SCHOOL OF PUBLIC HEALTH

COLLEGE OF HEALTH SCIENCES

UNIVERSITY OF GHANA

ASSESSING THE LEVEL OF DIGITAL HEALTH LITERACY AND ACCEPTABILITY OF THE LIGHTWAVE HEALTH INFORMATION MANAGEMENT SYSTEM AMONG HEALTH WORKERS AT THE LEKMA HOSPITAL

BY

EVANS ABEIKU TAKYI QUASHIE

10945672

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DECLARATION

This dissertation, except for properly acknowledged and cited references to other individuals' work, is entirely the result of my efforts as a student at the University of Ghana School of Public Health, College of Health Sciences and has not been submitted, in part or whole, to any other institution for a degree.

……. **Date: 15-12-2025**

Evans Abeiku Takyi Quashie

(Student)

…….. **Date: 15-12-2025**

Dr. Frances Baaba da- Costa Vroom

(Supervisor)

ABSTRACT

Background

The successful adoption of electronic health systems such as Electronic Medical Records (EMRs) depends on users' digital health literacy. This study assessed the level of digital health literacy and the acceptability of the Lightwave Health Information Management System (LHIMS) among healthcare professionals at LEKMA Hospital in Ghana.

Methods

A facility-based, cross-sectional study was conducted among 78 healthcare workers selected through stratified random sampling. Data was collected using structured questionnaires assessing digital health literacy and LHIMS acceptability. Descriptive statistics summarized sociodemographic characteristics, acceptability constructs and multiple linear regression analysis applied to examine associations between digital health literacy levels and acceptability of the system.

Results

Healthcare workers demonstrated high digital health literacy (Mean=4.02 (SD = 0.41)), and strong acceptance of LHIMS (Mean = 3.83, SD=0.08). Age was negatively associated with performance expectancy ($\beta = -0.035$, $p = 0.007$), while radiographers reported higher performance expectancy ($\beta = 1.044$, $p = 0.016$). Possessing an undergraduate degree correlated with effort expectancy, though not statistically significant ($p = 0.115$). Digital health literacy consistently predicted all acceptance constructs, including performance expectancy ($\beta = 1.149$, $p < 0.001$), effort expectancy

($\beta = 0.759$, $p < 0.001$), social influence ($\beta = 0.589$, $p < 0.001$), and facilitating conditions ($\beta = 0.639$, $p < 0.001$).

Conclusions Healthcare professionals at LEKMA Hospital demonstrated strong digital readiness and a high level of acceptability of the LHIMS platform. The findings highlight the need for targeted digital capacity-building interventions and suggest that tailored implementation strategies based on professional roles could support sustainable adoption of electronic health systems in similar settings.

Keywords
Digital health literacy; Electronic health records; Technology acceptance; Health information systems; Ghana; LMICs

DEDICATION

This work is dedicated to the Almighty God, who provided me with the strength and wisdom to complete this dissertation in good health. Additionally, I dedicate it to my longtime hero, Prof. Richard Asmah, Dean of Students at the University of Health and Allied Sciences (UHAS). Your immense support since my undergraduate days has left an indelible mark on me.

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Table of Contents

LIST OF FIGURES

LIST OF TABLES

LIST OF ABBREVIATIONS

ART	-	Antiretroviral Therapy Clinic
CAUIT	-	Consumer Acceptance and Use of Information Technology
DHL	-	Digital Health Literacy
eHEALS	-	e-Health Literacy Scale
EMR	-	Electronic Medical Records
HL	-	Health Literacy
LHIMS	-	Lightwave Health Information Management System
LMICs	-	Low and Middle Income Countries
ICT	-	Information and Communication Technology
IS	-	Information Systems
IT	-	Information Technology
OPD	-	Outpatient Department
TAM	-	Technology Acceptance Model
TRA	-	Theory of Reasoned Action
UTAUT	-	Unified Theory of Acceptance and Use of Technology
WHO	-	World Health Organization

CHAPTER ONE

INTRODUCTION

1.1 Background to the Study

Health information plays a critical role in supporting healthcare delivery globally. To improve a country's overall health status and enable individual health facilities to manage and enhance healthcare services, the information must be reliable (Teviu, Aikins, & Abdulia, 2012). Reliable information, coupled with effective communication strategies, is vital for disease monitoring, prevention, public health systems, and healthcare delivery. With the rapid rise of information and communication technology (ICT) in healthcare, organizations in many developing countries are increasingly relying on ICT to enhance their capacity to collect, manage, analyze, and report information across various aspects of healthcare (Vital Wave Consulting, 2009). This is crucial for disease prevention, individual health promotion, and enhancing the efficiency and effectiveness of health systems. The implementation and use of ICT in healthcare, commonly referred to as digital health, significantly improve the reliability and efficiency of health information through various innovative applications such as Electronic Medical Records (EMR), mHealth, and telemedicine (Yusif & Soar, 2014). By utilizing ICT in healthcare services, access for both patients and professionals is enhanced, leading to improved healthcare quality and increased labour productivity, which ultimately contributes to national development (Oyeyemi, Gabarron, & Wynn, 2014).

Digital health, refers to the application of information and communication technologies (ICT) within the health sector. According to the World Health Organization, it involves using electronic methods to enhance information flow, thereby improving healthcare services and the management

of health systems (Berhanu, 2017). Effectively engaging with Digital Health requires specific skills or literacy, as Digital Health tools provide limited value if users lack the necessary skills to use them effectively. This can be achieved by enhancing users' computer literacy or equipping them with specific skills that support health-related goals, while also designing systems with users in mind (Norman & Skinner, 2006). E-Health literacy is the ability to seek, locate, comprehend, and evaluate health information from electronic sources. It involves using this knowledge effectively to address or resolve health issues. Training skilled, motivated, and proficient healthcare information technology-oriented staff is crucial for overcoming barriers to effectively implementing e-Health systems. E-Health literacy comprises six core skills: traditional literacy, health literacy, information literacy, scientific literacy, media literacy, and computer literacy (Shiferaw & Mehari, 2019). These skills are influenced by various factors, including age, gender, education, internet access and availability, and income (Osei Asibey, Agyemang, & Boakye Dankwah, 2016).

In recent years, the adoption of electronic medical records (EMR) has gained traction in many countries due to the growing recognition that robust EMR systems are essential for delivering higher-quality care at lower costs (Chaplin et al., 2015). When implemented correctly, electronic medical records (EMRs) can streamline healthcare services and enhance operational efficiency, offering substantial advantages over traditional paper-based systems. These benefits include remote access to medical records, faster and easier information retrieval, mechanisms for flagging abnormal results, and the elimination of handwritten prescriptions, which helps reduce prescription errors (Gaylin et al., 2011). Additional benefits of EMRs include the ability for multiple users to access patient records simultaneously and the capability to perform data queries, which enhances informed decision-making. These advantages have led national governments in developing

countries to invest significantly in strengthening their health information systems (HIS) over the past decade (Sahay, Rashidian, & Doctor, 2020).

Despite the growing adoption of electronic medical record (EMR) systems, employees in public sector hospitals frequently resist these technologies. Al-Hanawi et al. (2019) highlight several unique challenges and barriers associated with the implementation plan and strategy such as processes, activities, and standards that contribute to this resistance. Additionally, environmental and contextual factors such as culture, organizational structure, macroeconomic conditions, political and social elements, and attitudes toward change play a significant role. Furthermore, the specific needs of health organizations, such as the required speed of implementation, investment levels, mission and vision alignment, infrastructure, and user-friendliness, are also critical considerations. Some of the EMR applications currently in use at health facilities throughout Ghana include "CAREWEX EMR," "HEALTH PRO ©," "HIS," and "LHIMS," among others (Attafuah, Abor, Abuosi, Nketiah-Amponsah, & Tenza, 2022). The Lightwave Health Information Management Software (LHIMS) is the EMR system being used across the nation by the Ghana Health Service, and is aimed at networking all hospitals including Lekma Hospital, clinics, and health centres across the country and all agencies under the Ministry of Health. In developing countries, the implementation of electronic medical record (EMR) systems encounters several challenges, including inadequate technical infrastructure, limited computer knowledge, insufficient skills and experience, and the attitudes of potential users. Despite these challenges, there is growing evidence of health workers' interest and willingness to accept these systems, provided they receive adequate training and support (Sukums, Mensah, Mpembeni, Kaltschmidt, Haefeli, & Blank, 2014). Consequently, this study aims to evaluate the digital health literacy levels

and the acceptability of the Lightwave Health Information Management System (LHIMS) among health workers at LEKMA Hospital.

1.2 Problem Statement

Health systems in sub-Saharan Africa continue to face persistent challenges that hinder the achievement of universal health coverage and the broader sustainable development agenda. Addressing these barriers to healthcare access is essential, particularly in remote or hard-to-reach regions (Agyemang-Duah et al., 2019). In Ghana, the Ministry of Health has prioritized the adoption of digital health systems through its national Digital Health strategy, which emphasizes the integration of digital technologies to enhance planning, management, and service delivery (Afarikumah, 2014; Adzakpah & Dwomoh, 2023).

In line with this agenda, LEKMA Hospital adopted the LHIMS system in February 2022 to improve patient record-keeping and service delivery. However, preliminary observations and informal discussions with health workers suggest mixed experiences with the system. While some staff acknowledge improvements in documentation and ease of retrieving patient information, others report frustrations related to slow system response, workflow disruptions, and prolonged working hours. Inadequate and irregular training, both at the point of deployment and as refresher training, has also been frequently cited by staff as a major barrier to effective use of LHIMS.

These experiences mirror challenges widely reported in EMR implementations across Africa, where issues such as insufficient training, lack of user involvement, system usability concerns, and limited digital readiness contribute significantly to low acceptability and high implementation failure rates (Adjorlolo & Ellingsen, 2013; Idoga et al., 2019). Studies further show that health worker acceptance of EMR systems is shaped not only by system characteristics but also by their

digital competencies and familiarity with digital health tools. In Ghana, concerns have also been raised about inadequate pre-service exposure to digital health systems, which leaves many health workers unprepared for EMR adoption (Alhassan et al., 2021).

As EMR acceptability is closely linked to users' digital health literacy, it becomes essential to understand the extent to which health workers at LEKMA Hospital possess the competencies required to effectively utilize LHIMS. Yet, no empirical study has assessed digital health literacy levels among health workers at LEKMA or examined how these competencies influence the acceptability and use of the implemented system.

These gaps make it necessary to investigate the digital health literacy of health workers at LEKMA Hospital and examine how it relates to their acceptance and use of LHIMS. This study therefore seeks to assess the level of digital health literacy among staff and determine the association between digital health literacy and acceptability of LHIMS.

1.3 Significance of the study

In today's information technology-driven landscape, the creation of a national e-Health strategy has emerged as a crucial milestone in the advancement of national health system development plans. A well-defined national framework and vision facilitate the effective allocation and utilization of resources. Consequently, the formulation of a national strategy serves as the foundational step in a lengthy journey toward achieving that vision (Hamilton, 2013). The anticipated outcomes of this study are intended to assist information system developers, hospital administrators, and healthcare professionals engaged in the implementation of e-Health tools. The insights gained will aid in the design of systems that cater specifically to the requirements of healthcare institutions. Additionally, the findings may play a significant role in shaping policy

regarding e-Health tools and other technological applications within Ghana's healthcare sector. Given the vital role of digital health literacy among healthcare workers in enhancing patient care, it is essential that assessments are conducted an assessment to ensure readiness to use digital health tools. The findings of this study will inform the training of healthcare workers on how to effectively find, interpret, and critically evaluate the quality of health information, thereby improving their e-Health literacy. Furthermore, this study will contribute to the existing literature by examining the capability of health workers to utilize EMRs, which is crucial for building comprehensive health information in Ghana.

1.4 Research Questions

i. What are the levels of digital health literacy among the health workers at LEKMA hospital?
ii. What factors affect LHIMS's acceptability among health workers?
iii. How does digital health literacy affect the acceptability of LHIMS among the health workers within LEKMA hospital?

1.5 General Objectives

The main objective of this research is to assess the relationship between level of digital health literacy and acceptability of the LHIMS among Health workers at the LEKMA Hospital.

1.5.1 Specific objectives

i. To assess the level of digital health literacy among health workers in LEKMA hospital.
ii. To assess the level of acceptability of LHIMS among health workers in LEKMA hospital.
iii. To assess the effect of digital health literacy on the acceptability of LHIMS among health workers in LEKMA hospital.

1.6 The Conceptual Framework

This section examines the key concepts and variables related to the study. The independent variable is Digital Health Literacy, while the dependent variable is the acceptability of the (LHIMS). The analysis focuses on understanding how digital health literacy influences the acceptance and utilization of LHIMS among healthcare professionals.

1.6.1 The Conceptual Framework

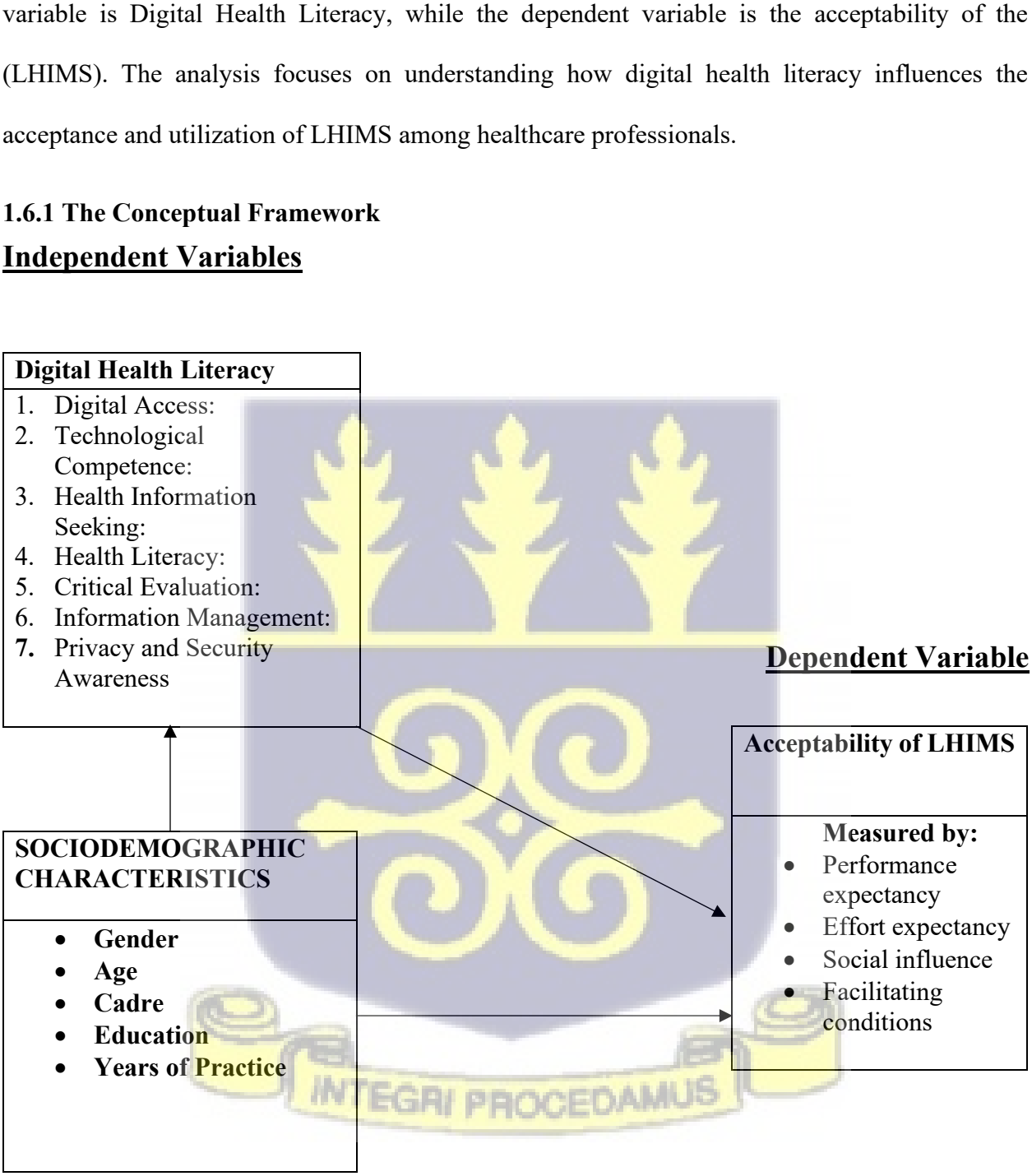

Figure 1: Conceptual Framework

Source: Adopted from (Venkatesh et al, 2012) and modified by the researcher (2023).

1.6.1.2 Narrative to the Conceptual Framework

This study adopts a conceptual framework that explores the influence of digital health literacy on the acceptability of the LHIMS platform. The framework identifies seven independent variables, digital access, technological competence, health information seeking, health literacy, critical evaluation, information management, and privacy/security awareness, as key components of digital health literacy. These variables are posited to affect a single dependent outcome: the acceptability of LHIMS. Acceptability is operationalized through four constructs derived from the Unified Theory of Acceptance and Use of Technology (UTAUT): performance expectancy, effort expectancy, social influence, and facilitating conditions. While these constructs are presented individually, they collectively represent the overarching outcome of system acceptability, thereby maintaining the integrity of a single-outcome conceptual framework.

In this study, LHIMS was introduced recently, and health workers engagement is still undergoing adaptation. For this reason, the UTAUT constructs are interpreted as reflecting acceptability as intended use, representing health workers willingness, perceived readiness, and positive or negative orientation toward integrating LHIMS into routine practice. Thus, although UTAUT traditionally predicts use behaviour, the model is suitable for operationalizing acceptability in this context because acceptability directly shapes future use and is strongly aligned with behavioral intention (Demsash et al., 2024).

The framework also incorporates sociodemographic characteristics; such as age, gender, education level, professional category, and years of experience, which may influence both digital health literacy and system acceptability. Previous studies indicate that demographic factors often shape digital readiness and influence perceptions of digital health tools. Therefore, the model posits that

sociodemographic characteristics have direct associations with both DHL and LHIMS acceptability.

Collectively, this framework integrates constructs from digital health literacy and UTAUT, providing a comprehensive basis for examining how workers' digital competencies and demographic factors shape their acceptance of LHIMS.

1.7 Organization of the report

This study is organized into six chapters. Chapter One serves as the introduction, providing an overview of the background, and explaining the research's context and rationale. Chapter Two reviews related literature, focusing on global and local research relevant to the topic and covering key areas aligned with the objectives. Chapter Three details the methodology, including the study area's profile, study population, design, and sampling procedures. Chapter Four presents the data analysis, offering detailed insights into the findings from the field. Chapter Five discusses these findings in comparison with other relevant studies, placing them in a broader context. Lastly, Chapter Six provides recommendations, conclusions, and suggestions for future research based on the study's results.

CHAPTER TWO

LITERATURE REVIEW

2.0 Introduction

The main concepts of the study namely, digital health (DH), digital health literacy (DHL), and acceptability of digital health technologies are discussed in this chapter. Other concepts that have a bearing on the conduct of this are duly explained in this chapter.

2.1 Digital Health

Digital technologies and the utilization of health data are revolutionizing the delivery of health services, enhancing public health protection, and improving the management and prevention of chronic conditions (OECD, 2023). Digital health is increasingly becoming important in health systems and healthcare delivery, such as through telemedicine and artificial intelligence. In the framework of the 2020-2050 global strategy on digital health, the term 'digital health' refers to "the field of knowledge and practice associated with the development and use of digital technologies to improve health" (World Health Organization, 2021). This definition highlights the critical role digital technologies play in modern healthcare. As highlighted by the Organization for Economic Co-operation and Development (OECD, 2023), "digital health expands the concept of e-Health to include digital consumers, with a wider range of smart devices, connected equipment, and digital therapeutics." Digital health integrates a wide range of technologies, this includes tools such as mobile health applications, digital patient records, health-monitoring wearables, remote healthcare consultations, and individualized treatment plans. It facilitates the transformation of healthcare by integrating software, hardware, and sensors into delivery systems. This has revolutionized the field, offering significant benefits to caregivers, patients, researchers, and others involved in healthcare (Bajwa, Munir, Nori, & Williams, 2021).

Digital health plays a vital role in improving healthcare delivery by introducing self-care and remote patient monitoring, reducing the pressure on healthcare facilities (Campion, Dorsey, & Topol, 2016). It supports prevention through early disease detection, especially for chronic and respiratory conditions(Murdoch & Detsky, 2013). Moreover, digital health strengthens the doctor-patient relationship by increasing transparency and real-time access to health data. It also expands healthcare professionals' reach, reduces administrative tasks, and promotes affordable care while connecting patients with supportive online communities(Terry & Buntoro, 2021).

2.1.1 Digital Health Literacy

The rapid advancements in digitization within the health sector over the past few years have significantly increased the importance of online resources and mobile applications in healthcare (Ittefaq & Iqbal, 2018). As these developments unfold, the capability to effectively search for, assess, and utilize web-based health data and complementary digital solutions is becoming crucial, particularly for healthcare consumers and professionals. This capability is referred to as digital health literacy (DHL) (Van Der Vaart & Drossaert, 2017). Recent studies highlight the impact of individuals' self-assessed competencies in utilizing online resources on their health outcomes and the overall quality of care they receive, suggesting that inadequate skills can lead to negative health consequences (Hsu, Chiang, & Yang, 2014). Digital Health is recognized to improve the quality, efficacy, capacity, and accessibility in the healthcare sector (Hernandez, 2009), thereby offering opportunities to advance public health (Camerini & Schulz, 2012) and foster health equity (Neter & Brainin, 2012).

Digital Health literacy, first introduced in 2006, initially identifies six components, including traditional literacy, health literacy, information literacy, scientific literacy, media literacy, and computer literacy (Lee & Tak, 2022). This concept is partially rooted in social cognitive theory

and self-efficacy theory (Sudbury-Riley, FitzPatrick, & Schulz, 2017), both of which emphasize the importance of skills and self-assurance as essential elements that facilitate behavior modification and skill acquisition, as discussed in detail by Norman and Skinner (2006). A significant challenge lies in developing effective assessment methods for these skills, which can inform strategies to support both consumers and health workers in fully utilizing Digital Health resources.

The e-Health Literacy Scale (eHEALS) was designed to address the demand for evaluating Digital Health literacy across diverse populations and contexts (Bazm et al., 2016). This self-report instrument is administered by a health professional and relies on individuals' self-assessment of their skills and knowledge in various domains (Slatyer et al., 2022). The tool aims to provide a comprehensive estimate of consumers' Digital Health-related competencies, which has the potential to be utilized to support clinical decision-making and health advocacy efforts for individuals or specific groups (Norman & Skinner, 2006).

Digital Health Literacy (DHL) has evolved from the broader concept of health literacy within the context of information and communication technology (Alipour & Payandeh, 2022). According to Norman and Skinner (2006), digital health literacy is "the ability to seek, find, understand, and appraise health information from electronic sources and apply the knowledge gained to addressing or solving a health problem." This concept extends the traditional understanding of health literacy by incorporating digital competencies required to effectively navigate online health environments. While DHL and health literacy share a common operational foundation (Dunn & Hazzard, 2019), the increasing reliance on digital platforms for health information and service delivery underscores the growing importance of DHL. It enables individuals to critically evaluate online health information (Diviani et al., 2015) and has become especially crucial during global health crises,

such as the COVID-19 pandemic, where accurate digital information access and use are vital for informed health decision-making.

Digital health literacy (DHL) offers various advantages, including reducing the time needed to consult healthcare providers, managing patients' clinical symptoms, monitoring dietary habits and other behaviors, and facilitating communication between patients and physicians (Conard, 2019). Elevated levels of DHL among healthcare professionals enhance accessibility to precise health information via effective internet search techniques, and foster improved collaboration with colleagues in delivering care, leading to more informed health decisions (Alipour & Payandeh, 2022). Also, it supports patient health literacy by assessing patients' health literacy levels and being aware of their requirements (Quinn, Bond, & Nugent, 2017). The competency of healthcare workers in DHL—who are primary individuals engaging with digital health technologies - have been identified as a critical element in advancing patients' digital health literacy (van der Heide et al., 2021).

As mentioned earlier, several variables have been found to impact digital health literacy (DHL), such as age, health status, level of education, digital literacy abilities, and information-seeking motivation (Isazadeh et al., 2019). The average score for health literacy and attendant techniques was low, according to a 2015 research conducted by Javadzadeh et al. regarding the health literacy of nursing personnel in Iran. It is critical to assess healthcare professionals' DHL because of the critical role that DHL plays in improving patient care and encouraging patients' own digital health literacy, which in turn enables improved self-care. Such an evaluation will shed light on their existing digital health literacy levels and point out areas in need of more work.

2.2 Acceptability of digital health interventions

Acceptability is crucial to digital health. This is because acceptance of technology leads to its application (Amoako-Gyampah & Salam, 2004; Khan & Woosley, 2011). Acceptability has emerged as a vital element in the development, evaluation, and implementation of healthcare interventions, which are often complex, involving multiple interconnected components or administration at various levels within a healthcare institution (Sekhon, Cartwright, & Francis, 2017). The adoption and utilization of information technologies can provide both short-term and long-term advantages for organizations and individuals, including improved performance, greater financial and time efficiency, and enhanced convenience (Foley Curley, 1984; Sharda, Barr, & McDonnell, 1988, as cited in Marikyan & Papagiannidis, 2023). The concept of "acceptability" has a significant impact on digital health research and practice, as it reflects how interventions are perceived by key stakeholders, including patients, family members, healthcare providers, institutional review boards, and policymakers (Perski & Short, 2021). In medical contexts, the term "acceptability" is often associated with tolerability, which refers to the degree to which a drug or procedure causes pain, discomfort, side effects, or adverse events (Perski & Short, 2021). However, while related, acceptability and tolerability are distinct concepts.

The literature on digital health contains a wide range of definitions and measures of acceptability (Nadal, Sas, & Doherty, 2020). Existing frameworks generally agree on the notion that acceptability refers to the way individuals consider and perceive a particular digital health intervention (Sekhon, Cartwright, & Francis, 2017). In the literature, "acceptability" has been described as encompassing people's emotional responses toward a new digital health intervention, their intentions to use it (e.g., willingness to engage), actual engagement (e.g., frequency of use), and their satisfaction after interaction with the intervention (Nadal, Sas, & Doherty, 2020). While

innovative medical technologies and digital solutions form part of emerging healthcare models, their successful implementation heavily relies on the acceptance of healthcare professionals, such as doctors and nurses, who are at the forefront of confronting and integrating these new technologies. Patients, in this scenario, are regarded as the customers of these innovations (Safi, Thiessen, & Schmailzl, 2018). Acceptability in the context of electronic medical records (EMRs) refers to the extent to which healthcare providers, patients, and other stakeholders perceive and embrace the use of EMR systems (Alshahrani, Stewart, & MacLure, 2019). It encompasses factors like user satisfaction and ease of use, perceived usefulness, and the willingness to adopt and utilize EMRs, workflow integration, training and support, intervention design and development, user engagement and behavior change, adoption and implementation, patient-centered care, continuous improvement, and iterative development in healthcare settings.

2.3 Relationship between Digital Health Literacy and Acceptability

Electronic medical records (EMRs) have gained widespread adoption in healthcare settings globally. According to Boonstra, Versluis, and Vos (2014), referencing Jha et al. (2009), the rollout of hospital-wide protocol Electronic Health Record (EHR) systems is a challenging process that requires careful consideration of various institutional and technical elements. These include human capabilities, institutional structure, institutional culture, IT infrastructure, funding capabilities, and effective coordination. Conversely, Abdulla, Ahmed, Alnoaimi, and Ali (2019) emphasize that health information technology (HIT) implementation has significantly improved healthcare quality, increased efficiency, reduced costs, and enhanced provider satisfaction. Furthermore, EMRs and EHRs have become the prevalent e-health solutions in diverse healthcare settings today (Amatayakul, 2009, as cited in Alanazi et al., 2020). Electronic Medical Records acceptability refers to the willingness of health professionals to adopt and integrate EMRs into their daily

practice. EMRs are a digital platform to manage patient health records, track medical histories, and streamline clinical workflows (Ajami & Bagheri-Tadi, 2013). While the benefits of EMRs are well-established, their acceptance among health workers varies due to factors such as system complexity, technical support, and digital competency levels. Another crucial factor affecting the successful implementation and utilization of e-health technologies is the users' perception.

Research suggests a strong connection between Digital Health Literacy (DHL) and the acceptability of Electronic Medical Record (EMR) systems among health workers. Several studies have confirmed this relationship, highlighting the significance of DHL in EMR adoption. A growing body of evidence, including studies by Alsahafi et al. (2022) and Alanazi et al. (2020), suggests that DHL contributes significantly to the promotion of EMR acceptance among healthcare professionals by improving perceived usefulness, ease of use, and reducing anxiety, ultimately facilitating successful adoption.

Health professionals with higher levels of DHL are more inclined to adopt EMRs and incorporate them into their practice, as they possess the necessary digital skills to navigate these systems (Tubaishat, 2017). A study by Park (2021) highlights that health professionals who are proficient in digital health skills are more prone to interpret EMR systems as beneficial and user-friendly, thereby fostering greater acceptance. DHL enables health workers to efficiently access, interpret, and use the health data stored in EMRs, leading to better clinical decision-making and workflow optimization (Tubaishat, 2017). Conversely, those with low DHL may find it challenging to interact with digital platforms, leading to resistance and lower adoption rates.

2.4 Review of Relevant Theories

2.4.1 The Unified Theory of Acceptance and Use of Technology (UTAUT)

This study is informed by the Unified Theory of Acceptance and Use of Technology (UTAUT), established by Venkatesh et al. (2012), as cited by Marikyan & Papagiannidis (2023). UTAUT is recognized as one of the leading comprehensive and resilient systems for examining technology adoption and acceptance (Momani, 2020). It is valued for its applicability to various technologies and its adaptability following modifications (Teng, Cai, Gao, Zhang, & Li, 2022). The model's simplicity, characterized by a limited number of constructs and moderating variables, enhances its suitability for studying the acceptance of new technologies (Momani, 2020). Venkatesh et al. (2003) intended to create a cohesive framework for technology acceptance theories, identifying five key limitations in prior theories and models (Raza, Qazi, Khan, & Salam, 2021). Consequently, UTAUT has emerged as a well-integrated and advanced theory by incorporating the most advantageous elements from earlier models. This research selects UTAUT due to its effectiveness in assessing user acceptance and intention to adopt new technologies.

Over the past two decades, the Unified Theory of Acceptance and Use of Technology (UTAUT), along with its adoption model, the Technology Acceptance Model (TAM), and related models, have been instrumental in explaining system use and acceptance (Marikyan & Papagiannidis, 2023). Originally, UTAUT was developed by consolidating eight distinct models and has since emerged as the most frequently referenced framework for individual technology acceptance (Hennington & Janz, 2007). UTAUT has seen significant applications in healthcare systems, particularly electronic medical records (Jewer, 2018). Building on related literature, Venkatesh et al. (2003) modified the Unified Theory of Acceptance and Use of Technology (UTAUT) to create the Consumer Acceptance and Use of Information Technology (CAUIT) model. This all-

encompassing framework integrates previous technology acceptance models while preserving the four essential constructs of UTAUT, which are Performance Expectancy, Effort Expectancy, Social Influence, and Facilitating Conditions. In addition, CAUIT introduces three new variables: Price, Habit, and Hedonic Motivation, all of which play a significant role in influencing consumer behavioral intentions (Shehu, Sanni, & Nsereko, 2019).

In their 2003 study, Venkatesh described performance expectancy as the extent to which an individual believes that utilizing a system will improve their job performance (Venkatesh et al., 2003). This concept includes various elements such as perceived usefulness, extrinsic motivation, job fit, relative advantage, and outcome expectations. Derived from the Technology Acceptance Model, perceived usefulness is described as "the degree to which a person believes that using a particular system would enhance their job performance" (Davis, 1989; Davis et al., 1989; Venkatesh et al., 2003). Effort expectancy refers to the ease of use associated with the technology (Khatimah & Halim, 2014). Social influence refers to the extent to which an individual feels that significant others think they should adopt the new system (Venkatesh et al., 2003). Lastly, facilitating conditions are characterized as the extent to which consumers believe that the organization's existing technology or resources will support the new technology (Venkatesh et al., 2012). Together, these constructs offer a detailed framework for comprehending the factors that impact technology acceptance and use in various settings.

An individual's actual use of technology is directly affected by their behavioral intention. The Theory of Reasoned Action (TRA), introduced by Fishbein and Ajzen in 1975, quantifies the degree of intention to undertake a specific task (Davis et al., 1989). In 1986, Davis adapted TRA for the information systems context through the Technology Acceptance Model (TAM), incorporating TRA's concept of behavioral intention into the Management Information Systems

(MIS) discipline. While Venkatesh et al. (2003) did not explicitly define behavioral intention, they measured it items derived from Davis et al. (1989), which had been widely applied in earlier individual acceptance studies. These items align with the original TRA definition of behavioral intention. Furthermore, TRA is pertinent to use behavior. When developing TAM, Davis et al. (1989) speculated that TRA's generality in explaining various human behaviors "should therefore be appropriate for studying the determinants of computer usage behavior as a special case." This foundational relationship between intention and actual behavior underscores the importance of understanding individual motivations in the adoption of technology.

The UTAUT model did not specifically define use behavior or behavioral intention; instead, it opted to measure these constructs through system logs. In contrast, Davis et al. (1989) utilized self-reports to assess use behavior, acknowledging this approach as a means to operationalize use behavior in the absence of "objective usage logs." Therefore, the use of system logs by Venkatesh et al. (2003) is justifiable. Furthermore, the influence of predictors on intention is moderated by factors such as age, gender, experience, and voluntariness of use. Age affects all four predictors, performance expectancy, effort expectancy, social influence, and facilitating conditions. Gender influences the relationships among effort expectancy, performance expectancy, and social influence. Experience moderates the connections between effort expectancy, social influence, and facilitating conditions, while voluntariness of use specifically moderates the relationship between social influence and behavioral intention (Venkatesh et al., 2003). This nuanced understanding of moderating factors enhances the applicability of the UTAUT model in different contexts.

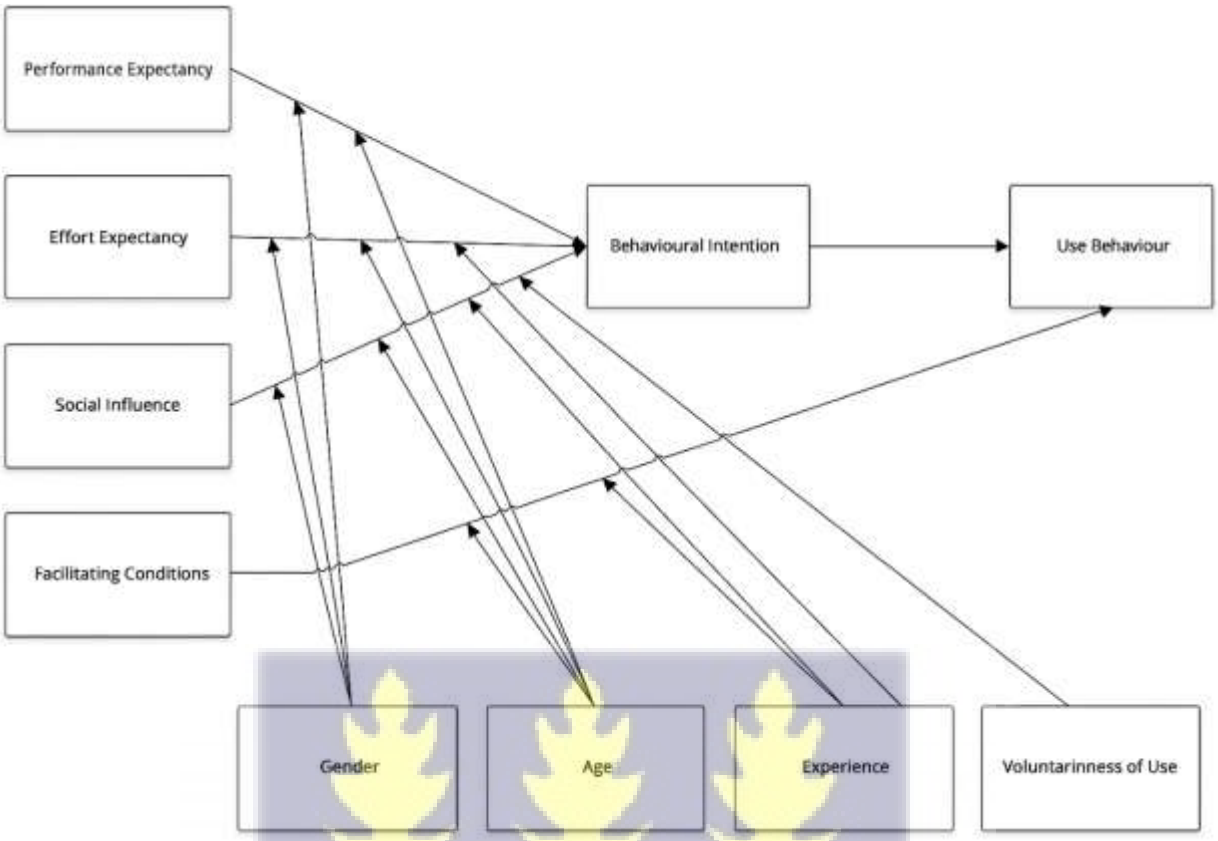

Figure 2: Overview of the UTAUT model and its key components

Marikyan and Papagiannidis (2021) provide an in-depth analysis of the Unified Theory of Acceptance and Use of Technology (UTAUT), a notable model for examining user acceptance and adoption of technology. This framework includes four key components. Performance expectancy, effort expectancy, social influence, and facilitating conditions

Table 2.1 Summary of the strengths and weaknesses of the most important technology acceptance theories.

Theory	Developer & Year	Field of Development	Strengths	Weaknesses
TRA (Theory of Reasoned Action)	Ajzen & Fishbein, 1980	Social Psychology	One of the most fundamental theories of human behavior; explains a wide range of actions and intentions. Applied successfully to technology acceptance.	General and does not consider external factors (e.g., mood, past experience). Assumes behaviors are planned beforehand.
TPB (Theory of Planned Behavior)	Ajzen, 1985	Social Psychology	Enhances TRA by including perceived behavioral control; widely used in technology adoption studies.	Similar limitations to TRA; decomposes TRA constructs but still assumes planned behavior.
DTPB (Decomposed Theory of Planned Behavior)	Taylor & Todd, 1995	Social Psychology	Incorporates factors from the IDT model for better managerial application in technology usage.	Still based on TPB's assumption that behaviors are planned; overlaps conceptually with TPB.
TAM (Technology Acceptance Model)	Davis, 1986	IT Field	Replaces attitude toward behavior with perceived usefulness and perceived ease of use. Strong predictive power for user acceptance of technology.	Does not include social norms or feedback from external factors (e.g., user experience, cultural influences).
TAM2 (Extended Technology Acceptance Model)	Venkatesh & Davis, 2000	IT Field	Expands TAM by adding subjective norms and explaining changes in user perception over time; includes social influence.	Still limited in accounting for broader behavioral factors; cannot predict behavior across cultures.
C-TAM-TPB (Combined TAM and TPB)	Taylor & Todd, 1995	IT Field	Integrates TPB's social psychology constructs with TAM's IT constructs; offers improved explanatory power for technology acceptance.	Constructs from TAM not fully reflected; neglects emotional and situational influences.
MPCU (Model of PC Utilization)	Triandis, 1979	IT Field	Useful for predicting acceptance of new technologies; incorporates voluntary usage.	Complex and better suited for long-term behavior, less effective for short-term impacts.

IDT (Innovation Diffusion Theory)	Rogers, 1983	Social Science	Explains and predicts rates of innovation adoption; applicable to many contexts.	Generalized; does not indicate how attitudes directly affect adoption behavior.
MM (Motivational Model)	Deci & Ryan, 1985	Psychology	Focuses on motivation (intrinsic and extrinsic) in technology use; useful for understanding user engagement and learning systems.	Requires multiple factors for measurement; lacks predictive simplicity.

Table 3 summarises the major technology-acceptance theories commonly used in information systems research. The table is an author-synthesised summary of the seminal theoretical works and later reviews; it is intended to provide conceptual grounding for selecting constructs in this study (Ajzen & Fishbein, 1980; Davis, 1986; Taylor & Todd, 1995; Venkatesh & Davis, 2000; Rogers, 1983).

CHAPTER THREE

RESEARCH METHODOLOGY

3.0 Introduction

This section describes the methods used in the study, including the study design, area, and population. It outlines the procedures for data collection and sampling, along with the approaches for data analysis and management. Furthermore, it addresses the ethical considerations involved in the research.

3.1 Study Design and Study Area

The study utilized a cross-sectional design and a quantitative approach to assess the digital health literacy and acceptability of the LHIMS among health workers at LEKMA Hospital. This design was considered appropriate for this study because it allows for the simultaneous assessment of digital health literacy, sociodemographic characteristics, and the acceptability of the LHIMS at a single point in time.

3.1.1 Profile of study Area

The study was conducted at the LEKMA Hospital in the Ledzokuku-Krowor Municipal Assembly(LEKMA), Greater Accra Region of Ghana. This 100-bed facility comprises key units typically found in a general hospital, including the Outpatient Department (OPD), Emergency Unit, Medical and Surgical Wards, Maternity and Labour Wards, Paediatrics, Neonatal Intensive Care Unit (NICU), Pharmacy, Laboratory, Radiology/Imaging Unit, Operating Theatre, Public Health Unit, Physiotherapy, Records/Health Information Management Unit, and various specialist clinics such as Eye, Dental, and HIV/ART services.

LEKMA Hospital functions as the primary general hospital for the Ledzokuku-Krowor Municipality. The clinical staff includes 22 doctors, of whom 9 are specialists, alongside over 200 nurses and midwives, 15 pharmacists, and 5 paramedical staff. Additionally, the hospital employs 30 laboratory technicians, 35 orderlies, and 50 security personnel, among others. On average, the Lekma Hospital sees a little over 300 OPD attendants daily and about 247,800 attendants per annum being both native and foreign clients (Health News, 2015).

The hospital was purposively selected because it represents the typical secondary-level healthcare facility targeted in the national roll-out of the (LHIMS). Furthermore, key LHIMS modules, including outpatient, laboratory, and pharmacy were operational at the time of data collection, thereby facilitating the evaluation of the system's functionality and user experience in real-world clinical contexts.

The facility renders services to all the communities within the Tema metropolis such as Nungua, Teshie, Spintex, Sakumono, North & South Teshie, Teshie Nungua estates, Teshie camp, Martey Tsuru, Greda estate, Regimanuel estate (East Airport), Tsuibleoo.

3.2 Study Population

The study population comprised health workers at LEKMA Hospital. The participants in this study included doctors, nurses Midwives, Laboratory Scientists, Pharmacists, and Dieticians.

3.2.1 Inclusion Criteria

- All health workers who use the Hospital LHIMS system in their daily activities

3.2.2 Exclusion Criteria

- All healthcare professionals who had been using the Hospital LHIMS system for less than 3 months.

3.3 Sampling Procedure

This study employed stratified random sampling to select participants in a way that would represent the broader population. The "stratum" in this context refers to the categories of healthcare workers grouped by their professional roles. The strata were composed of five distinct cadres: Nurses & Midwives, Doctors, Lab Scientists, Pharmacists, and Radiographers. Within each of these groups, participants were randomly selected, ensuring that all healthcare professional categories were proportionally represented, thereby reflecting a balanced sample for the research. Random sampling was carried out manually using the ballot method. In each unit, the names of all eligible healthcare professionals were written on identical slips of paper, folded to conceal identity, and placed into a container. The slips were then thoroughly mixed, and the required number of participants for each category was drawn blindly. This approach ensured that every eligible staff member had an equal chance of being selected, while still maintaining proportional representation across departments.

3.3.1 Sample Size Determination

3.3.2 Sampling Technique

The sample size for the study was determined using Neuman's rule of thumb for small sample populations. According to Neuman (2007), for populations under 1000, a large sampling ratio of around thirty percent (30%) is recommended. The health workforce at LEKMA Hospital totals two hundred and seventy-three (273) individuals. Based on this guideline, 30% of this number, equalling 82, was selected. To ensure a high enough response rate, additional questionnaires were distributed beyond the required number, and representative health workers from various staff cadres were included to make up the 82 participants.

3.2.1.2 Calculating Sample Size per Cadre

$n_0=(n/N) * 82$

Where n_0= is the sample size per Cadre, n= the total number of health workers per cadre, N= Population size

	Respondents	n	Sample Size
1	Nurses & Midwives	200	60
2	Doctors	22	6
3	Lab Scientists	30	9
4	Pharmacists	15	4
5	Radiographers	10	3

N=273

3.4 Data collection tools and procedures

This study employed a standardized online questionnaire comprising three sections with limited-response and closed-ended questions. Section A captured respondents' demographic characteristics, while Sections B and C assessed Digital Health Literacy and LHIMS acceptability using structured Likert-scale items. The questionnaire was developed using validated measures, including the 42-item eHealth Literacy Framework (eHLF) and UTAUT-based constructs for system acceptability. Following approval from LEKMA Hospital management and informed consent from participants, a link to the questionnaire was shared with eligible healthcare professionals. An in-depth explanation of the instrument was provided to ensure clarity and minimize ambiguity. Data were collected over a specified period, during which respondents completed the survey at their convenience. The researcher monitored participation, addressed clarification requests, and ensured that only consented and eligible participants submitted responses, thereby maintaining data quality and integrity.

3.5 Study Variables

A variable can be seen as anything or a factor that has a quantity or quality that varies. There is the independent and the dependent variable. The dependent variable is the variable a researcher is interested in, and the independent variable is considered a factor that influences the dependent variable. The study variables consist of independent and dependent variables that will be used to answer the research questions.

Table 3.1: Study Variables

Independent Variables	**Dependent Variable**
Level of Digital Health literacy	Level of Acceptability
Sociodemographic characteristics	

3.6.2 Data Analysis and Presentation

Data were entered into Microsoft Excel, then edited and cleaned before being exported to Stata version 15.0 for statistical analysis. Within Stata, variables were defined, and consistency checks were performed to identify and correct data entry errors. Digital Health literacy scores were computed using a validated Digital Health Literacy Scale, while system acceptability was assessed based on four constructs: performance expectancy, effort expectancy, social influence, and facilitating conditions. Descriptive statistics, including measures of central tendency and variability, were used to summarize the demographic characteristics of respondents.

A multiple linear regression analysis was performed to examine the effect of digital health literacy on the various acceptability constructs. Model diagnostics were conducted to ensure the accuracy and reliability of estimates. Robust standard errors were applied in Stata to account for potential heteroscedasticity, while the conceptual distinctness of the independent variables and the stability

of coefficients and standard errors indicated that multicollinearity was unlikely to have affected the results.

3.7 Limitations of the Study

The study encountered several limitations, particularly in securing respondent participation due to the demanding nature of their work and time constraints. Logistical challenges also arose, as the limited timeframe and budget made it infeasible to conduct a rigorous population-based study. Additionally, since the assessment relied on self-reporting, there was a risk of recall bias or socially desirable responses from participants.

CHAPTER FOUR

RESULTS

4.1 Introduction

This chapter presents the results of the analysis. The data gathered from the questionnaire were analyzed and presented in tables and pie charts, along with their respective percentages and frequencies. The findings align with the study's specific objectives, which include assessing the level of digital health literacy among health workers, evaluating the acceptability of the Lightwave Health Information Management System (LHIMS) among these workers, and examining the relationship between digital health literacy and the acceptability of LHIMS.

4.2 Demographic Information of Respondents

The demographic characteristics of respondents from various units within the hospital are detailed in Table 4.1, presented in frequencies and percentages. Out of 82 targeted respondents, 78 were involved in the study, resulting in an overall response rate of 95.1%. The sample population comprised 68 females, representing 87.2% of respondents. The participants' ages varied from below 20 to 51 years. The age group of 30–39 years were the majority, accounting for 52.6% of the respondents, whereas the 50–59 age group had the lowest representation at 1.3%.

The Lekma Hospital consists of five departments from which the respondents were drawn. Among these, the majority (44.9%) were from the Inpatient Department, while the Pharmacy Department had the least representation, comprising only 1.3% of the total respondents. Nurses and midwives constituted the largest group at 74.4%.

Regarding the highest educational level attained by the respondents, a majority (62.8%) reported having a bachelor’s degree, while 5.1% held professional certificates. The respondents also varied

in their years of experience within their respective professions: 53 participants (68.0%) had less than or equal to eight years of experience, 21 participants (26.9%) had between nine and sixteen years of experience, and 4 participants (5.1%) had more than sixteen years of practice experience.

A similar distribution was observed for the number of years respondents had worked at LEKMA Hospital. The majority, 54 respondents (69.2%), had less than or equal to five years of tenure at the facility. This was followed by 13 respondents (16.7%) with 6–10 years of service, and 11 respondents (14.1%) with over a decade of professional experience at the hospital.

Table 4.1: Demographic Characteristics

Characteristic	Number	Percentage
Age		
20 – 29	29	37.2
30 – 39	41	52.6
40 – 49	7	9.0
50 – 59	1	1.3
Sex		
Male	10	12.8
Female	68	87.2
Educational level		
Certificate	4	5.1
Diploma	17	21.8
Undergraduate	49	62.8
Master's	8	10.3
Cadre		
Doctor	7	9.0
Nurse & Midwives	58	74.4
Medical Laboratory Scientist	6	7.7
Pharmacists	1	1.3
Radiographer	2	2.6
Dietitian	4	5.1
Department		
Outpatient Department	29	37.2
Inpatient Department	35	44.9
Emergency Department	7	9.0
Pharmacy Department	1	1.3
Laboratory Department	6	7.7

Practice years		
< or 8 years	53	68.0
9 – 16 years	21	26.9
>16 years	4	5.1
Working years in the current facility		
< or 5 years	54	69.2
6-10 years	13	16.7
>10 years	11	14.1

4.3 Level of Digital Health Literacy among Health Workers

In this section, the findings are presented, as displayed in Table 4.2 and Table 4.3, related to the e-Health Literacy Questionnaire (eHLQ) across various domains. The data includes mean scores, standard deviations, and minimum, and maximum values, offering insights into the participants' perceptions and experiences in different aspects of Digital Health literacy.

4.3.1 Digital Health Literacy among Health Workers at LEKMA Hospital

The assessment of digital health literacy showed high levels of competence across all seven eHLQ domains (Table 4.2). Mean scores ranged from 3.9 to 4.1, with the highest mean scores observed for eHLQ3, which is "Ability to actively engage with digital services," and eHLQ5, "Motivated to engage with digital services" (M = 4.1, SD±0.75 for both). Domains assessing perceived access and confidence for eHLQ4, "Feel safe and in control," and eHLQ6, "Access to digital services that work" recorded relatively lower mean scores of 3.9 (SD±0.83 and SD±1.03 respectively). Other domains, including eHLQ1 (Using technology to process health information), eHLQ2 (Understanding health concepts and language), and eHLQ7 (Digital services that suit individual needs), also demonstrated high average mean scores around 4.0. The overall composite eHLQ score was 4.0 (SD±0.41), indicating a generally high level of digital health literacy among respondents.

Table 4.2: Digital Health Literacy Assessment among the Health Workers

	SD n(%)	D n(%)	N n(%)	A n(%)	SA n(%)
eHLQ1: Using technology to process health information					
I am able use technology to find and process relevant health information.	1(1.2)	0	2(2.6)	68(87.2)	7(9.0)
I often use technology to understand health information and interventions that are available for application.	0	1(1.3)	6(7.7)	43(55.1)	28(35.9)
Technology helps me decide which available interventions that best suits any health-related issue	1(1.3)	3(3.9)	16(20.5)	37(47.4)	21(26.9)
I use technology to share accurate information with other health professionals	1(1.3)	4(5.1)	8(10.3)	35(44.9)	30(38.4)
I use technology to organize and sort out high-quality health resource from low-quality health resource.	1(1.3)	6(7.7)	15(19.2)	42(53.8)	14(18.0)
eHLQ2: Understanding of health concepts and language					
The information I have helps me understand health concepts and to communicate them as much as possible.	0	3(3.9)	11(14.1)	53(67.9)	11(14.1)
I have adequate knowledge to take part in a medical or health related discussion	0	2(2.5)	12(15.4)	51(65.4)	13(16.7)
I understand patient medical results and I can provide sound medical advice to my clients based on knowledge I possess.	0	3(3.8)	12(15.4)	50(64.1)	13(16.7)
Overall, I have basic human anatomy understanding that helps me provide needed medical care.	0	0	4(5.1)	43(55.1)	31(39.8)
I can appreciate certain changes that occur inside the body of my patients because I appreciate similar changes occurring in my body.	2(2.6)	4(5.1)	12(15.4)	35(44.9)	25(32.1)
eHLQ3: Ability to actively engage with digital services					
I know how to get helpful health resources on the internet	1(1.3)	1(1.3)	6(7.7)	34(43.6)	36(46.1)
I know how to make health information evaluation from the internet	2(2.6)	2(2.6)	10(12.8)	43(55.1)	21(26.9)
I can make correct and meaningful data input into health systems software with little or no help.	-	4(5.1)	12(15.4)	47(60.3)	15(19.2)
I can quickly learn how to use the health information I find on the internet to help me	-	2(2.6)	6(7.7)	47(60.2)	23(29.5)
I easily learn to use digital services in my line of work	-	1(1.3)	4(5.1)	47(60.3)	26(33.3)

eHLQ4: Feel safe and in control					
I am sure that health data are stored and used for the right and intended purpose.	-	3(3.9)	11(14.1)	34(43.6)	30(38.4)
I know that electronic health data are being stored in secure servers that are safe.	1(1.3)	6(7.7)	19(24.4)	31(39.7)	21(26.9)
I have a clear understanding of how health information systems work.	1(1.3)	2(2.5)	13(16.7)	47(60.3)	15(19.2)
I am certain that only authorized people have access to stored data on information management systems.	2(2.6)	3(3.9)	16(20.5)	36(46.2)	21(26.9)
I am confident that health care providers responsibly use and apply data stored in health information systems.	-	-	11(14.1)	51(65.4)	16(20.5)
eHLQ5: Motivated to engage with digital services					
Technology makes me feel actively engaged to provide effective patient care	-	3(3.8)	9(11.5)	52(66.7)	14(18.0)
I find technology helps me reduce error rates	-	9(11.5)	13(16.6)	42(53.9)	14(18.0)
I find technology helps facilitate sharing of health resources with other users in the hospital	1(1.3)	1(1.3)	4(5.1)	44(56.4)	28(36.0)
Technology improves my communication as such improves coordination of patient care	0	1(1.2)	12(15.4)	46(59.0)	19(24.4)
I find technology useful by improving quality of patient care.	0	2(2.6)	5(6.4)	44(56.4)	27(34.6)
eHLQ6: Access to digital services that work					
Information about my patient's health is always available and can be accessed simultaneously from different location	4(5.1)	5(6.4)	7(9.0)	35(44.9)	27(34.6)
I can deliver health services that my patients can access from different locations	4(5.1)	4(5.1)	13(16.7)	33(42.3)	24(30.8)
My health data are available, stored securely and have been backed up	2(2.6)	3(3.9)	15(19.2)	34(43.6)	24(30.7)
eHLQ7: Digital services that suit individual needs					
I find that digital services can adapt to meet the dynamics that are inherent in the health system	1(1.2)	3(3.8)	15(19.3)	46(59.0)	13(16.7)
I find that digital health services seem to have features or shortcuts that are easy to use	-	3(3.8)	16(20.5)	46(59.0)	13(16.7)
I find digital health services help me meet patient's needs	-	4(5.1)	11(14.1)	51(65.4)	12(15.4)

SA=Strongly agree, A=Agree, N=Neutral, D=Disagree, SD=Strongly disagree, n=Frequency, %=Percentage

Table 4.3: Descriptive statistics of the domains

Domain	Mean	SD
eHLQ1: Using technology to process health information	**4.0**	**0.78**
eHLQ2: Understanding of health concepts and language	**4.0**	**0.73**
eHLQ3: Ability to actively engage with digital services	**4.1**	**0.75**
eHLQ4: Feel safe and in control	**3.9**	**0.83**
eHLQ5: Motivated to engage with digital services	**4.1**	**0.75**
eHLQ6: Access to digital services that work	**3.9**	**1.03**
eHLQ7: Digital services that suit individual needs	**3.9**	**0.74**
Total Mean eHLQ: Overall eHLQ Mean Score	**4.0**	**0.41**

4.4 Assessing the level of Acceptance of the LHIMS among Health Workers

This section presents the study's findings on the acceptance of the Lightwave Health Information Management System (LHIMS), as illustrated in Table 4.4, Fig. 4.5, and Fig. 4.6. The data collected focuses on four key dimensions: Performance Expectancy, Effort Expectancy, Social Influence, and Facilitating Conditions. The goal is to provide a comprehensive understanding of the factors influencing LHIMS acceptance among healthcare professionals at LEKMA Hospital.

4.4.1 Measuring the acceptability of LHIMS

The results show that respondents reported a moderate level of Performance Expectancy, with an overall mean of 3.7 (SD±0.72). Effort Expectancy recorded a higher mean of 4.0 (SD±0.60), indicating strong perceptions of ease of use. Social Influence showed a moderate overall mean of 3.6 (SD±0.51), while Facilitating Conditions scored highly with an overall mean of 4.0 (SD±0.50), reflecting adequate resource and support availability. The overall composite acceptance level of LHIMS was 3.8 (SD±0.48), demonstrating generally positive acceptability among respondents (Table 4.4).

Table 4.4: Assessing the level Acceptance of LHIMS at the LEKMA Hospital

Construct	Mean	Std. Dev
Performance Expectancy		
PE1	3.8	0.91
PE2	3.7	0.95
PE3	3.2	1
PE4	4.1	0.73
Overall Mean	**3.7**	**0.72**
Effort Expectancy		
EE1	4.1	0.75
EE2	4.0	0.81
EE3	3.9	0.71
EE4	4.1	0.66
EE5	4.0	0.93
Overall Mean	**4.0**	**0.60**
Social Influence		
SI1	3.8	0.77
SI2	3.3	0.87
SI3	3.5	0.98
SI4	3.8	0.75
Overall Mean	**3.6**	**0.51**
Facilitating Conditions		
FC1	3.8	0.79
FC2	4.2	0.51
FC3	4.2	0.70
Overall Mean	**4.0**	**0.50**
Overall Mean Level of Acceptance:	**3.8**	**0.48**

Table 4.4 shows the health workers' acceptance of the Lightwave Health Management System at LEKMA Hospital, focusing on four main constructs: Performance Expectancy (PE), Effort Expectancy (EE), Social Influence (SI), and Facilitating Conditions (FC). The overall mean scores

for each construct, as well as the standard deviations, offer insights into the respondents' perceptions and acceptance levels.

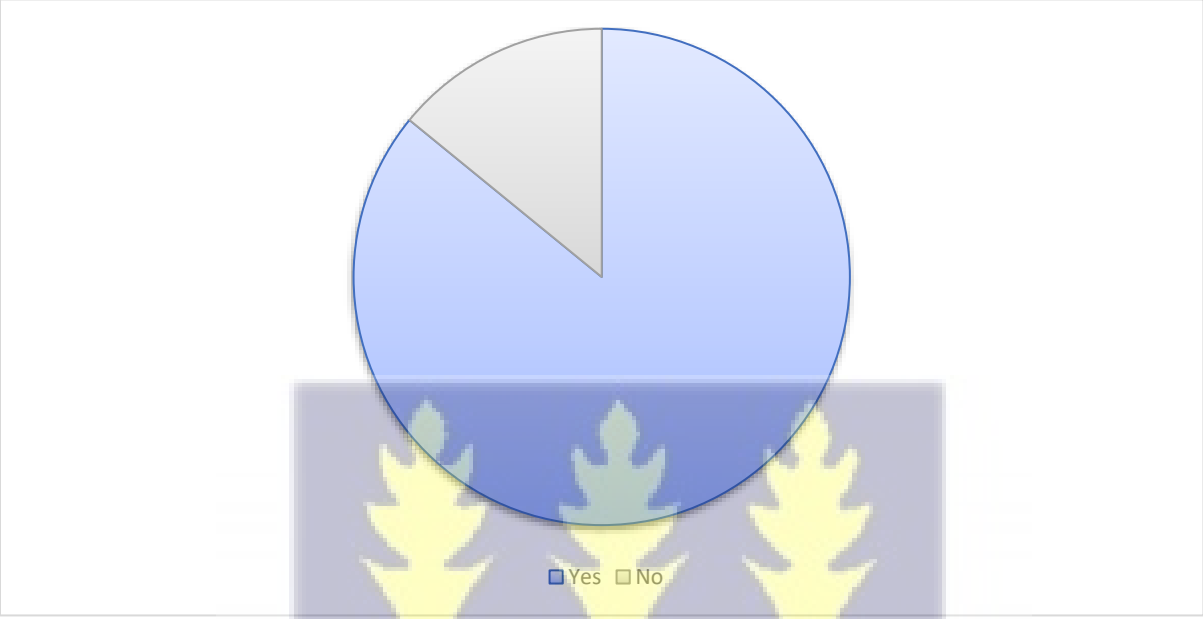

Figure 4.5: Previous Use of Electronic Medical Records System

Figure 4.5 is a pie chart showing respondents' history of use of any electronic medical records (EMR) system at LEKMA Hospital. Study results indicated that 86% of respondents (n=67) reported having used an EMR system before working at LEKMA Hospital.

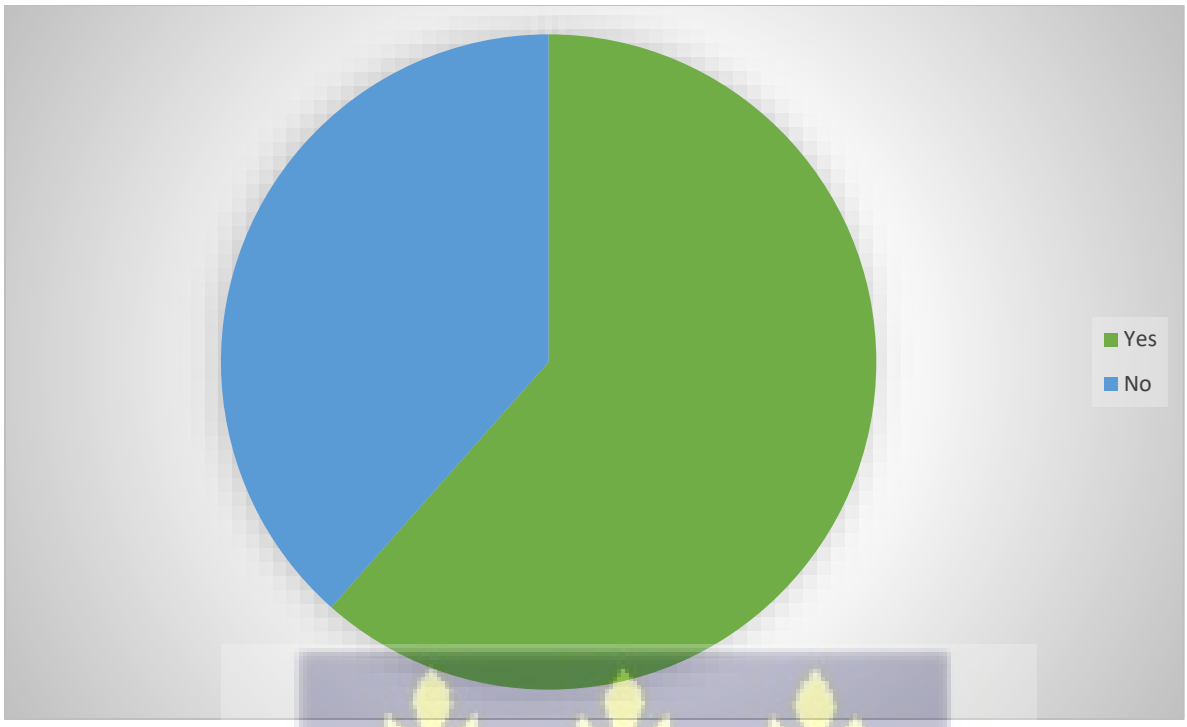

Figure 4.6: Knowledge of the LHIMS software before the hospital-wide rollout

Figure 4.6: Pie chart showing the distribution of respondents based on their awareness of the LHIMS software before the hospital-wide roll-out at LEKMA Hospital. Study results indicated that 62% of respondents (n = 48) reported knowing the LHIMS software prior to the roll-out.

4.5 Effect of Digital Health Literacy on the Acceptability of LHIMS.

Using a multiple linear regression analysis, Table 4.5 examines the relationship between the socio-demographic factors, Digital Health Literacy, and the various acceptance constructs, including Overall Performance Expectancy, Overall Effort Expectancy, Overall Social Influence, and Overall Facilitating Conditions.

To begin with, there were no statistically significant associations observed between gender, educational level and years of practice and the various acceptance constructs.

Age displayed a statistically negative influence on performance expectancy (β = -0.035, 95% CI: -0.060 to -0.010, p = 0.007), signifying that the older the healthcare worker, the less likely they

perceive that LHIMS would improve their job performance.

For the influence of cadres on the acceptance of LHIMS, there was no statistically significant relationship among all the cadres against the overall effort expectancy, overall social influence, overall facilitating conditions, and overall performance expectancy, except radiographers, who had a significant positive relationship with performance expectancy (β = 1.044, 95% CI [0.198, 1.891], p = 0.016).

Possessing an undergraduate degree proved to have a positive effect (β = 0.366, 95% CI [0.092, 0.823], p = 0.115) on effort expectancy but had a p-value of 0.115, well above the threshold for statistical significance. Aside from that, education did not show any statistically significant impact on performance expectancy, effort expectancy, social influence, and facilitating conditions.

Finally, health literacy score emerged as the most consistent and statistically significant predictor across all models. Digital Health literacy had a positive effect on all the constructs of acceptance. From performance expectancy (β = 1.149, 95% CI: 0.865 to 1.432, p < 0.001), effort expectancy (β = 0.759, 95% CI: 0.460 to 1.059, p < 0.001), social influence (β = 0.589, 95% CI: 0.321 to 0.858, p < 0.001), and facilitating conditions (β = 0.639, 95% CI: 0.386 to 0.892, p < 0.001), a statistically significant positive effect was observed between them.

Table 4.5: Assessing the relationship between Digital Health Literacy and level of Acceptance of LHIMS at the LEKMA Hospital

Variable	Category	Performance Expectancy (β, 95% CI)	p-value	Effort Expectancy (β, 95% CI)	p-value	Facilitating Conditions (β, 95% CI)	p-value	Social Influence (β, 95% CI)	p-value
Gender	Male (ref)	ref	ref	ref	ref	ref	ref	ref	ref
	Female	-0.135 (-0.529, 0.260)	0.498	0.160 (-0.258, 0.577)	0.448	0.111 (-0.242, 0.464)	0.532	-0.087 (-0.462, 0.287)	0.642
Age		-0.035 (-0.060, -0.010)	0.007	-0.010 (-0.036, 0.017)	0.466	0.004 (-0.018, 0.026)	0.722	-0.012 (-0.036, 0.012)	0.314
Cadre	Doctor (ref)	ref	ref	ref	ref	ref	ref	ref	ref
	Nurses & Midwives	0.330 (-0.170, 0.830)	0.193	-0.133 (-0.662, 0.396)	0.617	-0.115 (-0.562, 0.332)	0.608	0.242 (-0.232, 0.716)	0.311
	Medical Lab Scientist	0.121 (-0.452, 0.695)	0.674	0.076 (-0.531, 0.682)	0.803	-0.239 (-0.751, 0.274)	0.356	0.250 (-0.293, 0.794)	0.361
	Pharmacist	0.079 (-1.002, 1.161)	0.884	-0.421 (-1.565, 0.723)	0.465	0.367 (-0.600, 1.334)	0.451	-0.197 (-1.222, 0.828)	0.702
	Radiographer	**1.044 (0.198, 1.891)**	**0.016**	0.369 (-0.526, 1.265)	0.413	0.280 (-0.476, 1.036)	0.462	0.129 (-0.673, 0.932)	0.748
	Dietician	0.498 (-0.164, 1.160)	0.138	-0.068 (-0.768, 0.633)	0.848	-0.108 (-0.699, 0.484)	0.717	0.118 (-0.509, 0.746)	0.708
Education	Masters (ref)	ref	ref	ref	ref	ref	ref	ref	ref
	Undergraduate	0.004 (-0.428, 0.437)	0.984	0.366 (-0.092, 0.823)	0.115	0.172 (-0.215, 0.559)	0.377	-0.015 (-0.426, 0.395)	0.94
	Diploma	0.001 (-0.501, 0.504)	0.996	0.156 (-0.375, 0.688)	0.559	0.047 (-0.402, 0.497)	0.834	-0.146 (-0.622, 0.331)	0.544
	Certificate	0.279 (-0.382, 0.940)	0.403	-0.066 (-0.765, 0.633)	0.852	0.061 (-0.530, 0.651)	0.838	0.199 (-0.428, 0.825)	0.529
Years of Practice		0.105 (-0.089, 0.299)	0.283	-0.007 (-0.212, 0.198)	0.948	0.040 (-0.134, 0.213)	0.649	0.030 (-0.153, 0.214)	0.745
Health Literacy Score		1.149 (0.865, 1.432)	**<0.001**	0.759 (0.460, 1.059)	**<0.001**	0.639 (0.386, 0.892)	**<0.001**	0.589 (0.321, 0.858)	**<0.001**

CHAPTER FIVE

DISCUSSION

5.0 Introduction

This section presents the findings of the study on the assessment of e-Health literacy levels and the acceptance of the LHIMS, with a focus on various related constructs. The collected data provides insights into how e-Health literacy influences these acceptance constructs, offering a comprehensive insight into the factors that shape the adoption and effective use of LHIMS among health workers.

5.1 Level of Digital Health Literacy among the health workers

Digital health literacy has emerged as a foundational competency, particularly among healthcare professionals, enabling them to evaluate, apply, and integrate digital tools into clinical care (Gilstad, 2014). The high DHL observed in this study is consistent with findings from other LMICs, where healthcare workers demonstrated increasing proficiency in navigating digital platforms (Tesfa et al., 2022; Alipour & Payandeh, 2022). Our results also align with Norman and Skinner's (2006) framework, which emphasizes that individuals with higher DHL are more likely to make informed health decisions and contribute to improved outcomes. From a systems perspective, DHL is as critical as deploying digital infrastructure itself (Wamala Andersson & Pisano Gonzalez, 2025). The WHO (2021) asserts that building digital competence among frontline healthcare workers ensures that digital tools are meaningfully utilized and adapted into evolving healthcare workflows.

In this study, respondents notably attained the highest score in the *eHLQ3*, which evaluates the ability to actively engage with digital services, suggesting a strong confidence and competence in interacting with digital platforms for patient care. This mirrors Holt et al. (2019) and Kuek & Hakkennes (2020), who found that such digital engagement is closely linked to improved efficiency in patient care and communication across teams. The observed performance underscores the importance of ongoing training and professional development initiatives aimed at strengthening digital service competencies, particularly in resource-limited settings (Van der Vaart et al., 2013).

The strong performance in eHLQ1 (use of technology to process health information) and eHLQ2 (understanding health concepts and language) further highlights the interrelated nature of functional literacy and technical proficiency. This interrelationship indicates that improving one domain may positively influence the other, reinforcing the need for integrated strategies in digital health literacy development. (Kayser et al., 2018; Cheng et al., 2022).

However, adaptability of digital services (eHLQ7) recorded the lowest mean score. This indicates gaps in tailoring digital systems to user needs, echoing evidence from Van der Vaart et al. (2013) and WHO (2023), who stressed that insufficient personalization undermines engagement and adoption in the long term. Similar findings were reported in Denmark, where healthcare professionals with lower eHLQ7 scores were less likely to actively use electronic health records and other digital platforms (Kayser et al., 2018).

Variability in access to digital services (eHLQ6), reflected by higher standard deviations, also points to infrastructural disparities within the facility, a challenge similarly observed in LMICs (Alami et al., 2020). These findings highlight the need for equitable resource distribution and user-centered design to sustain adoption.

eHLQ4 (perceived safety and control) and eHLQ5 (motivation to engage with digital services) scored moderately high, at 3.98 (SD = 0.83) and 4.06 (SD = 0.75), respectively. These findings indicate that healthcare professionals not only trust the security of LHIMS but also demonstrate motivation to integrate it into routine practice. Prior work has shown that perceptions of data security and system reliability are crucial enablers of digital adoption, as they foster confidence and reduce resistance to change (Kayser et al., 2018).

5.2 Acceptability of LHIMS among Health Workers

The integration of electronic medical records (EMRs) has become central to enhancing operational efficiency and patient care outcomes in modern healthcare environments. At LEKMA Hospital, the Lightwave Hospital Information Management System (LHIMS) serves this function, reflecting broader shifts toward digitized care delivery (Bajwa, Singh, & Kumar, 2019). Findings from this study revealed a high overall acceptance of LHIMS among staff, indicating positive perceptions of its usefulness, ease of use, and compatibility with existing workflows. These results align with those reported by Agyemang et al. (2024), who, in a large-scale evaluation of 1,126 Ghanaian health professionals, identified similarly favorable views of LHIMS usability across the dimensions of satisfaction, efficiency, and effectiveness. However, their study also noted variability in the strength of inter-domain relationships, highlighting the nuanced nature of system adoption and the need for ongoing user-informed adaptation.

5.2.1 Acceptability of LHIMS among Health Workers

The second objective of this study assessed healthcare professionals' acceptance of the Lightwave Hospital Information Management System (LHIMS) at LEKMA Hospital. Respondents reported a high overall acceptance of LHIMS, indicating that the system is widely perceived as useful, easy to use, and compatible with clinical workflows. This is consistent with existing literature that

underscores the importance of system usability and relevance in influencing adoption (Bajwa, Singh, & Kumar, 2019).

Facilitating conditions emerged as the most positively rated acceptance factor (mean = 4.22), suggesting that respondents had access to the necessary infrastructure, training, and support to effectively use LHIMS. This mirrors the findings of Kaboré et al. (2022), who emphasized that availability of resources and institutional support as key enablers of digital health adoption. In contrast, the lowest mean score was recorded for social influence (mean = 3.31), implying limited peer, supervisory, or patient pressure to adopt the platform. Comparable findings were reported by Shiferaw and Mehari (2019), who noted minimal normative pressure in similar LMIC contexts. The contrast between strong structural readiness and limited peer-driven motivation suggests that while users are enabled to use the system, there may be a lack of cultural advocacy, which could impact sustained adoption.

Effort Expectancy domain achieved a composite mean score of 4.00 (SD = 0.51) across all items, suggesting respondents perceived LHIMS as highly user-friendly and easy to operate, a key predictor of technology adoption (Demsash, Kalayou, & Walle, 2024). This aligns with findings from a recent systematic review in Ethiopian health services, which identified effort expectancy as a significant facilitator of digital health system acceptance, affirming that the perceived ease of use is critical to user engagement and sustained acceptance (Walle et al., 2023). Effort expectancy plays a critical role in shaping first impressions and sustained engagement with health information systems. These results highlight the importance of designing platforms that are not only functionally robust but also intuitive, especially in healthcare environments where time pressures and multitasking are common (Vehko et al., 2019). Given the strong perceptions of ease of use among respondents, LHIMS appears well-positioned to support ongoing adoption, though targeted

interventions, such as refresher training or onboarding sessions, may be warranted to address variability in user experience (Agyemang et al., 2024).

Participants in this study achieved a composite mean of 3.70 (SD: 0.72), suggesting that health workers view LHIMS as moderately valuable in improving job performance. However, the observed variability (SD = 0.72) suggests differences across individuals, pointing to potential gaps in how consistently the system's utility is experienced. According to the original UTAUT model by Venkatesh et al. (2003), PE consistently emerges as a strong predictor of behavioral intention to use technology (Xue, Rashid, & Ouyang, 2024). The findings from this study align with similar research conducted in low- and middle-income countries (LMICs). For instance, in Southwest Ethiopia, a study employing the UTAUT-2 framework found that Performance Expectancy (PE) significantly predicted the intention to use digital health systems. With respect to the variability observed across individuals, it likely stems from doubts that certain respondents have about LHIMS' benefits and this has the potential to undermine sustained use. Addressing these gaps through targeted training, workflow integration, and clearer demonstration of efficiency gains could reinforce provider confidence and unlock LHIMS' full potential in supporting quality care delivery. This assertion is supported by findings from a recent interventional study in a primary healthcare facility, where personalized, blended EHR training designed to align with actual clinical workflows significantly enhanced provider competencies and satisfaction (Musa et al., 2023).

5.3 To assess the effect of digital health literacy on the acceptability of LHIMS among health workers in LEKMA Hospital

The analysis assessed how Digital Health Literacy influences the key UTAUT constructs, Performance Expectancy (PE), Effort Expectancy (EE), Social Influence (SI), and Facilitating Conditions (FC) in shaping health workers' acceptance of the LHIMS at LEKMA Hospital.The

analysis revealed that among the demographic and contextual factors examined, digital health literacy emerged as the most statistically significant predictor of acceptance of LHIMS across all UTAUT constructs, influencing performance expectancy ($\beta = 1.15$, $p < 0.001$), effort expectancy ($\beta = 0.76$, $p < 0.001$), facilitating conditions ($\beta = 0.64$, $p < 0.001$), and social influence ($\beta = 0.59$, $p < 0.001$). This result from this study agrees with existing evidence on the crucial role of digital health literacy in influencing health workers acceptance of LHIMS and by extension aligning with eHealth Literacy Framework and UTAUT model which mentions the user or individual competence as a key determinant of acceptance (Kayser et al., 2018)

In contrast, socio-demographic variables such as gender, education, and years of practice were not statistically significant in predicting LHIMS acceptance at LEKMA Hospital. This further buttress the claim that acceptance is less dependent on background characteristics and more on individual capability to engage with digital platforms aligning with the UTAUT's framework where socio-demographics function primarily as moderators rather than core determinants (Venkatesh et al., 2003). Studies in Ethiopia (Demsash et al., 2024) have reported similar findings where digital health literacy and perceived usefulness were consistently seen as strong predictors of adoption than demographic variables.

The negative association between age and performance expectancy ($\beta = -0.035$, $p < 0.01$) is consistent with prior studies in other LMICs. In 2024, Agboryah et al. looked at factors that influence the use of digital health among healthcare workers in Cameroon, highlighting key predictors of adoption. The study found out that older employees compared to younger employees were found to be significant determinants of readiness. Meaning age negatively influenced readiness to adopt electronic health records compared to younger providers. This brings to fore the need to tailor training and refresher interventions for such a group. Incidentally, radiographers

reported significantly higher performance expectancy than doctors ($\beta = 1.04$, $p < 0.05$), a finding that may reflect differences in workflow integration, where imaging services have more visible efficiency gains from digital records.

Practically, the findings suggest that investments in structured training and digital literacy programs could accelerate acceptance, particularly among older staff and cadres less familiar with LHIMS functionalities. At the policy level, embedding continuous professional development in digital competencies, alongside infrastructure support, could ensure more equitable adoption across hospital departments. Although the study's focus on a single institution restricts the extent to which the findings can be generalized, the strong association between health literacy and digital health acceptance highlights health literacy as a key pathway for promoting wider adoption of digital health technologies in Ghana and comparable LMICs contexts.

5.4 Limitation of the study

While the study contributes valuable insights into Digital Health literacy, LHIMS acceptability, and the effect of Digital Health literacy on the acceptability of LHIMS among the respondents, it is essential to recognize specific limitations that may impact the interpretation of the findings and the generalizability of the results.

The study's sample size was limited, potentially impacting the extent to which the findings can be applied to a larger population. The study focused on health workers at Lekma Hospital, and the characteristics of this specific group may not fully represent the diversity within the broader healthcare landscape.

The reliance on self-reported measures, particularly for Digital Health literacy and LHIMS acceptability, may introduce bias due to social desirability or response bias. Participants may provide answers they perceive as favorable rather than expressing their true attitudes or behaviors.

CHAPTER SIX

CONCLUSION AND RECOMMENDATIONS

6.1 Conclusion

This study ascertained the level of digital health literacy among health workers at LEKMA Hospital and its resultant effect on the level of acceptability of the LHIMS system. The findings pointed out a high level of digital health literacy among health workers; hence, a high positive influence on their ability to use technology for informed health decisions. Finally, it has been found that digital health literacy contributes hugely toward LHIMS acceptability, where high levels ensure aggregated acceptability of the system.

6.2 Recommendations for Policy and Future Research

1. **Prioritize Digital Health Literacy Initiatives:** The strong positive relationship between digital health literacy and all acceptance constructs indicates that staff at LEKMA Hospital possess a solid foundation in digital competencies. It is therefore recommended that the hospital sustains this capacity through continuous professional development. Regular refresher training, peer learning initiatives, and the integration of digital literacy into in-service training programs would help reinforce this strength and ensure sustained adaptability to evolving digital health systems. A Point-based System could be introduced to encourage participation, where points are awarded for completing activities such as attending workshops, finishing online courses, or actively engaging with digital health tools.
2. **Encourage Cross-Department Collaboration**: To foster greater acceptance of LHIMS among health professionals, hospital management should promote collaboration between departments with strong digital health literacy and those needing improvement. For

example, a department with a significant and positive relationship with acceptance, like Radiographers, can collaborate with IT, Quality Improvement, and In-Service Training departments to lead initiatives, share experiences, and provide training to their peers. This collaborative approach will facilitate knowledge sharing, streamline training efforts, and address technical challenges more effectively, ultimately enhancing the adoption and utilization of digital health systems across the hospital.

3. **Strengthen Digital Infrastructure and Onsite Technical Support:** To build confidence among health workers and promote sustained acceptance of LHIMS, it is essential to strengthen the digital infrastructure that supports their daily tasks. This involves ensuring reliable internet connectivity, providing sufficient and well-functioning hardware, and assigning dedicated onsite IT personnel to address technical issues promptly. By improving these structural supports, health workers can experience smoother workflows, reduced system-related disruptions, and greater efficiency, which collectively foster consistent and confident use of LHIMS.

4. **Integrate Digital Health Literacy Competencies into Pre-Service Health Training:** To ensure a digitally competent future health workforce, the Ministry of Health, together with health training institutions and regulatory bodies such as the Nursing and Midwifery Council and the Medical and Dental Council, should integrate structured digital health literacy (DHL) training into pre-service curricula. This should include practical modules on electronic medical records (such as LHIMS), data security, digital communication, and the use of digital tools for clinical decision-making. Embedding DHL competencies early in professional education will ensure that newly qualified nurses, doctors, and allied health professionals enter the workforce with the necessary skills and confidence to adopt digital

systems effectively. This policy direction will not only improve system acceptability but also enhance long-term sustainability of national e-health investments by reducing training costs, minimizing resistance to digital transitions, and strengthening overall quality of care.

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APPENDIX I: PARTICIPANT INFORMATION SHEET

Title: Assessing The Level Of Digital Health Literacy And Acceptability Of The Lightwave Health Information Management System Among Health Workers At The Lekma Hospital

Principal Investigator: Evans Abeiku Takyi Quashie

Address: School of Public Health, University of Ghana. Email: abeikutakyi@gmail.com Tel: 0552397155

General Information about the Research

The rapid integration of digital technologies into healthcare delivery has transformed the way health services are accessed, delivered, and managed. Digital health tools, including electronic medical records, telemedicine platforms, mobile health applications, and health information systems, have become increasingly important in improving efficiency, quality of care, and patient outcomes. However, the effective use of these technologies largely depends on the digital health literacy of healthcare workers and their willingness to adopt and utilize such innovations.

In low- and middle-income settings, challenges such as limited digital infrastructure, inadequate training, variable access to technology, and disparities in digital skills among health workers may hinder the successful implementation of digital health interventions. Additionally, factors such as perceived usefulness, ease of use, organizational support, and trust in digital systems play a critical role in influencing the acceptability of digital health solutions among healthcare professionals.

This study seeks to assess the level of digital health literacy and the acceptability of digital health technologies among health workers at the LEKMA Hospital. By examining both the digital health literacy and acceptance, the study aims to identify factors that influence adoption and effective utilization within the hospital setting.

The findings of this study are expected to provide valuable evidence to inform hospital management and policymakers on capacity-building needs, targeted training interventions, and system improvements required to enhance digital health adoption. Ultimately, the study seeks to support the optimization of digital health initiatives, improve healthcare service delivery, and strengthen health system performance at LEKMA Hospital and similar healthcare facilities.

Nature of Research

This is a cross-sectional survey that will involve at least 78 health staff at the LEKMA Hospital. Stratified random sampling will be used to recruit health staff in the facility who meet the inclusion criteria. We invite you to take part in this research project. If you accept, you will be required to sign or give oral consent to this study. Afterward, a link containing the questionnaire will be shared with you to fill.

The questionnaire contains questions on the level of digital health literacy among health workers, as well as their acceptability of LHIMS. Your participation in this study is expected to last for a maximum of 20 minutes.

Potential Risks and Discomforts

There are minimal risks associated with participating in this study. The primary potential discomfort may relate to the time required to complete the online questionnaire, which is estimated to take approximately 20 minutes. Additionally, participants may experience mild inconvenience due to internet connectivity issues or device limitations. To minimize these risks, the questionnaire has been designed to be concise and user-friendly, and participants will be encouraged to complete it at a time and place convenient to them. No sensitive personal information will be collected, and all responses will be kept confidential to ensure privacy.

Possible Benefits

You may not receive any direct benefit from participating in this study. However, the findings will be shared with the Hospital Management at LEKMA Hospital and policy makers. These results will provide evidence on the current level of digital health literacy and the acceptability of digital health tools among health workers. This information may guide strategies to improve digital health adoption and integration, ultimately enhancing service delivery and patient care. Additionally, the findings will be disseminated through conferences and peer-reviewed journals to inform broader health system strengthening efforts and promote dialogue among key stakeholders on digital health implementation.

Confidentiality

We will protect information about you to the best of our ability. Your name or any personally identifiable information will not be requested on the online questionnaire. All responses will be anonymized and stored securely. Information obtained will not be shared with any third party, except for my academic supervisor who may access the data for verification purposes. Data will be used solely for research purposes and reported in aggregate form, ensuring that individual responses cannot be traced back to you.

Compensation

There are no compensation packages whether in cash or kind available for participation

Voluntary Participation and Right to Leave the Research

This study is strictly voluntary. Should you, at any point during the study, decide that you do not wish to participate any further, you are free to terminate your participation immediately.

Termination of Participation by the Researcher

No circumstance may cause your termination from this study

Outcome and Feedback

Data obtained at the end of the study will be presented to the Hospital Management at LEKMA Hospital. Findings will also be shared with the Greater Accra Regional Health Directorate and the Management of the Ghana Health Service to inform strategies for improving digital health literacy and adoption among health workers. Additionally, results will be disseminated through academic platforms such as conferences and peer-reviewed journals to contribute to evidence-based practices in health system strengthening.

Feedback to participant

Feedback of findings would be communicated to participants at the end of the study on request

Funding Information

The study would be self-funded by the Principal Investigator

Sharing of Participants' Information/Data

Participants' identification would be anonymized during the data collection period. The final data obtained would be shared with the hospital, the municipal health directorate, as well as communicated to participants on request.

Data Access and Storage

Since this study uses an online questionnaire, responses will be collected electronically and stored in a secure, password-protected database accessible only to the principal investigator. No

personally identifiable information will be collected. After data collection, responses will be downloaded and saved on a password-protected computer. The dataset will be coded to ensure anonymity and will be stored securely for analysis using Microsoft Excel 2016. All data will be kept confidential and used solely for research purposes.

Provision of Information and Consent for Participants

A copy of the Information Sheet and Consent Form will be provided to you after you have given consent electronically. This is for your records and to ensure you have full details of the study, including its purpose, procedures, risks, benefits, and your rights as a participant.

Contacts for Additional Information

You may contact me, Principal Investigator (Evans Abeiku Takyi Quashie, 0552397155), or my supervisor (Dr. Frances da-Costa Vroom, 0267338320) if you need further explanation of pertinent questions about this research.

Your rights as a Participant

This research has been reviewed and approved by the Ethical Review Committee of Ghana Health Service (GHS-ERC). If you have any questions about your rights as a research participant you can contact the GHS-ERC Administrator, Nana Abena Apatu, between the hours of 8 am-5 pm through, 0503539896, email addresses: ethics.research@ghs.gov.gh

APPENDIX II: CONSENT FORM FOR RESPONDENTS

STUDY TITLE: **Assessing The Level Of Digital Health Literacy And Acceptability Of The Lightwave Health Information Management System Among Health Workers At The Lekma Hospital**

PARTICIPANTS' STATEMENT

I acknowledge that I have read or have had the purpose and contents of the Participants' Information Sheet read and all questions satisfactorily explained to me in a language I understand (English, Twi). I fully understand the contents and any potential implications as well as my right to change my mind (i.e. withdraw from the research) even after I have signed this form.

I voluntarily agree to be part of this research.
Name of Participant……..
Participants' Signature ……...OR Thumb Print……
Date:…….

INTERPRETERS' STATEMENT

I interpreted the purpose and contents of the Participants' Information Sheet to the afore named participant to the best of my ability in the (English, Twi) language to his proper understanding.

All questions, appropriate clarifications sorted by the participant, and answers were also duly interpreted to his/her satisfaction.

Name of Interpreter……
Signature of Interpreter…….. OR Thumb Print …….....
Date:……

Contact Details

STATEMENT OF WITNESS

I was present when the purpose and contents of the Participant Information Sheet were read and explained satisfactorily to the participant in the language, he/she understood (English, Twi)

I confirm that he/she was given the opportunity to ask questions/seek clarifications and the same were duly answered to his/her satisfaction before voluntarily agreeing to be part of the research.

Name:……

Signature…….... OR Thumb Print …….....

Date:……

INVESTIGATOR STATEMENT AND SIGNATURE

I certify that the participant has been given ample time to read and learn about the study. All questions and clarifications raised by the participant have been addressed.

Researcher's name……

Signature …….

Date…….

Should you wish to contact me at any stage regarding consent you can contact me at Cell: 0552397155, abeikutakyi@gmail.com

APPENDIX III: QUESTIONNAIRE

Respondent ID | | | |

SCHOOL OF PUBLIC HEALTH

UNIVERSITY OF GHANA, LEGON

Title of Project: Assessing the level of digital health literacy and acceptability of the LHIMS Among Health Workers at the Lekma Hospital.

Date of Interview: __ __ / __ __ / 2023

Consent Form

Hello Sir/ Madam, my name is **Evans Abeiku Takyi Quashie.** I am a student at the School of Public Health, University of Ghana. I am carrying out a study on the assessment of level of eHealth Literacy and acceptability of LHIMS in your facility as a course requirement. I kindly request you to spare a few minutes and answer the attached questionnaire. The information provided will be used for academic purposes only and will be treated with utmost confidentiality. Please do not write your name anywhere on the questionnaire. I would appreciate your voluntary participation in completing the questionnaire.

Do I have your permission to continue? Yes [ ] No [ ]

Thank you.

(Please read the instructions carefully before every question and provide your response appropriately.)

Section A: Demographic Information

Please Tick (√) the appropriate answer.

1. Gender

Male [ ] Female [ ]

2. What is your Age?.....

3. Please indicate your cadre (tick appropriately)

□ Doctor

□ Nurse & Midwives

□ Medical Laboratory Scientist

□ Pharmacists

□ Radiographers

4. What is your highest level of education?

PhD [ ] Masters [ ] Undergraduate [ ] Diploma [ ] Certificate [ ]

5. In which department do you work

Out patient Department [ ], Inpatient Department, [ ], Emergency Department [ ], Pharmacy Department, Llaboratory Department, Other: Specify_____

6. Your position in this health facility

……

7. For how long have you been working in this facility? ……

8. How many years of practice experience in your profession do you have? [ ]

9. Have you used an Electronic Health Records before?

a) Yes [ ] b) No [ ]

10. How frequently do you use the LHIMS software?

a) Rarely [ ] b) Sometimes [ ] c) Daily [ ] d) Others Specify ……

SECTION B: eHealth Literacy Assessment

eHealth literacy will be measured using the eHLF, which was a new concept for eHealth literacy assessment (Kayser et al., 2018): a model based on systematic and inductive methods that seek to identify the full range of elements relevant to individuals attempting to understand and use eHealth technologies and digital services. This model, the eHealth Literacy Framework (eHLF), consists of 7 dimensions that describe the attributes of the users (information and knowledge about their health); the intersection between users and the technologies (their feeling of being safe and in control and their motivation); and users experience of systems (they work and are accessible, and suits users' needs) that are scored on a 5-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree), and the total score ranges between 5 and 40.

S.N	Factors	SD=1	D=2	N=3	A=4	SA=5
	1. Using technology to process health information					
11	I am able use technology to find and process relevant health information					
12	I often use technology to understand health information and interventions that are available for application					
13	Technology helps me decide which available interventions that best suits any health-related issue					

14	I use technology to share accurate information with other health professionals					
15	I use technology to organize and sort out high-quality health resource from low-quality health resource.					
	2. Understanding of health concepts and language					
16	The information I have helps me understand health concepts and to communicate them as much as possible.					
17	I have enough information to take part in a medical or health related discussion					
18	I understand medical results and I can provide sound medical advice to my clients based on health information I possess.					
19	Overall, I have basic human anatomy understanding that helps me provide needed medical care.					
20	I can appreciate certain changes that occur inside the body of my patients because I appreciate similar changes occurring in my body.					
	3. Ability to actively engage with digital services					
21	I know how to get helpful health resources on the internet					
22	I know how to make health technology evaluations					
23	I am able to make correct and meaningful data input into health systems software with little or no help.					
24	I quickly learn how to use the health information I find on the internet to help me					
25	I easily learn to use digital services in my line of work					
	4. Feel safe and in control					

26	I am sure that health data are stored and used for the right and intended purpose.					
27	I know that electronic health data are being stored in secure servers that are safe.					
28	I have a clear understanding of how health information systems work.					
29	I am sure that only authorized people have access to stored data on information management systems.					
30	I am confident that health care providers responsibly use and apply data stored in health information systems.					
	5. Motivated to engage with digital services					
31	Technology makes me feel actively engaged to provide effective patient care					
32	I find technology helps me reduce error rates					
33	I find technology helps facilitate sharing of health resources with other users in the hospital					
34	Technology improves my communication as such improves coordination of patient care					
35	I find technology useful by improving quality of patient care.					
	6. Access to digital services that work					
36	Information about my patient's health is always available can be accessed simultaneously from different location					
37	I am able to deliver health services that my patients can access from different locations					
38	My health data are available, stored securely and have been backed up					

	7. Digital services that suit individual needs					
39	I find that digital services can adapt to meet the dynamics that are inherent in the health system					
40	I find that digital health services seem to have features or shortcuts that are easy to use					
41	I find digital health services help me meet patient's needs					
42	Digital health services provide me with easy ways that makes documentation appealing and easy to maneuver					

SECTION C: Health worker acceptance and use of the LHIMS at lekma hospital

Please indicate the extent to which you agree or disagree with the following statements concerning the Health Worker Acceptance and Use of LHIMS at Lekma Hospital

Note:

LHIMS == Light Wave Health Information System

LKH == Lekma Hospital

S.N	**INDICATOR**	**SD=1**	**D=2**	**N=3**	**A=4**	**SA=5**
	Performance Expectancy (PE)					
43	Using LHIMS enables me to accomplish tasks more quickly **(PE1)**					
44	Using LHIMS increase my job performances. **(PE2)**					
45	Using LHIMS increase my chances of getting a good grade during appraisal. **(PE3)**					

46	The LHIMS software is useful. **(PE4)**					
	Effort Expectancy (EE)					
47	My interaction with LHIMS is clear and uunderstandable. **(EE1)**					
48	LHIMS interfaces are simple to use **(EE2)**					
49	LHIMS interfaces are easy to use **(EE3)**					
50	LHIMS improve data accessibility **(EE4)**					
51	Learning to operate LHIMS was easy for me **(EE5)**					
	Social Influence (SI)					
52	Lekma Hospital influences my behaviour to use the LHIMS. **(SI1)**					
53	Patients think that Lekma Hospital should use LHIMS. **(SI2)** .					
54	Government has been helpful in the use of LHIMS. **(SI3)**					
55	In general, the top management has supported the use of LHIMS. **(S14)**					
	Facilitating Conditions (FC)					
56	Lekma Hospital has the resources necessary to use LHIMS **(FC1)** .					
57	I have the knowledge necessary to use LHIMS. **(FC2)**					
58	A specific person (or group) is available for assistance with LHIMS difficulties. **(FC3)**					

APPENDIX IV: ETHICAL APPROVAL LETTER FORM GHANA HEALTH SERVICE

GHANA HEALTH SERVICE ETHICS REVIEW COMMITTEE

In case of reply the number and date of this Letter should be quoted.

Research & Development Division
Ghana Health Service
P. O. Box MB 190
Accra
Digital Address: GA-050-3303
Mob: +233-50-3539896
Tel: +233-302-681109
Email: ethics.research@ghs.gov.gh
17th July, 2023

My Ref. GHS/RDD/ERC/Admin/App/23/376
Your Ref. No.

Evans Abeiku Takyi Quashie
P.O. Box DM 172
Makola- Accra

The Ghana Health Service Ethics Review Committee has reviewed and given approval for the implementation of your Study Protocol.

GHS-ERC Number	**GHS-ERC: 051/04/23**
Study Title	Assessing the level of digital health literacy and acceptability of the LHIMS among health workers at the Lekma Hospital
Approval Date	17th July, 2023
Expiry Date	16th July, 2024
GHS-ERC Decision	**Approved**

This approval requires the following from the Principal Investigator

- Submission of a yearly progress report of the study to the Ethics Review Committee (ERC)
- Renewal of ethical approval if the study lasts for more than 12 months.
- Reporting of all serious adverse events related to this study to the ERC within three days verbally and seven days in writing.
- Submission of a final report after completion of the study
- Informing ERC if study cannot be implemented or is discontinued and reasons why.
- Informing the ERC and your sponsor (where applicable) before any publication of the research findings.

You are kindly advised to adhere to the national guidelines or protocols on the prevention of COVID -19

Please note that any modification of the study without ERC approval of the amendment is invalid.

The ERC may observe or cause to be observed procedures and records of the study during and after implementation.

Kindly quote the protocol identification number in all future correspondence in relation to this approved protocol

SIGNED.....

Mr. Kofi Wellington
(GHS ERC Chairperson)

Cc: The Director, Research & Development Division, Ghana Health Service, Accra