact your ability to enter and manage data in the HMIS	Stable power supply	1	1	2
Are there any limitations or deficiencies in the hardware equipment that hinder your ability to input and access data	None	0	1	1
	Slow processing speed	1	0	1
How would you describe the performance and functionality of the HMIS software used in your healthcare facility	Reliable with reliable power supply	1	1	2
Have you observed any instances where economic or political factors have affected the accuracy or completeness of data entered into the HMIS	Much workload	1	1	2

In-charge Responses				
		Facility name		
Variable	Categories	Kis eny i	Ki sw a	T ot al
How does the economic environment, such as budget constraints or resource limitations, impact the quality of data captured in the HMIS	Limited hiring funds	1	1	2
Are there any political factors or changes in policies that have influenced the utilization and effectiveness of the HMIS	Mandatory requirement by MOH to use HMIS	0	1	1
	Policy changes	1	0	1
Can you describe any security measures in place to protect the confidentiality and integrity of HMIS data	Use of passwords	1	1	2
Are there any perceived barriers or challenges that hinder your use of the HMIS effectively	Unfriendly user interface		1	1
	Much workload	1		1
	Lack of data validation rules		1	1
	Power and internet instability	1		1

In-charge Responses				
		Facility name		
Variable	Categories	Kis eny i	Ki sw a	T ot al
Are there any specific features or functionalities of the HMIS that you find particularly useful or valuable	Data Validation		1	1
	Data visualization	1	1	2
	Pivot tables	1		1
What type of hardware devices are available for data entry and management within the HMIS in your healthcare facility	Computers and laptops	1	1	2
	Tablets		1	1
Mention any two HMIS electronic systems you know of	DHIS2	1	1	2
	KP-Tracker		1	1
	Uganda EMR	1		

Source: Primary Data (2023)

Number 1 represents a count of response from each in-charge of a particular Health facility in regards to the question asked.

Number 2 is the sum of responses for variables where both in-charges responded yes to that particular variable.

According to table (4.4.8) above, on the variable of how would you rate your knowledge and understanding of the Health Management Information System. Both respondents rated

themselves as very knowledgeable of the HMIS. For the variable of what specific skills do you possess that are relevant to effectively utilizing the HMIS, the respondent from Kiswa HCIII had data management skills whereas the respondent from Kisenyi HCIV had computer skills that are relevant to effectively utilize the HMIS. For the variable of Can you describe any training or educational programs you have participated in to enhance your HMIS-related knowledge and skills, the respondent from Kiswa HCIII had participated in a DHIS2 use workshop training whereas on the other hand the respondent from Kisenyi HCIV, had participated in a Microsoft excel training to enhance HMIS. For the variable of how do you perceive the importance and relevance of using the HMIS in your day-to-day work, the respondent from Kiswa HCIII perceived the importance and relevance of HMIS as a system that helped to make informed decisions whereas the respondent from Kisenyi HCIV perceived the importance and relevance of HMIS as a system that helped in data safety. For the variable of what are your views on the usability and user-friendliness of the HMIS, the respondent of Kiswa HCIII viewed it as user friendly whereas the respondent of Kisenyi HCIV viewed it as a system that needs continuous training. For the variable of in what ways does attitude and perception of HMIS usage among health workers affect the accuracy and completeness of data captured in the system, the respondent of Kiswa HCIII responded that there is too much workload that affects accuracy and completeness while on the other hand, the respondent from Kisenyi HCIV said its time consuming hence affecting accuracy and completeness of data captured in the system. For the variable of from your perspective, what are the main benefits or advantages of using the HMIS in your work, the in-charge of Kiswa HCIII responded that it provides reliable data while for the in-charge of Kisenyi HCIV responded that the benefit of using HMIS in his work was it made decision making easy. For the variable of have you observed any improvements or positive outcomes resulting from the utilization of the HMIS in your healthcare facility, the in-charge of Kisenyi HCIV responded that he observed easy tracking of performance as one of the positive outcomes resulting from the utilization of the HMIS whereas for Kiswa HCIII the in-charge responded that she observed reporting made easier as one of the positive outcomes resulting from the utilization of the HMIS. For the variable of how you would rate the reliability and availability of internet connectivity in your healthcare facility, both in-charges rated that the reliability and availability of internet connectivity at both Kiswa HCIII and Kisenyi HCIV as available and reliable. For the variable of can you identify any challenges or issues related to

internet connectivity that affect your ability to use the HMIS effectively, both in-charges responded there was slow internet. For the variable of how power supply impacts your ability to enter and manage data in the HMIS, both in-charges responded that there is a stable power supply at Kiswa HCIII and Kisenyi HCIV. For the variable of there are any limitations or deficiencies in the hardware equipment that hinder your ability to input and access data, the in charge of Kiswa HCIII had a response of none whereas the in charge of Kisenyi HCIV had a response of slow processing speed as a deficiency in the hardware equipment that hinder their ability to input and access data. For the variable of how would you describe the performance and functionality of the HMIS software used in your healthcare facility, both in charges responded that there is reliable power supply at their facilities. For the variable of have you observed any instances where economic or political factors have affected the accuracy or completeness of data entered into the HMIS, both in charges observed much workload as one of the instances which affected the accuracy and completeness of data entered into the HMIS. For the variable of how does the economic environment, such as budget constraints or resource limitations, impact the quality of data captured in the HMIS, both in charges responded that there were limited funds for hiring hence leading to workload at Kiswa HCIII and Kisenyi HCIV. For the variable of are there any political factors or changes in policies that have influenced the utilization and effectiveness of the HMIS, the in charge of Kisenyi HCIV responded that the mandatory requirement by Ministry of Health to use HMIS while for the in charge of Kiswa HCIII the in charge responded that there are policy changes.

For the variable of can you describe any security measures in place to protect the confidentiality and integrity of HMIS data, both in charges responded that they used passwords at their health centres. For the variable of are there any perceived barriers or challenges that hinder your use of the HMIS effectively, the in charge of Kiswa HCIII responded with a challenge of unfriendly user interface and lack of validation rules whereas on the other hand, the in charge of Kisenyi HCIV faced challenges of much workload, power and internet instability. For the variable of are there any specific features or functionalities of the HMIS that you find particularly useful or valuable, the in charge of Kiswa HCIII responded that she found features of data validation and data visualization while the in charge of Kisenyi HCIV responded that he found features of data visualization and pivot tables particularly useful.

For the variable of what type of hardware devices are available for data entry and management within the HMIS in your healthcare facility, both in charges responded that there are available computers for data entry and management. For the variable of mention any two HMIS electronic systems you know of, the in charge of Kiswa HCIII responded that she knows DHIS2 and KP Tracker whereas the in charge of Kisenyi HCIV responded that he knows DHIS2 and UgandaEMR electronic systems.

CHAPTER FIVE

DISCUSSION, SUMMARY, CONCLUSION AND RECCOMEDATION

5.0Introduction

In this chapter, a brief examination of the findings is presented in comparison and contrast with findings from other studies are incorporated to enrich the contextual understanding of the results.

It also gives the conclusion and recommendations of the study

5.1 Discussion

Demographics

This study investigated the determinants of health management information systems data among health workers at Kiswa Health Centre III and Kisenyi Health Centre IV in Kampala. Demographic characteristics of the health workers were examined to gain a comprehensive understanding of the respondents. The majority of respondents from both health centres belonged to the age range of 23-27 years, indicating a predominantly youthful workforce. Additionally, a significant proportion of the workers in both instances held bachelor's degrees and had accumulated 1-5 years of experience at their respective facilities. The study delved into both internal and external factors known to influence health management information system indicators.

In the domain of knowledge and skills pertaining to system utilisation, encompassing factors such as system familiarity, training, expertise level, frequency of usage, confidence in system usage, and technical proficiency, Kisenyi demonstrated a higher prevalence of individuals who were well-acquainted with the system compared to Kiswa Heath Centre. Upon internal analysis within each health centre, a majority of individuals exhibited familiarity with the system, albeit with a few exceptions. Notably, despite engaging with the system on a daily basis, most health workers tended to categorise themselves as competent rather than experts, as shown in Table 5. Surprisingly, this self-assessment did not align with the observed high confidence levels in the effective use of the system across both health centres. These findings suggest that, while health

workers possess essential knowledge, there exists a discernible gap necessitating on-the-job learning for the acquisition of expert and advanced proficiency. This parallels a study in health information technology workforce evaluation, wherein individuals demonstrated competence in system usage but acknowledged the imperative of cultivating a workforce with a spectrum of skills ranging from fundamental to advanced levels (Fenton, Gongora-Ferraez, & Joost, 2012).

From a technical standpoint, the majority of health workers exhibited a higher degree of familiarity with data analysis and database management, ranking as the second most prevalent skill set in each health centre, as shown in figure 6. Conversely, proficiency in software programming was notably scarce among the surveyed health workers. Furthermore, despite the availability of electronic options for data compilation, manual methods continued to be widely employed. This pattern bears resemblance to the findings of Maryam et al., who identified several factors impeding the comprehensive adoption of electronic systems. Among these factors were the absence of a suitable data entry format, ineffective services for data retrieval and editing, and a shortage of expert staff to provide support and maintain the system (Maryam Jahanbakhsh, 2011)

The adoption of electronic health recording and its associated systems is deemed inevitable. Nevertheless, the implementation of these systems introduces a socio technical change, fundamentally altering the methods and processes employed in the workplace (Beasley, Holden, & Sullivan, 2011). While healthcare systems are influenced by numerous components that contribute to the effectiveness of their interventions, there is a global consensus among both national and international entities that electronic records could significantly enhance the quality of healthcare (Uslu & Stausberg, 2021). Our study aligns with these observations, as the majority of health workers in various health centres acknowledge the significance of employing health information systems. These systems are recognised for their capacity to enhance healthcare service delivery (Table 8). Furthermore, our research findings reveal that health workers utilise these systems daily to facilitate decision-making across multiple levels within their health system. Moreover, they concur that Health Management Information Systems aid in enhancing their understanding of the health status of patients. Additionally, there is a strong inclination among health workers to recommend the usage of the system.

According to a study by Kenya Ministry of Health (MOH, 2014), Health information system policy, Kenya 2012 – 2030 identified various weaknesses that exist in current information systems that include inadequate capacities of Health Information System staff, unskilled personnel handling data and many parallel data collection systems amongst others. Overall, the current Health Information System provided limited information for monitoring health goals and empowering communities and individuals with timely and understandable information on health. The current study also mentions poor record keeping and Inadequate training and capacity building as challenges affecting challenges faced by the organization due to insufficient funding for the HMIS.

The presence and accessibility of reliable basic infrastructure, notably electricity, play a pivotal role in enhancing health systems. Similar to the challenges faced by many developing nations, power shortages have historically impeded the seamless functioning of health facilities. Nevertheless, the evolving landscape, marked by increased electrification and development, as observed in Brazil, has brought about positive changes (Lipscomb, Mobarak, & Barham, 2013). In the context of Uganda, a similar positive trend has been observed, with the respondents reporting a high level of reliability in power supply in both healthcare facilities.

Internet reliability demonstrated a moderate level for both healthcare facilities. This observation is consistent with the prevailing circumstances in Uganda, where access to fast and dependable internet is costly. It is acknowledged that reliable and fast internet connectivity is pivotal in enhancing health facilitation and accessibility for both healthcare workers and patients (Yu & Meng, 2022). However, the moderately reliable internet experience in this context hampers the seamless execution of work. Our data indicate that internet connectivity issues have, on occasion, impacted the submission or access of data by health workers, despite the Health Management Information System being predominantly user-friendly and hardware malfunctions being infrequent. Notably, the absence of fast, reliable internet is compounded by a lack of pertinent training and technical support necessary for a substantial proportion of health workers.

While Kisenyi has experienced an overall enhancement in patient information storage and data recording attributed to increased HMIS funding, Kisumu has observed improvements in patient follow-up and attendance. Nevertheless, health workers at Kisenyi faced challenges with short

data submission deadlines, which appeared to be a policy impediment. It is crucial to recognise that short data submission deadlines may be an intentional strategy by administrators and policymakers to ensure the provision of sound, reliable, and timely information, facilitating effective decision-making, implementation, and governance. Policymaking is an iterative process, evolving as new data emerges through comparisons and problem identification. To execute policies effectively, it is imperative that all stakeholders, including on-the-ground data managers, administrators, and policymakers, possess a comprehensive understanding of the underlying principles. This knowledge ensures proper adherence to policies and established systems. Policymaking should transcend mere wishful statements and be informed by a collective understanding of the values guiding the course of action (Chauhan, U. S, & Singh, 2021).

As expected, financial constraints consistently pose challenges to the implementation of HMIS within the health sector. The impact of limited funding was particularly noticeable in two key areas: the occurrence of stockouts of HMIS tools and deficiencies in data record-keeping, as outlined in table 14. The perpetual constraint of funding tends to hinder the establishment of robust, long-term systems, especially when governing bodies lack a comprehensive, long-term perspective on these extensive projects. In situations where competing government priorities demand attention, it becomes essential to consider the adoption of a performance-based funding system. This approach aims to concentrate resources on proven effective strategies, mitigating the challenges posed by financial limitations and ensuring the optimal functioning of the HMIS (AbouZahr & Boerma, 2005).

Health workers from both health centres were confident about the security and privacy of the data handled by HMIS mainly due to the usage of password-protected accounts that represented 70% of the measures taken. In addition, most health workers were confident that the data ownership and handling is done very well. Privacy is an issue that can be contextually viewed in terms of information flow and the actors that are involved. Failure to adhere to contextual views leads to violation of privacy, leading to leakage of patient data, which can lead to consequential concerns such as discrimination due to the knowledge of one's health status or deontological concerns that pertain more to ethical concerns where one loses control of their data through invasion of a third party (Price & Cohen, 2019). Although training or guidance on ethical

considerations is mainly done quarterly for Kisenyi, whereas monthly for Kiswa, there is a need to have national data privacy and protection for the Ugandan context, just like in Nigeria where the Nigerian Data Protection Regulation was put in place in addition to the General Data Protection Regulation from the European Union which is generally followed (Alafaa, 2022).

Some measures could be taken to ensure privacy, such as anti-tracking extensions, advertisement/script blockers and encryption tools. By using these tools, one can effectively limit the access to sensitive data Xu, L., Jiang, C., Wang, J., Yuan, J., & Ren, Y. (2014). In comparison, the current study mentions lock and key cabins, use of password protected data entry accounts, HMIS made more electronic, software update and training on data security as similar means for ensuring data privacy and security.

5.2 Conclusion

In conclusion, this study explored the determinants of health management information system (HMIS) data among health workers in Kiswa Health Centre III and Kisenyi Health Centre IV, Kampala. Demographically, most respondents were within the age range of 23-27 years, reflecting a youthful workforce with a significant number holding bachelor's degrees and 1-5 years of experience at their respective facilities. The investigation into assessing the skills and knowledge of health workers involved in HMIS usage revealed a relatively high prevalence of familiarity with the system, albeit with a gap in achieving expert proficiency. Despite daily usage, health workers tended to categorise themselves as competent rather than experts, highlighting a need for on-the-job learning. Regarding challenges in the technological infrastructure that hinder effective utilization of HMIS, reliable infrastructure, particularly electricity, played a pivotal role, and both health facilities reported high reliability in power supply. However, internet reliability was moderately reliable, impacting data submission and access for health workers. Policy-wise, short data submission deadlines were observed, possibly serving as a strategy for ensuring timely information for decision-making. Financial constraints consistently posed challenges, emphasising the need for a performance-based funding system to optimise HMIS functionality.

It was further discovered that there was a likelihood of a relationship between individual characteristics like level of education, professional training of the respondent and the period

spent at the facility by the respondent and the use of the HMIS to support decision making. However, there was no relationship between HMIS use and the familiarity of the functionalities of the HMIS

The study also addressed data security and privacy concerns, with confidence in password-protected accounts, but underscored the need for national data privacy regulations.

5.3 Recommendations

Based on the analysis and findings of the study conducted at Kisenyi HCIV and Kiswa HCIII, the following recommendations emerged:

- Offer comprehensive training programs aimed at enhancing health workers' proficiency in data collection, analysis, and utilization through effective supportive supervision and feedback. This initiative aims to boost the skills and knowledge of health workers in utilizing the HMIS.
- Implement motivational strategies for health workers, fostering a sense of accountability and commitment. This approach aims to encourage the production of high-quality data and information for evidence-based decision-making.
- Ensure the provision of adequate equipment for HMIS such as tools used in data collection, storage, and analysis. This step is crucial to obtaining high-quality data, supporting accurate analysis and informed decision-making.
- Allocate sufficient funds to the HMIS section to streamline data processing activities, including effective support supervision. This financial support aims to enhance the overall quality of data generated and utilized within the healthcare system.

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APPENDIX

APPENDIX I: Respondent's Consent Form

Title of Study

Assessing determinants of health management information system (HMIS) data among health workers in Kiswa Health Centre III and Kisenyi Health Centre IV, Kampala.

Investigator/institution identity

Nanyonjo Martha

Tel: +256 775 588298

Email: marthapamtree@gmail.com

Faculty of Agriculture, MSc in Monitoring and Evaluation at Uganda Martyrs University.

Rationale of study

The study provides information that was used to help district stakeholders and the Ministry of health as well as other partners to develop appropriate interventions that can support and maintain quality information system that will be able to improve health outcome and achieve universal health for all.

Study Procedures

You are being asked to participate in this study, as you are a health worker who is handling data at the health facility and we believe your participation can help us develop appropriate interventions that can improve the health information management system such as improved health outcome of the community.

If you take part in this study, you will be asked to:

- Take part in a one-time, one-on-one, semi-structured interview.

- The interview will take approximately half an hour.
- The interview will take place at a location most convenient to you as the participant.

Benefits

There may be no direct benefits associated with your participation in the study, but the information you will provide will be useful in planning and organizing health information management system strategies in improving health outcome of the community.

Risks or Discomfort

This research is considered to be of minimal risk. That means that the risks associated with this study are the same as what you face every day. There are no known additional risks to those who take part in this study.

Privacy and Confidentiality

We will keep your study records private and confidential. Certain people may need to see your study records. By law, anyone who looks at your records must keep them completely confidential. The only people who will be allowed to see these records are:

The research team, including the Principal Investigator and those involved with the study.

I may publish what I have learnt from this study. If I do, I will not include your name will not publish anything that would let people know who you are.

Voluntary Participation / Withdrawal

You should only take part in this study if you want to volunteer. You should not feel that there is any pressure to take part in the study. You are free to participate in this research or withdraw at any time.

There will be no penalty or loss of benefits you are entitled to receive if you stop taking part in this study.

You can get the answers to your questions, concerns, or complaints

If you have any questions, concerns or complaints about this study contact the researcher, Nanyonjo Martha Pamela, on +256 775 588298 or email: marthapamtree@gmail.com

If you have questions about your rights as a participant in this study, general questions, or have complaints, concerns or issues you want to discuss with someone outside the research, call the supervisor Dr Byabasaija Syliver on 0781989949 or email: sbyabasaija@umu.ac.ug respectively.

Assessment of understanding

Please check which box best describes your assessment of understanding of the above informed consent document:

- ☐ I have read the above informed consent document and understand the information provided to me regarding participation in the study and benefits and risks. I give consent to take part in the study and will sign the following page.
- ☐ I have read the above informed consent document, but still have questions about the study; therefore, I do not give yet give my full consent to take part in the study.

Signature of Person Taking Part in Study Date

.....

Signature of Person Obtaining Informed Consent / Research Authorization Date

.....

APPENDIX II: Respondent's Self-administered Questionnaire

Research Questionnaire to Assessing determinants of health management information system (HMIS) data among health workers in Kiswa Health Centre III and Kisenyi Health Centre IV, Kampala.

Section A: Respondent's demographic characteristics [tick any one that applies]

1. Respondent's gender? Male [1] Female [2]

2. What is your age?

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

3. What is your level of education?

Ordinary certificate [1], Diploma [2], Degree [3], Postgraduate [4], others [5]

4. What is your professional training?

[a] Mid wife [b] Data Clerk [c] Data officer [d] Clinician [e] Medical officer [f] Peer

[g] Laboratory technician [h] Counsellor

5. What period have you spent on the current position? (Years)

>1 year [a], 1-5 year [b], 6-10 years [c], 11+ years [d]

Section B: Internal factors

Knowledge and Skills

6. How familiar are you with the functionalities of the HMIS?

[a]Very familiar [b] Somewhat familiar [c]Not familiar

7. Have you received training on how to use the HMIS?

[a]Yes [b]No

8. How would you rate your level of expertise in using the HMIS?

[a]Expert [b] Competent [c]Novice [d]Not familiar

9. How often do you use the HMIS in your work?

[a]Daily [b]Weekly [c]Monthly [d]Rarely

10. How confident are you in your ability to use the HMIS effectively?

[a]Very confident [b] Somewhat confident [c]Not confident

11. What technical skills do you possess that you feel are necessary to effectively use the HMIS?

[a]Database management [b]Data analysis [c]Software programming [d]None of the above

12. How do you compile this data?

[a] Electronically [b]Manually (use of Tools/Registers) [c]Both

13. When do you submit your HMIS 105 report to the division?

[a]Within First week of the month [b]2-3 weeks into the month [c]more than 3 weeks

Perception of HMIS Usage

14. How do you perceive the usability of the HMIS? [a]Very easy to use [b]Somewhat easy to use [c]Neutral [d]Somewhat difficult to use

[e]Very difficult to use

15. How often do you use the HMIS to support decision-making at different levels of the health system?

[a]Daily [b] Weekly [c]Monthly [d]Rarely

16. How has the HMIS contributed to improving healthcare service delivery in your facility? [a]Significantly [b]Somewhat [c]Not significantly

17. What changes would you suggest to improve the usability and effectiveness of the HMIS?

.....

Perceived usefulness

18. On a scale of 1-5, how strongly do you agree with the statement: "Using the HMIS improves my work efficiency"?

[a]Strongly disagree [b]Disagree [c]Neutral [d]Agree [e]Strongly agree

19. On a scale of 1-5, how strongly do you agree with the statement: "The HMIS provides me with valuable information to make informed decisions"?

[a]Strongly disagree [b]Disagree [c]Neutral [d]Agree [e]Strongly agree

20. On a scale of 1-5, how strongly do you agree with the statement: "The HMIS helps me to better understand my patients' health status"?

[a]Strongly disagree [b]Disagree [c]Neutral [d]Agree [e]Strongly agree

21. On a scale of 1-5, how strongly do you agree with the statement: "The HMIS has improved the quality of healthcare provided to patients"?

[a]Strongly disagree [b]Disagree [c]Neutral [d]Agree [e]Strongly agree

22. On a scale of 1-5, how likely are you to recommend the use of the HMIS to a colleague in the healthcare industry?

[a]Very unlikely [b]Unlikely [c]Neutral [d]Likely [e]Very likely

Section C: External factors

Internet and power supply

23. On a scale of 1-5, how would you rate the reliability of power supply in your workplace?

1 - Not at all reliable,

2 - Slightly reliable

3 - Moderately reliable

4 - Very reliable

5 - Extremely reliable

24. On a scale of 1-5, how would you rate the speed and reliability of internet connectivity in your workplace?

1 - Very slow and unreliable

2 - Slow and somewhat unreliable

3 - Moderate speed and reliability

4 - Fast and very reliable

5 - Extremely fast and reliable

25. How often do internet connectivity issues prevent you from submitting or accessing data using the HMIS?

[a]Rarely

[b]Sometimes

[c]Often

[d]Very often

Hardware and Software

26. On a scale of 1-5, how user-friendly do you find the HMIS software?

1 - Not user-friendly at all

2 - Somewhat user-friendly

3 - Moderately user-friendly

4 - Very user-friendly

5 - Extremely user-friendly

27. On a scale of 1-5, how often do you experience technical difficulties when using the HMIS software?

1 - Very frequently

2 - Somewhat frequently

3 - Occasionally

4 - Rarely

5 – Never

28. On a scale of 1-5, how often do hardware malfunctions occur when using the HMIS?

1 - Very frequently

2 - Somewhat frequently

3 - Occasionally

4 - Rarely

5 - Never

29. Have you received any training or support to help you effectively use the HMIS software and hardware?

[a]Yes

[b]No

Economic and Political environment

30. Can you describe any specific challenges your organization has faced due to insufficient funding for the HMIS?

.....

31. How has increased funding for HMIS in your organization improved patient care health outcomes?

.....

32. Have you encountered any challenges in complying with government policies related to HMIS? If so, can you describe them?

.....

33. In your opinion, what are the most important policies that need to be in place to ensure the successful implementation and operation of an HMIS?

.....

34. How frequently does your organization review and update its HMIS-related policies and procedures to stay current with changes in national policies or regulations?

.....

Privacy, security, and ethical considerations

35. In your opinion, what ethical considerations should be considered when designing, implementing, and using an HMIS?

.....

36. How frequently do you receive training or guidance on ethical considerations related to HMIS?

[a] Monthly

[b] Bimonthly

[c] Quarterly

[d] Annually

[e] After two years

37. What measures do you think should be put in place to ensure data privacy and security in HMIS?

.....

38. On a scale of 1-5, how confident are you in the security and privacy measures in place for your organization's HMIS?

[a] Not strongly confident

[b] Not confident

[c] Neutral

[d] Confident

[e] Strongly confident

39. On a scale of 1-5, how well do you think data ownership and sharing is currently handled in your organization's HMIS?

[a] Well

[b] Very well

[c] Neutral

[d] Not well

[e] Not very well

End

Thank you for the valuable time.

APPENDIX III: Interview Questionnaire

Section A: Internal factors

Knowledge and Skills

1. On a scale of 1-5, how would you rate your knowledge and understanding of the Health Management Information System?
[a] Extremely knowledgeable
[b] Very knowledgeable
[c] Moderately knowledgeable
[d] Slightly knowledgeable
[e] Not at all knowledgeable
2. What specific skills do you possess that are relevant to effectively utilizing the HMIS?
.....
3. Can you describe any training or educational programs you have participated in to enhance your HMIS-related knowledge and skills?
.....

Perception of HMIS Usage

4. How do you perceive the importance and relevance of using the HMIS in your day-to-day work?
.....
5. What are your views on the usability and user-friendliness of the HMIS?
.....
6. Are there any perceived barriers or challenges that hinder your use of the HMIS effectively?
.....
7. In what ways does attitude and perception of HMIS usage among health workers affects the accuracy and completeness of data captured in the system?
.....

Perceived Usefulness

8. From your perspective, what are the main benefits or advantages of using the HMIS in your work?
.....
9. Are there any specific features or functionalities of the HMIS that you find particularly useful or valuable?
.....
10. Have you observed any improvements or positive outcomes resulting from the utilization of the HMIS in your healthcare facility?
.....

Section B: External factors

Internet and Power Supply

11. On a scale of 1-5 how would you rate the reliability and availability of internet connectivity in your healthcare facility?
[a] Available and very reliable
[b] Available and reliable
[c] Available and unreliable
[d] Slightly available and reliable
[e] None of the above
12. Can you identify any challenges or issues related to internet connectivity that affect your ability to use the HMIS effectively?
.....
13. How does power supply impact your ability to enter and manage data in the HMIS?
.....

Hardware and Software

14. What type of hardware devices are available for data entry and management within the HMIS in your healthcare facility?
.....
15. Are there any limitations or deficiencies in the hardware equipment that hinder your ability to input and access data?
.....
16. Mention any two HMIS electronic systems you know of?
.....
17. How would you describe the performance and functionality of the HMIS software used in your healthcare facility?
.....

Economic and Political Environment

18. Have you observed any instances where economic or political factors have affected the accuracy or completeness of data entered into the HMIS?
.....
19. How does the economic environment, such as budget constraints or resource limitations, impact the quality of data captured in the HMIS?
.....
20. Are there any political factors or changes in policies that have influenced the utilization and effectiveness of the HMIS?
.....

Privacy, Security, and Ethical Considerations

21. Can you describe any security measures in place to protect the confidentiality and integrity of HMIS data?
.....
22. How important do you consider privacy and confidentiality when working with HMIS data?

.....
23. Have you encountered any ethical dilemmas or concerns when working with HMIS data?
If so, can you provide examples?
.....

End

Thank you for the valuable time

APPENDIX IV: Work Plan

Activity	Period	Input	Output	Responsible person
Identifying research topic and presentation	November-December 2020	Text books, Internet, computer.	Research topic approved	Researcher
Writing research proposal	January-Feb, 2023	Internet, journals, Reports, text books.		Researcher
Pretesting Research topics making adjustments.	March, 2023	Research tools.	Approved research Proposal	Researcher
Training of three research Assistants	March, 2023	Research tools		Researcher
Pre-testing of data tools	March, 2023	Research tools, stationaries, transport, and snacks		Researcher and research assistants
Data collection exercise	March-April, 2023	Research tools, stationeries, transport, and snacks		Researcher and Research assistants.
Data cleaning and analysis.	April, 2023	Stationary computer, Calculator		Researcher
Writing Report	May, 2023	Stationary, Computer		Researcher
Presenting Report to supervisor	May, 2023	Comments, corrections		Researcher And supervisor
Defending of research Report	May, 2023		Approved Report	Research committee/ Examiners
Submission of Research Dissertations	May, 2023		Final Report (Dissertation)	Faculty Office

APPENDIX V: Budget

BUDGET CATEGORY	QUANTITY	UNIT COST IN SHILLINGS	TOTAL COST
Ream of papers	01	16,000/=	16,000/=
Pens	5	500/=	2500/=
Pencils	4	100/=	400/=
Photocopying	4pgs x 60 copies	200/=	48,000/=
Lunch	For 3people	6000/= x 11 days	66,000/=
Transport	For 3people	5000X 11 days	55,000/=
Paying research assistants	2 people	100,000/=	200,000/=
Typing and printing (Research report)	2 copies of report 80 pages each	1000	160,000/=
Hard copy binding of research report	2 copies	20,000 x 2	40,000/=
Miscellaneous			80,000/=
GRAND TOTAL			667,900/=