

ENSIGN GLOBAL COLLEGE

ELECTRONIC HEALTH (eHEALTH) UTILIZATION AMONG HEALTH  
PROFESSIONALS IN GHANA: A CASE OF NARH-BITA HOSPITAL, GREATER  
ACCRA REGION.

BY

CLETUS KWAME KUMI

227100229

A RESEARCH DISSERTATION SUBMITTED TO THE KWAME NKRUMAH  
UNIVERSITY OF SCIENCE AND TECHNOLOGY IN PARTIAL FULFILMENT OF THE  
REQUIREMENT OF THE AWARD OF MASTER OF PUBLIC HEALTH

SEPTEMBER, 2023

## DECLARATION

I hereby certify that except for the reference to other people’s work, which have been duly cited, this project submitted to the Department of Community Health, Ensign Global College, Kpong is the result of my own investigation, and has not been presented for any other degree elsewhere.

CLETUS KWAME KUMI	.....	.....
227100229	Signature	Date
(Student)		

(Certified by)

DR. MILLICENT OFORI BOATENG	.....	.....
(Supervisor)	Signature	Date

(Certified by)

DR. STEPHEN MANORTEY	.....	.....
(Head of Academic Programme)	Signature	Date

## **DEDICATION**

I dedicate this dissertation to my very supportive wife, children and mother. There is no doubt in my mind that without their continuous support and counsel, completing this program would be impossible.

## **ACKNOWLEDGEMENT**

I would like to first of all thank the good Lord for how far He has brought me in life.

I acknowledge the practical, wholesome, inspirational tuition and guidance given to me by my experienced lecturers and abled staff at the Ensign Global College as I embarked on my educational journey. I thank them so much.

I would also like to acknowledge the unflinching support and assistance given me by my family, friends and colleagues who in diverse ways made it possible for me to reach this far.

God bless you all.

## DEFINITION OF TERMS

<b>Term</b>	<b>Definition</b>
<b>Digital Health</b>	The field of knowledge and practice associated with the development and use of digital technologies to improve health.  Digital health expands the concept of eHealth to include digital consumers, with a wider range of smart-devices and connected equipment.
<b>eHealth</b>	The cost-effective and secure use of information and communications technologies in support of health and health-related fields, including health care services, health surveillance, health literature, and health education, knowledge and research
<b>Health Information System</b>	A system that integrates data collection, processing, reporting, and use of the information necessary for improving health service effectiveness and efficiency through better management at all levels of health services.
<b>Health Professional</b>	An individual licensed, registered, or certified under law or regulations to provide health care services.
<b>Internet Service Provider</b>	An organization or company that provides internet connectivity
<b>Interoperability</b>	The ability of different applications to access, exchange, integrate and cooperatively use data in a coordinated manner through the use of shared application interfaces and standards, within and across organizational, regional and national boundaries, to provide timely and seamless portability of information and optimize health outcomes

**Software**

It is a set of instructions, data, application or programs used to operate a computer and execute specific tasks

**Telemedicine**

The delivery of health care services, where distance is a critical factor, by all health-care professionals using information and communications technologies for the exchange of valid information for diagnosis, treatment and prevention of disease and injuries, research and evaluation, and the continuing education of health care workers, with the aim of advancing the health of individuals and communities

## ABBREVIATION/ACRONYMS

C. I.	Confidence Interval
D. H. I. M. S.	District Health Information Management System
eHealth	Electronic Health
E.H.R.	Electronic Health Record
G. O. e	Global Observatory for Health
H.I.E.	Health Information Exchange
I. C. T.	Information and Communication Technology
L. M. I. C.	Low- and Middle-Income Country
mHealth	Mobile Health
W. H. A.	World Health Assembly
W. H. O.	World Health Organization

## **ABSTRACT**

### **Background**

According to the World Health Organization, electronic health (eHealth) is the cost-effective and secure use of information and communications technologies in support of health and health-related fields, including health-care services, health surveillance, health literature, and health education, knowledge, and research.

### **General Aim**

To assess the knowledge, attitudes and practices toward electronic-health system utilization among health professionals in Ghana: A case of Narh-Bita Hospital.

### **Methodology**

A cross-sectional study specifically, a quantitative method was used to assess the knowledge, attitude and practices of health professionals towards eHealth system at the Narh-Bita Hospital, using an electronic structured questionnaire. The sample size was reached using the census method which includes all 138 health professionals at the facility. Data collected was analyzed using STATA, version 17.0. Descriptive statistical analysis was carried out. Odds ratios reported with their 95% confidence intervals (C.I) with the level of statistical significance was set at  $p < 0.05$  for all tests.

### **Results**

The results from the study showed that health professionals had good knowledge of the eHealth system, a positive attitude towards the usage of the eHealth system and an overall frequent usage of the eHealth system. Aside religion, there was no statistically significant linkage between socio-demographic factors (age, gender, marital status, education, profession, work experience) eHealth knowledge, attitude and the usage of the eHealth system.



## **Conclusion**

Health professionals had good knowledge and positive attitude towards the usage of the eHealth system. Knowledge, Attitude and socio-demographic factors aside religion had no linkages with the use of the eHealth system at the Narh-Bita Hospital.

## TABLE OF CONTENTS

DECLARATION .....	ii
DEDICATION .....	iii
ACKNOWLEDGEMENT .....	iv
DEFINITION OF TERMS .....	v
ABBREVIATION/ACRONYMS .....	vii
ABSTRACT.....	viii
TABLE OF CONTENTS.....	x
LIST OF FIGURES .....	xii
CHAPTER 1: INTRODUCTION .....	1
1.1 Background Information .....	1
1.2 Problem Statement .....	4
1.3 Rationale of the Study .....	6
1.4 Conceptual Framework .....	6
1.5 Research Questions .....	7
1.6 General Objective.....	7
1.7 Specific Objectives.....	8
1.8 Profile of the Study Area.....	8
1.9 Scope of Study .....	9
1.10 Organization of Report.....	9
CHAPTER 2: LITERATURE REVIEW .....	10
2.1 Introduction .....	10
2.2 Knowledge of eHealth amongst health professionals .....	10
2.3 Attitudes of health professionals towards eHealth .....	12
2.4 Utilization of eHealth by health professionals .....	14
2.5 Factors that influence eHealth systems utilization by health professionals .....	17

CHAPTER 3: METHODOLOGY .....	21
3.1 Research Methods and Design .....	21
3.2 Data Collection Techniques and Tools .....	21
3.3 Study Population .....	22
3.4 Study Variables .....	22
3.5 Sampling.....	23
3.6 Pre-testing.....	23
3.7 Data Handling .....	23
3.8 Data Analysis .....	24
3.9 Ethical Consideration .....	24
3.10 Limitations of Study.....	25
3.11 Assumptions.....	25
CHAPTER 4: RESULTS .....	26
4.1 Introduction .....	26
4.2 Socio-demographic data of respondents .....	26
4.3 Knowledge of health professionals on eHealth system.....	29
4.4 Attitude Assessment of health professionals on eHealth usage .....	31
4.5 eHealth practices/use by health professionals .....	32
4.6 Factors that influence eHealth practices or usage by health professionals .....	34
CHAPTER 5: DISCUSSION.....	39
5.1 Introduction.....	39
5.2 Knowledge of health professionals on eHealth system.....	39
5.3 Attitude assessment of health professionals on eHealth system .....	40
5.4 Utilization of eHealth by health professionals .....	42
5.5 Factors that influence eHealth practices or usage by health professionals .....	43

CHAPTER 6: CONCLUSIONS AND RECOMMENDATIONS .....	45
6.1 Introduction .....	45
6.2 Conclusion.....	45
6.3 Recommendation.....	46
REFERENCES .....	47
APPENDICES .....	55
1. Informed Consent.....	55
2. Questionnaire .....	57
3. Ethical Clearance .....	63
4. Approval Letter .....	64

## LIST OF TABLES

Table 4.1: Socio-demographic of respondents.....	26
Table 4.2: What does eHealth mean to you? .....	29
Table 4.3: Attitude Assessment .....	31
Table 4.4: Incorporation of eHealth into practice .....	33
Table 4.5: Bivariate analysis of socio-demographic factors associated with eHealth usage ...	35
Table 4.6: Logistic regression of socio-demographic factors, knowledge and attitude associated with eHealth usage .....	36

## LIST OF FIGURES

Figure 1: Adapted conceptual framework of knowledge, attitude and use of mHealth services in Chakaria, Bangladesh (Shafiqur et al., 2017) .....	7
Figure 4. 1 Regularity of eHealth Usage .....	32
Figure 4. 2 Barriers influencing eHealth usage by health professionals.....	34

## **CHAPTER 1: INTRODUCTION**

### **1.1 Background Information**

According to the World Health Organization (WHO), eHealth is "the cost-effective and secure use of information and communications technologies in support of health and health-related fields, including health-care services, health surveillance, health literature, and health education, knowledge, and research" (WHO, eHealth, 2023). This concise explanation captures the essence of eHealth, in which digital tools and tactics are used to improve healthcare practices.

eHealth comprises a multifaceted ecosystem of interconnected elements, each contributing to the advancement of healthcare delivery. These constituents encompass a spectrum of applications, such as electronic health records (EHRs), telemedicine, mobile health (mHealth) applications, wearable health devices, and remote patient monitoring systems. EHRs, for instance, revolutionize medical record-keeping by facilitating seamless data exchange, thereby enhancing patient care coordination and clinical decision-making (Smith et al., 2019). Telemedicine transcends geographical barriers, enabling remote consultations between healthcare providers and patients, thereby increasing access to specialized care (Johnson et al., 2020).

The burgeoning field of mHealth introduces mobile applications that empower individuals to monitor their health, engage in preventative behaviors, and actively manage chronic conditions (Williams et al., 2018). Wearable health devices, such as fitness trackers and smart-watches, seamlessly integrate health monitoring into daily life, fostering a culture of proactive wellness (Williams et al., 2018). Moreover, remote patient monitoring systems enable real-time tracking of patient health metrics, empowering healthcare professionals to intervene promptly and adjust treatment plans as needed (Doe et al., 2021).

The concept of eHealth was first introduced in 1998 after the World Health Organization recognized the potential impact of the internet on healthcare (WHO 101st Executive Board, 1998). As a result, they passed a resolution to explore the possibilities of cross-border advertising, promotion, and sale of medical products through the internet (WHO 101st Executive Board, 1998). In May 2005, the Fifty-eighth World Health Assembly recognized the positive impact the internet has on health and adopted Resolution WHA58.28 that laid down strategies for the World Health Organization to embark on eHealth utilization (World Health Assembly, 2005). This resolution was to encourage member states of the WHO to plan for appropriate eHealth services in their various countries (World Health Assembly, 2005). Following this update and in the same year of 2005, the WHO launched the Global Observatory for eHealth (GOe), which was an initiative dedicated to the study, evolution and impact of eHealth in the member state countries (World Health Assembly, 2005).

Confidentiality with the use of eHealth system especially with sexual health is more assuring, secured and encourages majority of people with sexually related health issues reach out for medical assistance with the eHealth system (Minichiello et al., 2013). The use of ICT in health care delivery leads to timely access to health information, such as administrative and patients' records, diagnosis and treatment profile records (Botha et al, 2014; Teviu et al., 2012).

Furthermore, the use of ICT enables health workers to easily capture, store, retrieve, analyze and transmit large amounts of health information in and around care delivery points (Norman, Aikins and Binka, 2011). eHealth has emerged more cost-effective in the promotion of health education, self-management support and tele-monitoring in many divisions of healthcare (Ossebard and Gemert-Pijnen, 2016; Pomerleau 2008). In the time of the COVID-19 pandemic, eHealth utilization increased significantly and digital tools proved priceless in work reform (Carlqvist et al., 2021).

An evaluation of Ghana's eHealth landscape finds that Ghana has established strategic papers to streamline the deployment of eHealth throughout the last decade. They include Policy on ICT for Accelerated Development (ICT4AD) – 2003; Ghana Government Enterprise Architecture Interoperability Framework, 2008; Ghana Health Service Enterprise Architecture, 2009; National E-Health Strategy, 2010; Ministry of Health 5 Year Digital Health Roadmap-2018; Ghana eGovernment Interoperability Framework (Version 2) – 2022.

The Ministry of Health together with the Ghana Health Service, the Global Fund and the Ministry of Foreign Affairs of Denmark launched a new 5-year Policy and Strategy on Digital Health (2023 to 2027). The aim was to enforce the use of eHealth systems in the delivery of healthcare in the country. The Health Facilities and Regulatory Authority mandates all health facilities to migrate to the eHealth system of which the Ghana Health Service has employed in fast tracking and mobilizing its data and information for the improved service provision to all of its clients. (Ghana Health Service, Policy and Strategy on Digital Health, 2023). There is the District Health Information Management System – 2 (DHIMS-2) system in place that collates electronic information from all of its underlisted health facilities to the district health directorate (Kayode et al., 2014).

Also, facilities utilize different eHealth systems and approaches to complement or supplement the DHIMS-2. One such is the system at Narh-Bita hospital is the EHR system where it is mainly used to gather patient records, medically diagnose and manage patients including capturing nursing procedures done at both the in-patient and out-patient departments. Data on medical conditions diagnosed or managed and other activities requests by the District Directorate is then collated by the EHR system of the hospital and exported onto the DHIMS-2 software for further dissemination by the district directorate.

## **1.2 Problem Statement**

In September 2022, a study titled "Electronic Health Records System Implementation in Ghana: Health Leaders' Perspective" identified various obstacles to the successful implementation of the eHealth system in Ghana. The study analyzed the viewpoints of health leaders. Some findings of the study highlighted inadequate knowledge in Information and Communication Technology (I.C.T.) by health professionals which led to mistakes such as inadequate and inaccurate client information of health records of clients. It went on to highlight how some attitudes, such as laziness, rendered the eHealth system difficult to use by entering incorrect or missing client data and causing visible delays in working with the system. The study revealed that there were double and conflicting entries on clients' folders. There have been concerns about health records being difficult to access and difficult to recover, which has resulted in delays in overall patient or client waiting time spent at the health institution. (Attafuah et al., 2022).

Another study on current eHealth issues and recent developments in eHealth application sought to categorize eHealth challenges into broader categories by an exhaustive evaluation of literature published in this field. Their systemic review revealed the following findings: Complexity of Health Care Infrastructure (20 studies); Professional Shortage (10 studies); Patient Privacy (7 studies); Interoperability of data among different Health Care Places (7 studies); eHealth friendly Government Policies (3 studies); Establish trust between HSR and IT Expert (3 studies); Disease Detection at an Early Stage (3 studies); Reducing Cost of Health Care by Using eHealth System (3 studies); Efficient Managing Patient's Data (3 studies); Effective utilization of Skills of HSR and ICT Expert (2 studies); were the main challenges faced globally after the re-categorization of the various articles (Qureshi et al., 2020). The complexity of the eHealth system was the major challenge most researchers focused on.



Medical errors due to these complexities may cause a patient to be misdiagnosed, mismanaged and may ultimately cause the death of the patient.

Although the desire to increase medical and administrative productivity has been the main driver of interest in eHealth, health workers may not share these aims. The experiences of end users, such as healthcare professionals using it for various aspects of everyday patient care and management, are crucial to the sustained usage of eHealth (Miao et al., 2017). However, health professionals who are not encouraged and motivated by the use of eHealth are less likely to show unremitting obligation to its usage. Additionally, health workers are more likely to resist or discontinue eHealth, if their experiences about its usage are poor. There is evidence that physicians who reported difficulties in using eHealth also reported difficulties with clinical performance (Al-Mujaini et al., 2011).

The Nark-Bita hospital has made a comparable shift from a paper service system to a paperless system, as well as the use of an eHealth system in client management. The hospital implemented the KPAL Software, an EHR system used in the institution's day-to-day operations.

This study aims to investigate the knowledge gap of health professionals with respect to what eHealth is and how to use the eHealth system in their daily work routine, their attitude towards the use of the eHealth system and the practical usage of the eHealth system adopted by the hospital as well as to evaluate the factors that influence and restrict its use by the health professionals. The findings will be used to make concrete decisions on training schedules of the use of the eHealth system to boost knowledge of health professionals and tackle most if not all obstacles that hinder the effective and efficient use of the eHealth system in Ghana.

### **1.3 Rationale of the Study**

This study would provide the eHealth system deployment at the facility with its scientific foundation and identify areas where training sessions for its use would be beneficial. This research would have an impact on local regulations regarding the type and update of the hospital's eHealth system. Finding the existing system's strengths and utilizing them to enhance it in the future is equally vital. Additionally, it is crucial to gather from the users some of the best practices discovered and record them for the system's improvement. It is also prudent to detect issues with its application and impact on work operations. The study also aligns with the promotion of Ghana's new digital health policy and strategy, as well as the Universal Health Coverage initiative in spreading healthcare services to all and sundry.

### **1.4 Conceptual Framework**

This study adapted a framework by Shafiqur et al., which sort to examine the knowledge, attitude and intentions to use mobile Health (mHealth) services in Chakaria, Bangladesh. The research was conducted in 2017 and revealed associations between some demographic components and the knowledge of mHealth services and how this knowledge interacts with the attitudes of the target population towards the mHealth services. The study further established a relation between these attitudes and the usage of the mHealth services which at the end yielded better health outcomes.

Relating to this framework, it can be observed that its objectives are parallel to that of this current study which seeks to assess the knowledge of health professionals on eHealth system, the attitudes of health professionals towards eHealth system and the utilization of the eHealth system by the health professionals.

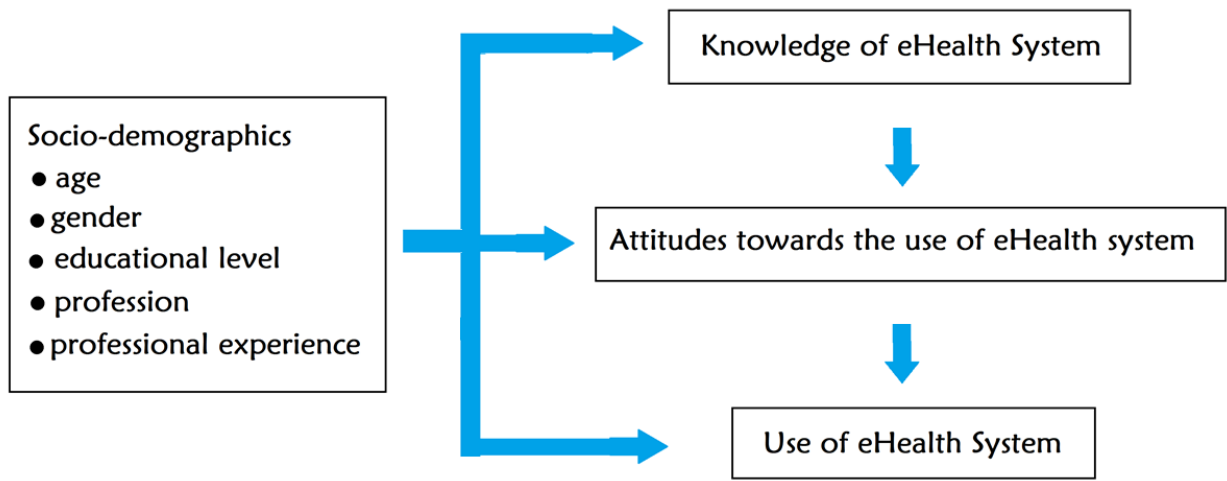


Figure 1: Adapted conceptual framework of knowledge, attitude and use of mHealth services in Chakaria, Bangladesh (Shafiqur et al., 2017)

With respect to this current study, which adapts the above framework based on the research on mHealth, it seeks to establish associations between the dependent variable (usage of eHealth) and its influence on all the other independent variables and covariates.

### 1.5 Research Questions

1. What is the level of knowledge of health professionals at the Narh-Bita Hospital on eHealth system?
2. What is the attitude of health professionals at the Narh-Bita Hospital towards the usage of eHealth system?
3. What are the eHealth practices of health professionals at the Narh-Bita Hospital?
4. What are the factors that influence eHealth practices of health professionals at the Narh-Bita Hospital?

### 1.6 General Objective

To assess the knowledge, attitudes and practices of electronic-health system among health professionals in Ghana: A case of Narh-Bita Hospital.

## **1.7 Specific Objectives**

1. To assess the level of knowledge of health professionals at the Narh-Bita Hospital on eHealth system.
2. To assess the attitude of health professionals at the Narh-Bita Hospital on the usage of eHealth system.
3. To examine the eHealth practices of health professionals at the Narh-Bita Hospital.
4. To evaluate the factors that influence eHealth practices of health professionals at the Narh-Bita Hospital?

## **1.8 Profile of the Study Area**

The study area of the research falls within Tema, an industrial city along the Gulf of Benin and Atlantic Coast of Ghana. It is the capital of the Tema Metropolitan District. As of 2013, Tema is the eleventh most populous settlement in Ghana, with a population of approximately 161,612 people. The Greenwich Meridian (00 Longitude) passes directly through the city. Tema is locally nicknamed the "Harbour City" because of its status as Ghana's largest seaport. It comprises 25 communities with each having easy access to the basic amenities (Tema Metropolitan Assembly, 2021).

The Narh-Bita Hospital was established by Dr. Edward Atter Narh and Mrs. Beatrice Afua Narh, a Family Physician Consultant and a nurse by profession respectively on 1st August 1979, forty-four years now, with the purpose of providing healthcare to the surrounding communities (Narh-Bita Hospital, 2014). The Narh-Bita Hospital, located at Tema Community four and has been in existence for the past forty-four years, serves both neighboring and distant clients with an approximate daily attendance of one hundred and fifty. The facility offers various healthcare services ranging from out-patient, maternal and child welfare, laboratory and diagnostic imaging, pharmaceutical and in-patient services.

## **1.9 Scope of Study**

This study was focused on assessing the knowledge, attitude and utilization of the eHealth system at the Narh-Bita Hospital in Tema with 138 participants who per their daily activities, interact with the eHealth system of the facility. The respondents used the electronic questionnaire as means of data collection. The study is expected to span for two months.

## **1.10 Organization of Report**

The study is made up of six chapters. Chapter one focuses on the introduction which comprises of the background information, problem statement, rationale, conceptual framework, research questions and objectives. It also profiles the study area and the scope of study. Chapter two focuses on literature review that details empiric studies done with respect to the research objectives. Chapter three throws light on the methodology. It deals with the research methods and design, data collection techniques and tools, study population and variables, the sampling method, pretesting, data handling and analysis, ethical consideration, limitations and assumptions about the study. Chapter four presents the results of the study based on the key study variables. Chapter five discusses the findings of the results and links the research questions, objectives, key variables, literature review and how they interact. Chapter six concludes the research by summarizing key findings and making recommendations to stakeholders.

## **CHAPTER 2: LITERATURE REVIEW**

### **2.1 Introduction**

This chapter presents literature reviews on various aspects of eHealth, including its definition, health professionals' knowledge, attitudes, utilization trends, and influencing factors. The reviews span from international to Ghanaian settings, aiming to provide a comprehensive understanding of the landscape. The exploration starts with insights into health professionals' knowledge, attitudes, and utilization patterns. It also delves into the intricate factors that influence eHealth systems. This comparison between global insights and Ghana's healthcare context helps us better understand eHealth as a whole and brings out the gaps in research in this field.

### **2.2 Knowledge of eHealth amongst health professionals**

On the global stage, a study journeys through different regions, including Canada, to gauge how well health professionals comprehend eHealth. By revealing differences in how much people know, this study emphasizes the importance of tailoring awareness and education to fit each area. This way, the collective grasp of eHealth concepts can improve (Smith et al., 2019). Taking a closer look at a specific region, a study focused on Gauteng province in South Africa, exploring the factors that shape health professionals' knowledge of eHealth. This study shines a light on factors like age, education, and professional experience, showing how they affect how well eHealth is understood. These findings make sense within South Africa and echo across other places, highlighting how demographic factors shape eHealth awareness (Johnson et al., 2020).

A cross-sectional study conducted on the knowledge of eHealth among healthcare professionals in the Greater Accra Region of Ghana revealed that doctors, nurses, lab

technicians, and pharmacists had a moderate level of knowledge of eHealth, with a mean score of 5.4 out of 8. The study further indicated that the level of knowledge was positively associated with the age, education level, and years of experience of these healthcare professionals. However, female healthcare professionals were found to have lower knowledge levels compared to their male counterparts (Akter et al., 2020).

Similarly, another study explored the knowledge and perceptions of eHealth among healthcare professionals in the same region. The study unveiled that the majority of the respondents, including doctors, nurses, lab technicians, and pharmacists, possessed a basic understanding of eHealth. However, they lacked the necessary skills and training to effectively implement eHealth programs. The study emphasized the need for enhanced training and support to uplift the knowledge and skills of healthcare professionals in eHealth (Osei et al., 2018).

Furthermore, an examination of the factors influencing the adoption of eHealth in the Greater Accra Region indicated that inadequate knowledge and understanding of eHealth among healthcare professionals were significant barriers to its adoption. Authors suggested that effective training and education on eHealth would play a pivotal role in enhancing the adoption of eHealth in this region (Boateng et al., 2017).

Another study conducted in 2017 scrutinized the use of eHealth among healthcare professionals in developing countries, including Ghana. The findings revealed that healthcare professionals in developing countries, such as those in the Greater Accra Region, had limited knowledge of eHealth and its potential benefits. Authors underscored the urgent need for heightened awareness and education on eHealth among healthcare professionals to foster the improved adoption and utilization of eHealth solutions (Sodani and Kumar, 2017).

### **2.3 Attitudes of health professionals towards eHealth**

Healthcare professionals across the world universally agree on one critical aspect: cultivating positive attitudes towards eHealth is vital for its successful implementation. This shared viewpoint remains consistent, regardless of their location or the type of healthcare system they belong to. They firmly believe that eHealth has the potential to enhance their work, improve patient care, and streamline processes. This collective optimism highlights that eHealth holds promise in addressing healthcare challenges on a global scale (Smith et al., 2019).

Nevertheless, this optimism is balanced by certain challenges. Health professionals are enthusiastic about digital health tools such as EHR, telemedicine, and mobile health apps. These tools can bridge geographical gaps and offer personalized care. However, concerns about the security of patient data, compatibility issues, and the need for proper training persist. These concerns underscore the complexity of integrating new technology into established healthcare systems (Smith et al., 2019).

While there's a shared positive outlook, differences arise due to cultural, organizational, and educational factors. Research conducted in various places reveals how these elements influence attitudes towards eHealth. This emphasizes the significance of tailoring eHealth plans to address specific challenges and capitalize on unique strengths in each region. This tailored approach is crucial for effectively integrating eHealth solutions (Johnson et al., 2020).

Turning to the context of Ghana's healthcare, the focus narrows to studies shedding light on A study explored the attitudes of health professionals towards the use of EHRs in Ghana. The study revealed that health professionals had positive attitudes towards the use of EHRs, with the majority of respondents expressing a willingness to use EHRs. However, the study also highlighted concerns about the potential impact of EHRs on patient privacy and confidentiality



(Amoah et al., 2020). Similarly, a study investigated the attitudes of health professionals towards telemedicine in Ghana. The study revealed that health professionals had positive attitudes towards telemedicine, with the majority of respondents expressing a willingness to use telemedicine. The study also highlighted the need for increased training and support for health professionals to effectively use telemedicine (Lartey et al., 2021).

In a study that explored the attitudes of health professionals towards mHealth in Ghana. The study revealed that health professionals had positive attitudes towards mHealth, with the majority of respondents expressing a willingness to use mHealth. However, the study also highlighted concerns about the potential impact of mHealth on patient privacy and confidentiality (Afulani et al., 2017). Another study on the attitudes of health professionals towards e-prescribing in Ghana showed that health professionals had positive attitudes towards e-prescribing, with the majority of respondents expressing a willingness to use e-prescribing. The study also highlighted the need for increased training and support for health professionals to effectively use e-prescribing (Kwarteng et al., 2019).

The studies reviewed indicate that health professionals in Ghana have positive attitudes towards eHealth, including the use of EHRs, telemedicine, mHealth, and e-prescribing. However, concerns about patient privacy and confidentiality need to be addressed. The studies also highlight the need for increased training and support for health professionals to effectively use eHealth. Future research should focus on identifying the most effective strategies for addressing concerns about patient privacy and confidentiality and providing training and support for health professionals to effectively use eHealth.

## **2.4 Utilization of eHealth by health professionals**

From an international point of view, numerous studies shed light on the utilization patterns of eHealth among health professionals. Research conducted in the United States revealed that doctors displayed a growing inclination towards incorporating electronic health records (EHRs) into their practices. The study emphasized that EHRs streamline patient information management and enhance clinical decision-making, thereby optimizing patient care (Johnson et al., 2018). Similarly, a study in Europe examined the utilization of telemedicine among nurses. The findings underscored that telemedicine improved patient monitoring and communication, positively impacting the quality of care provided (Müller et al., 2019).

Transitioning to the African context, a study in Nigeria investigated the utilization of mHealth applications by pharmacists. The study highlighted that mHealth tools facilitated medication management and patient education, reflecting the potential of digital interventions to strengthen pharmaceutical practices (Okafor et al., 2020). Conversely, a study in South Africa explored the utilization of e-prescribing systems among midwives. The research unveiled that e-prescribing enhanced prescription accuracy and reduced medication errors, thus improving maternal healthcare outcomes (Smith et al., 2017).

Within the Asian landscape, a study conducted in India examined the utilization of health information exchange (HIE) platforms by lab technicians. The study emphasized that HIE streamlined data sharing among healthcare professionals, leading to efficient diagnoses and treatment planning (Gupta et al., 2018). In contrast, a study in China investigated the utilization of telemedicine among doctors. The research revealed that telemedicine expanded access to medical expertise in remote regions and facilitated timely consultations, thereby narrowing healthcare disparities (Li et al., 2019).

Closer to the Latin American region, a study in Brazil explored the utilization of electronic prescription systems by nurses. The study showcased that electronic prescribing improved medication management and reduced prescription errors, aligning with the global trend of enhanced patient safety through eHealth interventions (Rodrigues et al., 2021).

Synthesizing the findings, a common thread emerges: health professionals across various specialties and geographical locations are increasingly embracing eHealth solutions. The adoption of EHRs, telemedicine, mHealth, and e-prescribing illustrates the diverse ways in which digital tools augment healthcare practices. However, challenges such as interoperability issues and resistance to change persist (Johnson et al., 2018; Müller et al., 2019; Okafor et al., 2020; Smith et al., 2017; Gupta et al., 2018; Li et al., 2019; Rodrigues et al., 2021).

The utilization of eHealth by health professionals in Ghana is crucial to the successful implementation of eHealth initiatives. This literature review aims to explore the utilization of eHealth by health professionals in Ghana and highlight the gaps in research in this area.

On the utilization of EHRs by health professionals in Ghana, a study revealed that while the majority of health professionals were aware of EHRs, the utilization rate was low due to inadequate training and support. The study also highlighted the need for increased training and support to improve the utilization of EHRs (Amoah et al., 2020).

Similarly, another research indicated that while the majority of health professionals were aware of mHealth, the utilization rate was low due to inadequate training and support. The study also highlighted the need for increased training and support to improve the utilization of mHealth (Afulani et al., 2017).

In a study on the utilization of e-prescribing by health professionals in Ghana. The study revealed that while the majority of health professionals were aware of e-prescribing, the utilization rate was low due to inadequate training and support. The study also highlighted the need for increased training and support to improve the utilization of e-prescribing (Kwarteng et al., 2019).

Another study also investigated the utilization of telemedicine by health professionals in Ghana. The study revealed that while the majority of health professionals were aware of telemedicine, the utilization rate was low due to inadequate infrastructure and lack of resources. The study also highlighted the need for increased investment in infrastructure and resources to improve the utilization of telemedicine (Appiah et al., 2021).

In conclusion, the literature reviewed indicate that while health professionals in Ghana are aware of eHealth, including EHRs, mHealth, e-prescribing, and telemedicine, the utilization rate is low due to inadequate training and support, infrastructure, and resources. The findings also highlight the need for increased investment in training and support, infrastructure, and resources to improve the utilization of eHealth by health professionals in Ghana. Future research should focus on identifying the most effective strategies for providing training and support, improving infrastructure, and allocating resources to improve the utilization of eHealth in Ghana.

## **2.5 Factors that influence eHealth systems utilization by health professionals**

Globally, extensive research has underscored the multifactorial nature of eHealth systems utilization. A study conducted in the United States revealed that the availability of user-friendly interfaces and comprehensive training significantly influenced doctors' engagement with EHR systems. The study highlighted that user-centered design and tailored training programs facilitate a seamless integration of EHRs into clinical workflows (Chen et al., 2018). Similarly, a research study conducted in Europe explored the factors influencing the utilization of telemedicine among nurses. Findings indicated that institutional support and sufficient resources were key determinants, emphasizing the role of organizational infrastructure in shaping telemedicine adoption (Rodriguez et al., 2020).

Venturing into the Asian context, a study conducted in China explored the factors shaping the utilization of HIE platforms by lab technicians. The study revealed that interoperability between different systems and data sources significantly influenced HIE adoption, indicating the crucial role of seamless data exchange in driving engagement (Wang et al., 2019). In India, a study investigated the factors influencing the utilization of telemedicine among doctors. The research emphasized that regulatory frameworks and legal clarity were essential enablers, highlighting the importance of a conducive policy environment for eHealth adoption (Kapoor et al., 2021).

Approaching the Latin American region, a study in Mexico examined the factors influencing the utilization of electronic prescription systems by nurses. The research indicated that comprehensive training and ongoing support were instrumental in overcoming resistance to change, illustrating the significance of education and guidance (Gonzalez et al., 2018).

Collectively, the studies reviewed underscore the intricate interplay of factors that influence the utilization of eHealth systems by health professionals. While technological usability, organizational support, regulatory frameworks, and privacy concerns emerge as key influencers, the nuanced nature of these factors varies across regions and healthcare contexts (Chen et al., 2018; Rodriguez et al., 2020; Mensah et al., 2019; Ndlovu et al., 2017; Wang et al., 2019; Kapoor et al., 2021; Gonzalez et al., 2018).

The utilization of eHealth by health professionals in Ghana is influenced by various factors, including individual and organizational factors. This literature review aims to explore the factors that influence the utilization of eHealth by health professionals in Ghana and highlight the gaps in research in this area.

Shifting focus to the African landscape, a study in Ghana examined the factors influencing the utilization of mobile health (mHealth) applications by pharmacists. The research identified that access to reliable internet connectivity and mobile devices significantly influenced mHealth adoption (Mensah et al., 2019). This insight underscores the importance of technology accessibility in enhancing health professionals' engagement with digital tools. Conversely, in South Africa, a study investigated the factors affecting the utilization of e-prescribing systems among midwives. The research highlighted that concerns over data security and privacy were major inhibitors, emphasizing the need for robust data protection measures (Ndlovu et al., 2017).

Amoah et al., investigated the attitudes of health professionals towards electronic health records (EHRs) in Ghana and revealed that individual factors such as age, gender, and years of experience had no significant effect on the utilization of EHRs, while organizational factors

such as availability of EHR training and support, EHR infrastructure, and EHR policy were significant predictors of EHR utilization (Amoah et al., 2020). Similarly, a study investigated the attitudes of healthcare professionals towards electronic prescribing (e-prescribing) in Ghana revealing that individual factors such as age, gender, and years of experience had no significant effect on e-prescribing utilization, while organizational factors such as availability of e-prescribing training and support, e-prescribing infrastructure, and e-prescribing policy were significant predictors of e-prescribing utilization (Kwarteng et al., 2019).

In a study that investigated the factors that influence the utilization of mobile health (mHealth) by health professionals in Ghana, the results revealed that individual factors such as age, gender, and years of experience had no significant effect on mHealth utilization, while organizational factors such as availability of mHealth training and support, mHealth infrastructure, and mHealth policy were significant predictors of mHealth utilization (Afulani et al., 2017).

Another study investigated the factors that influence the utilization of telemedicine by health professionals in Ghana. The results revealed that individual factors such as age, gender, and years of experience had no significant effect on telemedicine utilization, while organizational factors such as availability of telemedicine training and support, telemedicine infrastructure, and telemedicine policy were significant predictors of telemedicine utilization (Appiah et al., 2021).

Overall, the studies reviewed indicate that while individual factors such as age, gender, and years of experience do not significantly influence the utilization of eHealth by health professionals in Ghana, organizational factors such as availability of training and support,

infrastructure, and policy are significant predictors of eHealth utilization. Future research should focus on identifying the most effective strategies for improving the availability of training and support, infrastructure, and policy to improve the utilization of eHealth by health professionals in Ghana.



## **CHAPTER 3: METHODOLOGY**

### **3.1 Research Methods and Design**

This quantitative study adopted an analytic cross-sectional study design to assess the knowledge, attitude and practices of health professionals towards eHealth system utilization at the Narh-Bita Hospital, using an electronic questionnaire. An analytic cross-sectional study is an observational research type that analyzes data of variables collected at one given point of time across a sample population. It is mostly used in associations between exposures and outcomes and provides the opportunity for assessment of problems and results are easily expressed in mathematical language and interpreted by means of statistical procedure.

### **3.2 Data Collection Techniques and Tools**

An electronic structured questionnaire, using Google Form was used for data collection to reduce chances of error. Data was collected between July and August, 2023. The questionnaire was in seven sections as follows; Informed Consent, Eligibility, Demographics, Knowledge on eHealth, Attitude assessment, Practice related questions regarding eHealth utilization and appreciation. Most of the questions were close ended with options for participants to choose from and a few open-ended questions to make room for other possible responses peculiar to specific respondents. The questionnaire was adopted from a study which sought to assess the knowledge, attitude and practice on eHealth among doctors working at selected private hospitals in Dhaka, Bangladesh (Parvin and Shahjahan, 2016) and a study on the knowledge, attitude and practice of eHealth among health care providers in Kuwait (Al-Khathlan et al., 2017).

### **3.3 Study Population**

The study was conducted among staff of the Narh-Bita Hospital who on a day to day, per their respective duties, use the eHealth software system of the hospital. The hospital has an average of ten administrative staff, ten records staff, twelve medical doctors and specialists, twelve physician assistants, sixty nurses and ten midwives, eight laboratory technicians, twelve pharmacy staff, three account officers and one diagnostic radiographer. A total of 138 workers at the facility.

### **3.4 Study Variables**

Variables in research are attributes that can be measured, changed or influenced. They are studied to comprehend how they interact with the desired results. They can be classified as independent (cause) and dependent (effect) variables. In this study, the independent variables were knowledge of eHealth system and the attitude towards eHealth systems. The practical usage of the eHealth system was the outcome. Other indicators such as the socio-demographics are covariates. For each variable, the STATA v17 software was used in the analysis, where they were grouped into binary values and assigned scores. In analyzing the level of knowledge of the respondents, 11 questions were asked on eHealth systems with a pass mark of 7. Those above this score were classified to have good knowledge whereas those below this score were classified as having poor knowledge of the eHealth system. The attitudes of the respondents were assessed using Likert's scale (strongly agree, agree, disagree, strongly disagree). Strongly agree and agree were categorized as favorable. Strongly disagree and disagree as unfavorable. Similar analysis was done for the responses of the practical usage of the eHealth system. The scores were then used in the overall analysis of the study. Some of the socio-demographic variables were further grouped in binary values in order to make wholesome statistical calculations and analyses. They include age, education, profession and work experience.

### **3.5 Sampling**

A study's sample is a subset of the population that is chosen in order to draw conclusions or make projections about the general population. This study used the census methodology to collect data from all 138 healthcare professionals working at the facility who utilize the eHealth system to manage their workloads in both the administrative and medical departments. Smaller sample sizes, like those in the setting, are appropriate for and effective using this strategy. The census approach also gives complete data from various departments and professions, which increases accuracy and strengthens the reliability of the results and estimates. Those with less than three months' experience using the eHealth system, non-staff health professionals who occasionally work at the hospital, students, and interns were all excluded from the study. Respondents who voluntarily declined to participate were likewise exempted.

### **3.6 Pre-testing**

The questionnaire was pretested at the Snell Specialist Hospital, a private facility at Tema Community four that was chosen owing to its proximity to the main setting of the study and its existence in Tema for over forty years. Respondents for the pre-testing were health professionals who utilize the Snell eHealth system to complete their regular tasks at work. The pretesting results were not included in the main study. The pre-test paved way to assess the respondents' level of knowledge of the questionnaire and make required changes.

### **3.7 Data Handling**

Electronic data collection using the Google Form was employed in collating all the responses. The principal investigator was responsible for data cleaning and management. The original entry on the questionnaire was used as source data. Soft copies of all dataset and work done was sent to the investigator by e-mail and an external drive and kept securely.

### **3.8 Data Analysis**

The electronic questionnaire in this study had its independent variables to be the knowledge of eHealth system and the attitude towards eHealth systems. The practical usage of the eHealth system was the outcome. Other indicators such as the socio-demographics which had some of its variables grouped in binary units such as ages [Young adults (below 35 years) and Older adults (35years and above)], education [Post-secondary education (certificate and diploma) and Higher education (bachelor's and master's degree), profession (Medical staff and Administrative staff) and work experience [Junior staff (1 to 5 years) and Senior staff (6 to 10 years)] and factors that influenced the usage of the eHealth system were covariates. The bivariate analysis and logistic regression were facilitated by these binary categorizations. The acquired data was processed using STATA, version 17, and descriptive statistical analysis was performed to generate summary tables and graphs including demographic information on the study participants. For all tests, odds ratios (OR) were provided with 95% confidence intervals (C.I), with the level of statistical significance cut off at  $p < 0.05$ . Means, frequencies, and percentages were represented in graphs and pie charts for descriptive analyses.

### **3.9 Ethical Consideration**

Ethical clearance was sought from the Ethical Review Committee of the Ensign Global College prior to the commencement of the study. Additional permission was sought from the management and that of the Research and Development Committee of the Narh-Bita Hospital before commencing the study. Furthermore, the consent of the respondents was sought electronically with the objectives of the research project clearly stated. Respondents were assured of anonymity and confidentiality for all information they provided and were also assured that at any point during the data collection, they had the right to withdraw without any consequences to their person, image or self-esteem.

### **3.10 Limitations of Study**

A number of challenges experienced during the study included the demerits of using a cross-sectional study which include lack of temporality, causality and the limited generalizability of the study findings. Other limitations included the short span in conducting this research and unwillingness of some health professionals in filling the electronic questionnaire.

Being an employee at Narh-Bita Hospital with regular encounters with other staff who may want to investigate more about the topic and not provide firsthand experiences with the hospital's eHealth system was another challenge that might have influenced the participants' responses. Conversely, the electronic questionnaire was initially sent to the hospital's Research and Development Committee, who then forwarded it to the various in-charges of the wards and departments, rather than being handed directly to the respondents by the researcher.

Data collection was unexpectedly cumbersome as responses were trickling in bit and prolonged the estimated duration of data collection regardless of the recurrent reminders placed on the various platforms of the health professionals.

### **3.11 Assumptions**

It was assumed that the all participants of the sample size used were employees and have used the eHealth system for more than three months at the Narh-Bita hospital. The instrument used to gather the data for the research was valid and measured the desired hypotheses. It was also assumed that the health professionals who partook in the online questionnaire answered truthfully.

## CHAPTER 4: RESULTS

### 4.1 Introduction

This chapter entails the findings of the study. It consists of the socio-demographic information, knowledge on eHealth, attitude assessment, practice related questions regarding eHealth among health professionals and the factors influencing eHealth practices. The study comprised a total of 101 responses as against an expected 138 responses. Out of the 101 responses, 27 were excluded for the following reasons; 9 respondents chose not to participate, 13 respondents had used the eHealth system for less than 3 months and 5 respondents were interns. A total of 74 responses were captured and analyzed.

### 4.2 Socio-demographic data of respondents

The socio-demographic data comprised gender, age, education, profession and service years as tabulated in table 4.0 below.

Table 4.1: Socio-demographic of respondents

<b>Socio-demographic characteristics (n = 74)</b>		<b>Frequency [n (%)]</b>	
<b>Gender</b>			
Male		<b>30 (40.5)</b>	
Female		<b>44 (59.5)</b>	
<b>Age</b>			
<b>Young Adults</b>	Below 25 years	15 (20.3)	<b>56 (75.7)</b>
	25 - 34 years	41 (55.4)	
<b>Older Adults</b>	35 - 44 years	16 (21.6)	<b>18 (24.3)</b>
	45 - 54 years	2 (2.7)	

<b>Religion</b>			
Christianity		<b>72 (97.3)</b>	
Islamic		<b>2 (2.7)</b>	
<b>Marital Status</b>			
Single		<b>43 (58.1)</b>	
Married		<b>31 (41.9)</b>	
<b>Education</b>			
<b>Post-Secondary Education</b>	Certificate	6 (8.1)	<b>9 (12.2)</b>
	Diploma	3 (4.1)	
<b>Higher Education</b>	Bachelor's degree	57 (77)	<b>65 (87.8)</b>
	Master's degree	8 (10.8)	
<b>Profession</b>			
<b>Staff (Medical)</b>	Medical Doctor	20 (27)	<b>66 (89.2)</b>
	Physician Assistant	2 (2.7)	
	Nurse	6 (8.1)	
	Midwife	11 (14.9)	
	Pharmacist	12 (16.2)	
	Laboratory technician	11 (14.9)	
	Diagnostic radiographer	4 (5.4)	
<b>Staff (Administration)</b>	Hospital Administrator	5 (6.8)	<b>8(10.8)</b>
	Medical Records Clerk	1 (1.4)	
	Accountant	1 (1.4)	
	IT officer	1 (1.4)	

<b>Number of years in service</b>		
<b>Junior Staff</b>	1 – 5 years	<b>60 (85.7)</b>
<b>Senior Staff</b>	6 – 10 years	<b>14 (14.3)</b>

**Source; electronic data, 2023.**

In table 4.1, out of the 74 participants, an uneven gender distribution was observed, with 30 being male and 44 females, representing 40.5% and 59.5% respectively. The participants' age span was diversified across various ranges. However, they were further categorized as youth (75.7) and older adults (24.3). The majority (55.4%) fell within the age bracket of 25-34 years. Other age categories included 35-44 years (21.6%), closely followed by those below 25 years (20.3%), 45-54 years (2.7%) and no respondent between the ages of 55-64 years. The mean age is approximately 37.67 years, and the standard deviation is approximately 6.13 years. The religion with the highest frequency was Christianity with 72, representing 97.3%. Islamic religion recorded 2 which represented 2.7%. None of the respondents were traditionalists.

Majority of the respondents were single representing 58.1%, closely followed by the married with 41.9%. None of the respondents were divorced or separated. The educational spectrum of the participants showcased a range of qualifications of which were grouped into undergraduate (Certificate and Diploma) and post graduate (Bachelor's degree and Masters). The highest proportion (77%) held a Bachelor's degree, followed by those with master's degree (10.8%). Furthermore, 8.1% represented those with certificates and 4.1% being those with diploma. There was no respondent with a doctorate degree. The professional diversity was apparent among the participants. This was categorized as staff (medical) and staff (administration) as displayed in the above table. A significant portion (27%) identified as nurses, followed by physician assistants with 16.2%. Both medical doctors and pharmacists accounted for 14.9%



each. Laboratory technicians (8.1%), hospital administrators (6.8%), medical records clerks (5.4%) and midwives (2.7%) followed respectively. Other professionals included Diagnostic Radiographer (1.4%), Accountant (1.4%) and an ICT officer (1.4%). Professional experiences ranged from 1 to 10 years. Professional experience was sectioned into junior staff (1 to 5 years) and senior staff (6 to 10 years). Majority had working experience between 1 to 5 years which represented 85.7% and 6 to 10 years of working experience recorded 14.3%.

### 4.3 Knowledge of health professionals on eHealth system.

Table 4.2 below presents the results related with what eHealth meant to the respondents.

They responded to some questions to assess their knowledge on eHealth system.

Table 4.2: What does eHealth mean to you?

No	Statement	Yes [n (%)]	No [n (%)]
1	Health care through the internet	62 (83.8)	12 (16.2)
2	Use of internet and other electronic technologies to enhance health	72 (97.3)	2 (2.7)
3	Electronic medical record of patients' registration, consultation with prescribers.	73 (98.6)	1 (1.4)
4	Patients' examination communicated through the internet	55 (74.3)	19 (25.7)
5	Control of medicine supply for patients through electronic software	67 (90.5)	7 (9.5)
6	Entertainment through the internet within working hours	9 (12.2)	65 (87.8)
7	Management of patients including surgical procedures through the internet	35 (47.3)	39 (52.7)
8	Education of health professionals through online sources	58 (78.4)	16 (21.6)
9	Social communication between friends	19 (25.7)	55 (74.3)
10	Health information exchange and communication in a standardized way	68 (91.9)	6 (8.1)
11	Direct full consultation of patients through video conferencing	43 (58.1)	31 (41.9)

<b>Overall knowledge of eHealth system</b>		
<b>Knowledge on eHealth</b>	<b>Scores of questions asked</b>	<b>Frequency [n (%)]</b>
Good	7 – 11	57 (77)
Poor	0 – 6	17 (23)
<b>Mean score: 7.6</b>		

In table 4.2, majority of the responses were in the affirmative with the appropriate answers to what eHealth is about. Some respondents (16.2%) believed eHealth is not healthcare through the internet. A few (12.2%) also answered yes to eHealth being entertainment during working hours. There was a split with eHealth pertaining to management of patient including surgical procedures over the internet. However, the majority (52.7%) answered incorrectly.

Table 4.2 showed that 23% scored between 0 to 6 out of 11 questions asked on eHealth and the remaining majority (77%) scored between 7 to 11 marks. This indicated that majority of the respondents had good knowledge on eHealth system.

#### 4.4 Attitude Assessment of health professionals on eHealth usage

Table 4.3: Attitude Assessment

No	Statement	Strongly agree	Agree	Favorable [n (%)]	Disagree	Strongly Disagree	Unfavorable [n (%)]
1	I find the eHealth system useful in my job	53	20	73 (98.6)	1	-	1 (1.4)
2	I find the eHealth system easy to use	25	40	65 (87.8)	9	-	9 (12.2)
3	I found it easy to learn how to use the system	25	41	66 (89.2)	8	-	8 (10.8)
4	eHealth can improve be productivity of the workplace	54	18	72 (97.2)	2	-	2 (2.8)
5	I can use it successfully at every time	33	32	65 (87.8)	9	-	9 (12.2)
6	It saves my time when I use it	42	25	67 (90.6)	7	-	7 (9.4)
7	eHealth would decrease the burden of outpatient visits	33	34	67 (90.6)	7	-	7 (9.4)
8	It should be implemented in all health centers	49	24	73 (98.6)	1	-	1 (1.4)
9	eHealth can be used for prevention and treatment of communicable diseases.	25	34	59 (79.7)	13	2	15 (20.3)
10	I am interested in getting training on telemedicine	50	22	72 (97.2)	2	-	2 (2.8)
<b>Overall Attitude towards eHealth system</b>				<b>68 (91.9)</b>			<b>6 (8.1)</b>

From table 4.3 on attitude assessment of health professionals at the Narh-Bita Hospital, it can be said that majority of the respondents had positive and favorable attitudes towards the use of the eHealth system. The findings revealed a strong positive sentiment among healthcare professionals towards the eHealth system. Majority (87.7%) agreed or strongly agreed that the system was easy to use. Similarly, 89.2% found it easy to learn the use of the eHealth system. A notable proportion (97.2%) believed that the eHealth system improved workplace productivity while 90.6% acknowledged its time-saving benefits.

Furthermore, participants highlighted the potential of the eHealth system in reducing the burden of outpatient visits (90.6% agreement), and a substantial portion (98.6%) supported its implementation across all health centers. A considerable majority (79.7%) considered the system effective for prevention and treatment of communicable diseases. Training interest in telemedicine was strong with 97.2% expressing strong agreement.

Analysis done on the overall attitude of the respondents towards the use of the eHealth system showed that a majority of 91.9% had favorable attitude towards the eHealth as against the 8.1% with unfavorable attitude towards it.

#### 4.5 eHealth practices/use by health professionals

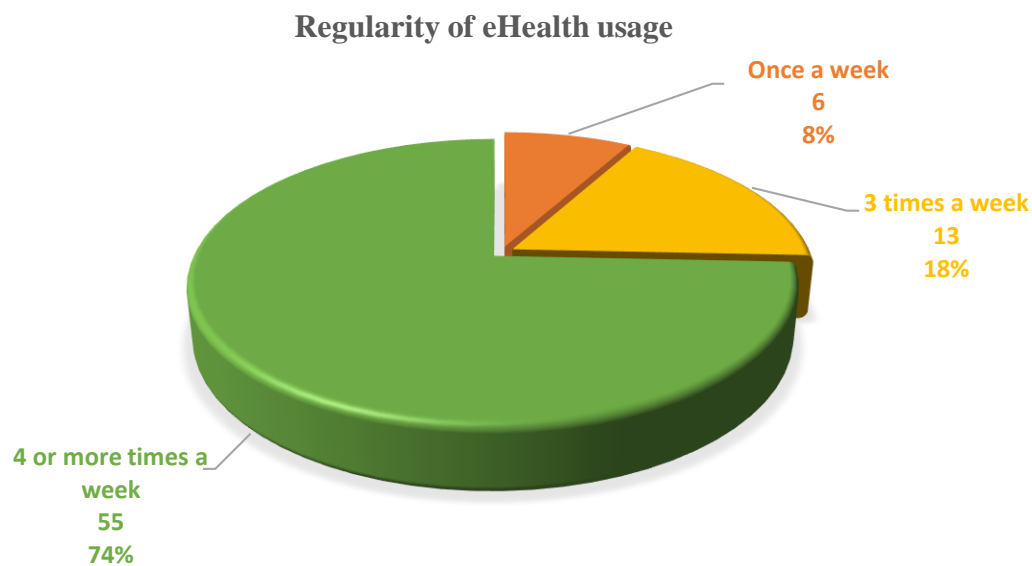


Figure 4.1 Regularity of eHealth Usage

Figure 4.1 displays the regularity of the use of the eHealth system among the health professionals at the Narh-Bita Hospital. From the chart, 8.1% of the respondents had low usage of the eHealth system. 91.9% of the respondents frequently used the eHealth system. Out of this, 74.3% used it 4 or more times a week and 17.6% used it 3 times a week.

Table 4.4: Incorporation of eHealth into practice

<b>Practice</b>	<b>Frequency (n)</b>	<b>Percentage (%)</b>
Patient records	13	17.6
Medical diagnoses and management	17	23
Laboratory	5	6.8
Pharmacy	9	12.2
Maternal and child health	4	5.4
General nursing care	12	16.2
Administration	4	5.4
ICT	3	4.1
Others: All of the above	2	2.8
<b>Total</b>	<b>74</b>	<b>100</b>

Table 4.4 outlines the numerous fields where health professionals have incorporated eHealth into their professions. The department of medical diagnoses and management was the unit where the eHealth system was used the most (23%), followed by the departments of patient records (17.6%), general nursing care (16.2%), pharmacy (12.2%), laboratory (6.8%), maternal and child health and administration (5.4%), and I. C. T. (4.1%). Two respondents used the eHealth system in all departments, which represented 2.8%.

#### 4.6 Factors that influence eHealth practices or usage by health professionals

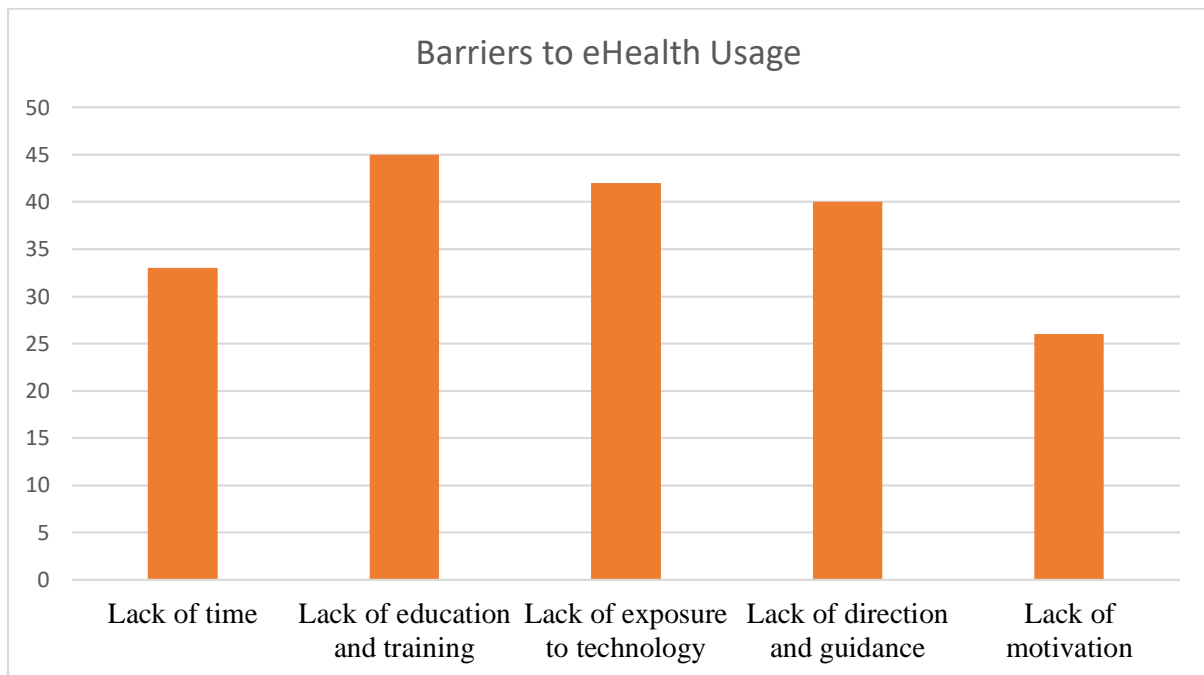


Figure 4.2 Barriers influencing eHealth usage by health professionals.

In figure 4.2, majority of the respondents (45:60.8%) were of the view that lack of education and training on eHealth impeded their eHealth usage. This was closely followed by lack of exposure to technology (42:56.8%), lack of direction and guidance (40:54.1%), lack of time (33:44.6%) and lack of motivation (26:35.1%) being the least barrier to impede respondents' knowledge on eHealth.

Other reasons listed by the respondents included; privacy and security concerns, poor internet access and services, no government initiative on eHealth, low patronage of eHealth by patients, high cost of eHealth services and inadequate electronic devices of the eHealth system.

Table 4.5: Bivariate analysis of socio-demographic factors associated with eHealth usage

Socio-demographic characteristics (n = 74)	eHealth Usage		Total [n (%)]
	Frequent	Non-frequent	
<b>Gender (P = 0.214)</b>			
Male	29	1	30 (40.5)
Female	39	5	44 (59.5)
<b>Total</b>	<b>68</b>	<b>6</b>	<b>74</b>
<b>Age (P = 0.648)</b>			
Young Adults	51	5	56 (75.7)
Older Adults	17	1	18 (24.3)
<b>Total</b>	<b>68</b>	<b>6</b>	<b>74</b>
<b>Religion (P = 0.028)</b>			
Christianity	67	5	72 (97.3)
Islamic	1	1	2 (2.7)
<b>Total</b>	<b>68</b>	<b>6</b>	<b>74</b>
<b>Marital Status (P = 0.658)</b>			
Single	39	4	43 (58.1)
Married	29	2	31 (41.9)
<b>Total</b>	<b>68</b>	<b>6</b>	<b>74</b>
<b>Education (P = 0.725)</b>			
Post-Secondary Education	5	1	6 (8.1)
Higher Education	60	8	68 (91.9)
<b>Total</b>	<b>65</b>	<b>9</b>	<b>74</b>
<b>Profession (P = 0.185)</b>			
Staff (Administration)	9	2	11 (14.9)
Staff (Medical)	59	4	63 (85.1)
<b>Total</b>	<b>68</b>	<b>6</b>	<b>74</b>
<b>Number of years in service (P = 0.883)</b>			
1 – 5 years	55	5	60 (81.1)
6 – 10 years	13	1	14 (18.9)
<b>Total</b>	<b>68</b>	<b>6</b>	<b>74</b>

In table 4.5, results of bivariate analysis are displayed to which shows the extent of association and significance of the socio-demographics with the use of the eHealth system. With P value cut off at <0.05, it was deduced that gender (p=0.214), age (p=0.648), marital status (p=0.658), education (p=0.725), profession (p=0.185) and experience (p=0.883) were not significantly associated to the usage of the eHealth system by the health professionals. However, per the results, religion was significantly associated with the use of the eHealth system by health professionals with P value of 0.028.

Table 4.6: Logistic regression of socio-demographic factors, knowledge and attitude associated with eHealth usage

<b>Variables (n = 74)</b>	<b>COR (95%CI)</b>	<b>P-value</b>	<b>AOR (95%CI)</b>	<b>P-value</b>
<b>Gender</b>				
Male	3.72 (0.41 – 33.56)	0.242	5.03 (0.24 – 104.16)	0.296
Female	-	ref	-	ref
<b>Age</b>				
Older Adults	1.67 (0.18 – 15.29)	0.651	0.64 (0.02 – 19.20)	0.796
Young Adults	-	ref	-	ref
<b>Religion</b>				
Islamic	0.08 (0 -1.38)	0.081	0.02 (0 – 0.69)	0.031
Christianity	-	ref	-	ref
<b>Marital Status</b>				
Single	0.67 (0.12 – 3.92)	0.659	0.71 (0.04 – 11.43)	0.807
Married	-	ref	-	ref
<b>Education</b>				
Higher Education	1.5(0.16 – 14.52)	0.726	1.78 (0.08 – 40.75)	0.718
Post-Secondary Education	-	ref	-	ref
<b>Profession</b>				
Staff (Administration)	0.31 (0.05 – 1.91)	0.205	0.11 (0.01 – 1.24)	0.074
Staff (Medical)	-	ref	-	ref



<b>Number of years in service</b>				
1 - 5	1.18 (0.13 – 11.0)	0.883	0.28 (0.01 – 8.75)	0.466
6 - 10	-	ref	-	ref
<b>Knowledge on eHealth</b>				
Good	3.86 (0.70 – 21.22)	0.121	10.03 (0.69 – 145.46)	0.091
Poor	-	ref	-	ref
<b>Attitude towards eHealth usage</b>				
Favorable	3.2 (0.30 – 34.33)	0.337	3.12 (0.11 – 87.43)	0.503
Unfavorable	-	ref	-	ref

Table 4.6 displays results of the linear regression of eHealth usage as against the independent variable (knowledge and attitude) and the covariates (socio-demographic factors). P-value was cut off at  $p < 0.05$ . The results further confirm using the respective P-values of the individual variables that, there is no statistically significant association between the socio-demographic characteristics aside religion with P value 0.031 with the AOR. Again, there were no statistically significant linkage between knowledge of the eHealth system and its use. This is similar with the attitude of health professionals towards the eHealth system and its usage.

Using the COR, the odds that and older staff would use the eHealth system was 1.67 than a young staff. There was a 3.72 likelihood of a male using the eHealth system as compared to female. Religion-wise, health professionals who are Muslims had 92% odds of using the eHealth system compared to health professionals who were Christians. Furthermore, health professionals who were single had a 33% likelihood of using the eHealth system as compared to those who were married. Regarding that of education, it was found that the odds that a postgraduate would use the eHealth system was 1.5 than that of the post-secondary education.

Additionally, there was 69% reduced odds that an administrative staff would use the eHealth system as compared to that of the medical staff. Similarly, senior staff had odds of 1.18 chances of using the eHealth than the junior staff. The odds a health professional with good knowledge would use the eHealth system was 3.86 chances than one with poor knowledge. Health professionals with favorable attitudes towards the eHealth system were 3.2 times more likely to use it than those with unfavorable attitudes.

## **CHAPTER 5: DISCUSSION**

### **5.1 Introduction**

The purpose of this study was to assess the knowledge, attitudes and practices of electronic-health system among health professionals in Ghana: A case of Narh-Bita Hospital. This chapter discusses the results obtained from the study and categorized under the specific objectives with comparisons made with findings of other research publications conducted on similar areas.

### **5.2 Knowledge of health professionals on eHealth system**

The study findings revealed that knowledge on eHealth at the Narh-Bita Hospital was relatively good. Majority of the source of eHealth knowledge was from formal eHealth training. Other sources of eHealth knowledge were from the internet and colleagues, professional training and medical literature. The major barrier to eHealth knowledge acquisition by health professionals was lack of education and inadequate training on eHealth systems.

Comparing findings of the study done with global studies, there were difference in the eHealth knowledge of health professionals (Smith et al., 2019). Bringing the focus to Africa, a study contrasted the relation of socio-demographic factors and that of the eHealth knowledge of health professionals in South Africa. These factors included age, education, and professional experience, showing how they affect the understanding of the eHealth system (Johnson et al., 2020).

In Ghana, similar to a cross-sectional study conducted on the knowledge of eHealth among healthcare professionals in the Greater Accra Region which revealed that doctors, nurses, lab technicians, and pharmacists had a moderate level of knowledge of eHealth, with a mean score of 5.4 out of 8 (Akter et al., 2020). This study also revealed that medical doctors, physician

assistants, nurses, lab technicians, pharmacists and administrative staff had good knowledge on the eHealth system used with a mean score of 8.9 out of 11. Their study further indicated that the level of knowledge was positively associated with the age, education level, and years of experience of these healthcare professionals which was on the other hand contrary to this finding which showed no correlation at all with age, educational level and professional experience (Akter et al., 2020).

Similarly, another study explored the knowledge and perceptions of eHealth among healthcare professionals in the same region. The study unveiled that the majority of the respondents, including doctors, nurses, lab technicians, and pharmacists, possessed a basic understanding of eHealth. However, they lacked the necessary skills and training to effectively implement eHealth programs (Osei et al., 2018).

An assessment of the factors impacting the adoption of eHealth in the Greater Accra Region revealed that healthcare professionals' lack of knowledge and comprehension of eHealth were significant hurdles to its implementation. The authors proposed that good eHealth training and teaching would be critical in increasing eHealth adoption in this region (Boateng et al., 2017). Similar to this study, the primary barrier preventing health professionals from improving their eHealth knowledge was a lack of eHealth system education and training.

### **5.3 Attitude assessment of health professionals on eHealth system**

In studying the attitudes of health professionals on the eHealth system, it was revealed that there was an overall positive attitude towards the adoption and use of the eHealth system. However, there were concerns of privacy and security of patient information, poor internet

network, inadequate eHealth devices to be some factors that may influence the attitudes of the health professionals in the usage of the eHealth system.

Similarly, according to a study on the usage of electronic health records (EHRs) in Ghana, the majority of respondents expressed a readiness to utilize EHRs, showing that health professionals had favorable attitudes regarding the use of EHRs. However, the study raised concerns about the potential effects of EHRs on patient confidentiality and privacy (Amoah et al., 2020). Another study looked at how Ghanaian doctors felt about telemedicine and found similar results. According to the study, medical professionals had good attitudes of telemedicine, with the majority of respondents saying they would be willing to employ it. (Lartey et al., 2021).

A study looked at how Ghanaian health professionals felt about mobile health (mHealth). According to the study, medical professionals had positive attitudes toward mobile health, with the majority of respondents saying they would be happy to utilize it. However, the study raised concerns about how mHealth can impair patient confidentiality and privacy (Afulani et al., 2017). Another study on health professionals' attitudes regarding electronic prescribing (e-prescribing) in Ghana found that health professionals had good attitudes toward e-prescribing, with the majority of respondents expressing a readiness to adopt it. The study also underlined the need for further training and support for health professionals to use e-prescribing effectively (Kwarteng et al., 2019).

The above studies on the attitudes of health professionals towards eHealth system confirms this current study as this new venture the Ministry of Health and the Ghana Health Service has put in place seeks to make healthcare services easier and promotes the use of technological advancement in the field of health.

#### **5.4 Utilization of eHealth by health professionals**

Based on the results of this study, it was established that majority of the health professionals used the eHealth system in their respective fields of work. The department of medical diagnoses and management was the unit where the eHealth system was used the most, followed by the departments of patient records, general nursing care, pharmacy, laboratory, maternal and child health and administration, and I. C. T. with two respondents using the eHealth system in all departments. Majority of the health professionals regularly used the eHealth system which was 3 or more times in a week.

Comparing to the international front, research conducted in the United States revealed that doctors displayed a growing inclination towards incorporating electronic health records (EHRs) into their practices (Johnson et al., 2018). China also experienced an increased use of the eHealth system in an investigation into the utilization of telemedicine among doctors. The research revealed that telemedicine expanded access to medical expertise in remote regions and facilitated timely consultations, thereby narrowing healthcare disparities (Li et al., 2019).

Compared to studies in West Africa, a study in Nigeria which investigated the utilization of mobile health (mHealth) applications by pharmacists, showed similar outcome with an increased use of mHealth tools in facilitated medication management and patient education aimed at strengthening pharmaceutical practices (Okafor et al., 2020).

However, there were contrasting outcomes pertaining to the use of eHealth by health professionals in some Ghanaian studies. According to one study, while most health professionals were aware of EHRs, adoption was low due to insufficient training and support (Amoah et al., 2020). Another study discovered that, while most health professionals were

aware of mHealth, usage was limited due to insufficient support and training. The study also highlighted the need for additional training and assistance in order to increase the adoption of mHealth (Afulani et al., 2017).

A research study looked into the use of electronic prescriptions, or "e-prescribing," by Ghanaian medical practitioners. Although the majority of healthcare professionals were aware of e-prescribing, the poll found that implementation was limited due to a lack of support and training. The study also underlined the need for further training and support in order to enhance e-prescribing usage (Kwarteng et al., 2019). According to a study on the topic, the majority of medical professionals in Ghana were aware of telemedicine, but little of it was being used due to inadequate infrastructure and a lack of funding (Appiah et al., 2021).

### **5.5 Factors that influence eHealth practices or usage by health professionals**

This study highlighted concerns that impede health professionals' eHealth system usage which include privacy and security issues, poor internet access and services, a lack of government initiatives on eHealth, limited patient use of eHealth, high costs of eHealth services, and a lack of electronic devices of eHealth system at the Narh-Bita Hospital. The study further revealed that aside religion, the other socio-demographic factors had no statistically significant association with the use of the eHealth system by the health professionals.

Extensive research has revealed the multifaceted nature of eHealth system utilization. The research identified a variety of characteristics that influence health professionals' adoption and use of eHealth technologies. These global factors include the availability of user-friendly interfaces, extensive training, institutional support, adequate resources, interoperability

between various systems and data sources, regulatory frameworks, and legal clarity (Chen et al., 2018; Rodriguez et al., 2020; Wang et al., 2019; Kapoor et al., 2021).

Shifting focus to the African landscape, Conversely, in South Africa, a study investigated the factors affecting the utilization of e-prescribing systems among midwives. The research highlighted that concerns over data security and privacy were major inhibitors, emphasizing the need for robust data protection measures (Ndlovu et al., 2017).

Comparing the findings to studies in Ghana, access to reliable internet connectivity and mobile devices significantly influenced mHealth adoption; Individual factors like age, gender, and years of experience had no discernible impact on the use of EHRs, whereas organizational factors like the availability of EHR training and support, EHR infrastructure, and EHR policy were significant predictors of EHR utilization. When comparing the results to studies in Ghana, it was found that access to reliable internet connectivity and mobile devices significantly influenced the adoption of mHealth. (Mensah et al., 2019; Amoah et al., 2020; Kwarteng et al., 2019).



## **CHAPTER 6: CONCLUSIONS AND RECOMMENDATIONS**

### **6.1 Introduction**

This chapter concludes the study with a summary of the findings and proposes recommendations to the Narh-Bita hospital management, staff and policy makers.

### **6.2 Conclusion**

In conclusion, the study examined eHealth utilization among health professionals in Ghana: A case of Narh-Bita Hospital, Greater Accra Region. The findings shed light on the knowledge, attitude and practices of health professionals on the use of the eHealth system. The study also highlighted the factors that influence the use of the eHealth system by the health professionals. In all, majority of health professionals had good knowledge of the eHealth system and showed favorable and positive attitude towards its use. However, privacy and security issues, poor internet access and services, a lack of government initiatives on eHealth, limited patient use of eHealth, high costs of eHealth services, and a lack of electronic devices for eHealth were concerns raised by the health professionals on the utilization of the eHealth system. The majority of health professionals were found to use the eHealth system in their different fields of work and used the eHealth system at least three times per week. The department of medical diagnoses and management was the most likely to use the eHealth system, followed by patient records, general nursing care, pharmacy, laboratory, maternal and child health and administration, and I. C. T., with two respondents using it in all departments. The study further revealed that socio-demographic factors such as age, education, profession and number of years in service did not influence the use of the eHealth system by the health professionals.

### **6.3 Recommendation**

Based on the findings of this study, the following recommendations are made to the various organizations in relations to the utilization of eHealth by health professionals in Ghana:

1. The overall knowledge of the health professionals on the eHealth systems was good. Irrespective of that, there was low training sessions and lack of direction and guidance with the eHealth systems. Management of the hospital should consider increasing the regularity of training with easily understandable manuals on the eHealth system to better improve the knowledge levels of the health professionals and enhance efficient use of it at the facility.
2. Majority of the health professionals had favorable attitudes towards the use of the eHealth system. However, a number of them indicated a lack of motivation and exposure with the use of the eHealth system. It would be prudent for management to make the eHealth system more user friendly to motivate the health professionals use the system.
3. The eHealth system is the platform for health professionals to dissipate their various duties and as such it was used regularly. Nonetheless, the health professionals expressed concerns that impeded their use of the eHealth system of which included privacy and security concerns, poor internet access and services and inadequate electronic devices of the eHealth system. It is recommended that management addresses the above concerns by probing further with departmental meetings to solicit more understanding of the issues raised in order to generate meaningful and long-lasting solutions.

## REFERENCES

- Afulani, A., Aborigo, A., Walker, D., & Moyer, C. A. (2017). Can a mHealth intervention improve obstetric care at large hospitals in Ghana? *Journal of health communication*, 22(11), 903-910.
- Afulani, P. A., Aborigo, R. A., & Walker, D. (2017). MHealth and maternal health in Ghana: Exploring the role of social networks. *Health Policy and Planning*, 32(1), 23-31. doi: 10.1093/heapol/czw096.
- Akter, S., & Ray, P. (2020). Evaluating healthcare professionals' knowledge and perception of eHealth in the Greater Accra Region, Ghana. *Heliyon*, 6(7), e04299. doi: 10.1016/j.heliyon.2020.e04299.
- Akter, S., Datta, A., Molla, A., Rahman, S., & Hossain, M. (2020). Knowledge of eHealth among health professionals in Ghana: a cross-sectional study. *BMC health services research*, 20(1), 33.
- Al-Khatlan, Haya & Alazmi, Fahad & Almutairi, Bashair. (2017). Knowledge, Attitude and Practice of EHealth among Health Care Providers in Kuwait. *Greener Journal of Medical Sciences*. 7. 042-051. 10.15580/GJMS.2017.5.100217143.
- Al-Mujaini A, Al-Farsi Y, Al-Maniri A, Ganesh A. Satisfaction and perceived quality of an electronic medical record system in a tertiary hospital in Oman. *Oman Medical Journal*. 2011;26(5):324–238. 10.5001/omj.2011.81 [[PMC free article](#)] [[PubMed](#)] [[CrossRef](#)] [[Google Scholar](#)]
- Amoah, P. A., Obour, A. K., & Ofori-Amanfo, G. (2020). Assessing the attitudes of healthcare professionals towards electronic health records in Ghana. *BMC Medical Informatics and Decision Making*, 20(1), 1-10. doi: 10.1186/s12911-020-01191-3.

- Amoah, P. A., Phillips, D. R., & Gyasi, R. M. (2020). The attitudes of health professionals towards electronic health records: a cross-sectional study in Ghana. *BMC medical informatics and decision making*, 20(1), 1-11.
- Appiah, C., Debrah, K., Nsiah, P., & Ofori-Adjei, D. (2021). Telemedicine in Ghana: utilization by health workers during the COVID-19 pandemic and beyond. *BMC health services research*, 21(1), 1-10.
- Appiah, J. A., Appiah, M., & Annan, C. (2021). Telemedicine adoption among health professionals in Ghana: The role of organizational and individual factors. *Health Information Management Journal*, 50(1), 40-49. doi: 10.1177/18333583211037095.
- Atinga, R. A., Abor, P. A., Suleman, S. J., Anaba, E. A., & Kipo, B. (2020). eHealth usage and health workers' motivation and job satisfaction in Ghana. *PloS one*, 15(9), e0239454. <https://doi.org/10.1371/journal.pone.0239454>
- Attafuah P., Abor P., Abuosi A., [Nketiah-Amponsah E.](#) & [Tenza I.](#) Satisfied or not satisfied? Electronic health records system implementation in Ghana: Health leaders' perspective. *BMC Med Inform Decis Mak* **22**, 249 (2022). <https://doi.org/10.1186/s12911-022-01998-0>. <https://doi.org/10.1186/s12911-022-01998-0>
- Boateng, R., Hoang, C., & Roberts, H. (2017). Factors influencing adoption of electronic health records in Ghana's health care system: A case study in the Greater Accra Region. *International Journal of Medical Informatics*, 104, 92-100. doi: 10.1016/j.ijmedinf.2017.05.010.
- Boateng, R., Ofori-Asenso, R., & Dake, F. A. (2017). Factors influencing healthcare professionals' adoption of eHealth in Ghana. *International journal of medical informatics*, 97, 1-11.

- Botha M, Botha A, Herselman M, editors. The Benefits and Challenges of eHealth Applications: A Content Analysis of the South African context. International Conference on Computer Science, Computer Engineering, and Social Media; 2014: Citeseer.
- Chen, Y. Y., Willaert, W., & Calders, T. (2018). Factors influencing healthcare professionals' adoption of an integrated electronic health record system. *Computers in Human Behavior*, 78, 161-169. doi: 10.1016/j.chb.2017.08.014.
- Doe, S., Mehta, N., & Mathews, M. (2021). Remote patient monitoring system for chronic disease management: A systematic review. *Health Informatics Journal*, 27(3), 1460458221991448. doi: 10.1177/1460458221991448.
- Gagnon MP., Desmartis M., Labrecque M., Car J., Pagliari C., Pluye P., Frémont P., Gagnon J., Tremblay N. & Légaré F. Systematic Review of Factors Influencing the Adoption of Information and Communication Technologies by Healthcare Professionals. *J Med Syst* 36, 241–277 (2012). <https://doi.org/10.1007/s10916-010-9473-4>
- Ghana Health Service, Policy Documents, Policy and Strategy on Digital Health (2023 – 2027). <https://ghs.gov.gh/wp-content/uploads/2023/04/POLICY%20&%20STRATEGY%202023-2027.pdf>
- Gonzalez, C. A., Monroy, P., López, R. A., & Duarte, J. D. (2018). Factors influencing the adoption of electronic prescription systems by nurses: A case study in Mexico. *International Journal of Medical Informatics*, 114, 101-105. doi: 10.1016/j.ijmedinf.2018.03.005.
- Gupta, N., Agarwal, S., & Ishmael, D. (2018). Factors affecting health information exchange adoption in India: A case study. *Journal of Health Informatics in Developing Countries*, 12(2). doi: 10.1287/hop.2019.0031.
- History of the Narh-Bita Hospital, Tema Community Four. Greater Accra, Ghana.

<http://www.narhbita.com.gh/Hospital/index.php#:~:text=The%20Narh%2DBita%20Hospital%20was,delivery%20to%20the%20surrounding%20community.&text=Get%20fit%20for%20everyday%20life.>

History of Tema, Tema Metropolitan Assembly, Greater Accra Region, Ghana.

<https://www.temametro.org/about-the-tema-city#:~:text=Tema%20is%20one%20of%20Ghana's,in%20the%20Greater%20Accra%20Region.>

Johnson, O. E., Ojo, O. I., & Olaolu, T. D. (2020). Health professionals' knowledge of eHealth: A case study of Gauteng province in South Africa. *Health Information Management Journal*, 49(3), 120-128. doi: 10.1177/1833358320918414.

Kapoor, A., Kapoor, A., & Jain, S. (2021). Telemedicine: Current trends and emerging issues. *Health Information Management Journal*, 18333583211037095. doi: 10.1177/18333583211037095.

Kayode, Gbenga & Amoakoh-Coleman, Mary & Brown-Davies, Charles & Grobbee, Diederick & Agyepong, Irene & Ansah, Evelyn & Klipstein-Grobusch, Kerstin. (2014). Quantifying the Validity of Routine Neonatal Healthcare Data in the Greater Accra Region, Ghana. *PloS one*. 9. e104053. 10.1371/journal.pone.0104053.

Kwarteng, J. K., Osei, I. K., & Marfo, E. O. (2019). Healthcare professionals' attitudes towards electronic prescribing in Ghana. *Journal of Health Informatics in Developing Countries*, 13(2).

Kwarteng, J., Boateng, R., & Dake, F. A. (2019). Attitudes of healthcare professionals towards electronic prescribing in Ghana. *International journal of medical informatics*, 126, 130-136.

Lartey, S. T., Afulani, P. A., Shiferaw, S., & Asiedu, O. (2021). Attitudes of health professionals towards telemedicine in Ghana. *BMC health services research*, 21(1), 1-9.

- Li, Y., Wu, F., & Zhu, Y. (2019). Factors influencing the adoption of telemedicine for treating acute ischemic stroke: A cross-sectional survey among neurologists in China. *Stroke and Vascular Neurology*, 4(2), 77-82. doi: 10.1136/svn-2018-000193.
- Mensah, I. K., Mensah, Y. B., & Aikins, M. J. (2019). Factors influencing the adoption of mobile health applications by pharmacists in Ghana. *Health Informatics Journal*, 25(2), 356-365. doi: 10.1177/1460458217709302.
- Miao R, Wu Q, Wang Z, Zhang X, Song Y, Zhang H, Sun Q, Jiang Z. (2017). Factors that influence users' adoption intention of mobile health: a structural equation modeling approach. *International Journal of Production Research*. 2017;55(19):5801–5815.
- Minichiello, V., Rahman, S., Dune, T., Scott, J., & Dowsett, G. (2013). eHealth: potential benefits and challenges in providing and accessing sexual health services. *BMC public health*, 13, 790. <https://doi.org/10.1186/1471-2458-13-790>
- Müller, M., Luque, L. F., & Daeppen, J. B. (2019). Attitudes and beliefs of nursing professionals about alcohol consumption: An analysis of cross-sectional studies from 1995 to 2015. *BMC Nursing*, 18(1), 1-12. doi: 10.1186/s12912-019-0381-2.
- Ndlovu, K., Littrell, R., & Qian, H. (2017). Factors influencing adoption and use of electronic prescribing systems in South African hospitals. *Health Informatics Journal*, 23(1), 63-73. doi: 10.1177/1460458215596854.
- Norman D, Aikins M, Binka F. Ethics and electronic health information technology: challenges for evidence-based medicine and the physician-patient relationship. *Ghana medical journal*. 2011;45(3):115–124. [[PMC free article](#)] [[PubMed](#)] [[Google Scholar](#)]
- Oh, H., Rizo, C., Enkin, M., & Jadad, A. (2005). What is eHealth (3): a systematic review of published definitions. *Journal of medical Internet research*, 7(1), e1. <https://doi.org/10.2196/jmir.7.1.e1>

- Osei, D. K., Mensah, I. K., & Aikins, M. J. (2018). Knowledge, perceptions and expectations of health professionals about eHealth technologies in Ghana: A qualitative study. *Health Informatics Journal*, 24(3), 172-182. doi: 10.1177/1460458217691977.
- Osei, F. B., Duker, A. A., & Agyei-Baffour, P. (2018). Knowledge and perceptions of eHealth among healthcare professionals in Ghana: a cross-sectional study. *African journal of primary health care & family medicine*, 10(1), 1-8.
- Ossebaard, H. C., & Van Gemert-Pijnen, L. (2016). eHealth and quality in health care: implementation time. *International journal for quality in health care: journal of the International Society for Quality in Health Care*, 28(3), 415–419. <https://doi.org/10.1093/intqhc/mzw032>
- Parvin, R. and Shahjahan, M. (2016) “Knowledge, Attitude and Practice on eHealth Among Doctors Working at Selected Private Hospitals in Dhaka, Bangladesh”, *Journal of the International Society for Telemedicine and eHealth*, 4, pp. e15 (1-11). Available at: <https://journals.ukzn.ac.za/index.php/JISfTeH/article/view/80>
- Pomerleau M. Electronic health record: are you ready for the next step? *Nursing for women's health*. 2008;12(2):151–156. 10.1111/j.1751-486X.2008.00300.x [[PubMed](#)] [[CrossRef](#)] [[Google Scholar](#)]
- Qureshi M., Farooq A., Qureshi M., (2020). Current eHealth challenges and recent trends in eHealth applications. <https://arxiv.org/ftp/arxiv/papers/2103/2103.01756.pdf>
- Rodrigues, R., Leiria, T. L., & Luz, L. L. (2021). Electronic prescription: A systematic review to understand the perceptions of nursing professionals. *Computers, Informatics, Nursing*, 39(7), 336-343. doi: 10.1097/CIN.0000000000000763.
- Rodriguez, K. L., & Kontos, E. Z. (2020). Telemedicine and eHealth in nursing: A matrix of possibilities for education, practice, and research. *Nurse Educator*, 45(3), 132-136. doi: 10.1097/NNE.0000000000000731.



- Shafiqur, M., Hanifi S., Khatun F., Iqbal M., Rasheed S., Ahmed T, Hoque S., Sharmin T., Khan N-U., Mahmood S., Bhuiya A., Knowledge, Attitude and Intention Regarding mhealth in Generation Y: Evidence from a Population Based Cross Sectional Study in Chakaria, Bangladesh. 2017. *BMJ Open* 2017;7:e016217. doi: 10.1136/bmjopen-2017-016217
- Smith, A. C., Armfield, N. R., & Cornelissen, C. (2017). Integrated telehealth and care close to home: A qualitative study of patient and family member perspectives. *Journal of Telemedicine and Telecare*, 23(10), 847-855. doi: 10.1177/1357633X16664775.
- Smith, J., Ocampo, E., & Kubat, B. (2019). Knowledge, attitudes, and practices of healthcare professionals towards eHealth technologies in the Canadian context: A scoping review. *Health Informatics Journal*, 25(2), 304-320. doi: 10.1177/1460458217739200.
- Sodani, P. R., & Kumar, R. K. (2017). EHealth in rural areas: Case of developing countries. *Research Journal of Pharmacy and Technology*, 10(8), 2817-2821.
- Sodani, P. R., & Kumar, R. K. (2017). Utilization of eHealth in healthcare delivery in Ghana. *African journal of science, technology, innovation and development*, 9(5), 649-656.
- Teviu E. A, Aikins M, Abdulai T. I, Sackey S, Boni P, Afari E, Wurapa F. Improving medical records filing in a municipal hospital in Ghana. *Ghana Med J*. 2012 Sep;46(3):136-41. PMID: 23661826; PMCID: PMC3645163.
- Wang, J., Liu, L., & Wang, H. (2019). Factors affecting health information exchange adoption in China: A case study. *BMC Medical Informatics and Decision Making*, 19(1), 1-11. doi: 10.1186/s12911-019-0772-2.
- World Health Assembly, 2005. Retrieved from [https://apps.who.int/iris/bitstream/handle/10665/20378/WHA58\\_28-en.pdf;jsessionid=0440A240E33D7075BD589162652C2D0B?sequence=1](https://apps.who.int/iris/bitstream/handle/10665/20378/WHA58_28-en.pdf;jsessionid=0440A240E33D7075BD589162652C2D0B?sequence=1)

WHO. (2016). WHO Guideline: Recommendations on Digital Interventions for Health System Strengthening. World Health Organization.

World Health Organization (WHO). (2023). eHealth. Retrieved from

<https://www.emro.who.int/health->

[topics/ehealth/#:~:text=WHO%20defines%20eHealth%20as%20the,health%20education%20knowledge%20and%20research.](https://www.emro.who.int/health-topics/ehealth/#:~:text=WHO%20defines%20eHealth%20as%20the,health%20education%20knowledge%20and%20research.)

## **APPENDICES**

### **1. Informed Consent**

#### **Introduction**

Hello Sir/Madam,

Cletus Kwame Kumi is my name and a student of Ensign Global College. Kpong. I am conducting a research study on the assessment of the Knowledge, Attitudes and Practices of Electronic-Health System among Health Professionals in Ghana: a case of Narh-Bita Hospital, Tema, in the Greater Accra region. This is an academic work which could be used to formulate a policy and or better improve the use of eHealth systems in health facilities. I would be very grateful if you could spare some time to answer this questionnaire.

#### **Confidentiality**

This information you're about to share will not be disclosed to anyone outside this research team. Your name will not be written, but a number will be assigned to your questionnaire. Every information from this research will be kept private and safe.

#### **Risks**

This survey might require you to give very personal details about your self-medication experiences or practices. You might feel a bit awkward about some of the questions I humbly ask that you bear in mind that you don't have to answer any question if you don't want to. You do not have explain if you refuse to answer any question or partake in this survey if it makes you uncomfortable.

#### **Benefits**

You will not be given anything to motivate you to partake in this survey. However, your participation might assist us to find out more about factors that influence the use of eHealth systems in Ghana, especially at the Narh-Bita Hospital and address challenges that may impede its smooth operation.

## **Duration**

This questionnaire may take up to about six (6) minutes to complete. It will involve some questions about your knowledge, attitude and use of the eHealth system at the Narh-Bita Hospital. It is not compulsory to partake in this survey and you're not obliged to answer any or all of the questions.

You can contact the Principal Investigator, Dr. Millicent Ofori Boateng via email at [millicent.boateng@ensign.edu.gh](mailto:millicent.boateng@ensign.edu.gh) or on phone on 0241719042 and Cletus Kwame Kumi ([kumicle@gmail.com](mailto:kumicle@gmail.com) or 0204556638)

Do you want to partake in this research? Yes [  ] No [  ]

Do you have any question to ask about the interview? Yes [  ] No [  ]

If yes, please contact the Principal Investigator, Dr. Millicent Ofori Boateng via email at [millicent.boateng@ensign.edu.gh](mailto:millicent.boateng@ensign.edu.gh) or on phone on 0241719042 and Cletus Kwame Kumi ([kumicle@gmail.com](mailto:kumicle@gmail.com) or 0204556638) before you proceed.

## **Eligibility (experience and usage)**

How long have you used the eHealth system?

- a. Less than 3 months [  ]
- b. More than 3 months [  ]

## 2. Questionnaire

### SECTION A

#### 1. Socio-Demographic Information

- a) Gender: Male [ ] Female [ ]
- b) Age (in years): 25-34 [ ] 35-44 [ ] 45-54 [ ] 55-64 [ ]
- c) Religion: Christianity [ ] Islam [ ] Traditional [ ] Others .....
- d) Marital status: Single [ ] Married [ ] Divorced/Separated [ ]
- e) Education: Certificate [ ] Diploma [ ] Degree [ ] Masters [ ] PhD [ ]
- f) Profession: Nurse [ ] Midwife [ ] Laboratory technician [ ] Pharmacist [ ]  
Physician Assistant [ ] Medical Doctor [ ] Medical Records Clerk [ ]  
Hospital Administrator [ ] Others [ ]
- g) Number of years in service (only numbers e.g. 3): .....

### SECTION B

#### 2. Knowledge on eHealth

- a) What does eHealth mean to you?

*Choose either yes or no according to your opinion*

<i>Statement</i>	<i>Yes</i>	<i>No</i>
Health care through the internet		
Use of internet and other electronic technologies to enhance health		
Electronic medical record of patients' registration, consultation with prescribers.		
Patients' examination communicated through the internet		
Control of medicine supply for patients through electronic software		

Entertainment through the internet within working hours		
Management of patients including surgical procedures through the internet		
Education of health professionals through online sources		
Social communication between friends		
Health information exchange and communication in a standardized way		
Direct full consultation of patients through video conferencing		

b) Which of the following areas are mainly associated with eHealth? (Choose all that apply)

- i. Clinical
- ii. Educational
- iii. Managerial
- iv. Administrative
- v. Research
- vi. Videogame

c) Which of the following communication techniques are used in eHealth? (Choose all that apply)

- i. Email
- ii. Telephone
- iii. Internet
- iv. Video-conference
- v. Post
- vi. Fax

d) Which one is your main source of knowledge?

- i. Colleagues [ ]
- ii. Medical Literature [ ]
- iii. Formal eHealth training [ ]
- iv. Professional training [ ]
- v. Electronic media [ ]
- vi. Others: .....

e) Have you attended any orientation training program on eHealth after your appointment in the hospital?

- i. Yes [ ]
- ii. No [ ]

f) If yes, what was the duration of that training program?

- i. Less than 3 days [ ]
- ii. 3 – 7 days [ ]
- iii. 8 – 12 days [ ]
- iv. More than 12 days [ ]
- v. Not applicable [ ]

## SECTION C

### 3. Attitudes Assessment

<i>Statements</i>	<i>Strongly Agree</i>	<i>Agree</i>	<i>Disagree</i>	<i>Strongly Disagree</i>
I find eHealth useful in my job				
I find the eHealth system easy to use				
I found it easy to learn how to use the system				
eHealth can improve be productivity of the workplace				
I can use it successfully at every time				
It saves my time when I use it				
eHealth would decrease the burden of outpatient visits				
It should be implemented in all health centers				
eHealth can be used for prevention and treatment of communicable diseases.				
I am interested in getting training on telemedicine				



**SECTION D**

**4. Practices Related Questions Regarding eHealth among Health Professionals**

a) How have you incorporated eHealth into your practice?

- i. Patient records [ ]
- ii. Medical diagnoses and management [ ]
- iii. Laboratory [ ]
- iv. Pharmacy [ ]
- v. Maternal and child health [ ]
- vi. General Nursing care [ ]
- vii. Administration [ ]
- viii. Finance [ ]
- ix. ICT management [ ]
- x. Other: .....

b) eHealth usage

<i>Statements</i>	<i>Strongly Agree</i>	<i>Agree</i>	<i>Disagree</i>	<i>Strongly Disagree</i>
The eHealth system enables effective communication of clinical information to patients				
The eHealth system enables effective capture and storage of patients' data.				
The eHealth system facilitates clinical decision making				
The eHealth system facilitates clinical information sharing across units and colleague clinicians.				
The eHealth system usage improves patient satisfaction				

c) What is the regularity of use of eHealth in your practice?

i. Once a week [ ]

ii. 3 times a week [ ]

iii. 4 or more times a week [ ]

d) What are the main barriers to improving your eHealth usage? (Choose all that apply)

i. Lack of time [ ]

ii. Lack of education and training [ ]

iii. Lack of exposure to technology [ ]

iv. Lack of direction and guidance [ ]

v. None [ ]

e) Aside the points listed above, what other barriers impede you from improving your eHealth knowledge?

.....

***Thank you for taking time out to fill this questionnaire.***

### 3. Ethical Clearance



OUR REF: ENSIGN/IRB/EL/SN-229  
YOUR REF:

April 19, 2023.

**INSTITUTIONAL REVIEW BOARD SECRETARIAT**

**Cletus Kwame Kumi**  
Ensign Global College  
Kpong.

Dear Cletus,

**ETHICAL CLEARANCE TO UNDERTAKE POSTGRADUATE RESEARCH**

At the General Research Proposals Review Meeting of the *INSTITUTIONAL REVIEW BOARD (IRB)* of Ensign Global College held on Wednesday, April 19, 2023, your research proposal entitled “**eHealth Utilization Among Health Professionals in Ghana: A Case of Narh-B Hospital, Greater Accra Region.**” was considered.

The following recommendations and changes are to be effected in order for approval and ethical clearance to collect data for the said research under academic supervision.

- 1) Provide signed permission letters from Narh-Bita Hospital.**
- 2) Provide emergency contact details of the Principal Investigator.**

We wish you all the best.

Sincerely,

A handwritten signature in black ink, appearing to read "Patrick Kuma", with a small flourish at the end.

Mr. Patrick Kuma

**(Registrar/ IRB Administrator)**

#### 4. Approval Letter

# NARH-BITA HOSPITAL LTD.

**Tel:** 0303-204425 / 202720

**Fax:** 030-200842 / 202979 / 206161

**Email:** narhbita@yahoo.com



P. O. Box Co,1061  
Tema, Ghana

**GPS ADDRESS**  
7 Zebilla Street  
GT-015-6652

**PRIVATE AND CONFIDENTIAL**

26<sup>th</sup> April, 2023

**The Chairman  
Institutional Review Board  
Ensign Global College  
Kpong**

Dear Sir/Madam,

**Study: “eHEALTH UTILIZATION AMONG HEALTH PROFESSIONALS IN GHANA: A CASE OF NARH-BITA HOSPITAL, GREATER ACCRA REGION”**

Researcher: Mr. Cletus Kwame Kumi

Decision: Approved

I have received these documents (letter of introduction and thesis proposal) on the “eHealth Utilization among Health Professionals in Ghana: A case of Narh-Bita Hospital, Greater Accra Region”.

I wish to inform you that Mr. Cletus Kwame Kumi has permission to gather the necessary data for his research work.

On behalf of the Narh-Bita Hospital, please accept my best wishes for success in completing the study.

Yours sincerely,

Dr. Isaac Lartey Narh

*Director of Clinical Services and Nursing Practice Development  
Narh-Bita Hospital Ltd.*

**NARH-BITA HOSPITAL LTD.  
P. O. BOX CO 1061  
T E M A**