

UNIVERSITY OF CAPE COAST

USE OF EHEALTH IN NURSING PRACTICE AMONG NURSES IN CAPE  
COAST

BY

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Health and Allied Sciences, University of Cape Coast, in partial fulfilment of  
the requirements for the award of Master of Nursing Degree

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**DECLARATION**

**Candidate's Declaration**

I hereby declare that this thesis is the result of my own original research and that no part of it has been presented for another degree in this university or elsewhere.

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**Supervisors' Declaration**

I hereby declare that the preparation of the thesis was supervised in accordance with the guidelines on supervision of thesis laid down by the University of Cape Coast.

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## ABSTRACT

Information and communication technology (ICT) is transforming the delivery of health care at a fast rate. Nurses who form the majority of the health workforce are strategically positioned to champion the transition to digital health care. Ghana is fast adopting eHealth, however there is little evidence on how well nurses are using these technologies. A descriptive cross sectional study using a quantitative approach was conducted aimed at identifying eHealth usage among registered nurses in Cape Coast. A multi stage sampling technique was employed. Data collated from 206 registered nurses in Cape Coast revealed that respondents were predominantly female (61.7%) and 38.3% were males. Knowledge, attitude, practice and resources were generally good. Most of the nurses (65.5%) had good knowledge and more than half of them (67.5%) generally demonstrated good attitudes towards eHealth. The majority (54.9%) of respondents also demonstrated a good skill in the use of ICT in health service delivery. Resources on eHealth were available to most nurses. Most nurses were found to be using electronic platforms which represented an opportunity for use as a channel for continuous professional development. Monitoring and evaluation was either erratic or non-existent. The study proves that the knowledge, attitude, practice as well as resources were good but there is a need for improvement in certain areas. It is recommended that nurses take advantage of electronic platforms and social networks for professional knowledge sharing as well as support research.

**KEY WORDS**

Information and Communication Technology (ICT)

eHealth

Knowledge

Attitude

Practice

Resources

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**DEDICATION**

To all my family who held me up during my trying times.

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## LIST OF ACRONYMS

<b>DHIMS</b>	District Health Information Management System
<b>CNA</b>	Canadian Nurses Association
<b>EHRs</b>	Electronic Health Records
<b>GRNMA</b>	Ghana Registered Nurses and Midwives Association
<b>HMIS</b>	Hospital Management Information Systems
<b>ICT</b>	Information and Communication Technology
<b>MIMS</b>	Mobile Inventory Management System
<b>MoTeCH</b>	Mobile Technology for Community Health
<b>mTrac</b>	Mobile Tracking
<b>m4RH</b>	Mobile for Reproductive Health
<b>NHIA</b>	National Health Insurance Authority
<b>PDA</b>	Pocket Digital Assistant project
<b>PHRs</b>	Personal Health Records
<b>RCN</b>	Royal College Nursing

## CHAPTER ONE

### INTRODUCTION

Information and Communication Technology (ICT) is transforming the healthcare industry and is now an integral part of providing healthcare (Canadian Nurses Association, 2006a). Today, health systems are more efficient and more responsive to clients' needs due to the incorporation of ICT. This is evident in the reduced healthcare costs, improved delivery and effectiveness of healthcare services and increased patient safety and decision support for clinicians (Remlex, 2007; O'Carroll, Yasnoff, Ward, Ripp, & Martin, 2007; Acheampong, 2012). Use of ICT in nursing practice in Ghana has the potential to propel the migration to digital healthcare, yet there are bottlenecks that threaten attainment of the desired status compared to the developed world.

#### **Background to the Study**

ICT is defined as the machinery, the hardware (computers, personal digital assistants, mobile phones and other devices) and the software (the information systems) — that enable information to be manipulated and transmitted from one place to another (Rumsey & Annasherlock, 2013). When ICT is used in health and health care, it is termed eHealth. eHealth comprises telehealth, telemedicine, health informatics, nursing informatics, telecare and telenursing (The Royal College of Nursing, 2013; World Health Organization, 2016).

The health sector worldwide makes use of information and communication technology (ICT) to expedite and advance most aspects of healthcare. These include the use of electronic medical records, virtual office visits, scheduling appointments online as well as paying for services, and

getting medication prescribed electronically (Onu & Agbo, 2013). Various studies have revealed that healthcare providers largely find eHealth advantageous for continuous professional development (Rouleau, Gagnon, & Côté, 2015). Health providers, especially nurses, are better able to communicate and relate with patients using eHealth thereby increasing their access to healthcare, consolidating the relationship between the patient and the nurse culminating in better care (Nilsson & Skar, 2010; Sandberg et al., 2009)

Ghana is successfully running a host of eHealth projects. They are the District Health Information Management System (DHIMS); the Mobile Technology for Community Health (MoTeCH); the SENE Pocket Digital Assistant (PDA) project and the National Health Insurance Authority (NHIA) mechanized service delivery by ICT (Acheampong, 2012; International Institute for Communication and Development, 2014).

Nurses form the greatest percentage of health care professionals worldwide and hence play a crucial role in championing health care reforms such as the adoption of eHealth (Institute of Medicine, 2004). In high income countries, nurses interact most with eHealth systems due to the demands of their work. They are indispensable when it comes to helping patients set up their own health records, or explaining to them how they can use a patient portal (Onu & Agbo, 2013). In order to obtain the greatest benefit from ICT, nurses must necessarily play a leading role in its adoption. However, various studies have proven that nurses are dissatisfied with electronic health solutions provided for them due to lack of consultation. Other reasons are that the computer systems were laborious to use, illogical, slow, complex and undependable sometimes (Adams, Adams, Thorogood, & Buckingham 2007; While & Dewsbury, 2011;

Azza, 2015). A study involving 10,000 nurses in Australia on their use of information and communications technology gives insight into the problem nurses have when it comes to its usage. Despite the benefits they stand to gain adopting ICT in their work, nurses expressed frustrations such as restrictions of access to the technology, software that do not always fit job specifications and lack of training opportunities. Consequently, the level of use was generally low and confidence in use was low even among those nurses who were users (Hegney et al., 2007). Nurses in Saudi Arabia currently cannot fully employ computer technology in their daily practices, and they are limited to only certain functions in their use of computerized systems (Azza, 2015). Other studies in Turkey also confirm that most electronic health record functionalities related to nursing were poorly utilized (Kaya, Asti, Kaya, & Kacar, 2008; Top & Gider, 2013). According to Rouleau, Gagnon, and Côté (2015), although electronic health records have been instituted in some health facilities and are used by clinicians in the provision of healthcare services, its evaluation by nurses who are by the patient 24 hours a day has received minimal consideration.

Several countries in Africa are implementing eHealth projects including Algeria, Benin, Burkina Faso, Burundi, Cameroon, Chad, Republic of Congo, Cote d'Ivoire, Ethiopia, Ghana, Kenya, Madagascar, Mali, Mauritania, Niger, Rwanda, Senegal and South Africa. These technologies can improve efficiency in time and resource utilization and also facilitate complex decision making. Diagnosis and treatment of patients can also be enhanced using these systems. However, these projects in the region continue to be on small scale and fragmented (Asamoah-Odei et al., 2012; World Health Organization, 2013).



Despite its relevance, Sarfo and Asiedu (2013), reported a decline in the integration of computers into nursing in many low-income countries.

The Ghanaian health sector appears to have joined the ICT revolution. This is evident through the incorporation and use of computers in health service delivery, management and administration. However, the Ministry of Health in Ghana intimates that the modest response has not been well structured (Ministry of Health, 2005). The government of Ghana developed a policy document on ICT for accelerated development in 2003, an eHealth policy in 2005 and the national eHealth strategy document in 2010 (Government of Ghana, 2003; Ministry of Health ICT Policy, 2005; Ministry of Health, 2010), all in the bid to improve the ICT infrastructure in the health sector and facilitate the adoption of eHealth solutions. Currently, the Ministry of Health has started equipping facilities with eHealth infrastructure starting from the Central Region of Ghana.

### **Statement of the Problem**

The Ministry of Health in Ghana adopted the Government of Ghana's ICT policy document in 2005 and the National eHealth Strategy in 2010. The objectives of this strategy were to; improve ICT infrastructure in the health sector; improve access to and management of health information; improve access to quality health using telemedicine; and improving ICT knowledge, capability and utilization among health workers. Ghana is growing significantly with the development of eHealth in its national health care delivery (Ministry of Health, 2005, 2010; Sarfo & Asiedu, 2013). Many eHealth initiatives have sprung up including the DHIMS and MoTeCH and NHIA initiatives. Despite the remarkable growth in the incorporation of ICTs in healthcare delivery, the

projects do not usually survive beyond the pilot phase (Adjorlolo & Ellingsen, 2013). One dimension of the upsurge of ICT use in Ghana that is conspicuously missing is the nursing contribution to these efforts. Nurses, who are major stakeholders in health care delivery claim they are ill informed about information technology health initiatives and are most of the time not consulted when implementing these initiatives (Hegney et al., 2007). This phenomenon is not limited to Ghana or Africa. Top and Gider (2013) and Kaya et al. (2008), affirm that, although electronic health records are used in many hospitals in the world and clinicians have reported numerous benefits from their effective and efficient use, its evaluation by nurses has received minimal attention. Again, little evidence exists regarding the nursing contribution within telehealth, especially beyond data input and output analysis for other members of the health team (While & Dewsbury, 2011).

Since nurses form the largest segment of the health work force, learning from their experiences and perspectives on eHealth would be highly relevant for Ghana as we migrate from mechanical to digital health care. However, various studies have revealed that nurses are the last set of health care workers to adopt the eHealth revolution for reasons of lack of consultation prior to implementation (Adams, Adams, Thorogood, & Buckingham, 2007; Azza, 2015). This might have been the reason why the use of eHealth was found to be lower among nurses than general practitioners in the United Kingdom (Richards et al., 2005). Some studies have attempted to find out the reasons influencing this phenomenon (While & Dewsbury, 2011; Afarikumah, 2014). However, these studies do not capture the Ghanaian nursing context. In Ghana, there is paucity of literature capturing factors and attitudes of nurses towards ICT use in

health (Afarikumah, 2014). Studies so far reviewed in Ghana do not isolate the nursing experience and hence do not explore the attitudes, level of knowledge, practice, facilitators and barriers to nurses' adoption of ICT in health.

### **Purpose of the Study**

The purpose of this study was to unravel the level of knowledge, attitudes, practices as well as the resources of eHealth usage among nurses in Cape Coast.

### **Objectives of the Study**

#### **Main objective**

To assess the use of eHealth in nursing practice among nurses in Cape Coast

#### **Specific objectives**

#### **The specific objectives of this study were to;**

- i. Assess the knowledge of nurses on eHealth
- ii. Assess the attitudes of nurses towards eHealth
- iii. Ascertain the competencies of nurses in their use of eHealth
- iv. Determine the resources available for eHealth

#### **Research Questions**

- i. What do nurses know about eHealth?
- ii. What are the attitudes of nurses towards ICT use in health?
- iii. How well do nurses use eHealth?
- iv. What resources are available for nurses to facilitate the use of eHealth?

### **Significance of the Study**

Austin and Boxerman (2003) predicted that eHealth will become a major factor in the infrastructure of health care. It is important therefore to find out all we can about it in order to harness its numerous benefits. Findings from this study will enable nurse leaders to make decisions critical to the development and implementation of eHealth initiatives as well as identify solutions to implementation challenges.

This study will also contribute to knowledge as it seeks to assess the level of knowledge and attitudes as well as identify systemic and infrastructural facilitators and barriers to the use of ICT in health among nurses. Nurses will also be able to identify and overcome their prejudices to the use of eHealth thereby enhancing its usage.

### **Delimitations**

This study involved only registered nurses in Cape Coast who have a year or more working experience, hence did not consider other cadres of nurses as well as registered nurses in smaller facilities such as Community-based Health and Planning Services (CHPS) compounds who may have different opinions and experiences.

### **Limitations of the Study**

Although this study has yielded valuable findings concerning eHealth use among nurses, limitations to the study need consideration. The three health facilities (Cape Coast Teaching Hospital, University of Cape Coast Hospital, and Ewim Polyclinic) were randomly selected among other health facilities in Cape Coast. Though these three facilities are well patronized within the

metropolis as a place to select respondents, a sample drawn from all the health facilities would have been more representative.

The results of the study could have been different if all participants had answered the questionnaire. However, some due to unknown reasons did not complete the questionnaire.

Some responses from the self-reporting structured questionnaire might have been inaccurate and could influence the findings.

### **Definition of Terms**

**eHealth-** This is the use of emerging information and communication technology, especially the Internet, to improve or enable health and health care. This includes the use of electronic health records, computers, personal digital assistants, mobile phones as well as applications and databases utilized in patient care (Eng, 2001).

**Telehealth-** This is the use of electronic information and telecommunications technologies to support long-distance clinical health care, patient and professional health-related education, public health, and health administration (Fordyce & Gold, 2012).

**Telemedicine-** This is the use of telecommunications technologies to provide medical information and services (Perednia & Allen, 1995).

**Telenursing-** This is a component of telehealth that involves the delivery, management and coordination of nursing care and services provided via information and telecommunication technologies (CNO, 2009).

**Teleconsulting-** This is the synchronous or asynchronous consultation using information and communication technology to omit geographical and functional distance. Its goals are for diagnostics or treatment between two or more

geographically separated health providers (for example physicians or nurses) or between health providers and patients (Bove, Homko, Santamore, Kashem, Kerper & Elliott, 2013).

**Telecare**-This is a way of offering remote care of elderly and physically less able people through the use of ICT (Barlow, Bayer, & Curry, 2006).

**mHealth**- Mobile health is a general term for the use of mobile phones and other wireless technology in medical care (Becker, Miron-Shatz, Schumacher, Krocza, Diamantidis, & Albrecht, 2014).

**Health informatics**- This is the integration of health-care sciences, computer science, information science, and cognitive science to assist in the management of healthcare information (Saba & McCormick, 2015).

**Nursing informatics**- Refers to the specialty that integrates nursing science with multiple information management and analytical sciences to identify, define, manage, and communicate data, information, knowledge, and wisdom in nursing practice (American Nurses Association, 2015).

**Electronic health records (EHRs)**-This is an electronic version of a patient's medical history that is maintained by the provider over time, and may include all of the key administrative clinical data relevant to that persons' care under a particular provider, including demographics, progress notes, problem and medications (Centers for Medicare and Medicaid Services, 2012).

**Personal health records (PHRs)**- This is a personal and secure set of online tools that connect consumers to their electronic medical records and empower them to manage their health, health care, and health care costs (Institute of Medicine, 2006).

## **Organization of the Study**

The study is organized under five chapters. The first chapter covers the introduction to the study. This includes a brief background to the study, the problem statement, the purpose of the study as well as the research objectives and the research questions. The significance, delimitations and limitations of the study were also presented. Chapter two elaborates on the theoretical underpinnings of the study as well as a review of the relevant literature on the phenomenon studied. Chapter three summarizes the research methodologies engaged in the study. It takes cognizance of the research design, the study area, the population, sampling procedure, data collection instruments, validity and reliability, ethical consideration and data analysis. The fourth chapter presents the findings and interpretation of the research. This chapter also discusses the findings relating it to the literature review. Chapter five gives a summary of the entire study. Conclusions based on the findings as well as recommendations to appropriate stakeholders, and suggestions of areas for further research are also presented in this chapter.

## CHAPTER TWO

### LITERATURE REVIEW

This chapter reviews relevant literature on eHealth use among nurses. It also discusses the theoretical underpinnings of the study. The threefold purpose of a good literature review is to research and discover what has been written about the topic; secondly, to critically evaluate the literature, determine the relationship among the sources and ascertain what has been done already and what still needs to be done; and finally writing to explain what you have found (Mongan-rallis, 2014; Skene, 2010). This review focuses on how ICT is being used by nurses worldwide and the state of ICT infrastructure. It also includes a critical analysis of the relationship among different works on the identified determinants of ICT usage among nurses.

Databases for the study included Researchgate, Cochrane, Pubmed, EBSCOhost, MEDLINE, Google Scholar and Hinari. Books, journals, government documents and other thesis related to the topic are also used as databases for the study.

#### **ICT Usage in Health**

ICT and the way it is used is rapidly evolving in the health sector. The introduction of information management systems and clinical decision support systems has completely changed the complexion of health care. According to the World Health Organization Regional Office for Europe (2016), over the past decade, eHealth has played a key role in expanding access to diagnostic services, improving the quality of services, increasing coordination between providers, improving patient management, helping to overcome physical distances between patients and providers and engaging patients in their own



health and well-being. Health systems, in order to take advantage of these systems must position themselves strategically to derive full benefits. This means fitting health care facilities with the requisite ICT infrastructure, equipping the human resource with the requisite skills, continuous technical support and enactment of the necessary policy framework to guide its operation.

ICT has been defined as “the machinery the hardware (computers, personal digital assistants, mobile phones and other devices) and the software (the information systems) — that enable information to be manipulated and transmitted from one place to another” (Royal College of Nursing, 2010). ICT is used in various fields such as commerce, banking and government and consequently adopts names such as e-commerce, e-banking, e-government respectively (Lipke, 2014). ICT use in health is termed eHealth (World Health Organization, 2013). Lipke (2014), also defines it as “technology that enables digital communication of health care professional with patient/client”. This suggests that ICT, while playing a vital role, is only a tool of e-health ( Lipke, 2014; World Health Organization, 2013). This may explain why some authors use ICT in health and eHealth interchangeably (Lipke, 2014; While & Dewsbury, 2011).

eHealth can take many different forms including telemedicine, electronic medical records, and health information systems with decision support, mobile health and eLearning tools (Marker, McNamara, & Wallace, 2002; Shiferaw & Zolfo, 2012). It may even involve a distant consultation between a patient and a healthcare provider using video conferencing or internet-based support groups who share information utilizing chat rooms, blogs or social networks. The list

may increase as and when new technology becomes available (The Royal College Nursing, 2012).

### **Trends in ICT Usage in Health**

The recent WHO global survey on eHealth with an overall regional response rate of 89% in the European region indicated that, 84% of respondents (38 Member States) have a national universal health coverage policy or strategy, of which 74% (28 Member States) reported that the policy or strategy specifically refers to eHealth or information and communication technologies in support of universal health coverage. Seventy percent (70%) have a national eHealth policy or strategy, 69% have funding for the implementation of their national eHealth strategy or policy and 59% have a national electronic health record system. Again, the use of mHealth for access to patient records has increased by 25% since the 2009 survey (World Health Organization Regional Office for Europe, 2016).

Digital technology solutions for health and their implementation have experienced significant growth in Africa in recent times (United States Agency for International Development, 2016). eHealth is therefore making moderate impacts. The African Development Bank identified a host of significant eHealth projects scattered across the continent. In the area of accessing health information, Ghana has implemented the District Health Information Management System 2 (DHIMS2) whiles Cameroon is using ICT to improve early detection and rapid response to epidemics. Again, Uganda has instituted real-time monitoring and evaluation of disease surveillance, drug stocks and health service delivery through mobile tracking (mTrac). When it comes to the area of empowering the health workforce, Kenya has taken the initiative of

upgrading nurses through eLearning. Ghana is also empowering nurses in the communities using Mobile Technology for Community Health (MOTECH). A telemedicine and distance learning network (RAFT) is also on going in most francophone African countries such as Mali and Burkina Faso (Mugo, 2014). To convey health education to the public, Gambia is using the Health Academy Project to promote health in schools. In delivering health services, Sierra Leone is strengthening maternal, neonatal and child health services using mobile phones to extend the reach of community health workers (African Development Bank, 2014). Kenya is also improving the reliability of family planning supplies through the Mobile Inventory Management System (MIMS) and there is also the Mobile for Reproductive Health (m4RH) being piloted in a number of African countries (African Development Bank, 2014).

Ghana has seen some development in eHealth since the implementation of the National eHealth strategy. Some of these successes include mHealth initiatives such as the Sene smart phone project, MoTeCH, MVP Project – telemedicine, SMS for life, Fio-GHS, and Health Management Information Systems such as, iHost (GHS), National Health Insurance Authority (NHIA) eClaims, eRegister and DHIMS2 (Afagbedzi, Obuobi, Aryeetey, & Bosomprah, 2013; International Institute for Communication and Development, 2014). Recently, the Ministry of Health has rolled out a programme to equip all health facilities with both hardware and software to enable the facilities to migrate to the use of eHealth. Selected facilities in the Central region of Ghana have started piloting this programme.

## ICT Usage in Nursing Practice

Some nurses may not support the migration to digital health care (Li, Land & Ray, 2008; Lipke, 2014). However, recent studies have revealed that nurses are beginning to perceive its usefulness in patient care and quality decision making (Jathanna, 2017). Many reasons have been assigned to its low adoption by nurses in many settings. Among them are technical difficulties, the absence of the human element of nursing and disruptiveness to patients (Adams, Adams, Thorogood, & Buckingham, 2007; Darbyshire, 2004). The question is, ‘are nurses really averse to the use of ICT in their practice? Sukums et al. (2014), note that health workers’ computer knowledge and attitudes have a crucial bearing on the adoption and usage of computer systems in their work schedules. Nurses may feel reluctant to adopt eHealth because they feel poorly informed about ICT health initiatives and are poorly consulted in its implementation (Hegney et al., 2007). When nurses fail to use these systems that have been imposed on them, they unfortunately wear the blame for something that is not their fault (Darbyshire, 2004). As far back as 1984, the Australian Nursing Federation recognized the importance of nursing involvement in information systems. They stated that, “nurses must be involved at an early stage when computer systems are being contemplated” (Royal Australian Nursing Federation, 1984). There may be bottlenecks, but it is necessary that nursing positions itself to take its rightful place in rendering healthcare as the largest health workforce with the greatest amount of contact time with patients. Lipke (2014) suggests that the question is not whether to transfer nursing practice to the digital world to meet the patients’ needs but rather how to do it. Perhaps the solution lies in engaging clinicians

meaningfully using a more discursive and reflective approach when it comes to the use of computerized patient information system (Darbyshire, 2004).

Hegney et al. (2007) reported that there was a high adoption of information technology into the nursing workplace and over 85% of nurses use a computer for some areas of their work. Nurses have used ICT in various ways in their practice. Applications have been mostly used in patient management and clinical use and tended to be used more frequently by younger nurses. Commonly used information and communication technology applications in health care were for accessing electronic health record systems, continuing professional education and communication as well as accessing online journals (Hegney et al., 2007). This illustrates the advantage offered by the use of information technology for education and training purposes. The indication is that given the right circumstances, nurses are ready to take advantage of ICT solutions in both patient care and continuous professional development.

### **ICT Needs of Nurses**

By virtue of the fact that nurses remain with the patient at all times during hospitalization, documenting the totality of care rendered becomes the primary duty of the nurse (Green & Thomas, 2008). Patient medical records using the conventional approach of documenting on paper by nurses have been fraught with numerous challenges including poor unreadable handwriting, incomplete documentation, and missing or disorganized folders (Byrd, Byrd, Jacome & Mbarika, 2011). This has the tendency of causing disruptions in the continuity of care. The shift to use electronic medical records has been found to ease these challenges and further make patient record accessible in real time to multiple users (Tsai & Bond, 2008). Depending on specialty, cadre and rank and even

age, different categories of nurses have different levels of access and expertise in ICT use in health (Hegney et al., 2007; Sarfo & Asiedu, 2013). In homecare, nurses have used video technology, text messages and electronic health monitoring. An example is the use of Health Buddy. This is a telehealth system that connects patients in their homes with care providers. Health data, including vital signs are collected and transmitted in real time (Lindberg, Nilsson, Zotterman, Söderberg, & Skär, 2013). Nurses have also used ICT applications associated with continuing professional education and for communication as well as accessing online journals (Hegney et al., 2007).

Although ICT has been incorporated in nursing practice, nurses do not find its use convenient (Fagerström, Tuveesson, Axelsson, & Nilsson, 2017). Barriers that have been enumerated include workload, access to computers, technical support and lack of information technology knowledge. The beliefs of nurses also play a vital role in their decision to migrate to digital health provision (Green & Thomas, 2008). In order to improve on the usage of eHealth, Lipke (2014) suggests four areas that are essential. These include: Skills acquisition which consists of ICT skills, work routines, communication skills and skills to assess suitability; Knowledge which comprises ICT literacy, legal issues, nursing interventions, training and development; Attitude which includes positive attitude, trust, willingness to change and develop, acceptance of ICT as part of practice and need for ICT; personal predisposition including interest, time management, professional relationship with clients, group behaviour and personal characteristics.

### **Benefits of eHealth in Nursing Practice**

The use of ICT in health care is known to have numerous benefits. These benefits include providing healthcare at a decreased cost, improving access to healthcare, enhancing efficiency in clinical decision making, prescription ordering, improving quality of care, promoting individual adoption of healthy lifestyles and self-care and information sharing among health workers (Canadian Nurses Association, 2006; Bashshur & Shannon, 2009; While & Dewsbury, 2011; The Royal College Nursing, 2012). The Canadian Nurses Association (2006), reiterates that competencies in information management and the use of ICT are no longer additions or appendages to traditional nursing care. Rather, these competencies are an important part of nursing practice. Nurses working in remote districts have increased opportunities to consult and compare practice with those in higher facilities when they adopt the use of eHealth, thereby reducing professional isolation (Gulzar, Khoja, & Sajwani, 2013). A virtual health promotion session is one way of saving time and increasing efficiency. Here, one nurse can work with a group of people simultaneously. Nurses can go on virtual visits through the use of internet and also have consultations with other health professionals to instantaneously facilitate better patient care and planning (While & Dewsbury, 2011).

ICT provides great opportunities to give health care services to even the remotest of clients who would otherwise have challenges accessing healthcare. (Gulzar et al., 2013). eHealth also helped nurses consult difficult cases with the specialists for providing better care to the communities. Again, in Pakistan, many nurses report a boost in the image of nursing due to the use of eHealth.

Apart from the improved reputation, there is better communication and coordination between healthcare providers (Gulzar et al., 2013).

### **Barriers and Facilitators of eHealth**

The initial set up of the eHealth infrastructure is capital intensive; hence many governments and facilities may be hesitant in the initiation of these solutions. However, once development and implementation stages have been successfully realized, the value of these benefits exceeds the costs, usually very significantly and net benefits tend to grow each year with expanding usage (Richards, King, Reid, Mcnicol, Brebner, & Godden, 2005; Stroetmann, Jones, Dobrev, & Stroetmann, 2006).

The most important barriers to the use of eHealth identified in various studies were lack of suitable training, lack of technical support and increase in work load (Gulzar et al., 2013; Hegney et al., 2007; Richards, King, Reid, Mcnicol, Brebner, & Godden, 2005). For example, the implementation of a clinical decision support system increased attendance in rural India, but the increased documentation workload inversely affected the attitudes of health workers (Peters, Kohli, Mascarenhas, & Rao, 2006). These barriers coupled with the fact that some nurses were also not familiar with the software utilized in eHealth applications resulted in their reluctance to use it (Hegney et al., 2007). The barriers differ according to geographical location, age, length of time in nursing, level of position and sector. Hegney et al., (2007) , noted that, experience in use of hardware and software was negatively correlated with age whiles experience and confidence with ICT applications associated with administrative functions was higher for registered nurses. Registered nurses were found to have more experience in the use of ICT if they worked in



community health, followed by public hospitals and other public facilities. Other bottlenecks reported by nurses included connectivity issues, lack of electricity, limited number of computers, and shortage of healthcare staff trained in eHealth (Gulzar et al., 2013). A systematic review found that nurses were dissatisfied with electronic patient records because they lacked patient impression and did not support personalized care. Furthermore, computer systems were considered unreliable; neither were they user friendly (Ross, Stevenson, & Lau, 2015). Concerns about patient privacy and security have also been noted as challenges in literature (Rouleau et al., 2015). Some nurses also consider information technology as a management tool and not a tool for clinical care, consequently, they were not very enthused about using it (Hegney et al., 2007).

These challenges represent opportunities to improve on the eHealth package. Initial startup capital though high becomes cheaper in the long run (Stroetmann et al., 2006). The difficulties in increased work load and unfamiliarity with eHealth solutions can be easily surmounted with adequate training. There is also the need for stringent policies to govern access to patient information. Nurses are at the fore front in health care and possess the greatest numbers. With the greatest numbers and their 24-hour contact time with patients, nurses have the opportunity to make huge impacts on patient care utilizing eHealth. Some nurses have found that using eHealth can lead to a reduction in professional isolation, and provides exposure to new knowledge (Gulzar et al., 2013). In sum, Fitzpatrick and Fry (2009) indicated nurses must engage more with ICT in order to contribute meaningfully to the design of high

quality healthcare. They must necessarily develop skills in designing and managing ICT solutions that optimize the use of resources.

### **Knowledge on eHealth**

In the development of eHealth from a professional perspective, nurses are required to remain updated with the necessary skills and knowledge to access and use various information sources (Dowding, 2013; Swedish Society of Nursing, 2013). Digital learning environments coupled with access to databases afford nurses the opportunity to gather vast amounts of information to impact upon client care. eHealth makes it possible to simulate care scenarios for use in both nursing education and learning in clinical practice contexts (Swedish Society of Nursing, 2013).

A number of recent studies point to the fact that nursing knowledge in ICT is picking up. Ninety-two percent (92%) of nurses use computers in their work at least daily and 57% know how to use electronic health records according to a recent survey in the United Kingdom (Royal College of Nursing, 2010). This also seems to be the case of health care providers at National Hospital in Abuja, Nigeria. They were found to possess good knowledge and skills in the use of computer and use of the Internet, especially for the enhancement of their professional practice and improvement of patient care quality (Adeleke et al., 2015). A cross-sectional study conducted in 2011 in Taiwan, involving 1026 registered nurses revealed that nurses were increasingly using social networks for knowledge sharing and knowledge acquisition (Khanum et al., 2016). They also enumerated numerous advantages nurses stand to gain if they use social media. The majority of nurses in a study reported that they use the internet routinely in their daily practice. However, most of them

exhibited a lack of confidence in its use. (Hegney et al, 2007). Most nurses, according to Webster, Davis, Holt, Stallan, New, and Yegdich (2003), use computers at home and at work and so are generally confident in its use. In their study, they found that 76% have used a computer to do a literature review, and 68% had accessed a knowledge resource. The impression here is that, nurses are finally catching up with the trends of the digital age. If this trend is to continue, nurses will soon be the true leaders in the digital revolution.

Geographical location, age, length of time in nursing, level of position and sector are some barriers listed by Hegney et al. (2007). Regarding sex, there is a perception that females are deficient in ICT but Huyer and Carr (2002), explains females generally have satisfactory knowledge of the ICT tools but rather it is the usage that was low especially in low-income countries. This position is affirmed by Kwapong (2009). In his study, males and females both had moderate knowledge and usage of ICT. Whiles Hegney et al. (2007), noted that, experience in use of hardware and software was negatively correlated with age in one study, Eley, Fallon, Soar, Buikstra, and Hegney (2008) found that ages of nurses rather positively correlated with knowledge and confidence in the use of computers. This observed contradiction provides opportunity for further inquiry. Registered nurses were also found to have more experience in the use of ICT if they worked in community health, followed by public hospitals and other public facilities Hegney et al. (2007). This view is shared by Eley et al. (2008), who affirm that experience and confidence with ICT applications associated with administrative functions was higher for registered nurses.

### **Nurses' Attitude to ICT Use in Health**

The attitude of nurses towards computers has improved over the years. Recent findings by Kipturgo, Kivuti-bitok, Karani, and Muiva (2014) indicated that nurses have a positive attitude towards ICT. Some nurses are reluctant to use new technology chiefly due to unfamiliarity with the system. However with time, they would rather prefer to use the system than be without it. A classic example is found in the study by Darbyshire (2004), involving an ICU nurse. Although she calls it an exception rather than the rule, it gives valuable insight into the perceived barriers to eHealth. She is quoted as saying, "When the system first arrived...we fought it like crazy. No, I won't have anything to do with it....It probably took me six months to learn all of the bits and pieces with it, and now I wouldn't be without it". The solution then to this problem will be training. Mugo (2014) reiterates that ICT skills are needed to engender positive attitudes towards eHealth. This position is buttressed by Marques, Oliveira, Dias, and Martins (2011), who see ICT training as an important element facilitator to eHealth. In order to ensure that this training is inculcated into clinicians, high income countries started training of clinicians in the schools by incorporating it into the curricula (Mugo, 2014). This is a lesson a country such as Ghana can learn so that nurses can acquire high level skill in electronic health before starting work. In order to guide the training of nurses, the set of competencies required for each cadre of nurses need to be specified. The Ghana Registered Nurses and Midwives Association (GRNMA) can take a cue from the Canadian Nurses Association (CNA) which has developed the e-Nursing strategy for Canada. This strategy addresses issues of access, competency and participation. The purpose of this e-nursing strategy is to guide the development

of ICT initiatives in nursing practice and client outcomes. With this strategy, actions on clinical practice, research, education, administration and policy in all domains of nursing practice are considered. It also aims at reduction in duplication of effort and benefits nurses, clients, employers, and regulatory bodies locally, nationally and internationally (Canadian Nurses Association, 2006b).

One deterrent for nurses when it comes to the use of eHealth services is privacy. Nurses were worried about the effects of teleconsulting on patient privacy and on the consultation itself (Richards, King, Reid, Mcnicol, Brebner, Godden, et al., 2005). Ownership of electronic data and information is not defined (Acheampong, 2012) and so patients seem to have no privacy or control over who has access to their medical records. Mugo (2014) adds that ICT exposes the actions of both physicians and patients to the unwarranted oversight of others through the internet both locally and internationally. Countries that do not provide specific legislation on the protection of patient privacy are more likely to face greater impediments in building confidence in the implementation of eHealth solutions (World Health Organization Regional Office for Europe, 2016). It is true that eHealth leads to improved patient outcomes, but the safety and privacy of the patient is paramount. Achampong (2012) laments that in Ghana, there is presently no policy guideline addressing electronic data exchanges and patient identifiable information in the health sector. This poses great risk to the use and management of electronic health records. This is particularly important in view of the fact that technology has the ability to operate beyond national borders. In the survey by the World Health Organization in Europe, 80% of member states have legislations to protect the

privacy of patient's electronic health records. However, only 47% had legislations that allowed patients to access their own records (World Health Organization Regional Office for Europe, 2016).

Positive working environments can engender quality care. ICT according to nurses Rouleau, Gagnon, and Côté (2015) can influence nurses' working environment and has a direct bearing on professional satisfaction. To ensure that they have positive working environments, it is essential that nursing management must encourage and support the use of computers. Also, early exposure to ICT and incorporation of computer literacy skills into curricula would engender positive attitudes towards computer usage (Asah, 2013). Walsham and Sashay (2006), agree that adequate training boosts confidence level and overcome the fear of technology. Not only is the ICT training necessary for promoting positive attitudes and environments but also for the fact that health care professionals who lack the ICT skills end up spending too much time on entering and managing patient electronic information (Hogan & Palmer, 2005).

Nurses continue to be left out when making decisions on eHealth solutions though they are most likely to be the majority of users. In their online survey on the knowledge and experience of nursing staff in relation to eHealth development involving 1158 respondents, the Royal college of Nursing found that 40% of nursing staff are not consulted about the introduction of eHealth solutions in their work place and a staggering 78% claimed they had no influence on eHealth use in their facilities (The Royal College of Nursing, 2013). That may be the reason why While & Dewsbury, (2011), claim there is little evidence relating to the nurses' contribution within eHealth. Since they are

not consulted, the result is apathy and dissatisfaction associated with the use of eHealth (Adams, Adams, Thorogood, Buckingham, 2007; Mahalli, 2015). The survey by The Royal College of Nursing was online indicating that all the respondents had some level of competence in ICT use. In low-income countries where many nurses do not have a lot of experience with ICT, the story may be worse. One may argue that given the opportunity they may not be able to contribute meaningfully to the design of these solutions due to the lack of technical knowhow.

According to While and Dewsbury (2011), five different studies in Australia, England and the United States of America found that the dissatisfaction of nurses with electronic patient record generally stemmed from the fact that they did not support nursing practice. Some nurses were of the view that the records did not take into account individualization of care and were saddled with countless protocols which dictated how the nurse performs her duty. Furthermore, the actual computer systems were found to be cumbersome, complicated, slow and unreliable. These sentiments are shared by Darbyshire (2004), who contends that the identity of nursing may be lost through the incorporation of technology in all aspects of care. The technological solutions provided are also often deficient. While he agrees that it is impossible for any system to capture all aspects of patient's problems, he argues that nurses require systems that are "sensitive and adaptable to the differing acuties of patients with ostensibly the same diagnosis" (Darbyshire, 2004; Page 23).

Eley et al. (2009), also identified lack of interest to be a major hindrance to the use of ICT by Australian nurses. Although Darbyshire (2004), suggests that it may be due to unfamiliarity with the systems which may improve over time, it is worth noting that time alone will not lead to consistent adoption (Granlien & Hertzum, 2012). The problem may be due to fear of adopting new technology often referred to as technophobia. It may also be internal challenges such as physical location of computers or shortcomings in technical or nursing management support (Asah, 2013).

Wong and Hanafi (2007) as well as Kipturgo, Kivuti-bitok, Karani, and Muiva (2014) found that there were no significant gender disparities in terms of levels of attitudes to ICT, age on the other hand was found to influence nurses attitude to eHealth (Kipturgo et al., 2014). This assertion has been substantiated by several other studies which found that younger nurses demonstrate a more positive attitude towards ICT usage (Lee, Choi & Chung, 2006). Kipturgo et al. (2014) pointed out that Professional qualification positively affected the nurses' attitudes. Those with bachelor degree and higher diploma had better attitudes compared with certificate holders.

### **Practice of eHealth**

Most nurses demonstrate some measure of confidence in using ICT but according to Eley, Fallon, Soar, Buikstra, and Hegney (2008), the experience and confidence is basic and limited to basic computer application. In their study they found that only 30% of Australian nurses in acute care settings have received training which could account for their lack of confidence in the use of ICT. Webster et al. (2003), however think this knowledge is more than basic because most nurses use computers at home and at work and so are generally



confident in computer use. According to Ridgway and Sheean (2011), about 80% of maternal and child health (MCH) nurses had received some training in ICT use and that may have translated into the confidence they had in the use of ICT. More than 85% of nurses displayed high levels of competence using computer hardware, email, Internet and electronic health records. However, the use of electronic libraries was greatly reduced. It is worth noting that nurses have varying competency levels in the utilization of ICT (Chan, Brew, & Lusignan, 2004; Darbyshire, 2004; Dee & Stanley, 2005). Despite the majority having received training in the use of computers or electronic resources, including the Internet, there were those who had not or had received it informally yet were comfortable using these resources. This brings to the fore the notion that the equipment may be used without adequate training. They were quick to add that, the ability of nurses to use ICT and electronic health record (EHR) programmes may have arisen from need as they were working alone in a location and by necessity needed to master the computer and EHR.

Wong and Atan (2007), found that, female participants exhibited an enhanced confidence level after an ICT course as opposed to the male participants buttressing the view that computer experience is sex-based as the surge in ICT confidence over time assumed different patterns for females and males. Although Primary Health Care nurses were found to have had less access to ICT than those working in the acute sector, Chan et al., (2004) and Eley et al., (2008) found that nurses working in MCH had more training in ICT than nurses in the acute sector. Eley et al. (2009) again found that one of the barriers to computer use was the age of the nurse.

## ICT Resources in eHealth

Many studies have identified that lack of ICT infrastructure is a major setback to the migration to digital healthcare (Asah, 2013; Car et al., 2008; Darbyshire, 2004; Peters, Kohli, Mascarenhas, & Rao, 2006). Closely related to this is the lack of technical support and training. Also, high quality interventions developed frequently fail to live up to their potential when deployed in real life (Asah, 2013; Car et al., 2008; Darbyshire, 2004; Peters, Kohli, Mascarenhas, & Rao, 2006). A recent survey in Europe by the World Health Organisation found that, the appropriate eHealth infrastructure was in place and funding was available for the projects yet to be implemented. This demonstrates a commitment by Governments in Europe to transform the health sector using ICT solutions (World Health Organization Regional Office for Europe, 2016). In the United States of America for instance, \$1.2 billion grant was unveiled to facilitate adoption of electronic health records in all hospitals by 2014 (Mitchell & Yaylacicegi, 2012). Countries such France, Denmark and Germany are all making giant strides in setting up ICT infrastructure for eHealth (Mugo, 2014).

There is improved awareness of the value of moving to digital systems and the benefits to be accrued in the use of mobile technology innovations in low-income countries, but the implementation of ICT solutions have been slow especially in the rural areas (Asah, 2013; Helmer, Lipprandt, Frenken, Eichelberg, & Hein, 2011; Peters et al., 2006; United States Agency for International Development, 2016). Omary, Lupiana, Mtenzi, and Wu (2010) attributed it to lack of necessary infrastructure required. However, it is noteworthy that ICT infrastructure and internet penetration are among the key determinants in the success of eHealth (Mugo, 2014). Omary et al. (2010) is

also of the view that low adoption of eHealth in low-income countries is partly due to lack of computer skills amongst the clinicians. This seems to be true because countries that have clinicians with the requisite ICT training demonstrate a high acceptance of eHealth (Khan, Shahid, Hedstrom, & Anderson, 2012). In recent times, some low-income countries have recorded success stories in ICT infrastructure such as the institution of electronic medical records. These countries include Malawi, Tanzania, Peru, Haiti, Uganda and Zambia (Mugo, 2014). In Africa, access to a stable supply of electricity in many countries is very poor, especially in rural settings. Although network connectivity is improving, access to especially broadband is minimal. Fifty seven percent (57%) of the population in Sub-Saharan Africa are in locations without mobile broadband access (United States Agency for International Development, 2016). This may threaten the adoption of eHealth in the sub region. Even with the willingness to join the digital migration, when resources are scarce, nurses are likely to easily give up. This is substantiated by Ajzen (2002) when he posited that people are not likely to form a strong intention to perform a behaviour if they believe that they do not have any resources even if they hold positive attitudes toward the behaviour and believe that important others would approve of the behaviour.

Ghana is currently seeking to use ICT to improve the quality of healthcare and reduce healthcare cost (International Institute for Communication and Development, 2014). In trying to attain this, it has come out with the eGovernment network infrastructure. It is also incorporating mobile network coverage with the help of service providers such as Vodafone, MTN, Tigo, Glo and Airtel. Many eHealth initiatives are currently on going in Ghana,

including data management, hospital management information systems (HMIS), public health (mobile health information), telemedicine and eLearning (International Institute for Communication and Development, 2014). The recent introduction of the national eHealth strategy in 2010, demonstrates the commitment of government to pursuing the eHealth agenda (Ministry of Health, 2010). Also, it has begun the outfitting of facilities in the Central region with the requisite hardware and software for eHealth service delivery.

### **Theoretical Framework**

The theoretical framework is the foundation on which all knowledge is constructed for a research study. It serves as the structure and support for the rationale for the study, the problem statement, the purpose, the significance, and the research questions. The theoretical framework provides a grounding base, or an anchor, for the literature review, and most importantly, the methods and analysis (Grant & Osanloo, 2014). This is a behavioural research which focuses on the identification of determinants of eHealth usage among nurses. The Reasoned Action Approach (RAA) was therefore been chosen to underpin this study.

The RAA is a merger of two previous theories; the theory of reasoned action (Fishbein & Ajzen 1975) and the theory of planned behaviour (Ajzen & Fishbein, 1980). The key terms that appear in this approach include; attitudes which refer to an aggregate of readily accessible or salient beliefs about the likely outcomes of performing the target behaviour; subjective norms refer to the perceived social pressure to perform or not perform the target behaviour; behavioural intentions refer to the perceived likelihood of performing the target behaviour; and perceived behavioural control specifies one's perceived ability

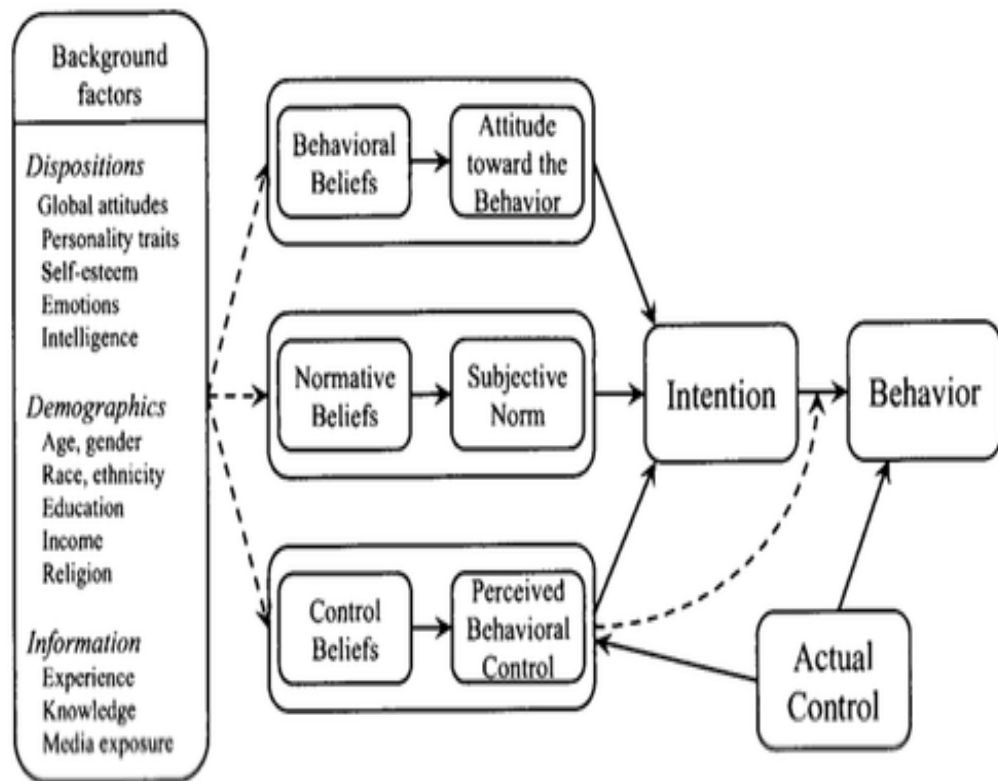
to enact the target behaviour (Nisson & Earl, 2015). The theory of reasoned action conjectures that behaviours arise from behavioural intentions as a direct result of attitudes and subjective norms (Fishbein & Ajzen, 1975).

Behaviour is explained by identifying and relating the primary features of behaviour and their sources. It is made up of three distinct parts that attempt to explain how behaviour is formed. According to Fishbein, they include; the prediction of behaviour from behavioural intention; the explanation of intention as a function of attitude, perceived norm, perceived behavioural control, and their underlying beliefs; and the exposition of beliefs as originating from a multitude of potential sources (Fishbein, 2000; Yzer, 2017). However, the Theory of Planned Behaviour expatiates on the Theory of Reasoned Action by adding perceived behavioural control as a means of forecasting both behavioural intentions and behaviour (Nisson & Earl, 2015). This perceived behavioural control is exhibited over resources, opportunities, and skills essential to execute the desired behaviour. This presumes that behaviour is dependent on but not limited to the individual's intention to perform the behaviour. This intention is not only governed by the attitude and subjective norms, but also by an individual's perceived behavioural control depending on the relationship and the situation (Communication for Governance and Accountability Program, 2006). For perceived behavioural control to influence behaviour change, a person must perceive that they have the ability to perform the behaviour. This perceived control over opportunities, resources, and skills needed is an important part of the change process (Grizzell, 2007; Kritsonis, 2005). In sum, behaviour is linked to attitudes by specific behavioural

intentions. Hence attitudes would predict behavioural intentions which would in turn predict behaviour.

The RAA states that attitudes towards the behaviour, perceived norms, and perceived behavioural control determine people's intentions, while people's intentions predict their behaviours (Fishbein & Ajzen, 2010). It is an integrative model that incorporates all the elements of the theory of reasoned action and the theory of planned behaviour (e.g., attitudes toward the behaviour, subjective norms, perceived behavioural control, and intentions), but also adds other factors that influence an individual's ability to perform a specified behaviour including actual control, defined as skills, abilities, and other environmental factors (Ajzen & Albarracín, 2007; Fishbein & Ajzen, 2010; Nissoon & Earl, 2015). Basically, a reasoned action approach to the description and prediction of social behaviour assumes that people's behaviour follows reasonably from their beliefs about performing that behaviour. According to Fishbein, some have questioned whether human behaviour can be described as reasoned. Furthermore, it fails to take into account emotions, compulsions, and other illogical elements of human behaviour (Martin Fishbein, 2008). In answer, he clarifies that to use the model one must clearly define the behaviour of interest. Using generalized categorizations such as exercise will make it difficult to predict the likelihood of that behaviour occurring. Yet, if you specify for example, swimming for 20 minutes three times a week will make it easier to predict. Yet, one may hold a positive intention but may be prevented from acting on it by a number of barriers including personal and environmental barriers. Here, the intervention is aimed at helping the individual overcome these barriers. A clear advantage of this model when compared to other

behavioural models is that it helps explain why different factors are either related or not related to a particular behaviour. The RAA was designed to understand and predict behaviour but has now been found beneficial in effecting behaviour changes and designing behavioural interventions. It has been found that adjusting predictors specified by this model results in a corresponding change in behaviour (Ajzen & Fishbein, 1980, 2005; McEachan, Conner, Taylor, & Lawton, 2011).



**Reasoned Action Approach (Fishbein & Ajzen, 2010; Nisson & Earl, 2015)**

In this model, intention determines the behaviour but is regulated by actual control. The intention arises through interplay of factors including attitude towards the behaviour, subjective norm and perceived behavioural control. These factors are directly as a result of behavioural beliefs, normative beliefs and control beliefs respectively. Perceived behavioural control influences behaviour directly and indirectly through intention. Perceived

behavioural control receives feedback from actual control. Other extraneous variables are treated as background factors. Relating this study to the Reasoned Action Approach, the antecedents to use of eHealth by nurses, will include adequate knowledge on ICT, good attitude toward the use of eHealth in health care delivery, good skill set in the use of eHealth and availability of adequate resources for eHealth service delivery.

### **Summary of Literature Review**

eHealth usage among nurses has been reviewed in this literature with emphasis on knowledge, attitude, practice and resources. eHealth can take many forms including telemedicine, electronic medical records and health information system. Nurses may be reluctant to adopt eHealth because they feel poorly informed about ICT health initiatives. The shift to electronic medical records has been found to make patient record accessible in real time to multiple users. The use of eHealth is known to have numerous benefits including provision of healthcare at a reduced cost, improving access to healthcare, enhancing efficiency in clinical decision making, prescription ordering, improving quality health care and promoting individual adoption of healthy lifestyle. However, the initial set up of eHealth infrastructure is capital intensive and requires suitable training. Some nurses who are not familiar with the software utilized in eHealth applications are reluctant to use the technology. Recent studies point to the fact that nursing knowledge in ICT is picking up. The attitude of nurses towards computers and eHealth has improved over the years, although there is still much to be done. It is worth noting that nurses have varying competency levels in the utilization of ICT. Lack of ICT infrastructure is a major setback to the migration to digital healthcare. Governments in Europe and USA have equipped facilities



with the appropriate eHealth infrastructure. There is however low adoption in Africa and Ghana. Ghana is currently seeking to use ICT to improve quality of health care and also reduce healthcare cost.

## CHAPTER THREE

### METHODOLOGY

This chapter focuses on the methods and tools used for the study. According to Burns and Grove (2005), research methodology is the application of all steps, strategies and procedures for gathering and analysing data in a research investigation in a logical and systematic way. This can be described as the research plan that guides the research. It involves a research design, sampling methods, data collection methods, reliability, validity, analysis, and ethical considerations.

#### **Research Design**

Research design guides the researcher in planning and implementing the study in a way that is most likely to achieve the intended goal (Burns & Grove, 2005). A descriptive cross sectional design was employed in this study. According to Cohen, Manion and Morrison (2007), descriptive surveys gather data at a particular point in time when there is an intention of describing the nature of existing conditions or identifying standards against which existing conditions can be compared. It has the advantage of cost-effectiveness and promotes faster and easier data collections.

#### **Study Area**

The study was conducted in selected health facilities in Cape Coast. The Cape Coast Metropolitan Area is one of the oldest districts in Ghana and served as the first capital of Ghana. It was upgraded to metropolitan status in 2007 by LI 1927. The Metropolis is bounded on the South by the Gulf of Guinea, to the West by the Komenda Edina Eguafo Abrem Municipality (at Iture bridge), to the East by the Abura Asebu Kwamankese District, and to the North by the

Twifu Heman Lower Denkyira District. The population of the Cape Coast Metropolis, according to the 2010 Population and Housing Census, was 169,894 representing 7.7 percent of the region's total population. Of the population 11 years and above, about 90.0 percent are literate and 10.0 percent are non-literate. The proportion of literate males is higher (94.1 %) than that of females (85.6%). About 32.0 percent of the population 12 years and older use internet facilities in the metropolis. Only 6,337 households representing 15.7 percent of the total households in the metropolis have desktop/laptop computers (Ghana Statistical Service, 2014).

The metropolis is home to three nursing training institutions including, University of Cape Coast School of Nursing and Midwifery, Cape Coast Nursing and Midwifery Training College and Ankaful Nurses Training College. Most of the students have their clinical affiliations in health facilities in Cape Coast and some remain in the metropolis after training.

The Metropolis is endowed with a teaching hospital, a metropolitan hospital, a university hospital, a polyclinic and various clinics and health centres that provide health care to the population. The three facilities that were sampled for the study included the Cape Coast Teaching Hospital, The University of Cape Coast Hospital and the Ewim Polyclinic. The teaching hospital which serves as a referral centre for the region and beyond is equipped with an eLibrary but this facility is not always functional due to systemic challenges. There is a computer in every ward with access to 24hour internet. The University of Cape Coast Hospital on the other hand has a patient health information system that is utilized in patient care from point of entry to the point of exit. Staff at the facility also has access to the university's eLibrary. Ewim Polyclinic which is

located in the main business district of Cape Coast lacks both internet services and computers on the wards. The computers and internet access in the offices are for administrative purposes only. The numerous number of health facilities also make it an attractive destination for health workers including nurses. The calibre of health facilities attracts nurses of various specialties with varying years of experience. The facilities are also at various levels of infrastructural development making it an ideal place to compare knowledge, attitudes and practices of eHealth.

### **Target Population**

Population is the total number of members targeted by the research as defined by the aims and objectives of the study (Postlethwaite, 2005). The population of study included all registered nurses who have had at least a year's working experience in Cape Coast. This enabled the researcher to reach the group of nurses who have worked in the metropolis and understand the systems. The estimated numbers of registered nurses within the metropolis, excluding midwives is about 550 according to data available at the regional health directorate, Cape Coast teaching Hospital and University of Cape Coast Hospital. Of this number, about 100 did not meet the criteria of working for at least one year.

### **Inclusion and Exclusion Criteria**

Nurses who have worked for one year or more were included in the sampling frame. Any nurse who met the criteria and chose the number 2 was administered a questionnaire. This study did not include midwives as well as enrolled nurses.

## Sampling Procedure

The multi stage sampling technique was used to select the sample for data collection. According to Trochim (2000), we can combine sampling methods in a number of useful ways to help us address our sampling needs in the most efficient and effective manner possible. When sampling methods are combined, we call it multi stage sampling.

Hospitals in the Cape Coast metropolis were first placed in clusters of primary, secondary and tertiary using cluster sampling. Cluster sampling is a sampling strategy in which the population is divided into sub populations. The units of interest are grouped together in clusters and the clusters are sampled randomly (Bowling, 2014). After placing the hospitals in clusters, one hospital was randomly selected from each cluster using simple random sampling. Simple random sampling is a sampling method with the probability that any of the potential subjects of the sample have the same likelihood of being the selected sample (Houser, 2016). Once a sampling frame is available, each person in the sample is assigned a number. Simple random sampling can be with or without replacement (Houser, 2016). The hospitals in each cluster were listed and assigned numbers. One hospital each was picked randomly from each cluster for the study. The three hospitals selected at the end of the exercise were the Cape Coast Teaching Hospital which had 396 registered nurses, the University of Cape Coast Hospital with 47 registered nurses and the Ewim Polyclinic with 21 registered nurses. Once the hospitals had been selected, registered nurses who had worked for a year or more were randomly sampled. Any nurse who did not meet this requirement was excluded. Eligible registered nurses with one or more years working experience in the selected facilities estimated at about

464, were then sampled randomly and served with questionnaires. At each ward, nurses meeting the criteria were isolated and allowed to pick pre-wrapped papers bearing the numbers 1 and 2. Any registered nurse meeting the criteria who chose the number 2 was administered a questionnaire. A total of 184 questionnaires were administered at the Cape Coast Teaching Hospital, 21 at the University of Cape Coast and 10 at the Ewim Polyclinic.

Various studies have recognized that, many available studies had inappropriately calculated sample size; consequently, they have less than required sample size with less power (Jaykaran, Deepak, Preeti, Paresh, & Solanki., 2011; Jaykaran, Kantharia, & Yadav, 2011). It is crucial therefore to ensure that the sample size calculations are accurate. For this study, the formula adopted for calculation of sample size is recommended by Yamane (1967) for quantitative cross sectional studies. The formula;  $\text{Sample size} = n = \frac{N}{1+N(e)^2}$

Where n is the sample size, N is the population size which is estimated to be about 464 according to data available at the regional health directorate, and e is the level of precision for which a 5% error margin was chosen. For this study, the sample size, a 95% confidence level and P=0.5 are assumed. Hence the sample size for the study was:

$n = \frac{464}{1 + 464(0.05)^2} = 214.8$ . This figure which was rounded up to 215 was selected randomly.

### **Data Collection Instrument**

The research instrument utilized for the study was a structured questionnaire. Structured questionnaires involve the use of fixed questions, tests and/or scales which are presented to respondents in the same way, with no variation in question wording, and with mainly pre-coded response choices

(Bowling, 2014). This questionnaire was in two parts. The first part was related to socio demographic information; the second part had questions about the use of eHealth in care and management of patients by nurses in the areas of knowledge, attitude, practice and resources. The second part had questions on a four point Likert scale. Likert items use response categories that range from strongly agree to strongly disagree (Babbie, 2005). There was an intentional omission of the midpoint. This is to enhance the accuracy of the responses and avoid the misinterpretation of the midpoints. According to Losby and Wetmore (2012) each respondent may be confusing and have a different interpretation of the mid-point even when it is labelled. It has been found that possible interpretations of the mid-point can be: Do not know, Unsure, Do not care, No opinion, Neither, Neutral, Both equal parts of agree and disagree, Undecided, Not applicable, or Unwilling to answer. However, it is acceptable to either use or refuse to use midpoints (Dawes, 2001; Matell & Jacoby, 1971). The questionnaire was developed by the researcher. The questionnaires that existed did not capture the essence of this research. This questionnaire had sections on demographics, knowledge, attitude, practice and resources.

### **Validity and Reliability**

To ensure validity and reliability, the questionnaire was designed according to the objectives of the study and under strict supervision of the supervisor. Questions were also framed well for easy understanding to avoid any ambiguous statements. Furthermore, a Cronbach's alpha testing was applied to the tool after pretesting and a coefficient determined.

### **Pre-testing**

Pretesting was done at Swedru Municipal Hospital. This was to ensure cultural acceptance, level of validity, clear understanding of questionnaire and to remove ambiguity. The hospital was chosen for pre-testing because it shares similar characteristics with the study area. All the necessary adjustments were effected before the commencement of actual data collection. No questions were deleted after the pre-test; however, a rearrangement of two questions was done to improve the cohesiveness among items. The Cronbach's alpha coefficient determined after being applied to the tool was 0.942.

### **Data collection procedures**

Data collection was done utilizing a structured questionnaire made up of two sections and was administered with the help of a research assistant who was trained for this purpose. The training included observing office protocol, personal introduction, and purpose of the study. He was also taken through the objectives of the study in order to understand the purpose and the need for the exercise. In addition, the research assistant was taken through the research instruments to ensure uniform understanding of the research items.

Data collection spanned a period of two weeks from Sunday through Saturday. Respondents who requested to take the questionnaire home were allowed a maximum of one week to return questionnaires. The researcher and assistant arrived at the study site as early as 7:30am so as to meet those from the night shift as well as the morning staff. At each ward, nurses meeting the criteria were isolated and allowed to pick pre-wrapped papers bearing the numbers 1 and 2. Any registered nurse meeting the criteria who chose the number 2 was administered a questionnaire. Prior to administration, the research



was briefly explained to them and they were told they had the right to opt out of the research. Nurses were made to sign consent forms prior to data collection. The average number of questionnaires collated per day was 20. The process continued until the total number required at each facility was obtained. A 95.81% response rate was recorded.

### **Data Processing and Analysis**

Questionnaires collated were checked for completeness and data collated from the structured questionnaire was entered into and analysed using statistical package for social sciences (SPSS) version 22.0 data analysis software. Responses of respondents were transformed into percentages and presented in the form of frequency distribution tables and graphs. A Kruskal-Wallis H test as well as post hoc analysis using Dunn's test were the statistical analysis used to test for significant relationships between demographic characteristics and knowledge, attitude, practice and resources on eHealth. A rating scale developed to categorize the levels of knowledge, attitude, practice and resources ranged from zero (0) to four (4). A score between zero (0) to one (1) was rated as poor, a score between 1.1 and 2.0 was rated as fair, a score between 2.1 and 3.0 was rated as good, and a score between 3.1 and 4.0 was rated as excellent.

### **Ethical Considerations**

Ethical approval was sought from the University of Cape Coast Institutional Review Board (UCCIRB) to conduct the study. Letters from the School of Nursing and Midwifery to seek approval for data collection was sent to the heads of the various facilities where data was collected. In order to participate in the research, participants must be 18years or older. Principles of confidentiality and anonymity were ensured. Respondents were made to

understand that all responses will be treated as aggregate data. No names or numbers were assigned to questionnaires. Any nurse who is unwilling to participate was allowed to withdraw. The purpose of the research was also explained to respondents and their consent sought before commencement of the study.

## CHAPTER FOUR

### RESULTS AND DISCUSSION

This chapter presents the results of the study to find out the level of usage of ICT in nursing practice among nurses in Cape Coast.

Table 1: Socio-Demographic Characteristics of Respondents

Socio-Demographics	Frequency	Percentage (%)
<b>Sex</b>		
Male	79	38.3
Female	127	61.7
<b>Total</b>	<b>206</b>	<b>100.0</b>
<b>Age (years)</b>		
21-25years	62	30.1
26-30years	67	32.5
31-35years	55	26.7
36-40years	11	5.3
more than 40years	11	5.3
<b>Total</b>	<b>206</b>	<b>100.0</b>
<b>Marital Status</b>		
Married	102	49.5
Single	99	48.1
Divorced	5	2.4
<b>Total</b>	<b>206</b>	<b>100.0</b>
<b>Religion</b>		
Christian	190	92.2
Muslim	14	6.8
Traditionalist	2	1
<b>Total</b>	<b>206</b>	<b>100.0</b>
<b>Education</b>		
Diploma	131	63.6
Advanced diploma	20	9.7
Bachelor degree	42	20.4
Post graduate diploma	4	1.9
Master's degree	9	4.4
<b>Total</b>	<b>206</b>	<b>100</b>

**Source: Field survey, Nukunu (2017)**

The registered nurses who participated in this study numbered up to 206. Majority of the respondents (61.7%) were female and 38.3% were

males. Almost half of these respondents (49.5%) were married, 48.1% single and about 2.4% were divorced. Most of the respondents (62.6%) were between the ages of 21 and 30 years, 26.7% were between 31 and 35 years and 5.3% were between 36 and 40 years. Respondents above age 40 were also 5.3%. Concerning religious associations, the study showed that majority of respondents (92.2%) were Christians, 6.8% were Muslims while 1% was a traditionalist. Many of the respondents (63.6%) had diploma as their highest level of education, 20.4% had a bachelor's degree, 9.7% had an advanced diploma, 1.9% had a post graduate diploma and 4.4% held a master's degree (Table 1).

Table 2: Professional Characteristics of Respondents

<b>Socio-Demographics</b>	<b>Frequency</b>	<b>Percentage (%)</b>
<b>Rank</b>		
SN	82	<b>39.9</b>
SSN	42	<b>20.4</b>
NO	41	<b>20.0</b>
SNO	30	<b>14.6</b>
PNO	10	<b>4.9</b>
<b>Ward</b>		
Surgical	49	<b>23.8</b>
Medical	51	<b>24.8</b>
Children	26	<b>12.6</b>
NICU	2	<b>1.0</b>
Obs/Gynae	9	<b>4.4</b>
ICU	7	<b>3.4</b>
Theatre	14	<b>6.8</b>
A&E	20	<b>9.7</b>
OPD	28	<b>13.6</b>
<b>Specialty</b>		
General nursing	162	<b>78.6</b>
Ophthalmic Nurse	13	<b>6.3</b>
Critical care nurse	3	<b>1.5</b>
Paediatric nurse	3	<b>1.5</b>
ENT nurse	4	<b>1.9</b>
Theatre nurse	3	<b>1.5</b>
Registered mental nurse	12	<b>5.8</b>
Registered CHN	5	<b>2.4</b>
Public health nurse	1	<b>0.5</b>
<b>Years of Work</b>		
1-5years	107	<b>51.9</b>
6-10years	69	<b>33.5</b>
11-15years	19	<b>9.2</b>
16-20years	6	<b>2.9</b>
More than 20years	5	<b>2.4</b>

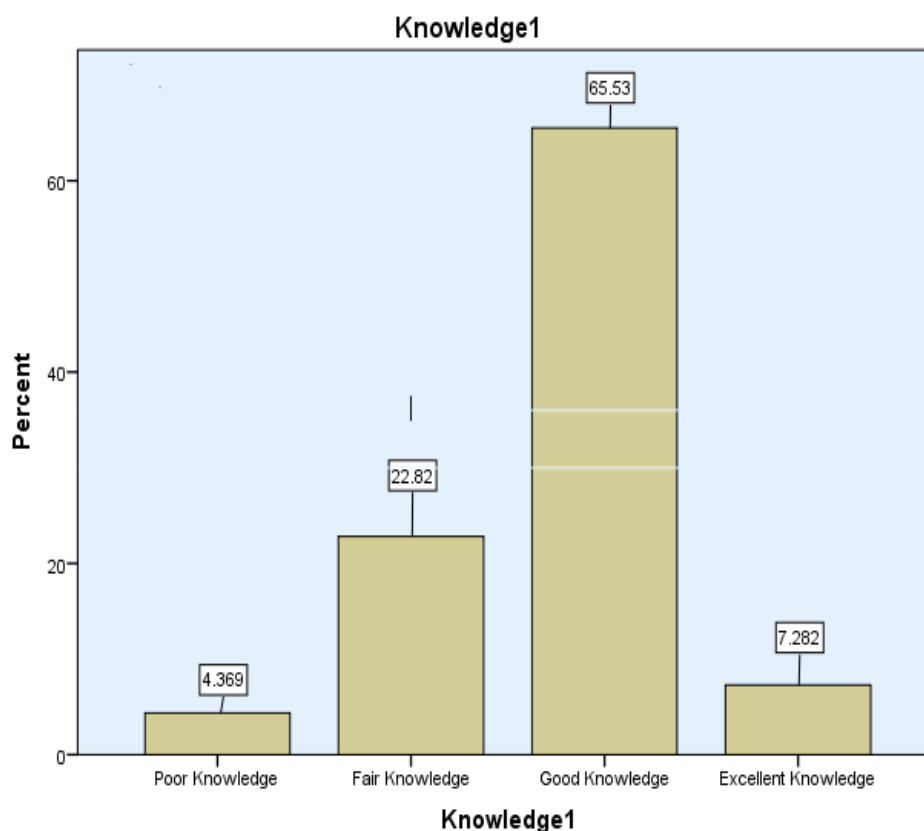
**Source: Field survey, Nukunu (2017)**

SN-Staff Nurse; SSN-Senior Staff Nurse; NO-Nursing Officer; SNO-Senior Nursing Officer; PNO-Principal Nursing Officer; NICU- Neonatal Intensive care unit; Obs/Gynae- Obstetrics and Gynaecology; ICU-Intensive Care Unit; A&E-Accident and Emergency; OPD-Out Patient Department; ENT-Ear, nose and throat; CHN-Community Health Nurse.

Regarding specialization and distribution on the wards, 78.6% were in general nursing practice, 6.3% were ophthalmic nurses, 5.8% were registered mental nurses and 2.4% were registered community health nurses. ENT nurses made up 1.9% while 1.5% were theatre nurses. Paediatric nurses were 1.5% and critical care nurses were also 1.5%. Only 0.5% of respondents were public health nurses. The majority of the nurses (24.8%) were on the medical wards and 23.8% were on the surgical wards. The children's ward also had 12.6% of respondents and 13.6% were at the outpatient department. Respondents from the theatre constituted 6.8% while the accident and emergency wards had a 9.7% response rate. Obstetrics and gynaecology wards, ICU and NICU accounted for 4.4%, 3.4% and 1.0% of respondents respectively. Only 2.4% of respondents had more than 20 years experience. The majority of respondents (51.9%) had worked between 1 and 5 years and 33.5% had worked between 6 and 10 years. About 9.2% and 2.9% had worked 11 to 15 years and 16 to 20 years respectively (Table 2).

**Research Question 1: Knowledge on e-health**

The researcher aimed at finding out how much respondents know about eHealth. Figure 1 below presents a summary of the level of knowledge on eHealth.



**Figure 1: Knowledge on eHealth**

The knowledge of nurses on eHealth was high as majority (65.5%) had good knowledge. A few nurses (22.8%) showed fair knowledge, 7.3% exhibited excellent knowledge; with 4.4% having poor knowledge.

Table 3 presents a summary of the knowledge of nurses on eHealth in relation to their socio-demographic characteristics.

Table 3: Association between socio-demographics and knowledge of Respondents on eHealth

<b>Independent variable</b>	<b>Dependent variable</b>	<b>N</b>	<b>Mean Rank</b>	<b><math>\chi^2</math></b>	<b>p-value</b>
<b>Age of Nurses</b>	<b>knowledge on ehealth</b>				
21-25years		62	95.57	4.063	.398
26-30years		67	107.87		
31-35years		55	110.51		
36-40years		11	88.36		
more than 40years		11	99.45		
<b>Sex</b>					
Male		79	104.09	.018	.894
Female		127	103.13		
<b>Marital Status</b>					
Married		102	105.07	2.595	.273
Single		99	100.25		
Divorced		5	135.80		
<b>Total</b>		154			
<b>Religion</b>					
Christian		190	102.57	.927	.629
		14			
Muslim			113.21		
Traditionalist		2			
			124.00		
<b>Education</b>					
Diploma		131	105.25	2.897	.57
Advanced diploma		20	114.10		
Bachelor degree		42	97.69		
Post graduate diploma		4	94.25		
Master's degree		9	85.67		

**Source: Field survey, Nukunu (2017)**

Findings from the study using a Kruskal-Wallis H test revealed that there was no significant association between the age of respondents and their knowledge about eHealth ( $\chi^2= 4.063$ ,  $p=.398$ ). The same holds true for sex as well as marital status. Sex recorded ( $\chi^2=.018$ ,  $p=.894$ ) whereas marital status



presented ( $\chi^2=2.595$ ,  $p=.273$ ). Religion ( $\chi^2=.927$ ,  $p=.629$ ) and educational level ( $\chi^2=2.897$ ,  $p=.57$ ) also did not show any significant associations with knowledge of nurses on eHealth (Table 3).

Table 4: Association between professional characteristics and knowledge of Respondents on eHealth

<b>Independent variable</b>	<b>Dependent variable</b>	<b>N</b>	<b>Mean Rank</b>	<b><math>\chi^2</math></b>	<b>p-value</b>
<b>Rank</b>					
SN		82	105.43	5.327	.255
SSN		42	113.36		
NO		41	100.02		
SNO		31	93.55		
PNO		10	80.10		
<b>Ward</b>					
Surgical		49	100.49	9.368	.312
Medical		51	93.86		
Children		26	112.88		
NICU		2	161.50		
Obs/Gynae		9	120.44		
ICU		7	108.71		
Theatre		14	86.36		
A&E		20	112.50		
OPD		28	108.86		
<b>Specialty</b>					
General nursing		162	102.88	17.995	.021
Ophthalmic Nurse		13	122.77		
Critical care nurse		3	118.67		
Paediatric nurse		3	124.00		
ENT nurse		4	64.50		
Theatre nurse		3	149.00		
Registered mental nurse		12	111.42		
Registered CHN		5	33.0		
Public health nurse		1	124.00		
<b>Years of Work</b>					
1-5years		107	100.62	4.435	.350
6-10years		69	107.80		
11-15years		19	103.53		
16-20years		6	78.55		
More than 20years		5	135.80		

Source: Field survey, Nukunu (2017)

Results from the study using a Kruskal-Wallis H test showed that there was a statistically significant relationship between specialty and knowledge on eHealth with ( $\chi^2=17.995$ ,  $p=.021$ ). There was no significant association between rank ( $\chi^2=5.327$ ,  $p=.255$ ), ward ( $\chi^2=9.368$ ,  $p=.312$ ), and years of practice ( $\chi^2=4.435$ ,  $p=.350$ ) and the knowledge of nurses on eHealth (Table 4).

Table 5: Post Hoc analysis for specialty and knowledge on eHealth

<b>Sample 1- Sample 2</b>	$\chi^2$	<b>Std Error</b>	<b>Std.Test statistic</b>	<b>P</b>
Registered CHN- ENT Nurse	31.500	33.605	.937	.349
Registered CHN- General Nurse	69.877	22.746	3.072	.002
Registered CHN- Registered Mental Nurse	78.417	22.665	2.941	.003
Registered CHN- Critical Care Nurse	85.667	36.585	2.342	.019
Registered CHN- Ophthalmic Nurse	89.769	26.362	3.405	.001
Registered CHN- Paediatric Nurse	91.000	36.585	2.487	.013
Registered CHN- Public Health Nurse	-91.000	54.877	-1.658	.097
Registered CHN- Theatre Nurse	116.000	36.585	3.171	.002

Table5 cont

ENT Nurse– General Nurse	38.377	25.355	1.514	.130
ENT Nurse– Registered Mental Nurse	-46.917	28.983	-1.622	.105
ENT Nurse– Critical Care Nurse	54.167	38.261	1.416	.157
ENT Nurse– Ophthalmic Nurse	58.269	28.643	2.034	.042
ENT Nurse– Paediatric Nurse	59.500	38.261	1.555	.120
ENT Nurse– Public Health Nurse	-59.500	56.008	-1.962	.288
ENT Nurse– Theatre Nurse	-84.500	38.261	-2.209	.027
General Nurse– Registered Mental Nurse	-8.540	14.987	-.570	.589
General Nurse– Critical Care Nurse	-15.790	29.189	-.541	.589
General Nurse– Ophthalmic Nurse	-19.833	14.441	-1.378	.168
General Nurse– Paediatric Nurse	-21.123	29.189	-.724	.469
General Nurse– Public Health Nurse	-21.123	50.250	-.420	.674
General Nurse– Theatre Nurse	-46.123	29.189	-1.580	.114
Registered Mental Nurse– Critical Care Nurse	7.250	32.337	.224	.823
Registered Mental Nurse– Ophthalmic Nurse	11.353	20.054	.566	.571
Registered Mental Nurse– Paediatric Nurse	12.583	32.337	.389	.697
Registered Mental Nurse– Public Health Nurse	-12.583	52.141	-.241	.809
Registered Mental Nurse– Theatre Nurse	37.583	32.337	1.162	.245
Critical Care Nurse– Ophthalmic	4.103	32.087	.128	.898

Table 5 cont

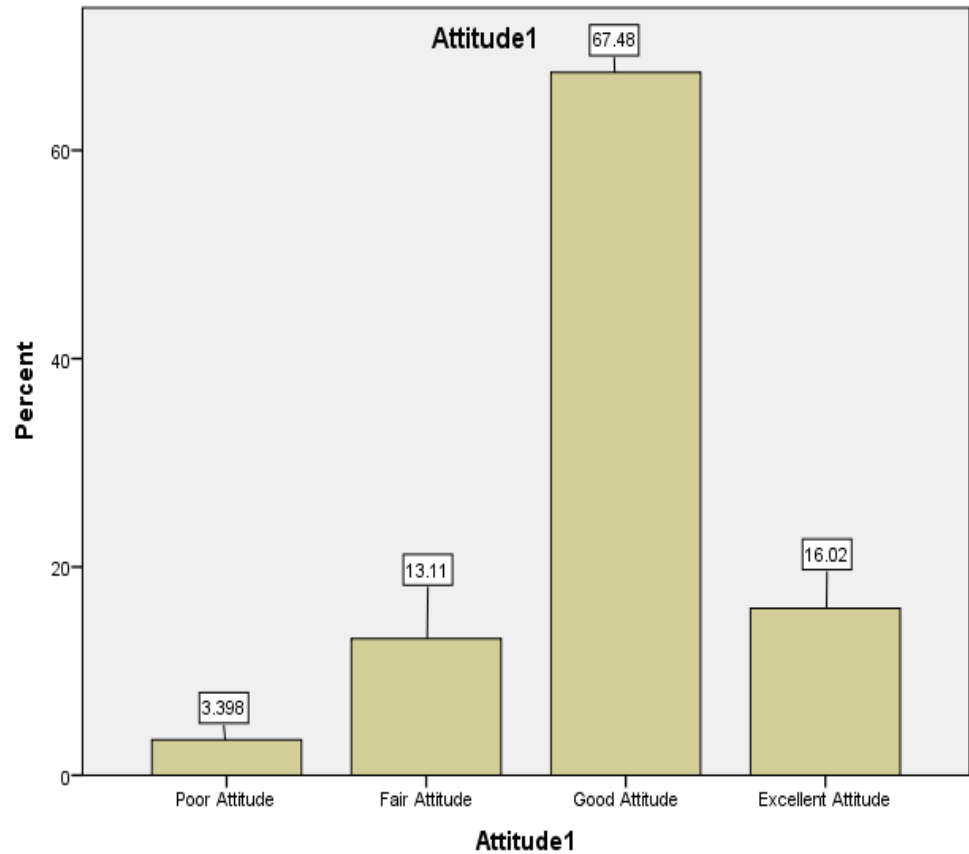
Nurse				
Critical Care				
Nurse-Paediatric	-5.333	40.903	-.130	.896
Nurse				
Critical Care				
Nurse-Public	-5.333	57.845	-.092	.927
Health Nurse				
Critical Care				
Nurse-Theatre	-30.333	40.903	-.742	.458
Nurse				
Ophthalmic				
Nurse-Paediatric	-1.231	32.087	-.038	.969
Nurse				
Ophthalmic				
Nurse-Public	-1.231	51.987	-.024	.981
Health Nurse				
Ophthalmic				
Nurse-Theatre	-26.231	32.087	-.817	.414
Nurse				
Paediatric Nurse-	.000	57.485	.000	1.000
Public Health				
Nurse				
Paediatric Nurse-	-25.000	40.903	-.611	.541
Theatre Nurse				
Public Health				
Nurse-Theatre	25.000	57.845	.432	.666
Nurse				

**Source: Field survey, Nukunu (2017)**

Post Hoc analysis using Dunn's test revealed that the specialty of a nurse was a likely determinant of knowledge on eHealth. Statistically significant associations were found between Registered CHN-General Nurse ( $P=.002$ ), Registered CHN-Registered Mental Nurse ( $P=.003$ ), Registered CHN-Critical Care Nurse ( $P=.019$ ), Registered CHN-Ophthalmic Nurse ( $P=.001$ ), Registered CHN-Paediatric Nurse ( $P=.013$ ), Registered CHN-Theatre Nurse ( $P=.002$ ), ENT Nurse-Ophthalmic Nurse ( $P=.042$ ) and ENT Nurse-Theatre Nurse ( $P=.027$ ). Registered CHNs appeared to have much more knowledge than the rest, while ENT nurses seemed to have better knowledge on eHealth than ophthalmic and theatre nurses. Overall, the impression was that Registered CHNs had the best knowledge on eHealth (Table 5)

**Research question 2: Attitudes of nurses towards ICT use in health**

The aim of the researcher was to assess the attitudes of nurses towards the use of eHealth as well as find out if there was a relationship between the attitudes and the socio-demographic characteristics. Figure 2 below identifies the attitude of respondents.



**Figure 2: Attitude towards eHealth**

The attitude of nurses towards eHealth was generally good with a percentage of 67.5. Sixteen percent (16%) had an excellent attitude whilst 13% showed fair attitude. Only 3.4% demonstrated poor attitude to eHealth.

Table 6 presents a summary of the attitude of nurses towards eHealth in relation to their socio-demographic characteristics.

Table 6: Association between socio-demographics and attitude towards eHealth

<b>Independent variable</b>	<b>Dependent variable</b>	<b>N</b>	<b>Mean Rank</b>	<b><math>\chi^2</math></b>	<b>p-value</b>
<b>Age of Nurses</b>	<b>Attitude on eHealth</b>				
21-25years		62	114.64	9.925	.042
26-30years		67	97.61		
31-35years		55	107.20		
36-40years		11	73.82		
more than 40years		11	86.09		
<b>Gender</b>					
Male		79	103.52	.000	.997
Female		127	103.49		
<b>Marital Status</b>					
Married		102	104.54	2.251	.325
Single		99	104.08		
Divorced		5	70.80		
<b>Religion</b>					
Christian		190	102.54	1.042	.594
Muslim		14	116.50		
Traditionalist		2	104.00		
<b>Education</b>					
Diploma		131	103.76	3.327	.505
Advanced diploma		20	117.05		
Bachelor degree		42	100.76		
Post graduate diploma		4	104.00		
Master's degree		9	82.11		

**Source: Field survey, Nukunu (2017)**

A Kruskal-Wallis H test indicated that there was a significant statistical association between age and attitude ( $\chi^2=9.925$ ,  $p=.042$ ). Religion, gender, marital status and educational level presented, ( $\chi^2=1.042$ ,  $p=.594$ ), ( $\chi^2=.000$ ,  $p=.997$ ), ( $\chi^2=2.251$ ,  $p=.325$ ) and ( $\chi^2=3.327$ ,  $p=.505$ ) respectively (Table 6).

Table 7: Post Hoc analysis for age and attitude on eHealth

Sample 1-Sample 2	$\chi^2$	Std Error	Std. Test statistic	P
36-40years – More than 40 years	-12.273	21.059	-.583	.560
36-40years-26-30 years	-23.794	16.067	1.481	.139
36-40years -31- 35years	33.382	16.312	2.046	.041
36-40years – 21- 25years	41.117	16.158	2.545	.011
More than 40years- 26-30years	11.521	16.067	.717	.473
More than 40years- 31-35years	21.109	16.312	1.294	.196
More than 40years- 21-25years	28.845	16.158	1.785	.074
26-30years-31- 35years	-9.588	8.986	-1.067	.286
26-30years- 21- 25years	17.324	8.703	1.990	.047
31-35years-21- 25years	7.735	9.148	.846	.398

Post Hoc analysis revealed that the age of a nurse was a likely determinant of the attitude towards eHealth. Significant associations were found between the following ages: 36-40years-31-35years ( $P=.041$ ), 36-40years-21-25years ( $P=.011$ ) and 26-30years-21-25years ( $P=.047$ ). Respondents between the ages of 36-40 seem to have a better attitude to eHealth followed by 26-30years Table 7.



Table 8: Association between professional characteristics and attitude towards eHealth

<b>Independent variable</b>	<b>Dependent variable</b>	<b>N</b>	<b>Mean Rank</b>	<b><math>\chi^2</math></b>	<b>p-value</b>
<b>Rank</b>					
SN		82	110.96	8.437	.077
SSN		42	97.89		
NO		41	98.40		
SNO		30	106.65		
PNO		10	67.10		
<b>Ward</b>					
Surgical		49	94.02	17.496	.025
Medical		51	103.80		
Children		26	117.58		
NICU		2	104.00		
Obs/Gynae		9	57.89		
ICU		7	75.43		
Theatre		14	114.29		
A&E		20	108.75		
OPD		28	118.96		
<b>Specialty</b>					
General nursing		162	103.33	7.246	.510
Ophthalmic Nurse		13	104.00		
Critical Care		3	105.00		
Paediatric nurse		3	132.67		
ENT nurse		4	75.50		
Theatre nurse		3	161.33		
Registered mental nurse		12	96.17		
Registered CHN		5	87.40		
Public health nurse		1	104.00		
<b>Years of Work</b>					
1-5years		107	106.38	5.882	.208
6-10years		69	107.68		
11-15years		19	84.74		
16-20years		6	76.83		
More than 20years		5	87.40		
<b>Total</b>		206			

Source: Field survey, Nukunu (2017)

The ward in which one worked seemed to have an impact on the attitude of staff to eHealth. There was an association between the ward the nurses worked in and attitude ( $\chi^2=17.496$ ,  $p=.025$ ). Rank ( $\chi^2=8.437$ ,  $p=.077$ ), specialty ( $\chi^2=7.246$ ,  $p=.510$ ) and years of practice ( $\chi^2=5.882$ ,  $p=.208$ ) did not demonstrate any significant associations (Table 8).

Table 9: Post Hoc analysis for ward and attitude on eHealth

Sample 1- Sample 2	$\chi^2$	Std Error	Std.Test statistic	P
OBS/GYNAE- ICU	-17.540	24.889	-705	.481
OBS/GYNAE- SURGICAL	36.132	17.911	2.017	.044
OBS/GYNAE- MEDICAL	45.915	17.856	2.571	.010
OBS/GYNAE- NICU	46.111	38.608	1.194	.232
OBS/GYNAE- A&E	-50.861	19.823	-2.566	.010
OBS/GYNAE- THEATRE	-56.397	21.101	-2.673	.008
OBS/GYNAE- CHILDREN	59.688	19.100	3.125	.002
OBS/GYNAE- OPD	-61.075	18.924	-3.227	.001
ICU-SURGICAL	18.592	19.956	.932	.352
ICU-MEDICAL	28.375	19.907	1.425	.154
ICU-NICU	28.571	39.598	.722	.471
ICU-A&E	-33.321	21.689	-1.536	.124
ICU-THEATRE	-38.857	22.862	-1.700	.089
ICU-CHILDREN	42.148	21.030	2.004	.045
ICU-OPD	-43.536	20.870	-2.086	.037
SURGICAL- MEDICAL	-9.784	9.879	-.990	.322
SURGICAL- NICU	-9.900	35.628	-.280	.779
SURGICAL- A&E	-14.730	13.105	-1.124	.261
SURGICAL- THEATRE	-20.265	14.967	-1.354	.176
SURGICAL- CHILDREN	-23.557	11.983	-1.966	.049
SURGICAL- OPD	-24.944	11.700	-2.132	.033
MEDICAL- NICU	-.196	35.600	.006	.996
MEDICAL-A&E	-4.946	13.030	-.380	.704
MEDICAL- THEATRE	-10.482	14.901	-.703	.482
MEDICAL- CHILDREN	-13.773	11.901	-1,157	.247
MEDICAL-OPD	-15.160	11.616	-1.305	.192
NICU-A&E	-4.750	36.627	-.130	.897
NICU- THEATRE	-10.286	37.833	-.276	.783
NICU- CHILDREN	13.577	36.240	.375	.708
NICU-OPD	-14.964	36.148	-.414	.679
A&E-THEATRE	5.536	17.210	.322	.748

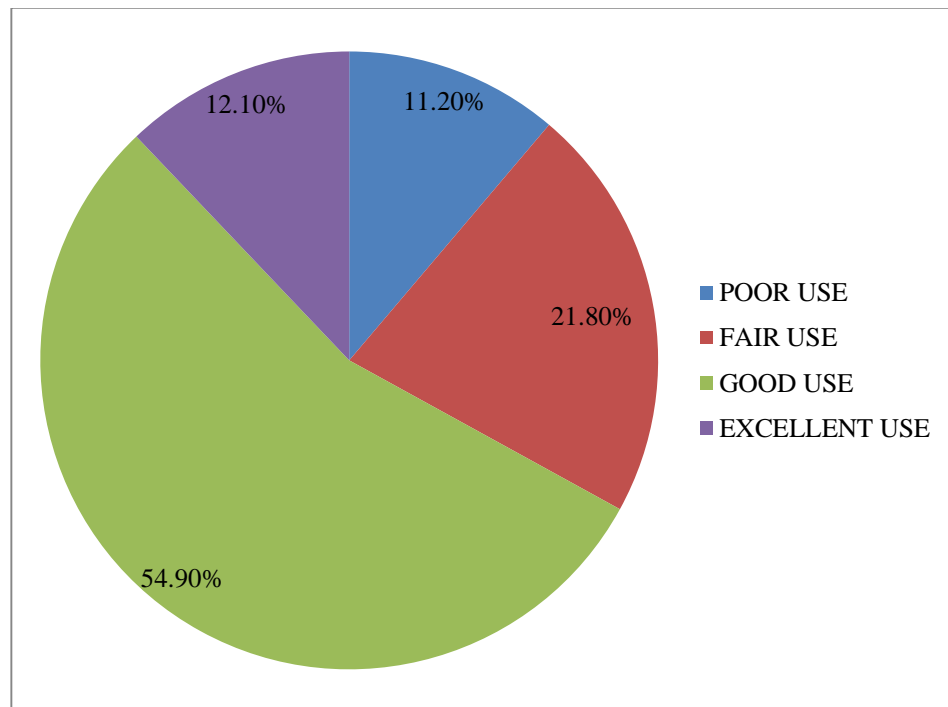
Table 9

A&E- CHILDREN	8.827	14.689	.601	.548
A&E-OPD	-10.214	14.459	-.706	.480
THEATRE- CHILDREN	3.291	16.372	.201	.841
THEATRE-OPD	-4.679	16.166	-.289	.772
CHILDREN- OPD	-1.387	13.451	-.103	.918

The Post Hoc analysis for ward and attitude on eHealth revealed that Obs/gynae-surgical (P=.044), Obs/gynae-Medical (P=.010), Obs/gynae-A&E (P=.010), Obs/gynae-Theatre (P=.008), Obs/gynae-Children (.002) and Obs/gynae-OPD (P=.001), ICU-Children (P=.045), ICU-OPD (P=.037), Surgical-Children (P=.049) and Surgical-OPD (P=.033). The obstetric and gynaecological ward seems to have the best attitude toward eHealth (Table 9).

### Research question 3: Use of e-health

The aim of this question was to find out if respondents had the requisite skills for use of eHealth and how well they used it. The association between the socio-demographics and practice of eHealth was explored. Figure 3 depicts the practice of eHealth among respondents.



**Figure 3: Practice of eHealth**

From the figure above, 11.2% exhibited poor utilization of eHealth, 21.8% showed a fair use and 12.1% depicted excellent utilization of eHealth. The majority (54.9%) of respondents however demonstrated a good use of ICT in health service delivery.

Table 10: Association between socio-demographics and Practice of eHealth

<b>Independent variable</b>	<b>Dependent variable</b>	<b>N</b>	<b>Mean Rank</b>	<b><math>\chi^2</math></b>	<b>p-value</b>
<b>Age of Nurses</b>	<b>Practice of ehealth</b>				
21-25years		62	96.16	3.454	.485
26-30years		67	102.78		
31-35years		55	114.07		
36-40years		11	103.55		
more than 40years		11	96.36		
<b>Total</b>		206			
<b>Gender</b>					
Male		79	101.66	.149	.700
Female		127	104.65		
<b>Total</b>		206			
<b>Marital Status</b>					
Married		102	114.14	9.445	.009
Single		99	91.56		
Divorced		5	123.00		
<b>Total</b>		206			
<b>Religion</b>					
Christian		190	101.48	4.783	.091
Muslim		14	133.43		
Traditionalist		2	85.50		
<b>Total</b>		206			
<b>Education</b>					
Diploma		131	97.73	10.318	.035
Advanced diploma		20	121.80		
Bachelor degree		42	101.69		
Post graduate diploma		4	120.00		
Master's degree		9	148.00		
<b>Total</b>		206			

**Source: Field survey, Nukunu (2017)**

In the areas of practice, a Kruskal-Wallis H test showed statistically significant relationships between some of the socio-demographics and practice of eHealth. The marital status and education showed a significant relationship. The values recorded were marital status ( $\chi^2=9.445$ ,  $p=.009$ ) and educational level ( $\chi^2=10.318$ ,  $p=.035$ ). The age was ( $\chi^2=3.454$ ,  $p=.485$ ), sex ( $\chi^2=.149$ ,  $p=.700$ ) and religion ( $\chi^2=4.783$ ,  $p=.091$ ) (Table 10).

Table 11: Post Hoc analysis for marital status and practice of eHealth

Sample 1-	$\chi^2$	Std Error	Std.Test statistic	P
<b>Sample 2</b>				
Single- Married	22.582	7.622	2.963	.003
Single-Divorced	-31.444	24.763	-1.270	.204
Married-Divorced	-8.863	24.746	-.358	.720

Post Hoc analysis for marital status and practice of eHealth revealed that the only significance was between single and married. Single-Married ( $P=.003$ ) proved that the single were more likely to practice eHealth (Table 11).

Table 12: Post Hoc analysis for education and practice of eHealth

Sample 1- Sample 2	$\chi^2$	Std Error	Std. Test statistic	P
Diploma- Bachelor degree	-3.965	9.580	-.414	.679
Diploma-Post Graduate	-22.275	27.422	-.812	.417
Diploma- Advanced Diploma	-24.075	12.970	-1.856	.063
Diploma-Master's Degree	-50.275	18.617	-2.701	.007
Bachelor Degree- Post Graduate Diploma	-18.310	28.270	-.648	.517
Bachelor Degree- Advance Diploma	20.110	14.677	1.370	.171
Bachelor Degree- Master's degree Post Graduate	-46.310	19.844	-2.334	.020
Diploma- Advanced Diploma Post Graduate	1.800	29.591	.061	.951
Diploma-Master's Degree Advanced	-28.000	32.465	-.862	.388
Diploma-Master's Degree	-26.200	21.685	-1.208	.227

For education, the Post Hoc analysis showed that Diploma-Master's Degree (P=.007), and Bachelor Degree-Master's degree (P=.020). This proves that Diploma and Bachelor Degree holders seem to have a better grasp of the practice of eHealth (Table 12).



Table 13: Association between professional characteristics and Practice of eHealth

<b>Independent variable</b>	<b>Dependent variable</b>	<b>N</b>	<b>Mean Rank</b>	<b><math>\chi^2</math></b>	<b>p-value</b>		
<b>Rank</b>							
SN		82	96.99	4.753	.314		
SSN		42	98.12				
NO		41	115.90				
SNO		30	111.57				
PNO		10	94.15				
<b>Ward</b>							
Surgical		49	83.35	19.691	.012		
Medical		51	97.84				
Children		26	127.50				
NICU		2	159.50				
Obs/Gynae		9	139.22				
ICU		7	122.14				
Theatre		14	108.86				
A&E		20	107.05				
OPD		28	101.43				
<b>Specialty</b>							
General nursing		162	99.70	13.204	.105		
Ophthalmic Nurse		13	106.77				
Critical care nurse		3	98.67				
Paediatric nurse		3	194.00				
ENT nurse		4	142.25				
Theatre nurse		2	125.00				
Registered mental nurse		12	116.83				
Registered CHN		5	86.60				
Public health nurse		1	125.00				
<b>Years of Work</b>							
1-5years		107	90.37			14.330	.006
6-10years		69	120.51				
11-15years		19	112.05				
16-20years		6	98.67				
More than 20years		5	123.00				

**Source: Field survey, Nukunu (2017)**

Regarding professional characteristics, a Kruskal Wallis H test demonstrated significant associations between ward and years of work. Ward ( $\chi^2=19.691$ ,  $p=.012$ ) and years of practice ( $\chi^2=14.330$ ,  $p=.006$ ). Rank recorded ( $\chi^2=4.753$ ,  $p=.314$ ), and specialty ( $\chi^2=13.204$ ,  $p=.105$ ) (Table13).

Table 14: Post Hoc analysis for ward and practice of eHealth

Sample 1- Sample 2	$\chi^2$	Std Error	Std. Test statistic	P
Surgical-Medical	-14.496	10.807	-1.341	.180
Surgical-OPD	-18.082	12.799	-1.413	.158
Surgical-A&E	-23.703	14.335	-1.653	.098
Surgical-Theatre	-25.510	16.372	-1.558	.119
Surgical-ICU	-38.796	21.829	-1.777	.076
Surgical-Children	-44.153	13.108	-3.368	.001
Surgical- Obs/Gynae	-55.875	19.592	-2.825	.004
Surgical-NICU	-76.153	38.973	-1.954	.051
Medical-OPD	-3.583	12.707	-.282	.778
Medical-A&E	-9.207	14.254	-.645	.518
Medical-Theatre	-11.014	16.301	-.676	.499
Medical-ICU	-24.300	21.776	-1.116	.264
Medical-Children	-29.667	13.019	-2.278	.023
Medical- Obs/Gynae	-43.379	19.533	-2.118	.034
Medical-NICU	-61.667	38.943	-1.583	.113
OPD-A&E	5.621	15.817	.355	.722
OPD-Theatre	7.429	17.684	.420	.674
OPD-ICU	20.714	22.830	.907	.364
OPD-Children	26.071	14.714	1.772	.076
OPD-Obs/Gynae	37.794	20.701	1.826	.068
OPD-NICU	58.071	39.542	1.469	.142
A&E-Theatre	1.807	18.826	.096	.924
A&E-ICU	15.093	23.725	.636	.525
A&E-Children	20.450	16.068	1.273	.203
A&E-Obs/Gynae	32.172	21.685	1.484	.138
A&E-NICU	52.450	40.066	1.309	.191
Theatre-ICU	13.286	25.009	.531	.595
Theatre-Children	18.643	17.909	1.041	.298
Theatre- Obs/Gynae	30.365	23.082	1.316	.188
Theatre-NICU	50.643	40.839	1.240	.215
ICU-Children	5.367	23.005	.233	.816
ICU-Obs/Gynae	17.079	27.226	.627	.530
ICU-NICU	37.367	43.316	.862	.388
Children- Obs/Gynae	-11.722	20.894	-.561	.575
Children-NICU	-32.000	39.644	-.807	.420
Obs/Gynae-NICU	20.278	42.233	.480	.631

Post hoc analysis for ward and practice of eHealth showed that Surgical-Children (P=.001), Surgical-Obs/Gynae (P=.004), Surgical-NICU (P=.051), Medical-Children (P=.023) and Medical-Obs/Gynae (P=.034). Here the surgical wards seem to show more use of eHealth (Table 14).

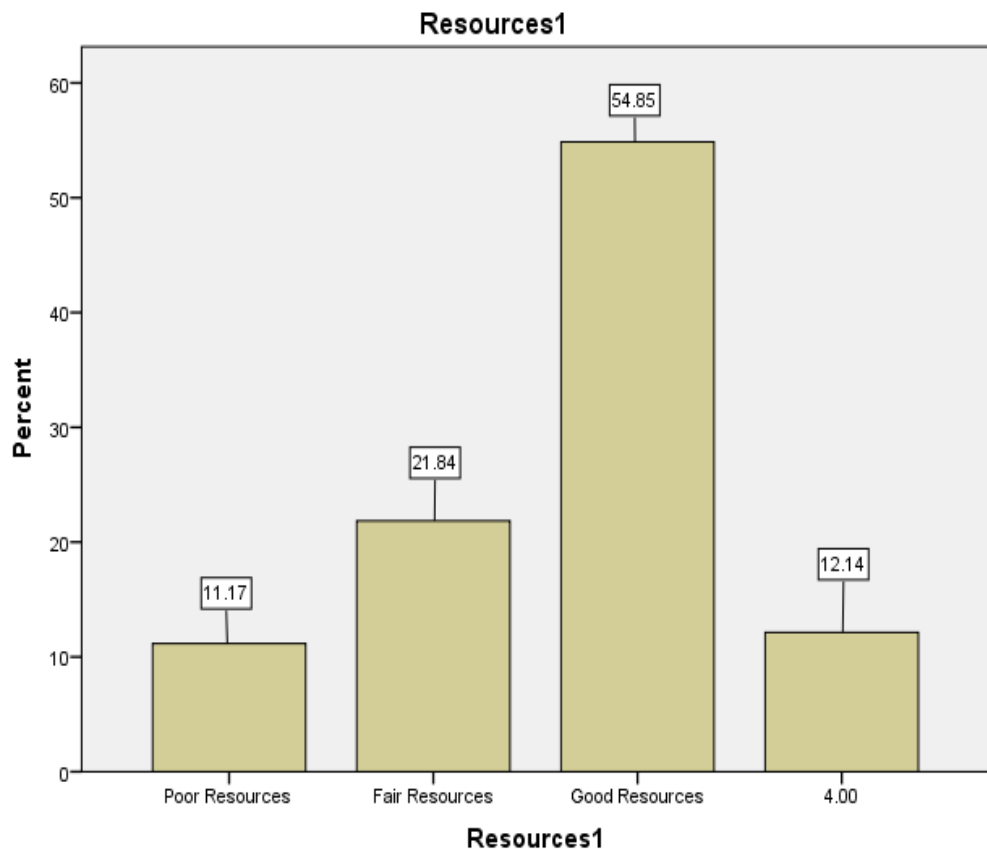
Table 15: Post Hoc analysis for years of work and practice of eHealth

Sample 1-	$\chi^2$	Std Error	Std.Test statistic	P
<b>Sample 2</b>				
1-5years-16-20years	-8.293	22.666	-.366	.714
1-5years-11-15years	-21.679	13.450	-1.612	.107
1-5years-6-10years	-30.133	8.341	-3.613	.000
1-5years- more than 20years	-32.626	24.719	-1.320	.187
16-20years-11-15years	13.386	25.300	.529	.597
16-20years-6-10years	21.841	22.995	.950	.342
16-20years – more than 20years	-24.333	32.714	-.744	.457
11-15years-6-10years	8.455	13.997	.604	.546
11-15years- More than 20 years	-10.947	27.154	-.403	.687
6-10years-More than 20years	-2.493	25.021	-.100	.921

The Post Hoc analysis for years of work and practice of eHealth revealed that 1-5years-6-10years ( $P=.000$ ). This showed that those who have worked between 1 and 5 years were more likely to show an affinity to eHealth compared to the rest of the age groups Table 15.

**Research question 4: Resources for eHealth use**

The researcher sought to find out resources on eHealth available to nurses and the state of ICT infrastructure in the various facilities. Figure 4 summarizes how well resourced facilities were with regards to eHealth.



**Figure 4: Resources on eHealth**

Most nurses in Cape Coast (54.9%) were found to have good resources on eHealth available to them. Approximately 21.8% agreed to have fair resources whereas 11.2% said they had poor resources. Only 12.1% however had excellent resources.

Table 16: Association between ward and eHealth Resources available to nurses

Independent variable	Dependent variable	N	Mean Rank	$\chi^2$	p-value
<b>Ward</b>	<b>Resources on ehealth</b>				
Surgical		49	83.35	19.691	.012
Medical		51	97.84		
Children		26	127.50		
NICU		2	159.50		
Obs/Gynae		9	139.22		
ICU		7	122.14		
Theatre		14	108.86		
A&E		20	107.05		
OPD		28	101.43		
<b>Total</b>		206			

**Source: Field survey, Nukunu (2017)**

The ward where one works seems to determine the type of resources on eHealth available to nurses. A Kruskal-Wallis H test showed that there was a strong statistical association between ward and resources ( $\chi^2 = 19.691$ ,  $p = .012$ ), with mean ranks of 83.35 for surgical ward, 97.84 for Medical ward, 127.50 for children's ward, 159.50 for Neonatal Intensive Care Unit, 139.22 for the obstetrics and gynaecological wards, 122.14 for the Intensive Care Unit, 108.86 Theatre, 107.05 for Accident and Emergency wards and 101.43 for the Outpatient Department (Table 16)

Table 17: Post Hoc analysis for wards and resources

Sample 1- Sample 2	$\chi^2$	Std. Error	Std. Test statistic	P
A&E-Medical	35.085	14.805	2.370	.018
A&E-Surgical	36.870	14.890	2.476	.013
A&E-OPD	-41.082	16.429	-2.501	.012
A&E-ICU	50.207	24.644	2.037	.042
A&E-Theatre	57.279	19.555	2.929	.003
A&E-Children	60.081	16.690	3.600	.000
A&E- Obs/Gynae	71.017	22.524	3.153	.002
A&E-NICU	105.600	41.617	2.537	.011
Medical- Surgical	1.785	11.226	.159	.874
Medical-OPD	-5.997	13.199	-.454	.650
Medical-ICU	-15.122	22.619	-.669	.504
Medical- Theatre	-22.193	16.932	-1.311	.190
Medical- Children	-24.995	13.523	-1.848	.065
Medical- Obs/Gynae	-35.931	20.289	-1.771	.077
Medical-NICU	-70.515	40.451	-1.743	.081
Surgical-OPD	-4.212	13.924	-.317	.751
Surgical-ICU	-13.337	22.674	-.588	.556
Surgical- Theatre	-20.408	17.006	-1.200	.230
Surgical- Children	-23.210	13.616	-1.705	.088
Surgical- Obs/Gynae	-34.146	20.351	-1.678	.093
Surgical-NICU	-68.730	40.482	-1.698	.090
OPD-ICU	9.125	23.714	.385	.700
OPD-Theatre	16.196	18.368	.882	.378
OPD-Children	18.999	15.283	1.243	.214
OPD-	29.935	21.503	1.392	.164

Table 17 cont

Obs/Gynae				
OPD-NICU	64.518	41.073	1.571	.116
ICU-Theatre	-7.071	25.977	-.272	.785
ICU-Children	9.874	23.895	.413	.679
ICU-	20.810	28.280	.736	.462
Obs/Gynae				
ICU-NICU	55.393	44.993	1.231	.218
Theatre-	2.802	18.602	.151	.880
Children				
Theatre-	13.738	23.976	.573	.567
Obs/Gynae				
Theatre-NICU	48.321	42.420	1.139	.255
Children-	-10.936	21.703	-.504	.614
Obs/Gynae				
Children-NICU	-45.519	41.178	-1.105	.269
Obs/Gynae-	34.583	43.868	.788	.430
NICU				

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**Source: Field survey, Nukunu (2017)**

Comparatively, the post Hoc analysis using a Dunn's test showed statistically significant relationships among the following pairs; A&E – Medical ( $p=.018$ ), A&E – Surgical ( $p=.013$ ), A&E – OPD ( $p=.012$ ), A&E – ICU ( $P=.042$ ), A&E – Theatre ( $p=.003$ ), A&E – Children ( $p=.000$ ), A&E – Obs/Gynae ( $p=.002$ ) and A&E – NICU ( $p=.011$ ). A&E had the most resources as compared to the medical ward, OPD, Surgical ward, Theatre, Children's ward, Obs/Gynae ward and NICU (Table 17).

Table 18 presents the data on training and technical support available to respondents.

Table 18: Training and Support

<b>Had Facility Training</b>	<b>Frequency</b>	<b>Percentage (%)</b>
Disagree	88	42.7
Agree	118	57.3
Total	206	100
<b>Technical staff support</b>		
Disagree	81	39.4
Agree	125	60.6
Total	206	100
<b>Regular workshops on eHealth</b>		
Disagree	119	57.8
Agree	87	42.2
Total	206	100

**Source: Field survey, Nukunu (2017)**

Regarding facility training, 57.3% agreed they have been trained in the use of eHealth. About 42.7% however have not received any training. The majority (60.6%) said that technical support was available to them whereas 39.4% of respondents did not have access to this support. Despite the fact that most nurses had received training on eHealth, the majority (57.8) claimed there were no regular workshops on eHealth and 42.2% have had regular workshops (Table 18).



Table 19: Internet Access

<b>24hour facility internet</b>	<b>Frequency</b>	<b>Percentage (%)</b>
Disagree	107	51.9
Agree	99	48.1
Total	206	100
<b>24hour personal internet</b>		
Disagree	85	41.3
Agree	121	58.7
Total	206	100
<b>Given internet bundles</b>		
Disagree	148	71.8
Agree	58	28.2
Total	206	100

**Source: Field survey, Nukunu (2017)**

In relation to access to internet in the facility, 48.1% claimed they had 24hour internet connectivity while 51.9% did not. Yet individually, 58.7% had 24hour internet connectivity and 41.3% reportedly had no access to the internet. Most of the respondents (71.8%) reported that they did not get internet bundles from the facility but 28.2% said they did. This indicates that, the high number of respondents with 24hour internet connectivity was largely as a result of personal effort (Table 19).

Table 20 identifies the use of electronic platforms for eHealth service delivery.

Table 20: Electronic platforms and libraries

<b>Nurses' common ePlatform</b>	Frequency	Percentage (%)
Disagree	74	35.9
Agree	132	64.1
Total	206	100
<b>Nurses' eplatform with other health professional</b>		
Disagree	94	45.6
Agree	112	54.4
Total	206	100
<b>Facility eLibrary</b>		
Disagree	132	64.1
Agree	74	35.9
Total	206	100
<b>eLink with other facilities</b>		
Disagree	130	63.2
Agree	76	36.8
Total	206	100

**Source: Field survey, Nukunu (2017)**

Intra and interdisciplinary cooperation seem to be very good. A greater portion of respondents (64.1%) confirmed that they had a common platform with their colleagues where they shared health information. However, 35.9% claimed they had no such platforms. Again, most nurses (54.4%) were on

platforms that connected them to other members of the healthcare team with 45.6% not involved in such activities. Majority (64.1%) of respondents had no access to eLibraries in their facility while minority (35.9) of the respondents reported the existence in their facilities. When asked about an electronic link with other facilities for the purposes of information sharing, 63.2% denied knowledge of any such link but 36.8% said they did (Table 20).

Table 21: Monitoring and supervision

<b>Regular monitoring and evaluation by management</b>	Frequency	Percentage (%)
Disagree	122	59.2
Agree	84	40.8
Total	206	100
<b>Complaints section for eHealth</b>		
Disagree	116	56.3
Agree	90	43.7
Total	206	100
<b>Channel of addressing challenges</b>		
Disagree	119	57.8
Agree	87	42.2
Total	206	100

**Source: Field survey, Nukunu (2017)**

In the areas of monitoring and evaluation, 59.2% of respondents revealed that the practice was either erratic or non-existent. However 40.8% agreed that it was well structured in their facilities. This gives the impression of poor supervision of eHealth in the various facilities. Furthermore, 56.3% did not

have a complaint section for eHealth and 43.7% said there was a clear channel in place for addressing eHealth challenges. A greater number, 57.8% of respondents acceded that they had no complaint section for eHealth with 42.2% also agreeing to a clear channel of addressing eHealth challenges. It seems that once in place, the eHealth systems are left to run on their own with minimal supervision (Table 21).

### **Discussion**

This study aimed at assessing the use of eHealth among nurses in Cape Coast. It assessed usage in the areas of knowledge, attitude, practice and resources. It also sought to identify relationships between socio-demographic characteristics of nurses and the interest areas mentioned above.

A total of 206 nurses participated in this study with a response rate of 96%. Majority (62.6%) of participants were aged between 21 and 30 years. Majority of the respondents (61.7%) were female. A greater percentage of the respondents (49.5%) were married, 48.1% were single and about 2.4% were divorced. This was an indication that the majority of registered nurses in Cape Coast are young nurses within the ages of 21 and 30 years. Respondents were predominantly Christians accounting for 92.2% with 6.8% being Muslims and 1% was a traditionalist. The highest level of education for most respondents (63.6%) was a diploma. A bachelor's degree was held by 20.4% of respondents, 9.7% had an advanced diploma, 1.9% had a post graduate diploma and 4.4% held a master's degree. This indicates that, most of the registered nurses in Cape Coast are working with a basic diploma qualification.

Majority of respondents (78.6%) were in general nursing practice, 6.3% were ophthalmic nurses, 5.8% were registered mental nurses and 2.4% were

registered community health nurses (CHN). Furthermore, 1.9% were also Ear, Nose and Throat (ENT) nurses while 1.5% were theatre nurses. Paediatric and critical care nurses were 1.5% each. Only 0.5% of respondents were public health nurses. Majority of the nurses (24.8%) were on the medical wards and 23.8% were on the surgical wards. The children's ward also had 12.6% of respondents and 13.6% were at the outpatient department. Respondents from the theatre amounted to 6.8% while the accident and emergency wards had a 6.8% response rate. Obstetrics and gynaecology wards, Intensive Care Unit (ICU) and Neonatal Intensive Care Unit (NICU) accounted for 4.4%, 3.4% and 1.0% of respondents respectively. This distribution in the wards is probably as a result of most of the nurses being in general nursing practice. The majority of respondents (51.9%) had worked between 1 and 5 years and 33.5% had worked between 6 and 10 years. Also, 9.2% and 2.9% had worked 11 to 15 years and 16 to 20 years respectively. Only 2.4% of respondents had more than 20 years' experience.

### **Knowledge of nurses on eHealth**

This study revealed that there is a high level of knowledge on eHealth among registered nurses in Cape Coast as 65.5% and 7.3% demonstrated good and excellent knowledge respectively. Sarfo & Asiedu (2013), however found that senior and junior nursing staff in Ghana had a fair knowledge on eHealth. Studies in the United Kingdom by the Royal College of Nursing (2010) and another in Nigeria by Adeleke et al. (2015) affirm this finding. The implication is that nursing knowledge in ICT is rapidly improving and gradually nurses are embracing the eHealth revolution. This seems to be translating into adoption of

eHealth as Hegney et al. (2007) reported that there was a high adoption of information technology into the nursing workplace.

The study revealed that the rank of nurses was a significant indicator of the level of knowledge on eHealth. Hegney et al., (2007) also identified the level of position of nurses as an important indicator of ICT knowledge. The age, gender, ward, marital status, specialty and years of practice did not show any significant association, sharply contrasting findings of Eley et al (2008) and Hegney et al., (2007) who mentioned age, sex and years of practice as having an impact on nursing ICT knowledge. This same position was also stated by Kwapong ( 2009) whose findings show that both males and females possess moderate knowledge on ICT. Interestingly, the study revealed that the level of education did not have an impact on nursing knowledge of eHealth. This may be pointing to the fact that increased knowledge in nursing practice does not necessarily mean a corresponding knowledge in ICT. This calls for specifically tailored ICT education for practising nurses irrespective of level of nursing education. Walsham and Sashay, (2006) agree that adequate training can boost confidence level and overcome the fear of technology.

The post hoc analysis utilizing a Dunn's test for specialty revealed that the Registered CHNs had better knowledge in eHealth compared to the rest of the nurses. This is not surprising because studies elsewhere have also obtained the same results (Ridgway et al, 2011). Over 85% of community health nurses indicated high levels of confidence using computer hardware, email, Internet and electronic health records (Ridgway et al, 2011). It is important for all nurses to be abreast with knowledge of eHealth. Hegney et al. (2007) identifies level or position in nursing as a bottleneck in acquisition of ICT knowledge. The reason

for this phenomenon is not clear. More research needs to be done in this area to clarify the reasons for this occurrence.

### **Attitude towards eHealth**

This study revealed that nurses' attitude towards eHealth use was good. A total of 83.5% showed good to excellent attitude to eHealth. Only 3.4% demonstrated poor attitude to eHealth with 13.1% showing fair attitude. This is in contrast to a number of studies that have identified a lack of interest and dissatisfaction with eHealth leading to poor attitudes towards its use (Adams et al., 2007; Azza, 2015; Eley et al., 2009; While & Dewsbury, 2011). Given the premise that the attitudes towards eHealth are good, it follows that with the right subjective norms, behaviours relating to use of e-Health are likely to be positive.

There was however a significant association between age and attitude as well as ward and attitude. The age and attitude gave the following 36-40years-31-35years was  $P=.041$ , 36-40years-21-25years was  $P=.011$  and 26-30years-21-25years  $P=.047$ . This indicates that the ages of 36-40years had better attitudes although 26-30years also had better attitudes than the younger ones. Applications used in patient management and clinical care tended to be used more frequently by younger nurses (Hegney et al., 2007). For the wards of nurses and attitudes, Obs/gynae nurses seemed to have better attitude than the other wards. It is revealing that the nurses at obstetric and gynaecological wards seemed to have better attitude towards eHealth. The rest of the socio-demographics and professional characteristics including sex, religion, education, marital status, rank, specialty and years of work did not show any association. Kipturgo et al. (2014) found that there was no significant gender

disparity in terms of attitude towards ICT on the other hand found that younger nurses do possess positive attitude towards ICT. Professional qualification was found to positively affect nurses' attitudes to eHealth (Kipturgo et al., 2014). In their study, nurses with bachelor's degree and higher diploma had better attitudes compared to certificate holders.

The relationship between attitude and demographics seems to be affected by other variables based on the setting. This, according to Fishbein and Ajzen (2010) may be due to background factors such as demographics, information and dispositions. Earlier studies have shown that it may be expedient to expose nurses to technology and eHealth early in training. Brumini, Koviæ, Zombori, and Luliæ (2003) mentioned that computer education and experience were important factors that engender development of nurses' positive attitudes towards computers. This shows that, the earlier one is exposed to technology, the better one gets at using it ultimately leading to a positive attitude. The author therefore advocates for the inclusion in the curriculum of nursing students a properly designed nursing technology course. This should expose student nurses to electronic health records, decision making support systems as well as nursing databases early enough to foster good attitudes towards eHealth in practice. It has been found out in some studies that greater acceptance and more positive attitudes are likely to follow in months following implementation (Choi, Chung & Lee, 2006; Kossman & Scheidenhelm, 2008) which reiterates the importance of effective change management during the e-health implementation process.



### **Practice of eHealth**

The majority of registered nurses in Cape Coast are able to utilize information technology in health service delivery. Most of the respondents (54.9%) rated their eHealth as good while 12.1% reported excellent use. The attitudes towards the use of eHealth were positive and the knowledge which also directly influences the perceived behavioural control was also good. In their survey in 2010, the Royal College of Nursing also found that 92% of nurses use computers in their work at least daily and that 57% know how to use electronic health records according to recent survey in the United Kingdom (Royal College of Nursing, 2010). Despite the high percentage reporting good use in Cape Coast, 32.9% still struggled with technology. This represents a weak link in the nursing fraternity when it comes to technology. There is need for a structured training for nurses to equalize the deficiency in knowledge. This assertion is reinforced by Eley et al. (2008) who revealed that the lack of confidence in the use of ICT could have resulted from the limited number of nurses who had received training in ICT. On the other hand, Ridgway et al. (2011) reported that, because 80% of MCH nurses had received training, they displayed a high level of confidence in their use of eHealth.

A Kruskal-Wallis H test showed statistically significant association between the marital statuses as well education and practice of eHealth. The single-married showed an association of  $P=0.003$ . This gives the view that those who are single use the eHealth better than the married and divorced. Regarding education, diploma and bachelor degree holders seem to use eHealth better than the rest. The surgical ward nurses seem to have a better grasp of the eHealth system compared to nurses on the obstetric and gynaecological wards, children

and NICU wards. Regarding years of work and Practice of eHealth, those who have worked 1-5years were more likely to use the eHealth system. The 1-5years-6-10years,  $P=.000$  showed a strong likelihood that the early users were more comfortable with the eHealth system. This finding seems interesting since most nurses who started the profession within the last five years are more comfortable with eHealth. This gives the impression that upcoming nurses will be more comfortable with the eHealth system. This also means that those who have been in the system for more than five years may require more training in order to use the system more efficiently.

### **Resources on eHealth**

Most nurses in Cape Coast (54.9%) claimed their facilities had good resources for eHealth service delivery available to them. About 21.8% agreed to have fair resources whereas 11.2% said they had poor resources in their facilities. A few respondents (12.1%) however had excellent resources. Although this study seems to point to the fact that basic infrastructure for eHealth service delivery was in place, many other studies have identified lack of infrastructure as a major setback to eHealth service delivery (Car et al., 2008; Darbyshire, 2004; Peters, Kohli, Mascarenhas, & Rao, 2006; Asah, 2013). In resource challenged countries such as Ghana that recently attained a low middle income status, this is an important finding. The United States Agency for International Development (2016) observes that in Africa, access to a stable supply of electricity in many countries is very poor, especially in rural settings. Although network connectivity is improving, access to especially broadband is minimal. Fifty-seven percent (57%) of the population in Sub-Saharan Africa are in locations without mobile broadband access. This is likely to threaten the

adoption of eHealth in the sub region. However, according to the alliance for affordable internet 2017 report, Ghana has about 60.68% broadband access compared to 17.5% in 2012 and 37.75% infrastructure coverage. This attests to the fact that Ghana has improved in the provision of broadband and this is likely to impact positively on provision of eHealth services. The likely explanation to the finding of good resources and infrastructural development from the study may be the recent efforts by the Ministry of Health to equip hospitals in the Central Region with eHealth infrastructure.

A Kruskal-Wallis H test performed to find the association between the wards of work and resources revealed that the ward where one works seems to determine the type of resources on eHealth available to nurses ( $\chi^2=19.691$ ,  $P=.012$ ). Comparatively, the post Hoc Dunn's test discovered that, the A&E had the most resources compared to the medical ward ( $p=.018$ ), OPD ( $p=.012$ ), Surgical ward ( $p=.013$ ), Theatre ( $p=.003$ ), Children ward ( $p=.000$ ), Obs/Gynae ward ( $p=.002$ ), ICU ( $p=.042$ ) and NICU ( $p=.011$ ). In relation to the ratings, Accident and Emergency ward seems to be the most resourced ward in terms of eHealth care delivery.

Regarding facility training, although 57.3% agreed they have been trained in the use of eHealth, 42.7% had not received any training. Again many respondents (60.6%) said that technical support was readily accessible to them whereas 39.4% of respondents did not have such support. In spite of the high numbers who had initial facility training, most of the respondents (57.8%) claimed there were no regular workshops on eHealth while 42.2% had had regular workshops. These findings could be the reason why knowledge and practice of eHealth was reportedly good. Many studies have identified lack of

technical support and training as significant barriers to eHealth usage. Furthermore, interventions developed frequently fail to live up to their potential when deployed in real life due to similar reasons (Car et al., 2008; Darbyshire, 2004; Peters, Kohli, Mascarenhas, & Rao, 2006; Asah, 2013). This underscores the need for constant training and technical support as these directly impact the use of eHealth. For example, nurses in Saudi Arabia currently could not fully employ computer technology in their daily practices, and were limited to only certain functions in their use of computerized systems (Azza, 2015). Most electronic health record functionalities related to nursing were poorly utilized according to some studies in Turkey (Kaya, Asti, Kaya, & Kacar, 2008; Top & Gider, 2013). Khan et al. (2012) observed that low adoption of eHealth in low-income countries is partly due to lack of computer skills amongst the clinicians. This means that countries that have clinicians with the requisite ICT training demonstrate a high acceptance of eHealth. Ridgway et al. (2011) also confirmed that training had a direct influence on use of eHealth. This underscores the need for structured training for staff as 44.8% had not been trained. But then, this finding leaves room for questioning as to why knowledge and practice of eHealth seems to be good but 44.8% claimed to have no training. Darbyshire (2004), Dee and Stanley (2005) and Hegney et al. (2006) reported that there were those who had not received training or had it informally yet are comfortable using these resources. Despite the fact that some nurses have been trained, regular workshops and in-service training seemed to be lacking and this omission may lead to a decline in the modest gains made.

Results from this study indicated that, most respondents had personal 24hour internet connectivity and was largely due to their own efforts. Access to

24hour internet in the facilities was average as 51.9% claimed they had no access while 48.1% had. Yet individually, 58.7% had 24hour internet connectivity with only 41.3% denying the fact. Most of the respondents (71.8%) reported that they did not get internet bundles from the facility but 28.2% said they did. Reliable 24hour internet connectivity as a backbone for eHealth systems is crucial. Its absence is likely to cripple eHealth service delivery. It is disturbing that only 50% of respondents had 24hour internet connectivity in the facility. Internet penetration is one of the key determinants in the success of eHealth (Mugo, 2014). Though a worrying situation, it is not surprising because 57% of the population in Sub-Saharan Africa are in locations without mobile broadband access (United States Agency for International Development, 2016). Also the erratic power situation in Ghana which has given rise to the new word “Dumsor” (Frequent electrical power outages) could be the reason for the inability to provide 24hour internet access. Although network connectivity is improving access to especially broadband is minimal (United States Agency for International Development, 2016).

In trying to explore the utilization of electronic platforms for professional development and information sharing, a greater proportion of respondents had a common platform with their colleagues where they shared health information. Most nurses were on platforms that connected them to other members of the healthcare team. This meant electronic platforms are a major source of health information for nurses. A minority (35.9%) of respondents had access to eLibraries in their facility. Majority (64.1) of the respondents reported the non-existence of these facilities. These findings are consistent with those of Ridgway et al. (2011) who found that the use of electronic libraries was greatly

reduced. Dowding (2013) observed that digital learning environments coupled with access to databases afford nurses the opportunity to gather vast amounts of information to impact upon client care. The absence of these facilities therefore place nurses at a disadvantage in getting access to latest information that can impact their practice. If nursing in Ghana is to join in the digital revolution, all facilities need to be equipped with eLibraries and access to electronic databases. It is worth noting that nurses had varying opinions when asked about an electronic link with other facilities for the purposes of information sharing; 63.2% denied knowledge of any such link but 36.8% said they did. Many nurses have used electronic platforms to increase their knowledge. Nurses working in remote districts have increased opportunities to consult and compare practice with those in higher facilities when they adopt the use of eHealth, thereby reducing professional isolation (Gulzar et al., 2013). Nurses in Cape Coast and Ghana as a whole, can take advantage of these platforms via social networks or closed user groups to enhance eHealth service delivery. These platforms can be used as a fulcrum to transform and improve practice since most nurses already use them. Gulzar et al., (2013) adds that there is better communication and coordination between healthcare providers with the use of these platforms. A study in Taiwan, involving 1026 registered nurses revealed that nurses were increasingly using social networks for knowledge sharing and knowledge acquisition (Khanum et al., 2016). In high income countries virtual health promotion sessions is one way of saving time and increasing efficiency. Here, one nurse can work with a group of people simultaneously. Nurses can go on virtual visits through the use of internet and also have consultations with other

health professionals instantaneously to facilitate better patient care and planning (While & Dewsbury, 2011).

In addressing the issue of nursing efficiency, ICT provides great opportunities to provide health care services to distant clients who would otherwise have challenges accessing healthcare (Gulzar et al., 2013). eHealth will also help nurses consult with specialist over difficult cases thus providing better care to the communities. There is better communication and coordination among healthcare providers (Gulzar et al., 2013). This represents an area that can be explored for improved health care delivery and help to bridge the nurse to patient ratio gap. It is important that smaller facilities have electronic links with bigger facilities for information sharing and consultation.

The study revealed that most facilities did not have access to eLibraries. This is a huge deficiency in this era of digitization. A large chunk of information in numerous databases on latest evidence based practice is readily available. This offers nurses an easy way to improve practice.

In the areas of monitoring and evaluation, 59.2% of respondents revealed that the practice was either erratic or non-existent. However 40.8% agreed that it was well structured in their facilities. This gives the impression of a less than average supervision of eHealth in the various facilities. To ensure effectiveness and efficiency, it is important that consistent monitoring and evaluation be done. Furthermore, 56.3% did not have a complaint section for eHealth and 57.8% said there were no clear channels in place for addressing eHealth challenges. Only 43.7% of respondents acceded that they had a complaint section for eHealth with 42.2% also agreeing to a clear channel of addressing eHealth challenges. It seemed that once in place, the eHealth

systems were left to run on their own with minimal supervision. Effective supervision affords managers the opportunity to identify and correct mistakes and also ensure that standards are maintained. Problems such as the lack of a complaints section or channels for addressing eHealth challenges could be easily identified and corrected if there was effective monitoring and supervision.



**CHAPTER FIVE**  
**SUMMARY, CONCLUSIONS, IMPLICATIONS AND**  
**RECOMMENDATIONS**

This chapter gives the summary of the study and conclusions drawn from the findings of this inquiry. Each conclusion is followed by corresponding implications.

**Summary**

A descriptive cross sectional research design was employed with a sample size of 206 registered nurses with one year or more working experience from Cape Coast Teaching Hospital, University of Cape Coast Hospital as well as Ewim Polyclinic. The research was designed to address the following questions: (i) what do nurses know about e-health? (ii) What are the attitudes of nurses towards ICT use in health? (iii) How well do nurses use e-health? (iv) What resources are available for nurses in the use of eHealth?

Ethical approval to conduct the study was sought from the University of Cape Coast Institutional Review Board (UCCIRB). Letters from the School of Nursing and Midwifery to seek approval for data collection were sent to the heads of the various facilities where data were collected. Nurses who were sampled for this study voluntarily participated and were guaranteed confidentiality and anonymity. Respondents were administered with structured questionnaires after signing an informed consent form. A total of 250 nurses were sampled and administered with questionnaires with 95.8 response rate. A descriptive analysis of the data was completed. The study was guided by the Reasoned Action Approach (RAA).

A summary of the key findings obtained from the study included:

1. The majority of the respondents (61.7%) were female and 38.3% were males and about half of these respondents (49.5%) were married. Most of the respondents (62.6%) were between the ages of 21 and 30 years and were mostly (92.2%) Christians. Diploma was the dominant certificate held by most (63.6%) respondents. Majority of respondents (78.6%) were in general nursing practice and (51.9%) of respondents had worked between 1 and 5 years
2. Most of the nurses (65.5%) had good knowledge of eHealth. About 22.8% exhibited fair knowledge with 7.3% exhibiting excellent knowledge on eHealth. A Statistically significant relationship was observed between specialty and knowledge on eHealth ( $\chi^2=17.995$ ,  $p=.021$ ). Largely, the impression was that registered community health nurses had the best knowledge on eHealth.
3. The age, gender and years of practice did not have any impact on ICT knowledge as shown by earlier studies (Eley et al., 2008) and Hegney et al. (2007) who mentioned age, gender and years of practice as having an impact on nursing ICT knowledge.
4. Most nurses (67.5%) generally demonstrated good attitudes towards eHealth and 16.0% had an excellent attitude.
5. The majority (54.9%) of respondents demonstrated a good skill in the use of ICT in health service delivery. However, there was a significant relationship between the socio-demographics and the practice of eHealth. The following relationships were observed: Marital status and practice ( $\chi^2 =9.445$ ,  $P=.009$ ), education and practice ( $\chi^2 =10.318$ ,

P=.035), ward and practice ( $\chi^2 = 19.691$ , P=.012) and years of work and practice ( $\chi^2 = 14.330$ , P=.006)

6. Most nurses in Cape Coast (54.9%) were found to have good resources on eHealth available to them whereas 12.1% had excellent resources. Significant statistical associations were observed between ward and resources ( $\chi^2 = 19.691$ , p=.012). A&E seemed to be the most resourced ward in terms of eHealth care delivery.
7. Although 57.3% agreed they had been trained in the use of eHealth and the majority (60.6%) said that technical support was available to them, many (57.8) claimed there were no regular workshops on eHealth and 42.2% had had regular workshops.
8. Access to 24 hour internet in the facility was average 48.1% and personal 24hour internet connectivity was 58.7%. Most of the respondents (71.8%) reported that they did not get internet bundles from the facility.
9. Use of electronic platforms seemed to be good. A greater proportion of respondents (64.1%) confirmed that they had a common platform with their colleagues where they shared health information. Most nurses (54.4%) were also on platforms that connected them to other members of the healthcare team. Only 35.9% of respondents had access to eLibraries in their facility. When asked about an electronic link with other facilities for the purposes of information sharing, 63.2% denied knowledge of any such link.
10. Monitoring and evaluation was either erratic or non-existent as claimed by 59.2% of respondents. Furthermore, 56.3% did not have a complaint

section for eHealth and 57.8% had no clear channels in place for addressing eHealth challenges.

### **Conclusion**

This study while establishing that knowledge, attitude and practice as well as resources were generally good, it reveals that gaps remain in the areas of monitoring and supervision, training and internet connectivity. eLibraries and eLinks with other facilities were virtually non-existent while monitoring and supervision was erratic. Nurses were found to be ardent users of electronic platforms. This represents an opportunity to use this as a channel to improve practice.

Though the results of the study showed some promise in the digitization of healthcare in Ghana, there is more to be done to bridge the gap between the health needs of the population and the technologies required to meet them. Most facilities after instituting the eHealth systems leave them to run on their own without adequate supervision. This is a dangerous trend which if allowed, will ruin the gains made towards digitization of healthcare.

### **Recommendations for Facility Heads and Nursing Institutions**

The study revealed that most facilities did not have access to eLibraries. Quick access to current quality information can be made through the utilization of eLibraries. This offers nurses an easy way to improve practice. Facility heads need therefore to make provision for staff to have access to these resources.

Poor monitoring and supervision was identified to be one area that could adversely affect the continued use of eHealth. At best, the practice is erratic. There is the need for a well-structured plan for monitoring and evaluation in all

facilities as well as clarifying channels for lodging and addressing complaints on eHealth.

Early introduction to eHealth technology especially in the training institutions will help engender positive attitudes in later years. It is therefore recommended that specifically tailored ICT education for practicing nurses irrespective of level of nursing education. This can be structured as a continuous professional development training programme by the Nurses and Midwives Council of Ghana. This can boost nurses' confidence levels and overcome the fear of technology. Regular workshops and in-service training should be institutionalized in the various facilities. Taking a cue from the Canadian Nurses Association, development of eHealth strategies by the Ghana registered nurses and midwives association will be another way to promote eHealth.

#### **Recommendation for Government**

Electronic linking of bigger facilities with smaller ones as well as out stations will help nurses consult difficult cases with the specialists for providing better care to the communities. This will ultimately lead to better communication and harmonization between healthcare providers. This represents an area that can be explored by the Ministry of Health for improved health care delivery and to help bridge the nurse/patient ratio gap.

### **Recommendation for Nurses**

Nurses in Cape Coast must take advantage of electronic platforms and social networks for professional knowledge sharing as well as support research. These platforms via social networks have been used by nurses in Taiwan to enhance eHealth service delivery. These platforms can be used as fulcrums to quickly transform and improve practice since most nurses already use them. Management of various facilities can explore this as a tool to maximize productivity. These can be done by holding lectures and discussions via social networks even in the comfort of their homes.

### **Recommendations for Further Research**

This study identifies level or position in nursing as a bottleneck in acquisition of ICT knowledge. The same finding is reported by Hegney et al. (2007). The reason for this phenomenon is not clear. More research needs to be done in this area to clarify the reasons for this occurrence.

A qualitative study to further explore the experiences of nurses using eHealth will help identify subjective motivations for the use of eHealth as well as challenges to help tailor eHealth solutions to the needs of the users.

The study should be replicated by other researchers in order to strengthen the foundation for interpreting results. A replication of the study with samples drawn from health facilities in other regions would provide additional insights into the factors affecting the use of eHealth among nurses.

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**APPENDICES**

APPENDIX A:	Questionnaire
APPENDIX B:	Ethical Clearance
APPENDIX C:	Letters of Introduction



**UNIVERSITY OF CAPE COAST**



**FRANK NUKUNU**

**SN/MNS/15/0015**

**SUPERVISORS: Dr. Mate Siakwa**

**Dr. Kingsley Asare Pereko**

I am a student at the University of Cape Coast and I am conducting a study on the **USE OF eHEALTH AMONG NURSES IN CAPE COAST**. I would be very grateful if you would consent to complete this questionnaire in order to shed light on the topic. Data from this study will be treated as aggregate data hence no personal information will be disclosed. This study will include registered nurses with a year or more work experience. In case of any difficulties arising during the completion of this questionnaire, kindly call me on 0244972338. Alternatively you can email me at [nerosinn@gmail.com](mailto:nerosinn@gmail.com).

This study aims at looking into the use of information and communication technology (ICT) in nursing and midwifery practice in the areas of knowledge, attitude, practice and resources. Electronic health (eHealth) refers to use of ICT in health service delivery. This includes all gadgets such as computers, personal digital assistants, mobile phones, etc, electronic health records, as well as

applications and databases utilized in patient care Key terms that appear in this questionnaire include;

- eLibrary – Electronic library
- eLink – Electronic link
- eHealth – Electronic health
- eLearning – Electronic learning
- ePlatform – Electronic platform

## SECTION 1 – DEMOGRAPHIC CHARACTERISTICS

Age

Less than 21years  21-25years  26-30years  31-35years   
36-40years

More than 40years

Sex

Male  Female

Marital Status

Married  Single  Divorced  Widowed  Other

(Specify).....

Rank

SN  SSN  NO  SNO  PNO  DDNS  DNS

Ward

Surgical  Medical  Children  NICU  Obs/Gynae  ICU

Theatre

A&E  OPD

Religion

Christian  Moslem  Traditionalist  Eastern Religions  Atheist

Highest Educational Level

Diploma  Advanced Diploma  Bachelor's Degree  Post Graduate

Diploma

Master's Degree  PHD  Other (Specify).....

Specialty

General Nursing  Ophthalmic Nurse  Critical Care Nurse

Paediatric Nurse

ENT Nurse  Theatre Nurse  Perioperative Nurse  Emergency N

RMN

RCHN  PHN  Other (Specify).....

Years of practice

1-5years  6-10years  11-15years  16-20years  More than  
20years

### SECTION B – FOUR POINT LIKERT ITEMS

**On a scale of 1 to 4 (1 - strongly agree, 2- agree, 3- disagree and 4 - strongly disagree), please check the box beside the number that best represents your response to the statement.**

#### KNOWLEDGE

I have sufficient knowledge on use of eHealth in nursing practice.

1  2  3  4

There are specific skills required for the use of eHealth.

1  2  3  4

I have the requisite skills needed to use eHealth.

1  2  3  4

I have read about how eHealth is used in developed countries

1  2  3  4

I know which website to visit to satisfactorily try out new eHealth applications

1  2  3  4

eHealth use is very visible in the hospital where I work

1  2  3  4

eHealth can improve healthcare delivery

1  2  3  4

I know the safety precautions to adopt to protect patient information during the use of eHealth

1  2  3  4

I have been watched or supervised during my use of eHealth for clients

1  2  3  4

I am conversant with the legislations governing the use of eHealth

1  2  3  4

eHealth technology can be used for all my clients

1  2  3  4

I am aware of Hinari as a source of health information.

1  2  3  4

I am aware of google scholar as a source of health information.

1  2  3  4

I am aware of medscape as a source of health information.

1  2  3  4

I am aware of ebcohost as a source of health information.

1  2  3  4

I am aware of other databases as sources of health information.

1  2  3  4

eHealth technology fits well with the needs and current practices of healthcare

Professionals

1  2  3  4

eHealth can help me prioritize my nursing care.

1  2  3  4

I know about some eHealth projects ongoing in the country

1  2  3  4

My opinion was sought before providing eHealth solutions for my use.

1  2  3  4

### ATTITUDE

eHealth is important in my role as a registered nurse.

1  2  3  4

My use of eHealth enhances the work of other healthcare team members.

1  2  3  4

I see eHealth as an integral part of my work as a registered nurse.

1  2  3  4

I use eHealth because it is compulsory in my facility.

1  2  3  4

I feel very motivated to use eHealth.

1  2  3  4

Use eHealth because it is **not** time consuming.

1  2  3  4

Use of eHealth does **not** take the “caring” out of nursing.

1  2  3  4

I am very satisfied with my use of eHealth.

1  2  3  4

I think using eHealth will make a big difference in my practice as a registered nurse.

1  2  3  4

I am encouraged by use of eHealth by my colleagues.

1  2  3  4

I do **not** feel pressured to use eHealth for clients.

1  2  3  4

I use eHealth even when I am fatigued.

1  2  3  4

In my opinion, I think it is practicable to expect registered nurses to use eHealth for every single client.

1  2  3  4

Use of eHealth does **not** interfere with my patient care.

1  2  3  4

My mood does **not** affect my use of eHealth.

1  2  3  4

The type of patient I nurse does **not** influence my use ehealth.

1  2  3  4

I encourage eHealth use because I think it is important.

1  2  3  4

**PRACTICE**

I currently use eHealth.

1       2       3       4

I use eHealth always.

1       2       3       4

eHealth is easy to use.

1       2       3       4

eHealth has improved my practice as a registered nurse.

1       2       3       4

I can use eHealth without any difficulty.

1       2       3       4

Use of eHealth makes my work more accurate.

1       2       3       4

My clients can get better care as a result of eHealth use.

1       2       3       4

The use eHealth is **not** cumbersome to use.

1       2       3       4

Despite the problems associated with eHealth use, it is better to use eHealth.

1       2       3       4

Using eHealth gives me greater control over my work

1       2       3       4

Using eHealth increases my work productivity

1       2       3       4



**RESOURCES**

I have had training from the facility for the use of eHealth.

1  2  3  4

I use personal ICT gadget in provision of eHealth to clients.

1  2  3  4

I have personal gadgets that enable me to use eHealth.

1  2  3  4

I have 24hour internet connectivity in my facility.

1  2  3  4

I have personal 24hour internet connectivity.

1  2  3  4

I have technical staff to support me in the use of eHealth.

1  2  3  4

I am given internet bundles to use for eLearning and eHealth activities.

1  2  3  4

I have ICT equipment at my facility to aid me in the use of eHealth.

1  2  3  4

My facility has an elink with other facilities where I can easily source support and information on ehealth.

1  2  3  4

Nurses have a common eplatform where we share health information in my facility.

1  2  3  4

Nurses are connected to other health professionals on a common platform for sharing health information.

1  2  3  4

My facility has an eLibrary that I can access when I need it

1  2  3  4

We have regular workshops and/or in service training on eHealth

1  2  3  4

There is regular monitoring and evaluation of eHealth systems by management

1  2  3  4

There is a complaint section on eHealth where complaints on eHealth can be lodged

1  2  3  4

There is a clear channel to address ehealth challenges within the facility

1  2  3  4

# UNIVERSITY OF CAPE COAST

## INSTITUTIONAL REVIEW BOARD SECRETARIAT

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OUR REF: UCC/IRB/A/2016/171

YOUR REF:

OMB NO: 0990-0279

IORG #: IORG0009996



27<sup>TH</sup> SEPTEMBER, 2017

Mr. Frank Nukunu  
School of Nursing and Midwifery  
University of Cape Coast

Dear Mr. Nukunu,

### ETHICAL CLEARANCE –ID :(UCCIRB/CHAS/2017/27)

The University of Cape Coast Institutional Review Board (UCCIRB) has granted **Provisional Approval** for the implementation of your research protocol titled **‘Use of eHealth Among Nurses in Cape Coast’**.

This approval requires that you submit periodic review of the protocol to the Board and a final full review to the UCCIRB on completion of the research. The UCCIRB may observe or cause to be observed procedures and records of the research during and after implementation.

Please note that any modification of the project must be submitted to the UCCIRB for review and approval before its implementation.

You are also required to report all serious adverse events related to this study to the UCCIRB within seven days verbally and fourteen days in writing.

Always quote the protocol identification number in all future correspondence with us in relation to this protocol.

Yours faithfully,

Samuel Asiedu Owusu  
**Administrator**

ADMINISTRATOR  
INSTITUTIONAL REVIEW BOARD  
UNIVERSITY OF CAPE COAST  
Date: 29/09/2017

CAPE COAST TEACHING HOSPITAL  
ETHICAL REVIEW COMMITTEE

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

Our Ref.: CCTH

Your Ref.:



P. O. Box CT.1363  
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21<sup>st</sup> April 2017

Frank Nukunu  
School of Nursing and Midwifery  
College of Health and Allied Sciences  
University of Cape Coast  
Cape Coast

Dear Mr. Nukunu,

**ETHICAL CLEARANCE – REF: CCTHERC/RS/EC/2017/18**


The Cape Coast Teaching Hospital Ethical Review Committee (CCTHERC) is glad to inform you that you have been granted permission to carry out your study at CCTH for your research on the topic, "Use of eHealth among Nurses in Cape Coast".

Please note that any modification of the project must be submitted to the CCTHERC for review and approval before its implementation.

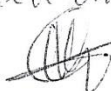
You are also required to submit a copy of your final report to the Research and Development Secretariat of CCTH.

Always quote the protocol identification number in all future correspondence with us in relation to this protocol.

Yours faithfully,

  
DR. ERIC NGYEDU RESEARCH & DEVELOPMENT UNIT  
MEDICAL DIRECTOR CAPE COAST TEACHING HOSPITAL  
CAPE COAST

CC: Biostatistician  
Director of Nursing ✓

Received on 21/04/17  


1120



UNIVERSITY OF CAPE COAST  
COLLEGE OF HEALTH AND ALLIED SCIENCES  
SCHOOL OF NURSING AND MIDWIFERY  
DEAN'S OFFICE



Telephone: 233-3321-33342/33372  
Telegrams & cables: University, Cape Coast  
Email: nursing@ucc.edu.gh

UNIVERSITY POST OFFICE  
CAPE COAST, GHANA.

Our Ref: SNM/R/2/Vol.2/241  
Your Ref:



31<sup>st</sup> March, 2017

THE DIRECTOR  
.....  
UCC HOSPITAL  
.....  
CAPE COAST  
.....

*Adm  
Bearer  
called  
w/ ref  
2405/17*  
*of the letter  
received times  
answer. Diff*

Dear Sir/Madam,

**LETTER OF INTRODUCTION: MR. FRANK NUKUNU**

The above named person is a level 850 Post Graduate student of the school of Nursing and Midwifery, University of Cape Coast with ID numbers SN/MNS/15/0015.

As part of the School's requirement for graduation, he has to do a research and present a report on it. He intends to collect data from the Cape Coast Teaching Hospital, University Health Service and Ewim Polyclinic as his research topic depicts: **Use of eHealth among Nurses in Cape Coast.**

We would be grateful, if you could offer him the necessary assistance and support he may need to enable him collect his data for the research.

Thank you.

Yours faithfully,

*[Signature]*

Dr. Samuel Victor Nuvor  
VICE-DEAN

*Dir  
link to methodology  
should be attached  
to collect data  
the student  
a discussion.*

*④ Dr. [unclear]  
need your inputs  
24/04/2017*

*⑤ CAN/SAM  
kindly facilitate  
match F. Ati  
Jnd 26.4.17*  
*③ Dr.  
the student may have  
to come here  
to know the kind of  
assistance he requires.  
I am on 24/4/17*

CAPE COAST TEACHING HOSPITAL  
ETHICAL REVIEW COMMITTEE

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

Our Ref.: CCTH

Your Ref.:



P. O. Box CT.1363  
Cape Coast  
Tel: 03321-34010-14  
Fax: 03321-34016  
Website: [www.ccthghana.org](http://www.ccthghana.org)  
email: [info@ccthghana.com](mailto:info@ccthghana.com)

21<sup>st</sup> April 2017

Frank Nukunu  
School of Nursing and Midwifery  
College of Health and Allied Sciences  
University of Cape Coast  
Cape Coast

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CC: Biostatistician  
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