

**UTILIZATION OF INFORMATION COMMUNICATION TECHNOLOGY IN
HEALTH MANAGEMENT INFORMATION SYSTEM AT MULAGO SPECIALIZED
NATIONAL REFERRAL HOSPITAL.**

BY

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REG. NO: 2021AP/BNS/1268



**A RESEARCH REPORT SUBMITTED IN PARTIAL FULFILMENT OF THE
REQUIREMENTS FOR THE AWARD OF BACHELOR'S DEGREE IN NURSING
SCIENCE OF KING CAESOR UNIVERSITY.**

APRIL 2024

Declaration

I, **Ronnah Ngabirano**, hereby declare that this work is my original work and has never been submitted before any School, or institution of learning for any academic award of any qualification. Theories, ideas and materials obtained from existing literature and other sources have been dully acknowledged and referenced.

Signed: Ronnah - Date: 12/04/2024.

RONNAH NGABIRANO



Approval

This dissertation titled “Utilization of information communication technology in health management information systems at Mulago Specialized National Referral Hospital” is submitted for approval of the following supervisor:

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ACKNOWLEDGEMENT

I acknowledge with gratitude and thanks to my supervisor and all individuals that have directly and indirectly contributed towards the completion of this report.

Appreciation to my family, friends and classmates for the generous support they have offered towards ensuring that we complete this project,

Above all, I thank the Almighty God for the gift of life, sober and sound mindset.

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Operational definitions

Health Management Information Systems (HMIS) refers to a data collection system specifically designed to support planning, management, and decision making in health facilities and organization.

ICT Accessibility is the availability and ability to possess or hire ICT materials.

ICT Attitude refers to an individual's outlook, perceptions or beliefs towards performing academic and non-academic activities using ICT.

Information Communication Technology (ICT) is a diverse set of technological tools and resources used to transmit, store, create, share or exchange information.

Information Technology (IT) refers to all communication technologies, including the internet, wireless networks, cell phones, computers, software, video conferencing and other social networks.

Abbreviations

HMIS	Health Management Information Systems
ICTs	Information Communication Technologies
MSNRH	Mulago Specialized National Referral Hospital
UDHS	Uganda Demographic and Health Survey
WHO	World Health Organization
eHMIS	Electronic Health Management Information Systems

Abstract

Globally, ICT integration in healthcare systems like Uganda has significantly improved patient care and administrative effectiveness, driven by real-time data access, telemedicine, and electronic health records, which could transform healthcare delivery. The purpose of this study was to assess the level and factors associated with utilization and integration of Information and Communication Technology in Health Management Information Systems at Medical and Surgical outpatient departments of Mulago specialized National Referral Hospital where there is a large number of referrals attending different specialties.

This study adopted a descriptive cross-sectional design to comprehensively explore the factors associated with ICT utilization in HMIS which employed convenience and purposive sampling methods. The study of 110 participants included Administrators, IT personnel, Records assistants, Doctors and Nurses working in Medical and Surgical departments at block D, Mulago Specialized National Referral Hospital. Data was collected for a period of 2 weeks from 1st December to 15th December 2023. Univariate and bivariate analysis was done and level of significance was set at a p-value < 0.05.

The study revealed that a majority of healthcare professionals were above 35 years of age (58.2%), representing diverse educational backgrounds and professions. Experience of over 10 years was common among participants. Regarding ICT integration, 52.7% lacked integration, while 47.3% actively integrated. Individual factors indicated high awareness of ICT training (68.2%) but low supervisors' support (19.1%). Health-system factors highlighted limited infrastructures and major barriers such as inadequate financial support.

In conclusion, the integration of Information Communication Technology (ICT) into Mulago Specialized National Referral Hospital's Health Management Information Systems (HMIS) is limited, with a significant association between medical doctors and ICT integration. The key factors being age, education, poor infrastructure, inadequate knowledge, staff workload pressure, digital illiteracy, and insufficient funding. Therefore, there is need to enhance the effective incorporation of technology into health information management systems in Mulago Specialized National Referral Hospital

CHAPTER ONE:

1.1 Introduction

This chapter presents the background to the study, the problem statement, the purpose of the study, specific objectives, research questions, the justification of the study, and the conceptual framework.

1.2 Background to the study

Globally, the level of ICT integration in HMIS varies widely (Asghar, 2019). Numerous healthcare systems in low and middle-level countries like Uganda have made significant progress in integrating ICT to improve their HMIS, to enhance patient care and administrative effectiveness (Hamid, 2020; Khanna, 2022). The need for real-time data access, telemedicine, and electronic health records, which have the potential to completely transform the way healthcare is delivered are the main forces behind this integration (Tahsin et al., 2023).

The integration of information and communication technology (ICT) into health management information systems (HMIS) has transformed the healthcare landscape (Chu et al., 2017). This fusion of healthcare and technology enhances efficiency and greatly improves patient care and outcomes (Awad et al., 2021). This chapter will explore the pivotal role ICT plays in HMIS, covering its utilization and the factors that facilitate its integration in the day-to-day care of patients.

The effective utilization of ICT in healthcare systems varies worldwide. Developed nations like the United States, Canada, and Europe have leveraged ICT to enhance data storage in HMIS. However, challenges such as variable data formats persist (Aceto et al., 2020). The global utilization of Information Communication Technology (ICT) in Health Management Information Systems (HMIS) has experienced a significant and transformative evolution over the past few decades. This transformation can be attributed to the increasing recognition of the pivotal role technology plays in improving healthcare delivery, data management, and patient outcomes (Gebre-Mariam & Bygstad, 2019). Different governments, healthcare organizations, and Institutions have been investing heavily in implementing advanced information systems to enhance

healthcare infrastructure (Steele Gray et al., 2018). This has resulted in a widespread integration of technology into the healthcare sector, leading to improved efficiency and patient care as ICT has enabled information sharing across professional and organizational boundaries is arguably one of the most crucial aspects of successful models of integrated care (Barbabella et al., 2017)

Furthermore, the COVID-19 pandemic caused a significant growth in the field of electronic medical records, telehealth, and telemedicine, as it prompted a rapid and widespread adoption of digital health solutions to ensure the continuity of healthcare services while minimizing in-person interactions (Wosik et al., 2020). Healthcare providers and patients have embraced remote consultations, enabling patients to access a wide variety of healthcare services at the comfort of their homes outside health care facilities. The utilization of ICT in telehealth has not only improved access but has also become a lifeline in underserved and remote areas.

Despite these advancements, global disparities exist in the adoption and utilization of ICT in HMIS. Developing nations often face challenges related to infrastructure, funding, and digital literacy, hindering widespread implementation. Efforts are underway to bridge this digital divide and ensure that ICT benefits reach all corners of the globe (Omotosho et al., 2019)

In Sub-Saharan Africa, ICT utilization in HMIS still faces many challenges like inadequate knowledge, resources, training, staff shortages, and heavy workloads (Wandera et al., 2019a). Despite these hurdles, there is a growing recognition of the potential benefits, and ongoing efforts being made to address these challenges and harness the transformative power of technology for better healthcare delivery in the region.

In East Africa, the integration of ICT in healthcare systems has seen notable progress in recent years. For instance, one significant development is the adoption of Electronic Health Records (EHRs) in many private and government health facilities which allows digitization of patient data, improving accessibility and data management (Fraser et al., 2022; M. Kumar & Mostafa, 2020) However, this initiative is hindered by factors like burnout, limited equipment, unreliable electricity supply, and personnel shortages.

At Mulago Specialized National Referral Hospital, Medical and Surgical outpatient departments, there is a big number of patients registered, booked and attended to daily and need close follow up plans. To efficiently manage this patient load, the integration of Information and Communication

Technology (ICT) within the Health Management Information Systems (HMIS) will reduce this burden. This integration will not only improve patient care but rather elevate the overall efficiency and effectiveness of healthcare services.

Therefore, this study is timely and will unfold the factors associated with the utilization and integration of Information and Communication Technology in Health Management Information Systems at Mulago Specialised National Referral Hospital. This will ultimately pave the way for more efficient and patient-centred healthcare delivery.

1.3 Problem Statement.

The Mulago Specialized National Referral Hospital faces challenges in effectively integrating Information Communication Technology (ICT) into its Health Management Information Systems (HMIS), which are crucial for optimizing healthcare delivery, resource allocation, and patient care (HMIS, 2021). It is important to note that integration of ICT in the management of HMIS improves efficiency, reduces errors, and enables healthcare providers to focus on patient care. It facilitates remote consultations, telemedicine, and real-time data availability, aiding in informed decision-making (Kyalo et al., 2018).

It's worth mentioning that failure to integrate ICT into HMIS in Uganda could have dire consequences for the attainment of Sustainable Development Goals (SDGs) and the realization of Vision 2040. This is likely to result in reduced healthcare access, and inefficiencies in data management could compromise progress towards universal health coverage (Karuganwa, 2018). In a study conducted on e-health use in healthcare delivery in government and private hospitals among health workers in Northern Uganda found that 57.4 % reported access to computer and 48.5 % access Internet at the workplace and the technical facilitators of integrating data were user friendly (Wandera et al., 2019).

Therefore, this study was conducted at Mulago specialized National Referral hospital in Uganda to determine the levels of ICT utilization, factors, and challenges associated with the integration of ICT into the routine HMIS.

1.4 Purpose of the study

The purpose of this study was to assess the level of ICT integration in HMIS in Medical and Surgical-outpatient departments of Mulago specialized National Referral Hospital.

1.5 Research Questions

1. What is the level of ICT integration into the existing HMIS at Mulago Specialized National Referral Hospital?
2. What are the individual factors associated with ICT integration in HMIS at Mulago Specialized National Referral Hospital?
3. What are the health facility factors associated with ICT integration in HMIS at Mulago Specialized National Referral Hospital?

1.6 Specific Objectives

1. To determine the levels of ICT integration into the existing HMIS at Mulago Specialized National Referral Hospital
2. To determine the individual factors associated with adoption and integration of ICTs in HMIS at Mulago Specialized National Referral Hospital.
3. To establish the health facility factors associated with ICT utilization in HMIS at Mulago Specialized National Referral Hospital.

1.7 Justification of the study

ICT integration in HMIS can significantly enhance healthcare services. It allows for the efficient management of patient data, streamlines administrative processes, and provides healthcare professionals with quick access to vital information, ultimately improving patient care and treatment outcomes (Okemiri et al., 2020). The study will help to understand how the adoption of ICT systems in healthcare institutions can lead to more efficient and effective healthcare delivery.

It will also provide useful insights into real time data access. The utilization of ICT in HMIS allows for the collection and analysis of real-time health data. This information is for healthcare decision-

makers, enabling them to track disease trends, allocate resources effectively, and respond promptly to health emergencies.

Lastly, ICT integration in HMIS plays a critical role in promoting telemedicine and telehealth services. These platforms enable remote consultations, making healthcare more accessible to underserved and remote populations. The study will explore how such services are being utilized and their implications for healthcare access and equity.

In a nutshell, integration of ICT in HMIS at Mulago Specialized National Referral hospital will have a substantial impact on healthcare delivery, patient outcomes, and the overall efficiency of healthcare systems.

1.8 Significance of study.

This study will have significant benefits to patients, healthcare practitioners, hospital administration, the Ministry of Health, policy-makers, and future researchers. It will promote efficient data storage, reduce patients waiting time and improve on documentation practices (Ndugga et al., 2020)

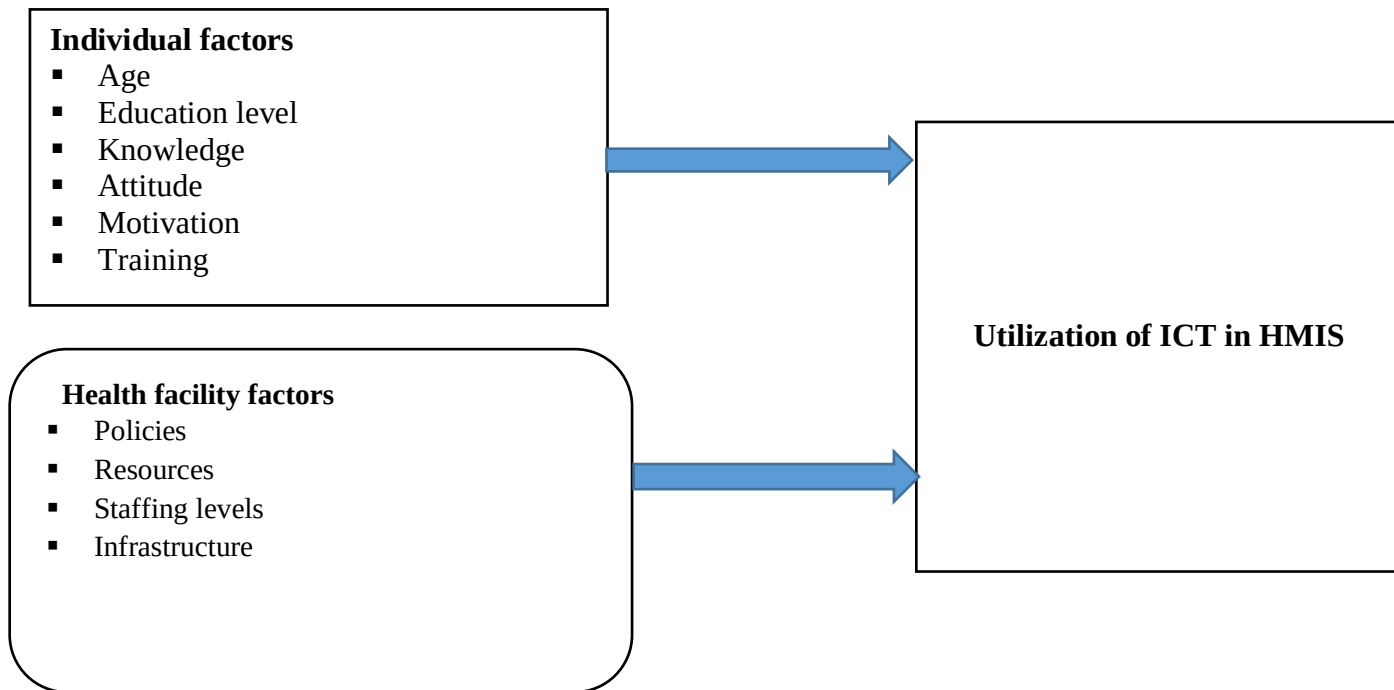
Patients and Caretakers will save on waiting time for review because eHMIS is effective and efficient on capturing, processing, storing and retrieving data. It helps Hospital administrators to have effective and reliable database for reference on decision making and proper resource allocation.

The findings will assist the Ministry of health, health planners and policy makers by identifying the potential areas which still require policy improvements as well as the development of national policy on effective use of eHMIS. Future academicians and researchers will find the study essential as reference for first-hand information about the utilization, challenges, and other aspects of integrating ICT into HMIS.

This study underscores how Information Communication Technology (ICT) integration in Mulago Specialized National Referral Hospital's Health Management Information Systems (HMIS) profoundly impacts healthcare. It highlights ICT's role in revolutionizing patient care, resource allocation, and operational efficiency. The findings will lead to improved data management, better decision-making, enhanced patient care, and increased healthcare access.

1.9 Conceptual framework

Independent Variables



Narrative to explain the conceptual framework

The relationship between individual factors and integration of ICT in HMIS is a complex one. At the individual level, healthcare providers and staff play a pivotal role in embracing and effectively using ICT in HMIS. Their digital literacy, attitudes toward technology and willingness to adapt to new systems significantly impact the successful integration of ICT. A workforce that is knowledgeable, receptive to change and adequately trained can harness the power of ICT to streamline patient data management, enhance data accuracy, and ultimately improve the quality of patient care. Conversely, resistance to change, fear of technology, or a lack of digital proficiency can impede the utilization of ICT in HMIS, hindering the realization of its potential benefits.

More to that, health facility factors provide the infrastructure and support necessary for ICT integration into HMIS. The availability of up-to-date hardware, software, and reliable internet connectivity is essential to ensure the smooth operation of ICT systems. Adequate investment in ICT infrastructure, including electronic health records and data storage solutions, facilitates efficient data collection, management, and sharing.

In summary, by understanding how these elements interact as well as the potential barriers to the hospital's eHMIS operationalization, the full potential of ICT integration may be realized, resulting in better patient care, more accurate data, and more efficient administrative procedures.

CHAPTER TWO: LITERATURE REVIEW

2.1 Introduction

This section provides detailed literature on the utilization of ICTs in HMIS. It discusses the individual and health facility related factors and challenges related to ICT integration in HMIS. The information has been obtained from data bases that contain peer reviewed articles such as; google scholar, PubMed, CINAHL, Scie-direct, HINARI to mention but a few. In order to facilitate a deeper understanding of the subject matter, the subsections of this chapter have been arranged according to the specific objectives of the study.

2.2 Integration of ICT into the existing HMIS

The delivery of medical services now relies heavily on the efficient, accurate, and accessible use of ICT in the healthcare industry. The integration represent the degree to which ICT systems—from simple digitization to sophisticated, networked systems—are integrated into the HMIS (Aceto et al., 2020)

Uganda faces challenges similar to global and East African trends, including staff shortages, inadequate tools, and negative attitudes towards ICT adoption (Rumisha et al., 2020).

Recent studies underline the global trend of integrating ICTs into healthcare systems, particularly in developed countries like the United States, Canada, and Europe Borghi et al, (2018). However, challenges persist, such as variable data formats (A. Kumar et al., 2020). According to a study carried out in a southern Indian district, HMIS enhances the capacity to gather, store, and evaluate precise health data as well as the enhancement of interventions in the health care sector. This study offered sufficient proof and insightful information to support the claim that ICT integration in healthcare enhances the interaction between healthcare providers and patients and boosts service delivery effectiveness (Sriram & Mohanasuundaram, 2020)

2.3 Individual factors influencing utilization of ICT in HMIS.

A study conducted on the impact evaluation of assistive technology support in different states of United Kingdom reveals that integration of ICT in HMIS in many countries is still in its infancy,

greatly due to the digital divide, and therefore requires appropriate training for all the stakeholders (not only data entry operators) to effectively implement HMIS (Asghar, 2019).

A study by Borghi et al, (2018) about measurement of health worker performance in surveys in low- and middle-income countries revealed excessive demands at work as well as home, lack of recognition and appreciation, poor working relations with supervisors, poor working relations with colleagues along with old age among other challenges faced by health workers towards the use of ICT in health information management systems.

Findings from a study conducted in Ethiopia reveal that 52% of the participants held a minimum of a diploma, 82% of the participants had knowledge regarding ICT use in HMIS with integration levels of 58%. However, 55% had a challenge of poor compliance to the regulations guiding the implementation especially with poor decision making, extra workload due to inadequate staff and lack of a supportive supervision (Bogale, 2021)

A study by Muthuri, Senkubuge & Hongoro (2020), on determinants of performance among healthcare workers in the East African Community between 2009–2019 as showed that management of medical records and documents electronically is low in public than private health units and in regards to individual challenges in use of ICT, revealed lack of job security, poor communication from managers as well as poor conflict resolution among others. Additionally, limited knowledge about how use computers to enter the patient's data electronically was a common challenge mentioned by 70% of the health workers in the private facilities and 41% of those in the private health units.

In African contexts, challenges include inadequate ICT knowledge among healthcare practitioners, limited resources, and personnel shortages especially among practitioners with an experience less than 3 years (Rumisha et al, 2020). East Africa faces factors like burnout, ICT literacy gaps, and

equipment shortages which was revealed by majority of the nurses and midwives (Khubone et al., 2020).

A study conducted by Vrignat et al., (2022), found that factors such as self-efficacy, service quality, and user satisfaction influence the use and behavioral intentions to use eHMIS among healthcare workers. “

In a different study by Fu et al., (2021), examined health professionals in Ethiopia and found that factors such as eHealth literacy, internet access, computer literacy, and information-searching skills were associated with the utilization of electronic health-information resources.

Similarly, results from a research study conducted by Munz et al., (2020), highlighted the importance of training, user experience, and management support in effective eHMIS implementation, with an increase in the frequency of use and self-efficacy among health workers.

2.4 Health facility factors influencing utilization of ICT in HMIS.

Globally, integration of ICT into Health Management Information Systems (HMIS) is influenced by various factors, including healthcare institutions' readiness, digital literacy, financial resources, investment capacity, and availability of updated hardware and software, as well as the legal and regulatory environment (Kyalo et al., 2018). Therefore, it is critical to understand these factors in order to apply ICT integration in HMIS effectively.

In a different study carried out in the United Kingdom have also discovered that the key enablers for effective ICT integration are financial and motivational support, proper implementation and maintenance supported by good ICT (Tull, 2018).

A cross sectional study from East Indian state, revealed that health facility related challenges faced by health workers towards the use of ICT in health information management systems as, inadequate provision of resources such as computers for efficient documentation of all patient data (Nwozichi et al, 2019). This is also supported by Kebede et al, (2020), who reported lack of reminders for staff about documentation, such as posters in wards/units and lack of effective support from supervisors who understand use of ICT in HMIS.

A mixed-methods study by Li et al, (2020) in four African countries revealed individual challenges faced by health workers towards the use of ICT in health information management systems as

nature of work, lack of career development (in regards to the possibility to specialize or be promoted as well as lack of support from supervisors and managers. This study further revealed that medical doctors or specialists were more likely to use of ICT in HMIS than other nurses.

Endriyas et al., (2019) study about integration of information and communication technology in nursing education in South East Asia: A systematic literature review revealed that some of the Health facility related challenges faced by health workers towards the use of ICT in health information management systems include inadequate supply of recording materials, leading to incomplete recording as well as lack of legal interest among others.

(Nshimyiryo et al., 2020) qualitative study in urban slums of Delhi, India about motivating and demotivating factors for community health workers revealed that, challenges faced by health workers towards the use of ICT in health information management systems include lack of organizational incentives as well as excessive job demands.

A systematic review by Endriyas et al., (2019) found that, among other things, a lack of interest and an inadequate supply of recording materials lead to incomplete recording while using ICT in HMIS in health facilities. These key factors if not addressed adequately are likely to lead to the inefficient adoption of an ICT infrastructure in the health care system.

A cross sectional study that reviewed challenges faced by health workers towards the use of ICT in health information management systems revealed lack of reminders such as posters in wards/units to remind staff about documentation, inadequate provision of resources such as computers for efficient documentation of all patient data (Mboera et al., 2021).

Another a qualitative study conducted in Delhi, India's urban slums found high workloads and a lack of organizational incentives as two obstacles health professionals faced while utilizing ICT in health information management systems. This study further revealed that there was lack of institutional policies which was associated with low ICT integration in HMIS (Nshimyiryo et al., 2020).

The study by Warshawski, (2020) further highlights on the major challenges associated with integration of ICT in HMIS as organizational structures, communication issues and medical staff

turnover in public hospitals. However, sensibly managed workforce led to satisfied and motivated personnel who effectively implemented workplace ICT systems.

2.5 Summary of Literature review

The literature on ICT integration in Health Management Information Systems (HMIS) highlights three main themes; integration levels, individual and health facility factors influencing its success. It highlights the need for financial resources, regulatory compliance, interoperability, and bridging the digital divide to enhance patient care and administrative efficiency.

CHAPTER THREE: METHODOLOGY

3.1 Introduction

The chapter consists of different approaches that the research adopted to conduct this study. It includes; the study design, study setting, study population, sample size determination, sampling procedure, inclusion criteria, definition of variables, research instruments, pilot testing, data collection procedure, data management, data analysis and presentation, ethical considerations, limitation of the study and dissemination of results.

3.2 Study Design

This study adopted a descriptive cross-sectional design to comprehensively explore the factors associated with ICT utilization in HMIS.

3.3 Study setting

The study was conducted in Medical and Surgical outpatient departments (Block D) of Mulago Specialized National Referral Hospital, Kawempe division, Kampala District. MSNRH is a tertiary institution that offers specialized services to the public. Patients are referred in from lower level health facilities like Regional Referral hospitals and Health Centers for diagnostic and curative medical and surgical care. They go through out-patient units then to specific wards depending on the individual's case and plan of care.

3.4 Study Population

The study included administrators, IT personnel, Record assistants, Doctors and nurses in Medical and Surgical departments at block D, Mulago Specialized National Referral Hospital.

Population as described below.

Administrators	7
IT Personnel	3
Records Assistant	20
Doctors	30
Nurses	50

3.5 Sample Size

The sample size for this study was estimated using Taro Yamane method as shown below:

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

Where: n : is the estimated sample size

 N : signifies the total population under study

 d : signifies the margin error (5%)

Therefore, by substitution:

$$n = 150 / [1 + 150(0.05^2)]$$

$$n = 150 / [1 + 0.375] = 109.1$$

The sample size estimate was 110 participants

3.6 Sampling techniques

The study employed convenience and purposive sampling methods. Convenience sampling is a non-probability sampling method where participants are selected based on their accessibility and availability. Then, purposive sampling is a non-probability sampling method that involves the deliberate selection of participants with specific characteristics, knowledge, or expertise based on the researcher's judgment and research objectives.

3.7 Study procedure

The researcher sought ethical clearance from the Research and Ethics Committee of King Ceasor University. Data collection tools were pretested in Kiruddu National Referral Hospital and any errors detected were corrected and updated on the questionnaire. Two Research assistants who were record keeping interns were recruited, trained for five days emphasizing on good conduct, understanding data collecting tool, ensuring clarity, completeness and confidentiality of information.

Before the interviews, written informed consent was obtained from all study participants. The interviews were conducted using quantitative approaches, and the data collected was exported to STATA version 17 for analysis.

3.8 Eligibility Criteria

3.8.1 Inclusion criteria

The study included Administrators, IT Personnel, Records assistants, Doctors and Nurses who were available at the unit during data collection days and willing to consent and take part in the study.

3.8.2 Exclusion criteria

The study excluded those who were not willing to consent for the study and those who were sick and not able to bear with time taken for interview.

3.9 Study Variables

3.9.1 Dependent Variable

The dependent variable for this study is utilization of ICT in HMIS.

3.9.2 Independent Variable

This includes individual and health facility factors associated with utilization of ICT in HMIS.

3.10 Data collection Tool

Interviewer-administered structured questionnaires were used to acquire quantitative and qualitative data through trained research assistants.

3.11 Data Management and Analysis

Data Cleaning

After data collection, data was exported to an Excel spreadsheet, data cleaning techniques such as checking for missing values, outliers, and inconsistencies in the data were used.

Data Analysis

Coded data sets from Excel spreadsheet were imported to STATA software Version 17.0 for analysis at three levels. At Univariate analysis, continuous variables were summarized into means (or standard deviation), and median (inter-quartile range) for normal and non-normal distribution respectively. Categorical data was summarized into frequencies and percentages presented in tables and graphs.

At bi-variate analysis, chi-square test was performed to test the association level of use and factors associated. Independent variables with $p < 0.2$ was considered to have associations with the dependent variable. At multivariate analysis, a logistic regression model was performed to assess factors associated with integration of ICT in HMIS. At a confidence interval of 95%, and $p < 0.05$, each of the selected independent variables and the outcome variable was considered statistically significant association. Controlling for confounders at multivariable level analysis relied on Mantel-Hensel chi-square. Odds ratios, p value and corresponding 95% confidence interval was reported.

3.12 Quality Control (Validity & Reliability)

Research assistants were recruited and trained for 5 days for the data collection. Questionnaires were pre-tested among 11 staff working at Kiruddu Regional Referral Hospital representing 10% of the total sample size. Necessary adjustments were made accordingly for final data collection. Filled-in questionnaires were checked for completeness daily before leaving the field. For missing data, the respondents were contacted through their mobile to collect it in two attempts, or other methods of managing missing data were employed. Questionnaires with incomplete data for key variables such as age and educational status were not included in the analysis.

3.13 Ethical Considerations

Ethical approval was sought from King Ceasor University after a thorough review of the proposal. A letter of authorization to collect data was sought from the King Ceasor Directorate of Research and Graduate Training. Permission was granted by the Executive Director MSNRH to carry out research in the hospital through heads of department and incharges. Written informed consent was obtained from all the respondents before recruitment into the study. Respondents were informed

about the objective, benefits, possible risks of the study, and remedies. Confidentiality was ensured using respondents' unique identifiers instead of names. For privacy, interview sessions were held on a one-on-one basis in a quiet and private place to allow respondents to fully express themselves with autonomy.

3.14 Limitations of the Study

The study being cross-sectional in nature, could not explain the casualty nor give solutions. There was limited time due to the nature of the course. However, the researcher overcame this limitation by drawing up a timetable which was strictly followed according to available time.

3.15 Dissemination Plan

The study results will be submitted to King Caesar University to enrich the school library, another copy will be given to the administration of Mulago Specialized National Referral Hospital which is the study area, for actions as per the recommendations:

- To make presentations during National and International conferences as well as seminars.
- To make publications on integration of ICT in health management information system, in peer-reviewed journals of publishers and companies.
- By conducting sensitization workshops for health professionals on use of ICT in HMIS

CHAPTER FOUR: RESULTS

4.1 Introduction

The study's findings show a detailed description of the levels of ICT use in the HMIS at Mulago Specialized National Referral Hospital in Kampala. They also present findings about the factors related to ICT use by both individuals and the health system itself. These results give us fresh views about how ICT is currently used, helping us understand the complex and detailed ways it's put into practice in healthcare systems. Data was collected from 110 respondents, and analysis was done following the specific objectives of the study.

4.2 Background characteristics

Table 1: Sociodemographic characteristics

N = 110

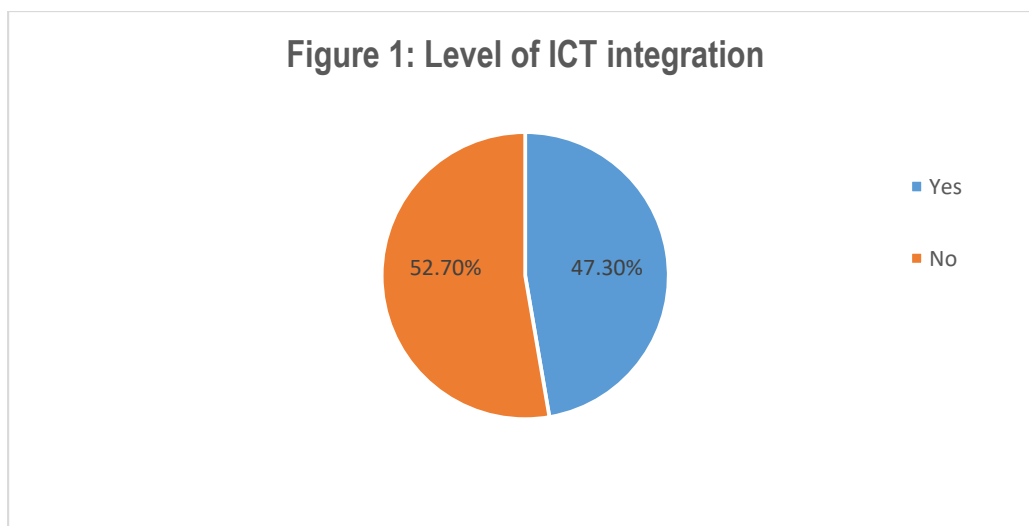
Characteristic	Frequency (n)	Percentage (%)
Age (years)		
20-25	8	7.3
26-35	38	34.6
>35	64	58.2
Gender		
Male	47	42.7
Female	63	57.3
Level of education		
Diploma	54	49.1
Degree	40	36.4
Above degree	16	14.6
Professional cadre		
Medical doctor/specialist	21	19.1
Nurse/midwife	58	52.7
IT personnel	4	3.6
Administrator	12	10.9

Records assistant	15	13.6
Years of experience		
2-5	21	19.1
6-10	28	25.5
>10	61	55.5

Table 1 above shows that a notable majority (58.2%) of respondents were aged over 35 years, while participants aged 26–35 years constituted 34.6%, and those aged 20–25 years’ account for 7.3%. The gender distribution shows a slight predominance of females (57.3%) over males (42.7%). Regarding education, nearly half of the sample holds a diploma (49.1%), followed by individuals with a degree (36.4%) and those with education above a degree (14.6%). Professionally, nurses and midwives form the largest group (52.7%), followed by medical doctors and specialists (19.1%), administrators (10.9%), records assistants (13.6%), and IT personnel (3.6%). Experience-wise, the majority of participants have over 10 years of experience (55.5%), with 6–10 years constituting 25.5% and 2–5 years comprising 19.1% of the sample.

4.3 Level of ICT integration

Figure 1: showing Level of ICT integration



Most respondents, comprising 52.7%, reported a lack of ICT integration within the HMIS. On the contrary, a smaller proportion, accounting for 47.3%, reported actively integrating ICT into their HMIS practices, showcasing a notable but lesser-supported inclusion of technology within the health system records and reporting systems at Mulago Specialized National Referral Hospital.

Table 2: Level of ICT integration into the existing HMIS at Mulago Specialized National Referral Hospital

N= 110

Variable	Frequency (n)	Percentage (%)
Level of integration		
Yes	52	47.3
No	58	52.7
State of integration		
High	6	5.5
Moderate	20	18.2
Partial	84	76.4
Reason for low level of integration		
Poor ICT infrastructure	37	33.6
Poor knowledge	33	30.0
Digital illiteracy	19	17.3
Inadequate funding	13	11.8
Lack of access to ICT	6	5.5
Lack of policies	2	1.8
Total	110	100

Table 2 above, shows that the most reported state of integration was partial integration (76.4%), while only a small percentage reported high (5.5%) or moderate (18.2%) integration levels. The most commonly reported reasons for the low integration levels were poor ICT infrastructure, inadequate knowledge, digital illiteracy, insufficient funding, limited access to ICT, and a lack of relevant policies.

4.4 Individual factors associated with adoption and integration of ICTs in HMIS at Mulago Specialized Women and Neonatal Hospital.

Table 3: Individual factors associated with adoption and integration of ICTs in HMIS

N= 100

Factor	Frequency (n)	Percentage (%)
Enablers of integration		
Institutional readiness	48	43.6
Digital literacy	27	24.6
Financial motivation	10	9.1
Legal and policy	25	22.7
Ever heard formal training		
Yes	75	68.2
No	35	31.8
Frequency of using ICT		
Twice a day	8	7.3
Four times a day	40	36.4
When necessary	62	56.4
Never		
Continuous support from supervisors		
Yes	21	19.1
No	89	80.9
Kind of support		
Trainings	34	30.9
Availability of ICT room	17	15.5
Not applicable	59	53.6
Rate interaction with supervisor		
Excellent	4	3.6

Very good	29	26.4
Good	55	50.0
Fair	22	20.0

Table 3 above shows that over two-thirds (68.2%) of participants have heard of formal ICT training, with varied ICT usage patterns for instance 36.4% use it four times a day. The table further shows that continuous supervisor support is low (19.1%). The individual factors enabling integration include institutional readiness (43.6%) and digital literacy (24.6%). The Interaction with supervisors regarding ICT was mostly rated 'Good' (50.0%). The available ICT support on the Unit include; trainings (30.9%) and availability of an ICT room (15.5%) and over half of participants reported no specific ICT support (53.6%) from the Institution.

4.5 Health-system factors

Table 4: Health-system factors related to ICT integration in HMIS

Factor	Frequency (n)	Percentage (%)
Number of computers in department		
0	14	12.7
1	33	30.0
2	61	55.5
3	2	1.8
Availability of functional computers		
0	22	20.0
1	35	31.8
2	47	42.7
3	6	4.5
Availability of other ICT support facilities		
Scanners	4	3.6
Video conferencing	15	13.6
Television	8	7.3

None	83	75.5
Major constraints to ICT integration		
Inadequate financial support	41	37.3
Staff burnout and fatigue	16	14.6
Low morale and motivation	5	4.6
Inadequate communication	5	4.6
All the above	43	39.1
Require assistance to use ICT		
Yes	66	60
No	44	40
Reasons for assistance		
Limited digital literacy	14	12.7
Complexity of health information systems	43	39.1
Accessing specialized information	53	48.2
Budgetary allocations		
Yes	32	29.1
No	39	35.5
Don't know	39	35.5
Roles of ICT*		
Efficient data storage and retrieval	1	0.9
Telemedicine and remote consultations	76	69.7
Patient portals	14	12.8
Health information exchange	18	16.5
Presence of an Institutional ICT policy		
Yes	21	19.1
No	8	7.3
Don't know	81	73.6
Challenges for implementation of ICT		

Limited ICT knowledge	30	27.3
Computer illiteracy	23	20.9
Lack of equipment	20	18.2
Few staff	2	1.8
Lack of training	15	13.6
Internet challenges	10	9.1
Poor attitude towards ICT	10	9.1

Table 4 above shows that most departments primarily possess either one (30.0%) or two (55.5%) computers, which are in a good mechanical condition. However, essential ICT support facilities like scanners and video conferencing are notably scarce, with a significant 75.5% reporting the absence of such resources. The major barriers to ICT integration primarily stem from inadequate financial support (37.3%) and a combination of multiple challenges (39.1%). A considerable proportion, 60%, necessitate assistance with ICT, primarily due to complexities in health information systems (39.1%) and the need to access specialized information (48.2%). Additionally, there's a noticeable lack of institutional ICT policies (19.1%), while implementation challenges spin around limited ICT knowledge (27.3%) and computer illiteracy (20.9%).

Table 5: Association between ICT use and parameters (Individual and health facility related to ICT integration in HMIS)

Factor	Yes	No	Chi-square	df	P value
	n(%)	n(%)	(X ²)		
Age (years)					
20-25	5(9.6)	3(5.2)	0.846	2	0.655
26-35	17(32.7)	21(36.2)			
>35	30(57.7)	34(58.6)			
Gender					
Male	21(40.4)	26(44.8)	0.221	1	0.638
Female	31(59.6)	32(55.2)			
Level of education					

Diploma	27(51.9)	27(46.6)	1.527	2	0.466
Degree	16(30.8)	24(41.4)			
Above degree	9(17.3)	7(12.1)			
Profession					
Medical doctor/specialist	6(11.5)	15(25.9)	12.443	4	0.014*
Nurse/midwife	27(51.9)	31(53.5)			
IT personnel	4(7.7)	0(0)			
Administrator	4(7.7)	8(13.8)			
Records assistant	11(21.2)	4(6.9)			
Years of experience					
2-5	12(23.1)	9(15.5)	1.051	2	0.591
6-10	13(25)	15(25.9)			
>10	27(51.9)	34(58.6)			
Enablers of integration					
Institutional readiness	22(42.3)	26(44.8)	4.954	3	0.175
Digital literacy	12(23.1)	15(25.8)			
Financial motivation	8(15.4)	2(3.6)			
Legal and policy	10(19.2)	15(25.9)			
Ever heard formal training					
Yes	38(73.1)	37(63.8)	1.089	1	0.297
No	14(26.9)	21(36.2)			
Frequency of using ICT					
Twice a day	4(7.7)	4(6.9)	4.447	2	0.108
Four times a day	24(46.2)	16(27.6)			
When necessary	24(46.2)	38(65.5)			
Continuous support from supervisors					
Yes	14(26.9)	7(12.1)	3.917	1	0.048*
No	38(73.1)	51(87.9)			

Number of computers in department					
0	5(9.6)	9(15.5)	3.639	2	0.303
1	20(38.5)	13(22.4)			
2	26(50)	35(60.3)			
3	1(1.9)	1(1.7)			
Other ICT facilities					
Scanners	9(17.3)	13(22.4)	2.163	3	0.539
Video conferencing	20(38.5)	15(25.9)			
Television	20(38.5)	27(46.6)			
None	3(5.8)	3(5.2)			
Major constraints					
Inadequate financial support	2(3.9)	2(3.5)	0.331	3	0.954
Staff burnout and fatigue	8(15.4)	7(12.1)			
Low morale and motivation	4(7.7)	4(6.9)			
Inadequate communication	38(73.1)	45(77.6)			
Require assistance to use ICT					
Yes	32(61.5)	34(58.6)	0.097	1	0.755
No	20(38.5)	24(41.4)			
Reasons for assistance					
Limited digital literacy	7(13.5)	7(12.1)	1.415	2	0.493
Complexity of health information systems	23(44.2)	20(34.5)			
Accessing specialized information	22(42.3)	31(53.5)			
Budgetary allocations					
Yes	11(21.2)	21(36.2)	3.475	2	0.176
No	22(42.3)	17(29.3)			
Don't know	19(36.5)	20(34.5)			
Institution has a policy					

Yes	10(19.2)	11(19.0)	5.731	2	0.05*
No	7(13.5)	1(1.7)			
Don't know	35(67.3)	46(79.3)			

DF=Degree of freedom, *significant = p-value < 0.05

Table 5 indicates that there was a significant association ($X^2 = 3.91$, $p = 0.014$) between the medical doctor/specialist profession and ICT integration in HMIS. Notably, other factors such as continuous support from the supervisor ($X^2 = 3.917$, $p = 0.048$) and the presence of an institutional ICT policy ($X^2 = 5.73$, $p = 0.05$) were associated with the integration of ICT in HMIS. The number of computers or the presence of facilities like scanners, video conferencing, and television, reasons for needing ICT assistance (limited digital literacy, complex systems, specialized information), budgetary allocations, having an institutional policy, or knowledge of its existence didn't exhibit significant associations ($p > 0.05$).

CHAPTER FIVE: DISCUSSION, CONCLUSION, RECOMMENDATIONS AND NURSING IMPLICATIONS.

5.1 Introduction.

This chapter presented the discussion of the results, conclusion, recommendations and nursing implications.

5.2 Discussion.

5.2.1 Social-demographic characteristics.

Majority (58.2%) of respondents were above 35 years. This was because the nature of medical and surgical practices requires a certain level of expertise and maturity, leading to a higher representation of individuals with extensive work experience. This was similar to a study of Borghi et al, (2018) which revealed that old age was a challenge faced by health workers towards the use of ICT in health information management systems.

The gender distribution shows a slight predominance of females (57.3%) over males (42.7%). This was because the nursing and midwifery fields, which constitute a significant portion of the respondents, traditionally attract more women, contributing to the observed gender distribution.

Regarding education, nearly half of the sample holds a diploma (49.1%), followed by individuals with a degree (36.4%) and those with education above a degree (14.6%). This was because the roles within the medical and surgical outpatient departments often require a diverse skilled staff. This study was in agreement with a study by (Bogale, 2021) in Ethiopia which indicated that 52% of the participants held a minimum of a diploma.

Professionally, nurses and midwives form the largest group (52.7%), followed by medical doctors and specialists (19.1%), administrators (10.9%), records assistants (13.6%), and IT personnel (3.6%). This was because the frontline healthcare workforce in outpatient departments primarily consists of nurses and doctors. The administrative and IT roles, while crucial, have a relatively smaller representation in this context. This was in agreement with a study Izudi, Akwang, &

Amongin, (2019), showing that majority of the nurses and midwives faced factors like burnout, ICT literacy gaps, and equipment shortages which was revealed

Experience-wise, the majority of participants have over 10 years of experience (55.5%), with 6–10 years constituting 25.5% and 2–5 years comprising 19.1% of the sample. This was because healthcare professionals with extensive experience are likely to have witnessed the evolution of ICT integration in HMIS. Their prolonged exposure positions them as key informants on the subject, providing valuable insights into the current state of technology implementation. This was in disagreement with a study by Fekadu, Ambaw, & Kidanie, (2020), which showed that challenges include inadequate ICT knowledge among healthcare practitioners, limited resources, and personnel shortages especially among practitioners with an experience less than 3 years.

5.2.2 Level of ICT integration.

Most respondents, comprising 52.7%, reported a lack of ICT integration within the HMIS. On the contrary, a smaller proportion, accounting for 47.3%, reported actively integrating ICT into their HMIS practices, showcasing a notable but lesser-supported inclusion of technology within the health system records and reporting systems at Mulago National Specialized Referral Hospital. The observed divide in ICT integration can be attributed to the varying levels of technological readiness and organizational priorities within the medical and surgical outpatient departments. The disparity reflects the complex interplay of factors influencing the adoption of ICT in healthcare settings. This was in disagreement with a study by Sriram & Mohanasuundaram, (2020) which offered sufficient proof and insightful information to support the claim that ICT integration in healthcare enhances the interaction between healthcare providers and patients and boosts service delivery effectiveness.

Most reported state of integration was partial integration (76.4%), while only a small percentage reported high (5.5%) or moderate (18.2%) integration levels. The most commonly reported reasons for the low integration levels were poor ICT infrastructure, inadequate knowledge, digital illiteracy, insufficient funding, limited access to ICT, and a lack of relevant policies. The dominance of partial integration suggests that while there is some incorporation of ICT tools, it falls short of achieving a fully integrated and streamlined system. The barriers identified—poor infrastructure, knowledge gaps, digital illiteracy, funding constraints, limited ICT access, and

absence of supportive policies—contribute to this partial integration status. This was in contrast with a study by Odoch et al., (2021) which revealed that the challenges faced by ICT integration included staff shortages, inadequate tools, and negative attitudes towards ICT adoption.

5.2.3 Individual factors associated with adoption and integration of ICTs in HMIS at Mulago Specialized National Referral Hospital.

Over two-thirds (68.2%) of participants have heard of formal ICT training, with varied ICT usage patterns for instance 36.4% use it four times a day. The table further shows that continuous supervisor support is low (19.1%). The awareness of formal ICT training suggests a recognition among participants of the importance of acquiring digital skills.

However, the low rate of continuous supervisor support indicates a potential misalignment between awareness and sustained encouragement in the workplace. It could be attributed to a lack of emphasis on the integration of ICT skills into daily tasks or a need for a more proactive approach from supervisors in fostering a culture of consistent ICT use. This was in agreement with a study Asghar, (2019) which showed that there was a requirement for appropriate training for all the stakeholders (not only data entry operators) to effectively implement HMIS.

The individual factors enabling integration include institutional readiness (43.6%) and digital literacy (24.6%). The Interaction with supervisors regarding ICT was mostly rated 'Good' (50.0%). The recognition of institutional readiness and digital literacy as key factors suggests that participants understand the prerequisites for successful ICT integration. The positive rating of interaction with supervisors indicates a supportive environment where communication and collaboration regarding ICT matters are encouraged. This positive interaction likely contributes to a more favorable attitude towards ICT adoption.

The available ICT support on the Unit include; trainings (30.9%) and availability of an ICT room (15.5%) and over half of participants reported no specific ICT support (53.6%) from the Institution. The uneven distribution of ICT support points to a potential disparity in resource allocation or accessibility, with a substantial portion of participants lacking specific support.

This may be attributed to budget constraints, inadequate infrastructure, or a lack of a comprehensive support strategy at the hospital. This was in line with a study by Fekadu, Ambaw,

& Kidanie, (2020) which showed that the challenges include inadequate ICT knowledge among healthcare practitioners, limited resources, and personnel shortages and to Izudi, Akwang, & Amongin, (2019) which showed that East Africa faces factors like burnout, ICT literacy gaps, and equipment shortages.

5.2.4 Health-system factors.

Most departments primarily possess either one (30.0%) or two (55.5%) computers, which are in good mechanical condition. However, essential ICT support facilities like scanners and video conferencing are notably scarce, with a significant 75.5% reporting the absence of such resources. The limited number of computers may be a result of budget constraints or resource allocation decisions that prioritize other aspects of healthcare infrastructure.

The scarcity of essential ICT support facilities may stem from a lack of comprehensive planning for ICT needs, potentially due to insufficient awareness of the critical role these tools play in healthcare information management. This was in line with a study by Kyalo et al., (2018) which showed that integration of ICT into Health Management Information Systems (HMIS) is influenced by various factors, including healthcare institutions' readiness, digital literacy, financial resources, investment capacity, and availability of updated hardware and software, as well as the legal and regulatory environment.

The major barriers to ICT integration primarily stem from inadequate financial support (37.3%) and a combination of multiple challenges (39.1%). Inadequate financial support underscores a critical barrier to effective ICT integration, signaling a need for increased investment in technology infrastructure and support services. The combination of multiple challenges suggests a complex interplay of factors, such as resistance to change, organizational culture, and a lack of awareness regarding the benefits of ICT. This was in disagreement with a study by (Tull, 2018) which indicated that the key enablers for effective ICT integration include financial and motivational support, proper implementation and maintenance supported by good ICT.

A considerable proportion, 60%, necessitate assistance with ICT, primarily due to complexities in health information systems (39.1%) and the need to access specialized information (48.2%). The demand for ICT assistance highlights the evolving nature of health information systems and the challenges faced by healthcare professionals in navigating complex technological landscapes. The

need to access specialized information underscores the importance of tailored support services to meet the unique requirements of healthcare practitioners.

Additionally, there is a noticeable lack of institutional ICT policies (19.1%), while implementation challenges spin around limited ICT knowledge (27.3%) and computer illiteracy (20.9%). The absence of institutional ICT policies indicates a potential governance gap, leaving departments without clear guidelines for ICT integration.

Implementation challenges related to limited ICT knowledge and computer illiteracy underline the importance of investing in education and training initiatives to equip healthcare staff with the necessary skills. This was in disagreement to a study done by (Shiferaw et al., 2017) which revealed that challenges faced by health workers towards the use of ICT in health information management systems revealed lack of reminders such as posters in wards/units to remind staff about documentation, inadequate provision of resources such as computers for efficient documentation of all patient data.

One significant finding indicated a correlation between individuals in the medical doctor/specialist profession and the integration of ICT in Health Management Information Systems (HMIS). The statistical analysis, with a chi-square (X^2) value of 3.91 and a p-value of 0.014 (less than 0.05), suggested that medical doctors or specialists were more likely to be associated with the use of ICT in HMIS. The study is in agreement with that done by Kok et al, (2018) who revealed that medical doctors or specialists were more likely to be associated with the use of ICT in HMIS.

Additionally, the study highlighted the importance of continuous support from supervisors in influencing the integration of ICT in HMIS. The statistically significant association, with a chi-square (X^2) value of 3.917 and a p-value of 0.048, suggests that individuals receiving consistent support from their supervisors were more likely to incorporate ICT into the HMIS. This is in disagreement with a study done by Mohd, Nilima, Prathibha and Singh (2020) which revealed that participants who lacked effective support from supervisors did not understand use of ICT in HMIS very well.

Furthermore, the presence of an institutional ICT policy emerges as a critical factor associated with ICT integration in HMIS. The statistical analysis revealed a significant association, with a chi-square (X^2) value of 5.73 and a p-value of 0.05. This finding underscored the importance of

having a clear institutional policy in place, as it was correlated with a higher likelihood of successful ICT integration. This is in agreement with a study by George et al., (2017) which revealed that lack of institutional policies which was associated with low ICT integration in HMIS.

Conversely, factors such as the number of computers, the presence of facilities like scanners and video conferencing, reasons for needing ICT assistance, budgetary allocations, and awareness of institutional policies did not exhibit statistically significant associations with the integration of ICT in eHMIS. The study suggests that these factors may not be as influential in determining the successful utilization of ICT in the context of electronic health information management systems.

5.3 Conclusion.

In conclusion, the study indicated that the demographic diversity of healthcare professionals, with a majority aged above 35 years, was dominated by females and encompassing various educational backgrounds and professions. While a significant portion had extensive experience, the level of ICT integration in Health Management Information Systems (HMIS) at Mulago National Specialized Referral Hospital was mixed, with notable challenges such as poor infrastructure and inadequate financial support.

Key individual factors influencing adoption included formal ICT training awareness, low continuous supervisor support, and varying levels of institutional readiness. The study identified a significant correlation between medical doctors/specialists and successful ICT integration, emphasizing the crucial role of continuous supervisor support and the presence of institutional ICT policies. However, certain factors like the number of computers and budgetary allocations did not exhibit significant associations with ICT integration in the context of electronic health information management systems.

5.4 Recommendations.

- The Ministry of health should increase financial support for Institutions or health facilities or allocate additional funds to support ICT integration activities in health care settings and formulate and enforce clear institutional ICT policies to guide healthcare facilities. These

policies should address infrastructure standards, support mechanisms, and guidelines for effective ICT integration.

- Additionally, the ministry of health should always collaborate with educational institutions and healthcare facilities to establish continuous training programs for healthcare professionals. These programs should cover digital literacy, health information systems, and the effective use of ICT tools.
- Mulago Specialized National Referral Hospital should prioritize budgetary allocations for essential ICT support facilities, such as scanners and video conferencing equipment, to enhance the overall capacity for information management.
- The health facility, should conduct a thorough assessment of ICT needs in each department and develop a strategic plan for comprehensive ICT infrastructure. Ensure that each department has an adequate number of computers and access to critical ICT tools.
- The principal of nursing schools should prioritize continuous professional development for all nurses, including specialized training programs tailored to the complexities of health information systems and the use of ICT tools.
- The health training institutions should advocate for the inclusion of digital literacy and ICT training in nursing education curricula. This will ensure that new nurses enter the workforce with the necessary skills to navigate evolving healthcare technologies.
- The Nursing Council should participate in the development and implementation of institutional ICT policies to help nurses embrace digital healthcare practices.

5.5 Nursing implications

Nurses at Mulago Specialized National Referral Hospital are key players in advancing healthcare through the integration of Information and Communication Technology (ICT).

Understanding the challenges associated with ICT integration allows nurses to actively contribute to developing effective solutions. They play a crucial role in advocating for increased financial support towards essential ICT tools, contributing to improved information management and patient care.

In policy development, nurses ensure that institutional ICT policies align with the practical aspects of nursing practice. Their participation in specialized training programs equips them with

the necessary skills to navigate health information systems and embrace technological advancements. Actively utilizing essential ICT tools will enhance nurses' collaboration, communication, and patient-centered care.

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Appendices

Appendix I: Consent Form

My name is **Ronnah Ngabirano**, a student at King Caesar University. I am carrying out a study to assess the utilization of Information Communication Technologies (ICTS) in health management information systems (HMIS) at Mulago National Specialized Referral Hospital.

You have voluntarily consented to participate in the study and all the information you give will be kept confidential. You are under no obligation to participate in the study, and refusal to participate will not block your access to any services at the hospital.

I have explained the study the purpose and objectives of the study to the participant, and they have understood and voluntarily consented to participate in the study.

Researcher's Signature.....Date.....

(RESEARCHER)

The topic and its objectives have been fully explained to me, and I have understood and voluntarily agree to participate in the study.

Respondents Signature.....Date.....

(RESPONDENT)

Appendix II: Questionnaire

S/No.	Section A : Socio-demographic Characteristics of respondents	
1	Age	1. < 30 years 2. 30-35 years 3. 36-45 years 4. 46 years and above
2.	Gender	1. Male 2. Female
3.	Your highest educational level	1. Diploma 2. Degree 3. Others specify
4.	What is your Professional Cadre?	1. Nurse/Midwife 2. Medical Doctor/Specialist 3. ICT/Records Officer 4. Administrator 5. Patient 6. Others Specify.....
5.	Years of experience	1.< 2 year 2. 2-4 years 3. 5-10 years 4. Above 10 years
	Levels of ICT integration into the existing HMIS	
6.	Do you incorporate ICT within HMIS in accordance with your work responsibilities?	1.Yes 2.No
7.	What is the current state and application of ICT as a tool for health information access and dissemination at Medical / Surgical Out Patients' department in Mulago Specialised Hospital?	1. Highly Integrated 2. Moderately Integrated 3. Partially Integrated 4. No Integration/Not applicable
8	Why is this so?	

		
	Individual factors associated with adoption and integration of ICTs in HMIS	
8.	Are you willing to use ICT(Computer/networks) to enable capturing of vital patients' information at your work place?	1. Yes 2. No
9.	How do you rate your ability to use eHMIS?	1. Excellent 2. Very good 3. Good 4. Fairly good 5. Fair 6. Poor
10	Which of the following factors are enablers to integration of ICT in HMIS at Mulago National Referral Hospital?	1. Healthcare institutions' readiness 2. Digital literacy 3. Financial motivation 4. Availability of updated hardware and software 5. Legal and policy 6. All the above
11	Have you ever had any formal training on eHMIS?	1. Yes 2. No
12	How often do you use this electronic HMIS to capture process and store patients 'data?	1. Sometimes 2. Always 3. Never
13	Do you have continuous support from your supervisors in using eHMIS?	1. Yes 2. No
14	If so, what kind of support?	1. Trainings on use of ICT 2. Availability of ICT Room 3. Other specify
15	How do you rate your interaction with your supervisors?	1. Excellent

		2. Very good 3. Good 4. Fairly good 5. Fair 6. Poor
	Health facility factors associated with adoption and integration of ICTs in HMIS	
16	How many computers do you have in the Department ?	
17	How many of these computers are used to access and share patient's information	
18	Which other ICT facilities other than computers do you have and are used in your Department for accessing and dissemination of health information?	1.Scanners 2.Video-conferencing 3.Video 4.Television 5.Others (specify).....
19	List some of the major constraints that face the acquisition and use of ICT in accessing and dissemination of health information at Mulago Specialised Hospital?	1. Inadequate financial support 2. Staff burnout and fatigue 3. Low morale and motivation 4. Inadequate Communication 5. Limited knowledge 6. All the above
20	Do you require assistance in using ICT facilities when accessing health information from the Internet?	1. Yes 2. No
21	If 'Yes', why?	1. Limited digital literacy 2. Complexity of Health Information Systems

		3. Accessing specialized Information 4. Data Interpretation
22	Are there budgetary allocations at your institution that are geared towards acquisition of ICT to promote access to and dissemination of patients' information?	1. Yes 2.No
23	What roles do you think ICT is playing in promoting Access to and dissemination of patient's information?	1. Efficient data storage and Retrieval 2.Telemedicine and remote Consultations 3. Patient Portals 4. Health Information Exchange (HIE) 5. Educational Resources 6. All the above
24	Has your institution/Ministry got an ICT policy to regulate and control the use of ICT as a tool for health Information access and dissemination?	1.Yes 2.No 3. Do not know
25	What are the problems facing the implementation and use of ICT as a tool for accessing and disseminating Patients' information?	1. 2. 3..... 4. 5.

Thank you for your cooperation!

Appendix III: introductory letter



KING CEASOR

UNIVERSITY

"Moral Rearmament, Wealth Multiplication"

P.O Box 88, Kampala, Plot 30/33 King Ceasor Road, Bunga Hill Main Campus,

Email: amoskalukusu@kcu.ac.ug

DIRECTORATE OF RESEARCH

23 November 2023

*The Executive Director,
Mulago National Referral Hospital,
Kampala, Uganda.*



RE: RECOMMENDATION FOR RESEARCH DATA COLLECTION OF :-
NGABIRANO Ronah (Index No. 2021AF/BSS/1268)
Email: rngabirano21ap@student.ac.ug Tel: 0782550033

I write to recommend the above named student who is pursuing a Bachelor of Nursing from King Ceasor University, in Uganda.

Ms. NGABIRANO Ronah (0782550033) is in her third year of study (3.2) and now expected to write her research dissertation as part of the requirements for the award of her degree.

She is working on the topic given as follows:

"Utilization of information communication technologies (ICTs) in health management information systems (HIMS) at Mulago National Referral Hospital, Kampala, Uganda".

The purpose of this letter is to request that you allow her undertake data collection from your hospital facility which will assist her to fulfill the requirements of the university.

The results of her research can be shared with you upon the successful completion of her study.

In any correspondence, use the address given herein. Looking forward to hearing from you.

Sincerely,

A handwritten signature in blue ink, appearing to be "Amos".

Amos Ronald Kalukusu (PhD Fellow, Public Health).

Assoc. Director for Research.

Email: amoskalukusu@kcu.ac.ug Tel: 0781457183

CC: DVC Academic Affairs; Cc: Academic Registrar; Cc: NGABIRANO Ronah



Appendix IV: Approval Letter

TELEPHONE: +256-41554038/1
FAX: +256-414-5325591
E-mail: admin@mulago.or.ug
Website: www.mulago.or.ug



MULAGO NATIONAL REFERRAL HOSPITAL
P. O. Box 7051
KAMPALA, UGANDA

IN ANY CORRESPONDENCE ON THIS
SUBJECT PLEASE QUOTE NO.....

28 November 2023.

Ms. Ronnah Ngabirabo
Principal Investigator
King Ceasor University.

Dear Ngabirano,

Re: Approval of Protocol MHREC 2637: "Utilization of Information Communication Technology in Health Management Information System at Mulago Specialized National Referral Hospital".

The Mulago Hospital Research and Ethics Committee reviewed your proposal referenced above and granted approval of this study on 28 November 2023. The conduct of this study will therefore run for a period of one (1) year from 28 November 2023 to 27 November 2024.

This approval covers the protocol and the accompanying documents listed below;

- Informed consent
- Questionnaire

This approval is subjected to the following conditions:

1. That the study site may be monitored by the Mulago Hospital Research and Ethics Committee at any time.
2. That you will abide by the regulations governing research in the country as set by the Ugandan National Council for Science and Technology including abiding to all reporting requirements for serious adverse events, unanticipated events and protocol violations.
3. That no changes to the protocol and study documents will be implemented until they are reviewed and approved by the Mulago Hospital Research and Ethics Committee.
4. That you provide quarterly progressive reports and request for renewal of approval at least 60 days before expiry of the current approval.
5. That you provide an end of study report upon completion of the study including a summary of the results and any publications.
6. That you will include Mulago Hospital in your acknowledgements in all your publications.

I wish you the best in this Endeavour.

DR. NAKWAGALA FREDERICK NELSON
CHAIRMAN- MULAGO HOSPITAL RESEARCH & ETHICS COMMITTEE.



Vision: "To be the leading centre of Health Care Services"

Appendix V: Map of Uganda showing location of Kampala District



Appendix VI: Map Showing Location of Mulago Specialized National Referral Hospital.

