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Knowledge And Use Of Information Technology For Follow-Up Care Among Primary Healthcare Nurses In Rivers State, Nigeria.

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ABSTRACT
The study determined the knowledge and use of information technology (IT) for follow-up care among Primary Healthcare Nurses (PHCN) in Rivers State, Nigeria. The objective of the study is to assess PHCN knowledge of the use of IT for follow-up care of patients. The study used descriptive cross-sectional research design. The study population was 264. Due to the small sample size a census (total enumeration) method was used. The sample size was 227 respondents representing 86% of the population. Mean rating and standard deviation was used to analyze the research questions. Z-test was used to test the hypotheses with SPSS software 2.0. The study revealed that some PHCN know how to use IT for follow-up care of patients while some have no knowledge of computer use. There is an association between socio-demographic variables (age, educational qualification and years of experience) and the use of IT for follow-up patient care with no computers in facilities, a power cut and poor network connectivity noted as some barriers affecting PHCN use of IT for follow-up care. The study concludes that IT helps to improve the quality of patient care: hence recommend that PHCN should be trained to use IT accessories, healthcare facilities should be equipped with computers and electronic devices to facilitate easy monitoring and follow-up care of patients. At the same time, the barriers identified such as poor electricity and internet connectivity should be looked into to boost patient care.

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I. Background to the Study

Primary care is the major healthcare service given in communities with the aim of ensuring continuous accessibility of personal healthcare needs throughout the lifespan of an individual. Primary Healthcare Centres (PHC) provide healthcare services in communities through grass-root management. Primary Healthcare was adopted in the Nigerian National Health Policy in 1988, and currently, the healthcare system in Nigeria is moving towards digitalization in the management of patients' health information for improved healthcare quality (WHO, 2018). Nurses predominantly provide services in PHC such as preventive, curative and rehabilitative services. Nurses play a key role in connecting, expanding and coordinating care in primary care.

The 21st century represents the peak of information technology or information communication technology (ICT) and biotechnology (Simba, 2019). The introduction of information technology in healthcare to support organizational and financial functions started in the 1960s and has expanded to include patients' laboratory results. The healthcare system has grown and has become dependent upon technology. Before the advent of information technology in healthcare facilities, patients' data were handwritten on paper and stored in office files inside racks. Most of the time, retrieving such files is cumbersome and time-consuming, and sometimes the files are destroyed by rodents or insects (Hebda & Czar, 2019).

In developed countries, information technology usage in healthcare facilities has become the standard of practice as it improves the safety of records and further enhances efficiency and the quality of care patients receive. National Coordinator for Health Information Technology (2019) reported that about 96% of hospitals in the United States adopted the use of a certified electronic health record as of 2015. In the wake of globalisation, developing countries are facing challenges trying to strengthen their Health Management Information Systems (HMIS) to adopt ICT. As a result of poor communication infrastructure and economy, the process is limited to provincial and national regions as many healthcare workers, including Primary Healthcare nurses in rural areas, are left behind. At the same time, those with access lack expertise in ICT advancements and data utilisation. Information technology is a concept that broadly includes different technologies such as system software,

computer equipment, and infrastructure that store, protect, record, and retrieve administrative, clinical or financial information (National Coordinator for Health Information Technology (NCHIT), 2019). Information technology is used in healthcare facilities to transmit health information among healthcare professionals. It is used for storing, processing, exchanging information, treating disease, preventing illness, managing chronic illness, and promoting health (Rouleau et al., 2019).

The benefits of information technology in the healthcare system cannot be overlooked. Storing a patient's history electronically promotes the secure exchange of patient's data among various authorised healthcare professionals ensuring quality integrated healthcare. Patient records are also easily tracked, thus helping the caregivers stay updated with the patient's progress, and serve as a faster alternative when compared to accessing handwritten patient data (WHO, 2018). Thus there is a need for primary healthcare nurses to adopt the use of information technology to promote patients' health.

Information technology is a powerful tool for addressing inequities in healthcare access. For example, mobile health applications can provide access to care for people who may not have the ability to travel to a clinic or hospital. This could be especially important for women and girls, who often face barriers to assessing healthcare services. Another potential benefit of using information technology in primary healthcare is the ability to provide remote care, which could also help to reduce the cost of healthcare. Remote care is often cheaper than in-person care, and it can help to reduce hospital stays and the use of expensive medical equipment. Health literacy is a critical factor in promoting good health and wellbeing, and information technology is a powerful tool that can be used to educate people about health issues. By provision of access to accurate and reliable information, there will be a reduction in the spread of misinformation and improve the health of communities.

While the use of information technology in primary healthcare may not directly address the shortage of qualified healthcare workers, it could help reduce the workload and improve efficiency. By automating certain tasks and providing access to information and resources, healthcare workers could focus on the most important aspects of their job. Despite these benefits, some have argued that information technology has adverse consequences in a hospital setting. Siltig et al. (2019) maintained that using information technology to store patient records could lead to patient privacy breaches and incomplete information and that usability issues can arise frustrating users' experience. A systematic review by Kim et al. (2019) supports this and adds that there could be altered clinical decision-making, delayed care, and modified care processes which can affect patient outcomes.

In healthcare facilities, nurses play significant roles in patient care as they stay with the patients throughout the day. The nursing profession is unique, and in line with the nursing process used as the standard of practice, nurses are expected to plan, diagnose, organise, collaborate, implement, evaluate, document and follow up on all patient care (Hebda & Czar, 2019; Zadvinskis et al. 2018). Hence, with the advent of information technology, primary healthcare nurses are expected to integrate this to record all patient activities and care rendered to enable proper patient follow-up.

Some studies maintain that the use of information technology for follow-up in a healthcare facility increases easy access to patient's information and allows other healthcare professionals such as laboratory technicians, physicians and other specialists to access vital information, which will inform better patient treatment (Buntin et al. 2019; Terry et al. 2019). Additionally, the World Health Organisation (WHO) (2018) reported that in 2018, the World Health Assembly encouraged its member states to use digital technologies to store patients' data. This enables access to multiple authorized users to promote continuity of care and achieve integrated healthcare delivery.

The knowledge of ICT entails that primary healthcare nurses are able to use some electronic devices such as telephones and computers. They should be computer literate, have analytical and critical thinking skills, can input and retrieve data, have problem-solving skills, and be able to use and maintain equipment. At the same time, using ICT in follow-up involves regular monitoring of patients and constant communication through the telephone, email and phone calls or chats to know their welfare.

A case report conducted in India by Bexci & Subramani (2019) argued that using ICT in patient follow-up improved patient monitoring via video chat applications. In the study, the surgeon monitored the patient's recovery after the orthopaedic surgery through skype communication with the patient and family. The surgeon gave post-operative instructions via skype. This helped with follow-up treatment and enhanced satisfactory clinical outcomes. Kraai & Lesman (2019) conducted a randomised controlled trial in New York that tested the impact of an ICT-guided disease management system combined with telemonitoring in heart failure patients. They concluded that there were reduced clinic visits to Heart failure clinics signifying that the use of ICT in follow-up care is cost-effective. These studies focused on the doctor's assessment of patients using ICT for follow-up care.

In a systematic review carried out in Europe, Sweden, North America and the United Kingdom on the utilization of information and communication technology for communication in home care between patients, family members, and healthcare professionals by Lindberg et al. (2013) discussed the use of ICT for follow-up of patient care between the patient, patients family and healthcare professionals. The result showed patient and family participation in patient care. As the study was not specific on the healthcare professionals being studied, it is difficult to tell if nurses were part of the healthcare professionals assessed in the study. There is little available literature discussing nurses' use of ICT in the follow-up care of their patients. There is also no known study on the use of ICT in patient follow-up care in Rivers State, Nigeria hence the importance of this research. Therefore, this research will examine the knowledge and use of information technology for follow-up among primary healthcare nurses in Rivers State, Nigeria.

Previously, in developed countries, after patients discharge from the hospital, healthcare institutions gave patients a follow-up appointment card to return for a check-up at a given period (Simba, 2015). Satisfaction surveys are often mailed to patients after discharge to express their satisfaction or dissatisfaction with the care received. Most services, such as prescribing laboratory investigations or medications for the patient, were delivered face-to-face (Simba, 2015). However, this appointment card has recently been replaced with text messages, emails or phone reminders to patients. The advantage is the ease of communication between the patient and the caregiver at any time of the day. This also enhances patients' safety and the quality of care rendered despite reducing the traditional face-to-face direct care patients receive. In contrast, in developing countries like Nigeria, appointment cards are used for patient appointments as emails and phone reminders are still not widespread in most healthcare facilities (personal communication).

Statement of Problem

Globally, it is estimated that the majority of information technology projects have failed, and the reasons identified as the cause of failure include managerial, technical, cultural and financial issues. Poor health data management was identified by the Federal Ministry of Health Nigeria, which led to the introduction of National Health Management Information System (NHMIS) tools in 2013, which many sectors have not complied with (WHO, 2018). Many studies on using information technology or information communication technology (ICT) for patient follow-up care focused on physicians (Arditi et al. 2019; Divall et al. 2013). Preliminary searches revealed limited global reviews targeted at nurses, and these few reviews (Ammenwerth et al. 2001; Bosman et al. 2019; Daly et al. 2019) were carried out over twelve years ago. This limited review of primary healthcare nurses' use of ICT in follow-up care makes it challenging to ascertain the universal standard regarding the use of information technology and what primary healthcare nurses expect to remedy patient care regarding follow-up. This suggests current research is needed to determine the knowledge and use of information technology in follow-up care among primary healthcare nurses.

However, in a more recent study, Stone (2014) argued that despite integrating information technology in healthcare settings globally, its use is limited to the accounts, internal medicine, and laboratory departments alone in developing countries. These departments use information technology to track financial transactions, the laboratory results of their patients, and patients' appointments, respectively. One could argue that information technology should be used in all the departments in a healthcare setting, especially in primary healthcare centres, to enable primary healthcare nurses to document the care given to patients. However, the usage of information technology by primary healthcare nurses and nurses generally for the care and follow-up of patients is still low despite nurses being the largest group in facilities.

Furthermore, a brief search of databases gave few published topics in southwest Nigeria, Osun, Ekiti, and Ebonyi States, while no published study was found for Rivers State. This showed a knowledge gap that needs to be filled by this study. This also makes it likely that there is still poor use of information technology among primary healthcare nurses for follow-up of patient care hence the need for this research. Therefore, primary healthcare nurses must fully engage in information technology to shape the care system and improve care delivery and follow-up.

The focus question is, "Do primary healthcare nurses have knowledge of and utilize information technology for follow-up care in Rivers State, Nigeria? This focus question was formed using the PEO worksheet to create a search strategy to answer the question. PEO stands for Population/Patient/Problem, Exposure, and Outcome.

Scope of the Study

The content scope of the study will cover the knowledge of information technology, the use of information technology, the mode of storage of patient information and the barriers influencing the use of ICT for follow-up care. The geographical area is limited to primary healthcare nurses working in the primary healthcare centres in Rivers State. The unit of analysis will include male and female primary healthcare nurses in Primary health centres in Rivers State.

Definition of Operational Terms

Primary Healthcare Nurses: Nurse professionals trained to care for the infirm or sick and provide essential health care based on socially and scientifically sound methods and technology while coordinating patient care in Primary Healthcare Centres.

Follow-up care: Care that the primary healthcare nurses give an individual over time after completing treatment for a disease. This involves medical check-ups, including blood, imaging, and physical examination.

Use of Information Technology: The use of computers and telecommunications for retrieving, storing, monitoring, and sending information.

Knowledge of information technology: Refers to the respondents having knowledge of how to use computers, electronic software and other electronic devices to send data and its use in the follow-up care of patients as well as issues surrounding the use of information technology for follow-up care from the questionnaire options.

II. LITERATURE REVIEW

This chapter will present the current knowlegde on the topic and an overview of previously published works, to give a better understanding and appreciation of the study under the following sub-headings:

1. Conceptual Review
2. Theoretical Framework
3. Empirical Review
4. Summary of Literature Review and Gaps

Concept of Knowledge

Knowledge as defined by Pinto (2018) is a belief that is true and justified. This definition has steered the need for the measurement of knowledge by methods that rely on the correctness of answers. A correct or incorrect response is deduced to mean simply that a person does not know or that they know the answer. Knowledge is an understanding or awareness of something, such as facts, skills, or objects. Knowledge can be developed in different ways and from sources, including but not limited to perception, reason, memory, scientific inquiry, education and practice (Pinto, 2018).

Knowledge can denote a theoretical or practical understanding of a subject matter. It can be implicit (practical skill or expertise) or explicit (as with the theoretical knowledge), formal or informal, systematic or particular. Sveiby (1997, p. 37), as cited in Hunt (2013), defines knowledge as "a capacity to act"; this makes a vital distinction between the behavioural potential, which cannot be directly observed, and the visual performance or behaviour. Although it may be challenging to differentiate between knowledge and behaviour clearly, and not doing so would prevent the formulation of precise questions about the entire process by which individuals and organizations acquire, retain, and manage knowledge to perform tasks safely, effectively, and at a high-quality level.

People's knowledge dramatically affects the comfort, effectiveness, safety and satisfaction with which the people's or organisation's goals are attained and formed (Hunt, 2013). Knowledge provides an orderliness to our lives that allows us to conceptualize goals, anticipate and perceive events, and respond to changing needs, purposes, and desires. For example, our perceptions depend on the data or facts we receive through our senses (skin, ears, eyes etc.) and the knowledge we possess that allows us to interpret them. Contrary to the famous phrase, "Seeing is believing," it is needs, belief and knowledge that structure our perceptions by analyzing the data of our senses (Hunt, 2013). An individual's behaviour and performance depend on the knowledge acquired through learning, practice, experience, sensory receptors, and the system of muscles and organs.

As Pinto (2018) reminds us, "To know is to have the capacity to give a successful performance, not actually to be giving one." A person can possess considerable knowledge due to learning. Still, such expertise remains a hidden power until the person uses the ability to make a decision, carry out some task, understand something or solve a problem. Despite its inaccessibility for direct measurement, its influential power over performance can be overwhelming. Training programs and schools are so important in our society because they provide formal opportunities to acquire knowledge. As a result of these increased powers acquired from training and education, the person can perform at an advanced level than they would have ordinarily done. Additionally, the experiences with other people and the environment influence the kind and amount of knowledge acquired and retained by a person (Hunt, 2013).

Assessing knowledge before testing the a complex task' performance has the advantage of detecting and identifying knowledge deficits before they are revealed by errors in performance or other near-accident incidents. Knowledge must not only be acquired but should be retained and remembered. If knowledge is acquired but does not influence behaviour, cannot be retrieved from memory, and is forgotten before its intended later use, then earlier learning has failed to accomplish its instructional purposes (Hunt, 2013).

Concept of Information Technology

The use of devices or computer systems to access information is referred to as Information technology. A large portion of business operations, workforce and personal access to information has been made accessible through information technology. The use of information technology has been introduced and adopted in healthcare settings globally. Healthcare is information-intensive, beginning from taking the patient's history to the prescription of drugs and follow-up care. The provision of quality healthcare needs an organized record-keeping or filing of information systems. Effective coordination of healthcare services such as assessment, establishing diagnosis via investigation, and determining the most effective mode of treatment is now carried out using information technology, thus promoting the management of the disease process.

Quality of care is a significant concern in many African countries, and information technology can play a crucial role in addressing this issue. For example, decision support tools can help healthcare providers to make better decisions, and electronic health records can provide a more complete picture of a patient's medical history. Risk management is what determines the quality of care provided, and healthcare professionals are prone to treatment errors unless the risks are effectively managed. Albarrak et al. (2019) in their study argued that the use of electronic prescriptions compared to handwritten prescriptions enhances effectiveness in patient identification. They maintained that an illegible doctor's prescription could cause a wrong medication to be dispensed by the pharmacist; hence they are advocating for the use of information technology for documentation.

Improving patient safety is a top priority in healthcare, and information technology can be a valuable tool in this effort. For example, electronic health records can cause a reduction in medication errors by providing a completely accurate list of patients' medications. Miller, Britt and Valenti (2019), in their survey in Australia, concluded that about 10% of patients who received handwritten prescriptions from their doctors experienced an adverse drug event. They further posited that the speed of communication between patients and doctors improved, and correct medication for the right person was ensured through the use of electronic prescription systems. This shows that data analytics can be used to identify areas where patient safety is at risk and develop interventions to address these risks.

Furthermore, in recent times there has been an emphasis on patient-centred care, and this information needs to be constantly updated and shared among the patient's care providers and relevant authorities. In healthcare settings, ICT applications can be used to do the following:

- Tracking and reporting of patients' data
- Clinical decisions
- Analytical programs related to diagnosis
- Population statistics and forecasting systems
- Financial transactions for private or public payment
- Communication (face-to-face or distant communication)
- Legal and ethical framework
- Assisting time management as ICT helps to schedule reminders to facilitate follow-up or the next activity automatically.

Also, advancements in ICT have given rise to opportunities to provide quality healthcare services globally. The Medicare Benefits Schedule adopted in Australia influenced the use of ICT among healthcare professionals. They recorded each consultation and developed a plan of care for patients so as to ensure routine care (Zwar and Davis, 2019). This improved information management and promoted the use of computers among healthcare professionals from 15% to 70% in the years 1997 and 2000, respectively.

Financial management is a crucial area where information technology can make a big difference. In many African countries, healthcare spending is limited and inefficiently allocated. Information technology can help to streamline financial processes and improve financial transparency. For example, electronic health records can provide real-time data on the cost of care, which can help to identify where spending can be reduced. For instance, The United States hospitals in 2015 encountered cuts to their Medicare and Medicaid reimbursements; however, their adoption of ICT and its use as an electronic prescribing system helped to minimize the burden of the Medicare cut (Toland, 2019). The United Kingdom (UK) is also not left out on the use of ICT in patient care. In 2013 in line with the Health and Social Care Act 2012, the UK government set up a body to serve the general practices in the area of data management using ICT. This demonstrates that information technology can be used to assemble and analyze data from a variety of sources, including electronic health records, patient surveys and social media. The data obtained can be used to identify gaps in care and target resources more effectively, and inform decisions about how to improve the healthcare system.

Some factors can hinder the use of ICT in healthcare centres. These include technical issues, the high cost of ICT applications, and political and social factors (poor knowledge of ICT). Regarding political factors, fraud and corruption are major problems in Africa, and they can have a devastating impact on patient care. Information technology can be used to track and monitor financial transactions, which can help to identify and

prevent fraud. Additionally, block chain technology can be used to create tamper-proof records of transactions which can help build trust and transparency in the system. However, most developing countries such as Nigeria are still struggling to implement the use of ICT in healthcare facilities fully, but considering the benefits to be gained from its use, there is a need for primary healthcare nurses and other healthcare professionals to have knowledge of the use of ICT so as to enhance better healthcare service delivery and follow-up care of patients.

2.1.3 Knowledge of ICT.

Maternal mortality is still a serious problem around the world. According to WHO 2017 estimates, 810 women die daily from pregnancy and childbirth related complications globally. It further discussed that 295 000 women died in 2017 during pregnancy and after pregnancy and childbirth. The vast majority occurred in locations with few resources, which could have been avoided. The third of the thirteen Sustainable Development Goals (SDGs) as discussed by the international community in 2015 is to enhance maternal health (WHO, 2019). The use of ICT to promote maternal health and support service
providers has increased dramatically during the last 20 years. However, "the application of information and communications technology in support of health and health-related sectors" is what ICT refer to (WHO, 2019). Mobile technologies such as mobile software apps or programs, the internet, telecare, wearables, text messaging, social media and remote monitoring equipment are all examples of digital forms of support. In this initiative, the terms digital technology, electronic health (eHealth), and mobile health (mHealth) will be used interchangeably. The use of new information and communication technologies to promote or enable health and health care is referred to as electronic health (Brainin & Neter, 2018).
Mobile health (mHealth) is described by the WHO as "the use of mobile and wireless technologies,suchasmobile phones, patient monitoring devices, personal digital assistants, and mobile software a pplications, to support the accomplishment of health objectives" (WHO, 2018a) WHO also mentioned the use of mobile telecommunications and multimedia technologies in health service delivery and public health systems (WHO, 2018b; Mendoza, et al., 2019).

To meet health demands, digital health, or the use of ICT for health, has emerged as a key field of practice for utilizing both traditional and novel kinds of information and communication technology (WHO, 2016a). Digital health is based on eHealth and is defined
as "the use of information and communications technology in support of people's health and health-related sectors" by the World Health Organization (WHO, 2015). In 2018, the 71st World Health Assembly supported digital innovations for health system strengthening strategies to assist nations in achieving universal health coverage. On the other hand, mobile health (mHealth) is a subset of eHealth that is described as the usage of mobile wireless technologies for health" (WHO, 2016b).

Digital health was recently coined as "a broad umbrella word including eHealth, which encompasses mHealth, as well as developing disciplines, such as the application of sophisticated computing sciences in 'big data, artificial intelligence, and genomics" (Dokas, 2019). Mobile device ICT have recently been critical in supporting performance and progress monitoring, promoting inclusivity and transparency, integrating information systems for reporting and research, and giving healthcare and advice to even the most remote regions (WHO, 2015). Several community partners in Reproductive, Maternal, Neonatal, and Child Health (RMNCH) believe that technology, particularly m-Health, is critical to improving women's and children's health (Mauco, 2018). The sixth United Nations (UN) Commission recommendation on Life-Saving Commodities for Women and Children encourages countries to integrate ICT into national health systems and infrastructure, while the third recommendation on Information and Accountability for Women's and Children's Health encourages countries to integrate ICT into national health systems and infrastructure. Many countries are now using digital technology in their long-term plans for delivering critical health interventions and services to their citizens (WHO, 2016a). Technology resources are well-established in the United Kingdom, and they considerably support the e-health system.

In the United Kingdom, health workers have mobile devices and computers with internet access that they utilize when interacting with patients. Appointment scheduling solutions, e-Radiology solutions, and e-Prescription services are some of the health services that have been used in the UK (Eason & Waterson 2019). Governments, funders, and international institutions have all recognized the potential for ICT to help better health systems (WHO, 2019). In a joint declaration published in 2015, the United States Agency for International Development (USAID), the WHO and the World Bank Group pushed for the "application of the ICT revolution to scale up health initiatives and engage civil society" (WHO, 2015).
Technology integration is being implemented in various nations in Sub-Saharan Africa, despite numerous hurdles. (Coleman, 2019). Although medical teams are always challenged with continual changes in the way ICT are employed to provide quality care to their customers, some of the benefits mentioned include early

diagnosis, treatment, and information sharing (Kiberu, 2019). It's critical to recognize that incorporating new technology into normal care can be a lengthy and unexpected process (Carlfjord & Mauso, 2015). The incorporation or routine usage of ICT into health care has been termed a successful integration (Carlfjord, 2017).

Even when there is evidence of potential benefits to patients and the whole health care system, many developing countries fail to accept new technology. According to Zayyad & Toycan (2018), the majority of the participants in their study had a basic understanding of ICT and had some experience with ICT resources and apps in their health care context. This finding is in line with that of Venkatesh, Thong, and Xu (2019), who discovered that health practitioners' information technology literacy and experience have a significant impact on their desire, readiness, attitude, and intention to use digital technology applications in the health environment. Similarly, Kabashiki & Moneke (2019) found that professionals with adequate information technology literacy and experience were strong favorable aspects of new technology applications such as e-health technology during their routine patient care in their study on health workers' shortcomings in using information and communication technology-related gadgets to manage patients. More mHealth research in developing countries revealed low knowledge of mHealth whereby 18.7% of health workers attributed to Ethiopia were referred to have had good knowledge of mHealth (Alwan, 2019), while in India it was accounted to be 22% this contrasts with findings in the United Kingdom, where all health workers had good knowledge of mHealth (Sherwin-Smith, 2018 ; Epocrates, 2019).

2.1.4 Use of ICT

As a result, the current condition of e-health suggests that the deployment of e-health systems depends on a variety of factors, including technical assistance in medical institutions and a lack of ICT knowledge among health practitioners. As a result, issues influencing e-health implementation cannot be generalized; rather, they must be contextualized. As a result, comprehensive research is required to uncover these characteristics in various circumstances.

Globally, the technological transformation has changed the way healthcare is delivered (O'Conner et al., 2018; Rouleau, 2018). As digital technology becomes more ingrained in healthcare settings, there will be a greater emphasis on health workers developing their digital professionalism as part of their professional identity building (Ellaway, 2019) The requirement for health professionals to learn, develop, and know appropriate professional behavior when utilizing digital media has given rise to the concept of digital professionalism (Mather, 2019). There is no accepted or standard meaning of this phrase at this time (Ellaway, 2019; Bahr, 2019). Other countries, on the other hand, are making calls to strengthen the rigor of mHealth evidence generation and reporting (Agarwal et al., 2019). According to the findings of a systematic assessment of eHealth solutions on ANC, PNC, and childhood vaccination coverage and use in low- and middle-income countries, there is some evidence of effectiveness in influencing behavior (Lund, 2019). Two RCTs one in Zanzibar and the other in Kenya that looked at the effectiveness of text message reminders and instructions given to pregnant women's phones reported statistically significant increases in ANC in their intervention groups compared to their control groups (Lund & Fedha, 2019). The use of information communication technology to transport information for administrative, therapeutic, educational, or research objectives is referred to as "digital." A complex combination of variables has led to the impediment of digital transformation in Australia, resulting in a digital technological paradox. Health professionals, particularly midwives, are unable to employ digital technology in the workplace, even though it is increasingly being recognized that its use has the potential to improve patient outcomes (Mather, 2019). Digital transformation in the health professions will not be possible until systems and organizational governance frameworks facilitate legitimate access to and use of ICT (Mather, 2018) As new graduates get enculturated to the social and cultural norms of their profession and workplaces, this lack of guidance has contributed to a missed chance to model digital professionalism (Mather, 2018; Mather & Noordegraaf, 2019). For more than 15 years, there has been a global discussion on the development of nursing and midwifery competencies in digital health (Borychi, 2019). However, no agreement has been reached on agreed-upon nursing informatics capabilities to guide the legitimate use of digital technology (Honey, 2019). Digital technology is pervasive, and its application in healthcare settings is becoming more common (Honey, 2019; Kinnunen, 2019).

The Australian Digital Health Agency's National Digital Health Strategy (National Strategy, 2019) emphasizes the development of digital professionalism among health practitioners. To advance the tenets of Strategic Priority 6, which states that Australia needs a workforce that effectively uses digital health technologies to deliver health and care" (Australian Government, (2019), page 44), current barriers and challenges must be overcome (Mather, 2018).

Organizations and individuals who promote the integration of aspects from nursing informatics competency standards (Australian College of Nursing, 2018; Honey, 2018) into workflows can help attain this aim. To meet the workforce issues by 2022, methods to support and analyze organizational readiness and capability development of digital professionalism of health professionals must be developed. To ensure the safety and the quality of healthcare service delivery within healthcare facilities, it is critical to use digital technology in a safe, effective, and acceptable manner (Mather, 2018).

The area of mHealth is at a tipping point, set to move from isolated pilot projects to full integration into healthcare systems and formalization of healthcare delivery in both poor and developed countries. Improved ability to detect, track, and treat disease; timely, actionable public health information; and wider access to health education are all benefits of mHealth projects around the world (Machael, 2019). Improved data collection is critical in mHealth initiatives to better understand the specific consequences of mHealth applications and treatments in a variety of cultural and situational circumstances. The mHealth Alliance is one initiative that aims to address effect evaluation and promote more coherence and information sharing in the mHealth space. The initiative's reproductive health component, the Mobile Alliance for Maternal Action, intends to establish a piece of evidence found on the successful use of mobile technology to promote maternal health (Mobile Alliance for Maternity Action, 2019).

This program focuses on Bangladesh, India, and South Africa at the moment, and it offers resources and technical assistance to promising new business ideas. As insights learned in the field are shared, challenges to implementing mHealth apps in the area of women and children's health are arising. Gender issues, such as women having less access to mobile phones than men, and the traditional role of women in certain societies conflicting with the independence and professional responsibility that mobile phones can provide, are cultural considerations that limit the use of information and communication technologies for health. (Chib, 2019). The learning curve for the use of mobile phones for data collection and transmission is steepened by high rates of illiteracy, which could be a significant barrier. (Chib, 2019). Mobile phone use, on the other hand, has been suggested as a technique for improving literacy in low-literate communities. (Aker, 2019). The difficulty of implementing mHealth on a large scale is exacerbated by logistical and usage issues. The fact that some mHealth programs require advanced or expensive phones is a deterrent. Before mHealth technology may be introduced in some places, concerns of consistent availability of electricity must be solved. (Fraser, 2019). When mobile phones are used among family members or groups of people to communicate patient health data, methods for ensuring the confidentiality of health information must be devised. (Mechael, 2019). The establishment of national and global mHealth infrastructure will be the overarching task in the next years. The WHO published its first formal statement analyzing the area of mobile health and creating a global mHealth strategy in June 2011. The WHO recommends that "if applied deliberately and systematically, mHealth can transform health outcomes, providing nearly anybody with a mobile phone with medical skills and information in real-time," recognizing the need for a global standard to optimize the impact of mHealth initiatives (WHO, 2018b).

The statement lays out concrete actions, such as the creation of an international framework for evaluating these programs, which will give governments the evidence they need to distribute funds and build policies that support strategic mHealth implementation. The State of World's Midwifery Report 2011: Delivering Health, Saving Lives, (UNFPA, 2012) was released a few months later by the United Nations Population Fund and collaborating organizations. Reflecting a major recommitment to bolstering the function of the midwife around the world.

The importance of midwives in reaching Millennium Development Goals 4 and 5, which aim to minimize under-5 child mortality and maternal mortality, is highlighted in the article. This publication also includes country-specific recommendations for promoting the profile of midwifery as a profession, expanding and improving the midwifery workforce, and empowering midwives to build deeper collaborative links with other members of the healthcare system and within their communities. (UNFPA, 2018). Midwives and mHealth can have a mutually beneficial partnership. mHealth has the potential to play a substantial role in reaching the goals outlined in The State of the World's Midwifery Report, as seen by the results of the programs mentioned previously (UNFPA, 2019). mHealth applications can be used to increase public awareness of midwifery care, midwifery workforce recruitment and retention, and midwifery workforce access to high-quality training and continuing education, according to available evidence. Midwives have a big say in how the area of mHealth evolves because they are on the front lines of health care delivery. Experts are asking for a more health-sector-driven and user-driven strategy for mHealth uptake, arguing that rather than being technology-driven, mHealth initiatives should be strategically organized with the specific target group (providers or population) in mind (WHO, 2018a). Midwives can help ensure that mHealth programs are implemented in a way that is both relevant and functional for midwifery and the women and families they serve (Michael, 2019). The midwifery

care paradigm stresses a holistic approach that focuses on understanding the woman in the context of her family, community, cultural beliefs, and physical surroundings (Rooks- Midwifery model of 1999). Midwives have the expertise and skills to turn mHealth apps into health services that meet the requirements of the communities they serve. According to Special (2019), because mHealth is such a new field, and possibly also because of the high-touch, low-tech midwifery approach to care, there hasn't been much interest and involvement from midwives in it thus far. There has been very little published midwifery-led and midwifery-focused mHealth research. Midwives must keep up with the latest advancements in mHealth and take advantage of chances to participate in mHealth programs and research. mHealth Summits and the International Conference on Information and Communication Technologies and Development (ICTD) are two examples of conferences, and the International Congress on Nursing and Informatics are great places to learn and network. Tech Change, a newly founded organization, offers month-long online courses on the use of mobile technology in development.

Following projects and people who are innovating in the mHealth field on social media sites like Twitter and Facebook to remain up to date. International mother and child health projects that use mHealth tools are in desperate need of leadership and technical assistance. These opportunities should be taken advantage of by midwives who are engaged in global health. Midwives who are already involved in global health programs should take the lead in implementing mHealth tools into programming and ensuring that built-in evaluation procedures are in place. They should also make an effort to publish the data in peer-reviewed journals. Midwives in less-developed nations should also be better connected for professional consultation and networking using mobile devices, according to midwifery leaders. This can aid in the strengthening of national midwifery associations and the advancement of midwifery as a profession around the world. The American College of Nurse-Midwives' Life-Saving Skills Curriculum, for example, should search for methods to include mobile technologies in training for midwives in less-developed countries. Finally, as the mobile EMR becomes more widely used in developing countries, midwives must push for its adoption.

2.1.5 Readiness to Adopt ICT

Technology has changed healthcare delivery around the world (O'Connor and Rouleau, et al., 2019). As of 2019, about 67 percent of the global population are already using mobile devices, 65 percent using smartphones, with Sub-Saharan Africa experiencing the highest increase (GSMA, 2020). In the United Kingdom, up to 90% of midwives utilize e-health (Jobie, 2020), and a recent study by Vasileios (2019) on the use of digital technology in health revealed an increase in the uptake of medical services. The eHealth movement has been introduced and regarded as a vital part of the health care sector as a result of the exponential growth of Internet penetration along with advances in networking and information communication technology. The leveraging of information and communication technology to connect paients, providers and governments, to inform and educate managers, health care professionals and consumers; to kindle innovation in health system management, care delivery and to improve our health care system, (WHO, 2019). eHealth projects have been generally recognized as a chance for fundamental reform in the public health care sector, to reduce the massive demand for and supply of health care in both developed and developing countries (Ball, 2019 ; Ludwick, 2019). The WHO's Global Observatory for Health performed a survey of 96 countries to determine the need for e-Health tools, and found that e-Health tools are extremely valuable in more than 70% of non-Organization for Economic Cooperation and Development (nonOECD) countries (WHO, 2016a). Developed countries have invested and will continue to invest significant resources in e-Health system implementation to reduce costs and improve care quality (Yavlacicegi, 2019 and Lohman, 2019). The discovery of elements that influence the adoption and acceptability of e-Health systems has piqued the interest of academic and non-academic research communities in recent years (Mair, 2019).

One of the most important requirements for the successful deployment of e-Health, among other things, is the essential infrastructure. Many scholars have done extensive investigation and documentation in this area (Detmer, 2019). The role of ICT infrastructure, including Internet adoption, hardware, and software, as well as IT professional training and education, has been recorded, as well as its present status on e-Health deployment. However, past research indicates that data security and privacy concerns persist and that e-Health adoption, including the use of Personal Health Records, is low, particularly in industrialized countries (lafky, 2019).

Many countries, particularly developed countries (USA and Australia), have established or are establishing corresponding laws and legislations to protect their citizens' health data to address these security and privacy concerns, such as the Health Insurance Portability and Accountability Act and the Personally Controlled Electronic Health Records Act 2012. ICT plays a significant role in improving health and health care systems in poor nations, similar to what has been found in affluent ones (McConnel, 2019).

Hoque et al., (2019), in his study maintained that e-Health is an ICT product that has an impact on improving the health care sector in poor nations.
Many governments in developing nations have high hopes for the e-Health system to improve the quality, accessibility, and cost of health care (Tierney, 2019). E-Health can improve access to healthcare facilities for everyone, including patients, doctors, nurses, and other healthcare workers, as well as improve healthcare quality and collaboration (Khalifehsltani, 2019). Because of the well-documented potential benefits, poor countries, such as Bangladesh, are adopting ICT to address health care cost, quality and access. In addition, ICT adoption in the healthcare industry in developing nations will hasten knowledge diffusion and improve access to health information (Chetley, 2019).

Despite the potential benefits of e-Health, its implementation is proving difficult, especially in poor nations like Bangladesh. Bangladesh, with a population of 156 million people, is in Southeast Asia one of the developing countries. The residents of the country are served by a hybrid health system run by the government and the private sector (Ahmed, 2019). In Bangladesh, there are 593 government hospitals, 467 Upazila- (Bangladesh's second-lowest tier of regional administration) and Union-level (the lowest tier of local government) hospitals, and 126 secondary and tertiary-level hospitals. Furthermore, 2983 private hospitals and 5220 private diagnostic institutes in Bangladesh are always working to improve health services (Health bulletin, 2013).
Although Bangladesh is one of the minorities of the countries in the world where public hospitals provide free medical services to their citizens on a community level, it has been identified as one of 57 countries with an unbalanced health system characterized by a critical shortage of health workers (only 2.28 doctors, nurses, and midwives per 10,000 people) and hospital beds (only four beds per 10,000 people) (WHO, 2019). The e-Health initiative started in Bangladesh in 1998 during the launching of the Health and Population Sector Programs (HPSP) by the Ministry of Health and Family Welfare (MOHFW) to increase the effectiveness of the programs already in place. Bangladesh's government views the e-Health system as a critical tool for increasing the quality of health care in routine medical activities. Due to the current government's Digital Bangladesh program, which supports health services delivery to residents via ICT, thus e-Health is being given special attention (Karim, 2019). In the country's health sector, many public and private hospitals, nongovernmental organizations (NGOs), and private businesses have implemented a variety of e-Health initiatives and services (Commonwealth, 2019). From July 2012 to June 2013, the Bangladesh government set aside BDT 11,025.00 lakhs (USD 13 million) for e-Health systems. From July 2013 to June 2014, a further 12,500.00 lakhs (USD 16 million) was set aside. Furthermore, the government has allocated resources to the training of doctors and nurses to ensure that e-Health services are used effectively (Health bulletin, 2013). However, due to minimal citizen participation in e-Health systems, observers are skeptical that the systems will be able to meet the government's objectives (Sheraz, 2019).

The supply side of e-Health life supplying infrastructure) appears to be promising based on present e-Health infrastructure, but few studies have looked into the demand side for example adoption) (Ashraf, 2019). As a result, it's critical to figure out why these new systems didn't meet their predetermined goals. Health systems are multi-stakeholder social systems with diverse origins, experiences, and values. With the adoption of other information systems, the success of e-Health systems is dependent not just on the supply side but also on the demand side say end-user perspectives). It's critical to comprehend the impact of social and human elements on adoption attitudes (Sharif, 2019;Chen, 2019), such as attitude and perceived ease of use.
A recent study (Khan, 2019) looked into the consumers' hopes and fears as e-Health was being implemented in Bangladesh. Most users were hesitant to employ ICT in health services, according to this study, because of their negative perceptions of its effectiveness and efficacy. However, the study only looked at adoption-related difficulties from the standpoint of physicians, not from the perspective of patients. Based on the findings given above, it can be inferred that the majority of study efforts focused on users' attitudes regarding e-Health adoption as well as other elements from providers' perspectives, such as physicians and nurses.

To our knowledge, no studies, if any, have been undertaken from the perspective of patients, although patients play a vital role in the effective adoption of e-Health. Furthermore, the majority of past research has been undertaken in the context of wealthy countries. As a result, this study sought to fill the gaps identified above by looking into the issues surrounding the adoption and acceptance of e-Health in Bangladesh from the patient's perspective.
Privacy and trust have been cited as additional hurdles to the successful adoption and use of e-Health, in addition to diverse social and human aspects. Gender is also a crucial influence in the adoption of technology, including e-Health, in developing nations, according to previous studies. Gender has a considerable moderating effect on the association between ease of use, perceptions of relative advantage, and usage intentions, according

to a prior study (Ilie, 2019). Gender is a key moderating factor in the adoption of technology in underdeveloped nations, according to another study (Jaruwachirathanakul, 2019). Gender has a role in the effective usage of ICT in underdeveloped nations, according to researchers (Davison, 2019). Gender is also a crucial influence in the adoption of technology, including e-Health, in developing nations, according to previous studies. Gender has a considerable moderating effect on the association between ease of use, perceptions of relative advantage, and usage intentions, according to a prior study (Ilie, 2019). Gender is a key moderating factor in the adoption of technology in underdeveloped nations, according to another study (Jaruwachirathanakul, 2019). Gender has a role in the effective usage of ICT in underdeveloped nations, according to researchers (Davison, 2018).

The Ugandan Ministry of Health (MOH) began installing technical equipment such as internet around the country in 2011 (Namusobya, 2018). Despite the continuing installation of digital technology resources and training of medical personnel in many regions of the country, there is still a lack of knowledge about the adaptability and usability of technology in the hospital setting Kiberu (2018). However, it is envisaged that the adoption of tele-midwifery techniques will only take shape if healthcare practitioners have favorable attitudes and knowledge of how to use the technical instruments available. Though digital technology is thought to have advantages, the question of whether or not midwives will adopt it persists. The majority of the literature on healthcare provider adoption of digital technology has thus far concentrated on physicians rather than midwives, resulting in a dearth of information in this field. Antheunis (2018) argued that the usage of ICT has increased rapidly throughout the industrialized world, resulting in significant changes in how individuals communicate in their daily lives. He went on to note that the use of ICT by hospitals and professionals has increased dramatically around the world, allowing for new kinds of connections between patients and health professionals as well as enhancing patient involvement in their self-care.

Similarly, Moorhead (2019) recognized that integrating technologies, particularly social media, into the delivery of health communication and healthcare has several potential advantages. He went on to suggest that social media technology may be utilized to increase workplace efficiency, facilitate communication, and provide a platform for peer-to-peer social support and information exchange, as well as serve as a valuable resource for boosting patient health knowledge.

ICT readiness, according to Khoja et al., (2018), refers to a healthcare organization's or society's readiness for the predicted change brought on by plans involving IT applications and Internet use. Similarly, Durrani et al. (2019) discovered that organizational readiness includes infrastructure, linked systems, and technical expertise. Mengiste (2018) found that issues relating to Technologies are also concerned with the organisation's weak understanding of ICT in place and cost-related concerns in a study analyzing the challenges of Information system implementation in public health institutions in a developing country.

2.1.6 Factors enhancing the use of ICT

The successful interaction with midwives and physicians, according to the Information System specialists, is crucial for the use of technologies in healthcare. The independence and professional position of healthcare providers might be severely harmed by ICT. The conflict stems from the ability of technology to modify the work pattern of delivering healthcare services, allowing for different skill-mixes in clinical teams, empowering different midwives to make patient-care decisions, and empowering and enabling patients to self-care. According to Uluc and Ferman (2018), a comparative examination of four developing nations, namely Saudi Arabia, Turkey, Egypt and the United Arab Emirates, was conducted to assess the problems that health care professionals encounter while implementing e-health technology. The biggest obstacles faced by healthcare professionals, according to the report, are ICT infrastructure, policy restrictions, the clinical adaption of users, healthcare funding, and supply chain management Abejirinde (2018) reported.

In a similar study of diagnostic and clinical decision support systems, in a study of diagnostic and clinical decision support systems, Abejirinde (2018) discovered that user training, technical and supervisory support, well-resourced health systems and faith in decision recommendations are all necessary for ICT to be sustained and integrated into normal use for both patients and healthcare workers. He went on to argue that, in addition to usability and viability research, supporters of revolutionary maternal care technology should consider how implementation techniques and contextual factors such as existing supervision styles and collaborations trigger mechanisms that influence the outcome of programs. When building culturally and linguistically relevant digital health treatments, socio-cultural elements, and community power dynamics, according to Hughson (2018), are vital to address. Stisen (2018), maintained that in the development of ICT, the medical viewpoint and the clinical or healthcare practitioner viewpoint have traditionally been provided as design justification. Stein went on to note that in clinical settings, ICT are frequently entrenched in an environment where healthcare practitioners have the necessary medical knowledge and equipment, as well as

resources and IT support. In another study by Grönvall (2018), however, it was discovered that incorporating ICT into medical care is not the same as incorporating them into people's homes and daily lives.

Nunes et al., (2018) agreed with Gronvall that In a study of Self-care technologies in HCI, researchers found that home and other non-clinical settings, as well as the hospital, are quite different social worlds with their socio-technical and cultural practices that affect the way designers and researchers address issuesand difficulties while developing digital health technologies. The rapid adoption of ICTs in the developed world has resulted in significant changes in how people communicate in their daily lives. The use of ICTs by health professionals and hospitals has developed dramatically around the world, allowing for new kinds of interaction between patients and health professionals as well as more patient involvement in their care. Antheunis, (2018). According to Moorhead (2018), integrating ICTs, particularly social media, into the delivery health communication and healthcare has various potential benefits.

Furthermore, Antheunis (2018) posit that social media can be used to facilitate doctor/midwife to patient communication, provide a medium for peer-to-peer social support among patients and professionals, aid information sharing, improve workplace efficiency, and serve as an important resource for increasing patient health knowledge. Anderson (2018), however, maintains that as the use of social media in healthcare has grown, that there have been cautions of possible difficulties. Hence, Kirschner and DeCamp (2018) emphasized the need for precise standards to manage social media use, with a focus on duty of care issues for both staff and patient privacy and confidentiality, as well as cautions about the risk of professional reputation injury.

Melas et al., (2019); Venkatesh, Thong, & Xu, (2019), and Steininger & Stiglbauer, (2019), all agree that the major factors affecting the adoption of e-health in Nigeria and other African countries, were structured into six parts namely: technology resources factors related to hardware, software, and networking; information communication technologists' factors. Some of the problems affecting the adoption and utilization of ICT tools in hospitals include poor user acceptance, a lack of infrastructure, financial limits, a lack of computer proficiency, and organizational regulations (Qureshi et al. 2018). Similarly, WHO (2017) indicated that one of the most common causes of medical device failure is a mismatch between the device's design and the context of usability. The difficulties and experiences of conducting self-care tasks as part of a woman's and partner's regular life are not taken into account by ICT built under the traditional model of medical care (Grönvall, 2019). In Barry's (2018) study of mHealth for maternal mental health, user- and patient-centered, participatory design approaches were used to help balance the influence of different stakeholders in the design of digital health implementation to improve women's health and well-being, as well as the delivery of healthcare services.

Unequal positions in social, economic, and political networks reinforce unequal competencies and skills to access resources and navigate the system, and there is a risk that social inequalities will be reinforced in information networks and communication processes unless policies to address this are implemented. The works reviewed in this chapter by Van Dijk (2019) have already emphasized the dangers that socially disadvantaged people confront. Kontos and colleagues discovered vital differences in digital use based on socioeconomic status (SES) in the general population in the United States (Kontos et al., 2019). They propose that to overcome inequalities in health communication and public health communication, clinical treatment, and public health communication should recognize various digital health usage. The eHealth movement has been introduced and regarded as a vital part of the health care sector as a result of the exponential growth of Internet penetration along with advances in networking and ICT.

The impact of ICT in linking healthcare providers, patients, and governments; to inform and educate managers, consumers,health care professionals; to encourage innovation in care delivery & health system management; and to improve the health care system cannot be overlooked (WHO, 2012). eHealth projects have been generally recognized as a chance for fundamental reform in the public health care sector, to reduce the massive demand for and supply of health care in both developed and developing countries (Ball, 2019 ; Ludwick, 2019).

The WHO's Global Observatory for Health performed a survey of 96 countries to determine the need for e-Health tools, and found that e-Health tools are extremely valuable in more than 70% of non-Organization for Economic Cooperation and Development (nonOECD) countries (WHO, 2016a). Developed countries have invested and will continue to invest significant resources in e-Health system implementation to reduce costs and improve care quality (Yavlacicegi, 2019 ; Lohman, 2019). The discovery of elements that influence the adoption

and acceptability of e-Health systems has piqued the interest of academic and non-academic research communities in recent years (Mair, 2018).

One of the most important requirements for the successful deployment of e-Health, among other things, is the essential infrastructure. Several scholars have done extensive investigation and documentation in this area (Detmer, 2019). The role of ICT infrastructure, including Internet adoption, hardware, and software, as well as IT professional training and education, has been recorded, as well as its present status on e-Health deployment. However, past research indicates that data security and privacy concerns persist and that e-Health adoption, including the use of Personal Health Records, is low, particularly in industrialized countries (lafky, 2019).

Many countries, particularly developed countries (USA and Australia), have established or are establishing corresponding laws and legislations to protect their citizens' health data to address these security and privacy concerns, such as the Personally Controlled Electronic Health Records Act 2012 and the Health Insurance Portability and Accountability Act. ICT plays a significant role in improving health and health care systems in poor nations, similar to what has been found in affluent ones (McConnel, 2018). According to a recent study by Hoque et al., (2018), e-Health is an ICT product that has an impact on improving the health care sector in poor nations.

Many governments in developing nations have high hopes for the e-Health system to improve the quality, accessibility, and cost of health care (Tierney, 2019). E-Health can improve access to healthcare facilities for everyone, including patients, doctors, nurses, and other healthcare workers, as well as improve healthcare quality and collaboration (Khalifehsltani, 2019). Because of the well-documented potential benefits, poor countries, such as Bangladesh, are adopting ICT to tackle health care access, cost and quality issues.

In addition, ICT adoption in the healthcare industry in developing nations will hasten knowledge diffusion and improve access to health information (Chetley, 2018). Despite the potential benefits of e-Health, its implementation is proving difficult, especially in poor nations like Bangladesh. Bangladesh, with a population of 156 million people, is a developing country in Southeast Asia. Residents of the country are served by a hybrid health system run by the government and the private sector (Ahmed, 2019). In Bangladesh, there are 593 government hospitals, 467 Upazila- (Bangladesh's second-lowest tier of regional administration) and Union-level (the lowest tier of local government) hospitals, and 126 secondary and tertiary-level hospitals. Furthermore, 2983 private hospitals and 5220 private diagnostic institutes in Bangladesh are always working to improve health services (Health bulletin, 2013).

Although Bangladesh is one of the few countries in the world where public hospitals provide free medical services to their citizens on a community level, it has been identified as one of 57 countries with an unbalanced health system characterized by a critical shortage of health workers (2.28 doctors, nurses, and midwives per 10,000 people) and hospital beds (only four beds per 10,000 people) (WHO, 2012). The e-Health initiative began in Bangladesh in 1998 as the Ministry of Health and Family Welfare (MOHFW) launched the Health and Population Sector Programs (HPSP) to increase the effectiveness of the programs already in place. Bangladesh's government views the e-Health system as a critical tool for increasing the quality of health care in routine medical activities. Due to the current government's Digital Bangladesh program, which promotes the delivery of health services to residents via ICT, e-Health is being given special attention (Karim, 2011). In the country's health sector, many public and private hospitals, nongovernmental organizations (NGOs), and private businesses have implemented a variety of e-Health initiatives and services (commonwealth, 2013). From July 2012 to June 2013, the Bangladesh government set aside BDT 11,025.00 lakhs (USD 13 million) for e-Health systems. Over this period July 2013 to June 2014, a further 12,500.00 lakhs (USD 16 million) were set aside. Furthermore, the government has allocated resources to the training of doctors and nurses to ensure that e-Health services are used effectively (Health bulletin, 2013). However, due to minimal citizen participation in e-Health systems, observers are skeptical that the systems will be able to meet the government's objectives (Sheraz, 2018). The supply side of e-Health life supplying infrastructure) appears to be promising based on present e-Health infrastructure, but few studies have looked into the demand side for example adoption) (Ashraf, 2019). As a result, it's critical to figure out why these new systems didn't meet their predetermined goals. Health systems are multi-stakeholder social systems with diverse origins, experiences, and values. With the adoption of other information systems, the success of e-Health systems is dependent not just on the supply side but also on the demand side say end-user perspectives). It's critical to comprehend the impact of social and human elements on adoption attitudes (Sharif, 2018; Chen, 2019), such as attitude and perceived ease of use. A study by (Khan, 2018) looked into the consumers' hopes and fears as e-Health was being implemented in Bangladesh. Most users were hesitant to employ ICT in health services, according to this study, because of their negative perceptions of its effectiveness and efficacy. However, the study only looked at adoption-related difficulties from the standpoint of physicians, not from the perspective of patients. Based on the findings given

above, it can be inferred that the majority of study efforts focused on users' attitudes regarding e-Health adoption as well as other elements from providers' perspectives, such as physicians and nurses.

To our knowledge, no studies, if any, have been undertaken from the perspective of patients, even though patients play a key role in the effective adoption of e-Health. Furthermore, the majority of past research has been undertaken in the context of wealthy countries. As a result, this study sought to fill the gaps identified above by looking into the issues surrounding the adoption and acceptance of e-Health in Bangladesh from the patient's perspective. Privacy and trust have been cited as additional hurdles to the successful adoption and use of e-Health, in addition to diverse social and human aspects. Gender is also a crucial influence in the adoption of technology, including e-Health, in developing nations, according to previous studies. Gender has a considerable moderating effect on the association between ease of use, perceptions of relative advantage, and usage intentions, according to a prior study (Ilie, 2018). Gender is a key moderating factor in the adoption of technology in underdeveloped nations, according to another study (Jaruwachirathanakul, 2018). Gender has a role in the effective usage of ICT in underdeveloped nations, according to researchers (Davison, 2018). However, few, if any, research in Bangladesh have looked into the role of gender in e-Health uptake. One of the most complicated interpersonal connections in healthcare is that between a care provider and a patient. According to the healthcare providers who took part in this study, the usage of e-health systems can either improve or worsen the doctor-patient interaction. Some healthcare providers saw e-health as a way to strengthen the care provider-patient connection by making information more accessible.

As a result, healthcare providers that took part in this study had differing perspectives on the impact of technology on physician-patient relationships. The physician-patient interaction has always been and will continue to be a cornerstone of healthcare. Furthermore, healthcare providers are concerned about the potential for e-health tools to disrupt their patient relationships. There is strong evidence, according to Gerber and Eiser (2019), that clinicians are concerned about broken relationships with patients as a result of e-health use. E-health technologies have been criticized by some healthcare providers as harming the doctor-patient interaction (Ariens et al. 2018). The use of e-Health tools has the potential to change the control of medical data. The use of e-health for health information has evolved into a technique of shifting patients' obligations. In many cases, e-health technologies provide consumers with more control over their treatment (Varsi 2018; WHO 2018c). Some healthcare personnel may feel challenged when patients bring information to consultations. As a result, some healthcare providers are dissatisfied with the use of technology like telemedicine.

2.1.7 Factors limiting the use of ICT.

One of the major sectors that need the use of ICT to improve the quality of healthcare delivery to all populations is the health sector. The use of e-health, in particular, is reliant on a variety of technologies and ICT infrastructure. The lack of ICT infrastructure that enables e-health systems was discovered in this investigation. Currently, many hospitals in Zimbabwe do not have sufficient e-health technology (Kundi et al. 2018). The current ICT technologies are mostly used for administrative and procurement purposes. Many healthcare practitioners expressed dissatisfaction with the lack of infrastructure needed to adopt e-health. According to comments made by healthcare providers in various institutions, e-health has been unsuccessfully implemented in hospitals due to a lack of infrastructure.

E-health, like any other electronic system, necessitates the usage of several technologies. The infrastructure of e-health has a significant impact on e-health adoption (Kundi et al. 2018). In all organizations, research on e-projects is dominated by infrastructural challenges, including in the health sector (Kundi et al. 2018 ; Qureshi and Shah 2018). Infrastructure for e-Health is recognized as a major factor. In the context of a developing country like Zimbabwe, this becomes even more crucial. In Zimbabwe, hospitals lack the necessary technologies, computer systems, and utilities to improve healthcare services. Procurement departments, on the whole, have better ICT infrastructure than physicians. During the researcher's observations, this was also recorded. According to observations, the bulk of Zimbabwe's public hospitals has minimal ICT and e-health infrastructure. Some healthcare workers in Zimbabwe are now adopting personal electronics such as smartphones to supplement the country's poor e-health infrastructure. Despite this, many public hospitals' principal ICTs for managing healthcare still rely on basic technology, such as pen and paper, crude database systems, and human memory (Catwell & Sheikh, 2018). The usage of such flawed technologies in healthcare should be taken into account when working to improve the country's health services. To ensure that e-health systems can be deployed in hospitals, some components should be made available. E-Health infrastructure is not only costly to set up, but it also necessitates ICT skills and knowledge to use e-projects successfully (Simbini, 2018). The adoption and real usage of e-health in primary care will most

likely be driven by medical healthcare providers with ICT skills. This is because healthcare providers with ICT skills and expertise can recognize the potential benefits of e-health in their workplace. Participants cited a lack of ICT skills and knowledge as a factor influencing the deployment of e-health in public hospitals as a contributing factor.

The poor adoption of e-health in public hospitals in Zimbabwe is due to a lack of ICT skills and expertise among medical healthcare workers in the country's health sector. As a result, individuals may be unable to accept the usage of e-health technologies. This study showed that the MoHCC should educate doctors to help them become more techno-literate. As a result, educating and training medical professionals on how to effectively use e-health is critical to the adoption and deployment of the technology (Olok, Yagos & Ovuga, 2018). As a result, ICT should be taught in medical schools, and graduate healthcare providers should participate in e-health training sessions as part of their in-service training. Furthermore, the utilization of e-health is complicated due to a lack of ICT skills and understanding among medical healthcare providers. The knowledge and expertise in information and communication technology are critical in lowering the complexity of technology. A low level of complexity, according to the DOI theory, promotes technology adoption because users can understand and use it (ner&Sertel 2018). As a result, it is critical to ensure that prospective users have adequate knowledge and skills whenpromoting innovation to the target population.

IT specialists' technical assistance is also essential for the implementation of an IT project. To keep the system up and running, technical help is essential. Technical support from IT departments has been discovered to be another factor that supports the establishment of e-health systems. However, several participants stated that they were not receiving adequate technical assistance from IT, staff, due to the lack of IT departments, the attitude of information and communication personnel, or a lack of experience, as detailed below. Based on these comments, it appears that technical support is essential for the operation of e-health systems. During the monitoring period, the study discovered that only central hospitals had small IT departments with two to five IT support staff. According to the interviews and observations, the majority of hospitals lack enough technical support. Ross et al., (2018) in their study discussed that the inclusion of technical support staff has been suggested as a strategy to relieve hurdles related to workflow disruptions, roles, and responsibilities that e-health adoption may involve. As a result, hospitals should have an ICT infrastructure in place, and IT personnel should be knowledgeable about healthcare technologies as ICTs are vulnerable to security and privacy breaches, which has a negative influence on their adoption in the health sector. This is because e-health customers want to know that employing technology in healthcare will not expose their personal information to unauthorized parties. The safeguarding of patient information is one of the most essential ethical rules in medicine. Data privacy, confidentiality, and security concerns have been mentioned as barriers to e-health adoption in Zimbabwe. The message here is that e-health data security is critical if e-health is to establish credibility among healthcare stakeholders. Stakeholders want e-health data privacyto be on par with that of paper record systems. Concernsaboutlosing autonomy (Dünnebeil et al. 2018), li ability (Dehzad et al. 2018), patients security and privacy being compromised (Robinson, 2019), and perceived threats to patient and health professionals relations hips (Kart, Miao, & Moser, 2018) have all been reported as barriers to use in previous research. The shift to electronic platforms raises concerns about patient data privacy and security.

In terms of ICT ethics, privacy and security are undoubtedly the most hotly debated topics (Dinev et al. 2018). Patients and providers must trust that the information being communicated is safe and protected to fully appreciate the benefits of e-health. As a result, concerns regarding the privacy and security of e-health systems continue to be a barrier to wider adoption of e-health by medical healthcare practitioners in public hospitals and, if not addressed effectively, may jeopardize e-potential health's success. Furusa and Coleman (2018) discussed that in countries like Zimbabwe, the lack of basic medical facilities has also hampered the use of e-health services. The majority of hospitals expressed dissatisfaction with the lack of essential medical instruments for treating patients. The following issues were brought up: These findings indicate that Zimbabwe has a scarcity of advanced health facilities capable of performing a wide range of medical treatments with cutting-edge equipment. Without the necessary equipment to use inpatient treatment, e-health systems will continue to fail. The researcher discovered throughout his study that hospitals have inadequate medical facilities, making it impossible to prioritize technology over basic needs. As a result, the status of medical facilities has hampered the use of e-health in most institutions.

Additionally, Ferusa (2018) also discovered that the adoption and usage of technology are connected with age. In the study about factors facilitating the use of e-health in Zimbabwe, age is by definition a source of

the digital divide. During the interview, the doctors who took part, particularly the younger ones, expressed concern about the elderly healthcare providers who attended medical school in the paper age. As one doctor pointed out, this demonstrates that age plays a role in the adoption and use of technology. Younger healthcare providers are more comfortable with technology than their older counterparts. Technology adoption has the potential to significantly alter work processes, procedures, and interactions. Employees, on the other hand, are prone to resisting change if they are unhappy with it. The participants in this study showed a high level of opposition to the introduction of e-health systems in public hospitals. The following thoughts were recorded: Medical doctors must overcome certain obstacles, such as change resistance, to incorporate ICT into their work procedures. Bennani, Belalia, and Oumlil (2018) agrees with the views of Ferusa (2018) and added that medical personnel becomes resistant to the use of technology because of the perceived negative impact on their workflow.

A suitable health strategy is required for the development of a robust e-health system. During the interviews, healthcare practitioners cited issues with health policies that hinder the deployment of e-health systems in Zimbabwe. As a result, the lack of a well-defined health policy may stymie the implementation of e-health systems at all levels of the healthcare system.The following is what one doctor had to say. Based on this information, Zimbabwe's government deficit of a clearly defined policy encourages the adoption of e-health systems in public health facilities.

Although the country has an e-health strategy (draft version 2012) developed in collaboration with WHO and based on the ITU/WHO toolkit (Chikuni, 2018), there is a lack of policy to guide e-health development and technological diffusion in public hospitals. There is no clear, well-coordinated system in place to organize e-health implementation. Liability issues, as well as a lack of or inadequacy of regulations and rules, may stymie the development of e-health systems at the organizational and health professional levels. Because electronic health cannot be integrated alone, a careful strategy must be considered to encourage e-health growth in the public sector. As a result, public hospitals should be compelled to deploy e-health systems as a matter of policy (Rodrigues, 2019). Because the Ministry of Finance does not allocate adequate funds to the health sector, the Ministry of Health is unable to equip health institutions with current technology. Because of underfunding, most hospitals operate on a shoestring budget.

As a result, hospitals are expected to operate on a shoestring IT budget. This suggests that the healthcare sector's funding influences e-health uptake (Mugo, 2018). According to Mars and Scott (2019), first-world countries have the financial resources to engage heavily in research of developing information systems that match the needs of their specific healthcare system. This shows that greater health-sector financing is highly linked to e-health adoption, even in rich countries, and that this should also be true in underdeveloped countries (Zhang et al., 2019). Omary et al. (2019) believe that it is difficult to dedicate much money to the acquisition of information and communication technologies resources required in the health sector due to poor government support of the health sector in third world nations. The cost of implementing computerized health infrastructure is high, necessitating increasing investment in the health sector for a variety of developing countries.

The health sector in Zimbabwe is underfunded, making it difficult to devote sufficient funds for the acquisition of ICT tools. The Ministry of Health and Child Welfare typically receives around $400 million, which is 15% and 11.3 percent less than the Abuja target and Sub-Saharan Africa average (UNICEF, 2016). As a result, increased financing may lead to greater implementation of e-health systems and services. The healthcare system's authority structures are rather rigid and not very adaptable (Simbini, 2013). The Ministry of Health determines how e-health is used in hospitals. Hospitals, particularly district and central hospitals, do not have the authority to implement e-health systems on their own. As a result, there is a lack of initiative in the specialty of the ministry in terms of medical service delivery when it comes to e-health. The ministry established the systems in place, such as EPOC, DSHI, and PMS, among others. As a result, the use of technology by public hospitals is stifled by strict controls in the health sector. In general, there are strict laws and regulations in Zimbabwe governing the changing of procedures in government departments. As a result, public hospitals are not exempt. Traditional healthcare delivery methods are gradually being displaced by e-health solutions. Governments, health professionals, and research organizations in both rich and developing countries have recognized the importance of implementing e-health. Many governments have put in place rules to encourage the use of e-health at all levels of health care. In Zimbabwe, however, the concept of e-health is still relatively new. Its application hasn't gotten enough attention. Despite the efforts of funders, foreign partners, and governments to roll out e-health systems, healthcare practitioners only use them in part or not at all (Zhou, Herselman & Coleman 2018).

In public healthcare institutions, the state of e-health is poor and unsatisfactory. E-health systems are mostly concentrated on a few core hospitals, leaving other hospitals behind. As a result, it is in a nascent stage in public hospitals. As a result, the need for guidelines to aid in the implementation of e-health across public healthcare facilities cannot be overstated. The elements that influenced the introduction of e-health in Zimbabwe's public hospitals were discovered.
According to the study, the success of an e-health system is determined by a variety of factors. Government policy, ICT skills and expertise, ICT and e-health infrastructure, finance, medical facilities, and IT technical assistance are only a few examples. Furthermore, the findings show that public hospital healthcare providers face similar problems in implementing e-health systems. If these elements are taken into account, Zimbabwe has a lot of potential for implementing e-health. Otherwise, Zimbabwe's implementation of e-health systems in public hospitals will continue to lag.

2.1.8. Follow-up care among primary healthcare nurses.

Continuity of care is essential for ensuring that patients receive the best possible care, and the role of information technology in supporting this cannot be overlooked. For example, electronic records can help to ensure that patient information is shared between different healthcare providers so that patients receive consistent care and follow-up (Qasim, 2021). And telemedicine can help to connect patients with specialists who may be located far away.

Thus, follow-up care refers to care given to a patient after completion of treatment for a disease. This involves regular medical checkups, which include imaging tests, blood tests and physical examinations (Qasim, 2021). Nurses working in PHC are called primary healthcare nurses, and their roles include patient education, health promotion, prevention and treatment of illnesses. An essential advantage of follow-up care is that it keeps patients healthier, promotes positive care outcomes, and early follow-up care minimizes hospital readmissions.

Some patients have some medical conditions which a physician can treat after only a hospital visit; some require continuous treatment. As such prompt follow-up with patients is essential to ensure they comply with the prescribed treatment regimen, for instance: undergoing laboratory tests and compliance with medication. Furthermore, to increase the chances of a positive treatment outcome, a medical follow-up is essential to promote safety and care.

The importance of patient follow-up cannot be overlooked in instances of inadequate follow-up where a patient comes to the healthcare facility with symptoms suspected of cancer. If the patient is sent for testing, the care facility does not check to ensure the patient keeps the appointment. If it turns out that the patient did not do the test and the disease progresses, not only is the patient's health in jeopardy, but the healthcare practitioner could also be the target of malpractice litigation.
Implementing these steps in primary healthcare practice can ensure timely, efficient patient-follow-up (Qasim, 2021):

- Create a verifiable notification system where the office contacts and sends a reminder a day before the appointment.
- Develop a procedure to check missed appointments and test results, including letters, phone calls, text messages, and emails.
- Establishment of an open communication channel with all specialists to whom patients are referred for follow-up examinations.
- Develop a system for ensuring all findings are received from specialists to whom patients were referred, as well as that the results are communicated to the patients.
- Use the EHR system to track tests and follow-up test results that have not been received by the date specified.
- Documentation of all medical advice given to patients in their file and indication of what is perceived as their degree of perception.
- Conducting a routine follow-up phone call within a specified time frame after each visit to ascertain if the patient has any concerns regarding testing prescribed medications, the treatment protocol or anything else.
- Train staff to discuss questions outside the scope of their job specification to a licensed medical professional.
- Developing an email newsletter that can be sent to patients that contains general medical information, advice and answers to frequently asked questions regarding their disease condition.
- Contacting new patients after their initial visit to ascertain if they are satisfied with their treatment and level of service. Consider sending them a patient satisfaction survey.

One may argue that this approach to patient follow-up care relies on the use of information technology to ensure its effectiveness and implementation. Therefore, if these measures listed above are taken by the primary

healthcare nurses in the follow-up care of their patients, they are likely to improve their patient's health promptly.

2.1.9 Strategies for Implementing ICT in Follow-Up Care

ICT includes tools necessary for running primary care facilities in the 21st century. The new applications used in ICT include cloud computing, e-health, mobility in health, telehealth, and other remote health care services delivery (Godbole, 2018). Care organization managers and leaders are learning how to use ICT systems to enhance care regarding efficiency and quality (Wu, Rundall, Shortell, & Bloom, 2019). ICT adoption is also a reliable and necessary tool to operate a primary care practice efficiently with financial success (Wu et al., 2019). Further, adopting ICT can improve health care services reliability, accessibility, efficiency and accuracy in the primary care industry. For instance, people and patients experiencing trouble accessing health care services as a result of reasons that are not related to the status of their insurance are more likely to seek support using the internet to obtain health information, which may include different ICT features (Amante, 2019). Improving the reliability and accuracy of publicly available health information online also assists patients who have challenges accessing services in healthcare facilities (Amante, 2019). Therefore, it is important to develop strategies to enable successful ICT implementation.

To obtain the benefits of emerging technologies, it is expedient to make sure that the health care system (a) is accessible to patients, (b) empowers patients, and (c) be a channel to update patients about their personal health (Godbole, 2019). Effective use of ICT can be beneficial for health and well-being by helping individuals to manage their health, support a healthy lifestyle, and help them have access to important information at any time, irrespective of where they are (Paglialonga, Lugo, & Santoro, 2018). As a result, using applications in health care can promote patient empowerment, increase their awareness, and improve patient–doctor communication.

Widespread use of ICT can improve the healthcare quality within the primary care industry, avert medical errors, minimise health care costs, improve administrative efficiencies, reduce paperwork, and expand access to affordable health care. The adoption of ICT into a health facility can cause an 8% rise in revenue as well as improving health care quality (Lee & Choi, 2019).

Another positive impact of ICT in hospitals is the minimisation of waste and maximization of efficiency of energy (Godbole, 2019). Replacment of IT equipment and upgrading same with energy efficient systems such as virtual data storage, virtual servers, database structures and efficient application can reduce IT power consumption by up to 40% for the replaced equipment compared to data center networks devoid of power saving scheme (Biswas, Ray, Sondur, Pal, & Kant, 2019). Additionally, virtual data storage technology and virtual server are methods that enable hospitals to reduce system management and equipment costs. Also, there is costs reduction when patients are empowered to use ICT in managing their health (Godbole, 2019).

Therefore, the use of facilities such as ICT can create a big impact for both the patients and the health care providers. In recent times, advances in the adoption and use of ICT have a dramatic influence on medical practice (Payne et al., 2019). However, the implementation of ICT is still a challenge for some primary healthcare professionals (PHPs). Many primary care facilities, as well as healthcare practitioners are yet to adopt ICT despite the benefits reported (Lee & Choi, 2019; Payne et al., 2019). To tackle this, ICT-related public health communication and clinical care efforts should be more concerned with the differential benefits accrued with the use of e-Health (Kontos, 2018). Finding a solution to the communication inequalities and the disparities in health outcomes has led to efficient and faster patient results (Kontos, 2018). Public health and medical practitioners use ICT to disseminate information to patients in both traditional and novel methods to address health concerns such as diabetes management, cancer prevention, smoking cessation, and heart health (Kontos, 2018). Thus, innovative developments, like ICT, shows how important the successful technology implementation empowers and improves patients health. In the United States, a study on the correlation of the implementation of ICT among a national cohort of small primary care practices to ascertain the adoption rate and use among PHPs over time was carried out by Rittenhouse et al. (2019). Studies of individual physicians showed that physicians in primary care setting, especially family physicians, are more highly likely to adopt and use ICT than their colleagues (Fragidis & Chatzoglou, 2018; Rittenhouse et al., 2019). Rittenhouse et al's study demonstrated an increase in the measures of ICT use and adoption by a nationally representative cohort of 566 small primary care practices between 2007-2010 and 2012-2013. The percentage of practices that was based on paper records reduced drastically during this period, and functionalities such as e-mail with patients, e-prescribing and the collection of clinical data using electronic health record, rose substantially (Rittenhouse et al., 2019). The adoption and implementation of ICT into primary care facilities, showed a different set of challenges to the management and the clinicians of the organisation. For example, Fragidis and Chatzoglou (2018) argued that commitment and the involvement of top hierarchy, senior management, and leaders in the implementation of ICT process was an important success. However, a lack of support from nursing, medical and

administrative staff can cause failure of implementation of ICT (Fragidis & Chatzoglou, 2018). Fragidis and Chatzoglou and Rittenhouse et al. both discovered how vital involvement and commitment of leaders, senior management, medical, nursing and administrative staff are to the success of the implementation of ICT. Therefore, users and leaders are a significant part of every successful implementation of ICT.

Independent hospitals and small health systems face challenges while trying to develop their health care IT competencies to meet the requirements of value-based care. Some PHPs in the United States are faced with financial difficulties in their attempts to cover the cost of implementation of ICT (Zulman, 2018). For orgnisations to keep providing quality care to patients and remain competitive in the health care industry, they require investments in ICT (Burgdorfer & Simnick, 2019). Burgdorfer and Simnick (2019) surveyed how independent hospitals and small health systems managed their lack of funds when adopting ICT. Patients use ICT for various health issues to sustain self-care for certain conditions that would allow them to surpass ill health boundaries (Zulman, 2018). Thus, the accessibility of mobile devices which support access to ICT greatly affects health and medical practices (Ventola, 2018). Furthermore, the rapid incorporation of mobile devices and technology into clinical practice will advance the availability and quality of medical software applications (Ventola, 2018). Per Ventola, (2018), several challenges are present in the future incorporation of mobile devices and apps into health care practice. To guarantee a fundamental level of quality and safety when using medical apps and ICT, Ventola (2018) argues that the development of rigorous evaluation, assessment, validation, and best practice standard alongside the implementation of assessment measures. The main determinant of the value of an app may be the provision of timely and accurate end user information and guidance (Ventola, 2018).

The quality of ICT and apps improves patient outcomes and the health care system (Ventola, 2018). Small health systems and independent hospitals that cannot afford to implement their own ICT, fall behind competitors (Burgdorfer & Simnick, 2018). To solve this, they work together with larger systems that have the expertise and capital to facilitate an electronic health record rollout. The increasingly vital role the adoption of ICT plays in a hospital's business operations has been a major factor (Burgdorfer & Simnick, 2018). Research and other factors can influence policy in several models of the ways (Gold, 2019; Peterson, 2019). Popular models of the policy process begin with identification of problem and describes the pathways by which evidence affects the foormulation of policy. Therefore, PHPs and small health system leaders should weigh their options carefully and proceed cautiously in meeting the challenge of sourcing and implementing ICT. With the implementation of ICT implementation, PHPs target to improve patient care through promotion of adherence to clinical guidelines, promoting disease monitoring, a reduction in medication and medical errors, and access to accurate complete health information. However, Doekar and Sarnikar (2018) discusssed that the implementing ICT does not guarantee improvements. The adoption of ICT is a process of implementing change in an organization. Changes within an organization are usually linked with psychological uncertainty of employees on how the change will impact their lives (Nilsen, Schildmeijer, Ericsson, Seeing, & Birken, 2019).

Therefore, the adoption of ICT or replacing an existing one, creates organizational change, the work process and the attitude of employees. Implementation can be overwhelming with unforeseen circumstances as ICT could involve more than the application of technology. Deokar and Sarnikar (2019) argued that the achievement of electronic health record implementation depends on change management; implementation of electronic health record require complex changes to core organizational processes. Understanding health care professionals' change responses is important to facilitate implementation so as to achieve an evidence-based practice in the health care environment rapidly changing (Nilsen et al., 2019).

2.1.10 Benefits of ICT in Heathcare

The implementation of ICT in the primary care industry could improve peoples health and the practitioners performances caused improved quality, costs reduction and paper waste reduction. Access to the medical records of patient's became easier and patients were well engaged in their health care. Management systems allow for the transmission, storage, acquisition, display of clinical activities related to patients, such as electronic medical records (Rouleau et al., 2019). Fernandez-Planelles, Jover, Palomar, and Calvo (2018) studied the health service organizations with regards to their effort in achieving improved management of chronic disease treatment and its preventive control. To promote care continuity, Fernandez-Planelles et al., determined that ICT implementation was an essential tool which supports improvement of drug treatment, comprehensive care and improved control through communication.

To administer appropriate treatment in the health care industry, the implementation of ICT would simplify the process of communication among clinical specialists. Communication also creates an atmosphere

that encourages professionals to engage in the various evolutionary stages of a disease, reduce the clinical variability, improve the clinical approach, promote the continuity of care, reduce morbidity, and standardize process of registration to improve quality of care and patient satisfaction (Fernandez- Planelles et al., 2018). Significant rise in IT spending in recent years has generated great interest in its effects on patient privacy, quality of care provided and the health care industry cost structure (Haried, Claybaugh, & Dai, 2019). With regards to ICT advantages, Fernandez-Planelles et al. and Haried et al. conveyed that ICT implementation has enhanced patients interaction with physicians and other healthcare professionals without the barriers of distance and time.

Jassas (2019) studied the benefits of e-health smart network system. The structure for this system includes medical sensors which can support the patients by determinig their physical parameters thrugh the use of wireless sensor networks (WSNs). These sensors transfer data from the body of patients' over the wireless network to the cloud environment which is a form of ICT. Rahmani et al. (2018) agrees with this view and adds that because of the computing nature of IT, all the health care system entities which includes: individuals, appliances and medicine can be monitored and continuously managed. By applying IT technologies to health care, the cost and medical care quality can be enhanced by automating tasks performed by humans previously. Therefore, patients will receive a high-quality service as the e-heath smart system helps medical staff by providing real-time data gathering of their patients data. The WSNs discourages collection of data manually and supports the monitoring of huge numbers of patients and eliminates the possibility of human error (Jassas, 2019).

Sheikh (2019) determined that perceptions of ICT included improvements on patient care, population health, and a reduction of patients health care expenditures and for the institutions running hospitals. Sheikh believed that ICT catalyzed the creation of a publicly accessible digital infrastructure and that innovative ways to improve quality of care and obtain cost efficiencies are determined by users. Early experiences showed that the resulting digital infrastructure in the field of health care improved the quality of care and minimised costs (Sheikh, 2019). Efforts to reform health care systems are severely limited by problems with usage across limited interoperability, ages and the persistence of the fee-for-service paradigm. There is significant rise in the ratio of aging population since 2012 with the progressive decline in physical and cognitive skills preventing the elderly people from living independently and from performing basic daily living activities (Mshali, Lemlouma, & Magoni, 2018). These issues should be the main policy target of the Federal government to ensure a widespread cover in terms of patients who can actually access ICT features (Sheikh, 2019).

In this technological era, one of the efficient ways to promote the effectiveness and quality of health care services is through the implementation of ICT. Sun and Qu (2019) established that having a good knowledge of the factors that have significant effects on the adoption of ICT may help policy makers and practitioners in developing effective solutions to the ICT implementation process, making it smooth and seamless for patients, physicians and other health care professionals. Primary care leaders can advance the quality of patient care by providing reliable, accurate, timely and secure data to users. Primary care physicians who implement ICT can improve the quality of patient care significantly. The quality of care recived by patients in hospitals can significantly improve after the implementation of ICT (Khatri & Gupta, 2018). Thus, to ensure quality health care as a result of ICT implementation, coaching and training should be a priority to update the patients and the health professionals with the knowledge and education on how to make the ICT system work.

The implementation of ICT in the primary health care industry has the ability to promote patients health and safety but its implementation and use has caused unintended consequences and new safety concerns (Singh, 2018). A major challenge when improving safety in health IT-enabled health care systems in clinics and hospitals is to develop effective, practicable strategies to measure safety concerns at the intersection of patient safety and health IT and patient. Graber, Siegal, Riah, Johnston, and Kenyon (2019) also discussed how the adverse events linked with ICT vulnerabilities can cause extensive harm and is seen through the range of health care settings and sociotechnical factors. The ICT framework should be able to facilitate organizational learning and involvement of the ICT merchants in the health needs of the patients who use their ICT applications (Singh, 2018). ICT vendors should consider that not all users of ICT are already adept with the know-how on how to properly use technological equipment required to effectively use the ICT system.

Wrong patient information due to medical error and improper treatment are a major worry in the health care industry, which can make a patient's condition become worse, potentially leading to premature death. Patient safety risks occur althrough healthcare facilities due to failure to correctly identify patients, resulting in the incorrect patient, wrong procedure site, incorrect medication, and other errors (Jeon et al., 2019). The

implementation of ICT and barcode technology can stop medical errors by providing comprehensive and reliable patient care information. The use of barcode is one of the cost effective methods of improving the patient safety (Hachesu, Zyaei, Leila, & Hassankhani, 2018). The health professionals and the patients readiness should always be considered when trying to implement the ICT system. However, for barcode technology implementation to be effective and successful, these issues such as organizational readiness and financial planning should be considered.

Hachesu et al. (2018), argued that the most critical steps for the successful implementation of barcoding in health care organizations mostly depends upon the managers readiness to accept and apply the policies of barcode technology, monitoring applications and allocation of priorities. In a study conducted by the U.S. Department of Health and Human Services officials to examine the relationship that exists between ICT, costs, administrative efficiencies and health outcomes. Different studies have shown that a positive relationship exist between the use of ICT and health outcomes (U.S. Department of Health and Human Services, 2018). Feinberg et al. (2018) in his study maintained that about 50% of the health care funds are wasted due to inefficient processes, yet implementation of ICT have measurable economic benefits. Henry et al. (2018) noted in their study that about 75% of laboratory technicians use electronic medical health records to help them to obtain laboratory results faster. The studies of Feinberg et al. and Henry et al. are important in highlighting the cost saving and the profit potential of ICT implementation.

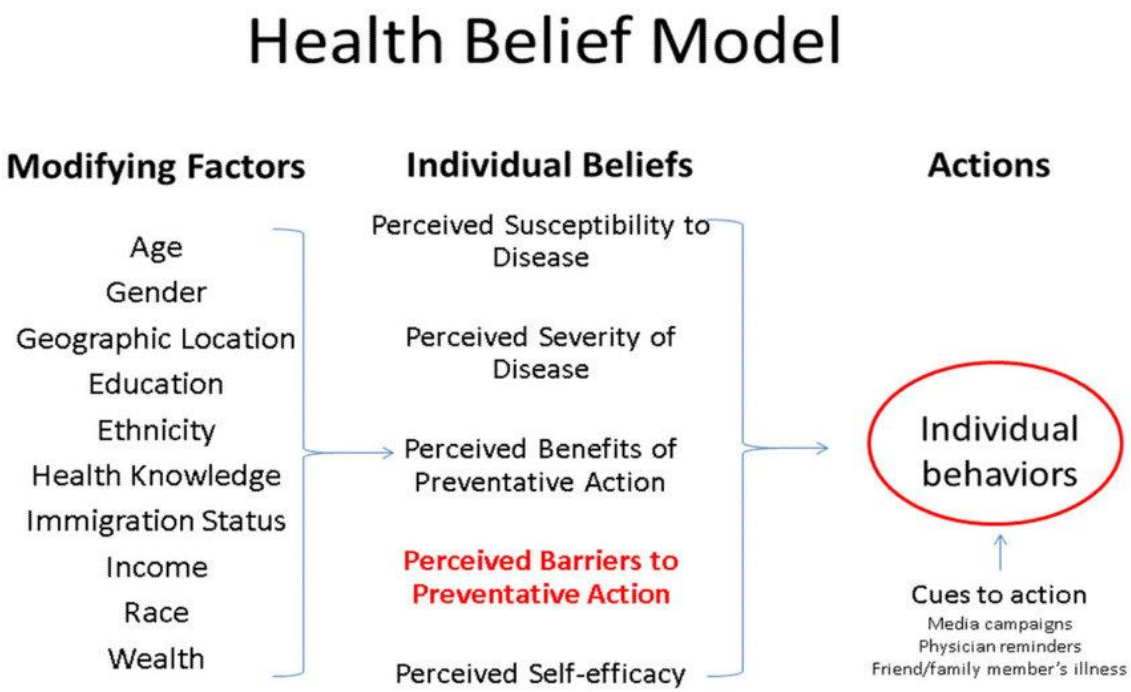
According to Gesulga et al. (2018), implementation of ICT enables error-free and high-quality care in effective and efficient ways. In addition, the use of ICT simplifies the access to vital information needed by professionals in remote areas (Garofalo et al., 2019). ICT implementation is also essential to ensuring clear and complete documentation of patient's health records. The implementation of ICT in primary care facilities makes the problem of deciphering someone's handwriting outdated. Practitioners in primary care enter their orders directly into computer systems, potentially eliminating transcription errors and intensely improving turnaround time. For instance, when a prescription order is entered by a practitioner, the system checks automatically for any adverse drug interactions or allergies and immediately alerts the physician if any are found. Another benefit of successful implementation of ICT in the primary care industry includes the easier and timely tracking of drug interactions cautions (Institute for Safe Medication Practices, 2018). Garofalo et al. (2019) and Gesulga et al. (2018) both assert that the potential improvement and value ICT implementation can add to health care services.

2.2. Theoretical Framework

The following theories were used to explain the relationship between the study variables: The Health Belief Model, the Theory of Transfer of Learning and Diffussion of innovations Theory.

2.2.1 The Health Belief Model

The Health Belief Model is a theoretical and social psychological health behaviour model that can guide health promotion and disease prevention programs (Green, Murphy & Gryboski, 2020; Janz & Marshall, 1984). It is used to predict and describe specific health behaviour changes. It is a model widely used to understand health behaviours. A significant elements of the Health Belief Model focuses on personal beliefs with regard to conditions of health, which can give an insight into people's health-related behaviours. The model defines the key factors that impact health behaviours as a person's perceived threat to sickness or disease, perceived severity, potential positive benefits of action (perceived benefits), perceived barriers to activity, exposure to factors that prompt action, and confidence in the ability to succeed (Green et al., 2020; Janz & Marshall, 1984).



Source: Public Health Nigeria (2022). Health Belief Model online]. PHN. Available from: https://www.publichealth.com.ng/health-belief-model/ Accessed 05 April 2023.

The Health Belief Model is founded on the theory that an individual's willingness to change their health behaviours mainly comes from their perception of health. In other words, exposure to information can trigger someone to take action. What a person perceives will be of benefit to them can make them imbibe healthy behaviours as well as one's perception and confidence on an issue. Short- and long-term interventions for follow-up care of patients can be designed using the Health Belief Model. This is because the model emphasizes the importance of an individual's consciousness and understanding of their perceived health status (Green et al., 2020). It could be argued that if primary healthcare nurses make patients become aware of the importance of the health-related implications of their disease conditions, they will be motivated to comply with their treatment regimen. The significance of the model cannot be overemphasized as it compels health educators, teachers, and the government to make efforts to gather information by conduction of a health needs assessment to ascertain who is at risk and the target population to convey the consequences of unhealthy health behaviour (Green et al., 2020). The Health Belief Model is not without critism as the environmental and the economic factors that impact a person's behavior was not addressed. Likewise, a persons attitude, characteristics and individual beliefs were not also addressed. Thus, the health educators should ensure that the correct information is communicated to the target population regarding the steps involved in taking the recommended action and highlighting the benefits to these people.

2.2.2 Transfer of Learning Theory

This study will also adopt the transfer of learning theory. This theory uses previously acquired knowledge and skills in new learning or problem-solving situations (Ellis, 1965; Macaulay & Cree, 2007; Royer, 1979). Thereby similarities and analogies between previous and actual learning content and processes play a crucial role. The transfer phenomenon is presented within a general perspective of learning. A fundamental goal of education is to ensure that learners apply their acquired knowledge in various ways and under different circumstances (Macaulay & Cree, 2018). However, this "transfer" expected does not always happen, and, therefore, the knowledged acquired cannot be easily applied in other contexts. One way of reducing this problem is to understand how transfer occurs and what learning conditions can improve this process. This study will provide theoretical perspectives and pedagogical practices to ascertain the most effective ways to optimize knowledge acquisition and transfer among primary healthcare nurses. The comparison of the selected theories will indicate that the transfer of necessary knowledge on health occurs at any stage and is a multi-dimensional process, and enhances the proper management and follow-up care of patients.

Diffusion of Innovations Theory

This is a behavioural change model propounded by E.M. Rogers in 1962 (Dearing and Cox, 2018). This theory is one of the frameworks which helps to promote the understanding of how innovation spreads. The theory explains that over time, an idea could gain popularity and spread through a social system. At the end, people adopt these new behaviours or products. This adoption comes about through the perception that that idea is innovative, useful and will add value to their services. However, the acceptance of the new behavior or idea does not simultaneously occur in a specific population. The model points out that the characteristics of the target population can hinder or help innovation adoption, thus researchers should have a good understanding of this before pushing for adoption of an idea that is new.

Rogers categorized the innovation adopter as follows (Dearing and Cox, 2018):

1. Innovators: These are persons who will wait in a longline or jump on board a new product introduction or an innovation.
2. Early adopters: Theses are influential group of people who are taste-makers and opinion leaders.
3. Early majority: These are the mainstream who will determine the mass appeal of an innovation or a product.
4. Late majority: These are individuals who wait for a couple of generations of improvement and proof points.
5. Laggards: These are persons who are skeptics who may be the last to be on board in adopting the new idea or product.

Empirical Review

A related study was conducted by Secginli, Erdogan and Monsen (2019), a questionnaire survey, to determine the health professionals attitude towards electronic health records in primary health care settings. This survey was carried out in Turkey to assess the health professionals attitude towards electronic health records in the primary health care setting. About 754 questionnaires were administered to health professionals in seven districts in Istanbul, Turkey. The survey was developed using an extensive review of the literature, and it is made up of 33 statements on a five-point Likert scale rating. Out of the 754 questionnaires that were distributed, 325 were completed and returned, representing a 43% response rate, with 97% of respondents satisfied with the electronic health record system in their health centres. The result also showed significant differences between health professional groups (nurse/midwives and physicians) in their perceptions of electronic health records reducing paper-based records, cost of electronic health records and data security in electronic health records. There was generally a positive attitude towards using electronic health records among the primary health care professionals in that setting which suggested intense usage and acceptance. This demonstrates a need to train staff on electronic health records and refine electronic health record technology to improve clinical documentation.

Iqbal et al. (2018) examined the association between usage intention and the adoption of electronic health records at primary health clinics in Taiwan. They aimed to measure the relationship between usage intention and adoption behaviour. A structured questionnaire was distributed to ascertain both electronic health record adopters and non-adopter among the physicians, which was aimed at establishing the information exchange environment across Taiwan. The result showed the rate of adopters and non-adopter was 54.7% and 55.0%, respectively. This shows that many primary health clinics are not using the electronic health record system in Taiwan. One could argue that if the physicians are not using the electronic health records system, the primary health care nurses working there are not also using it either. The primary care physicians who adopted its use in the study affirmed it encouraged ease of assessment of patient data and records compared to the use of paper records. Therefore, it is crucial for the government to promote and ensure the implementation of electronic health records use in primary care facilities and emphasize its adoption based on its benefits.

A survey by Tubaishat (2021) to determine the acceptance of electronic health records in primary healthcare settings was carried out in Jordan. In this national survey with a descriptive cross-sectional design carried out alongside the annual review of the Jordanian Ministry of Health to determine the implementation of electronic health records in primary healthcare centres in Jordan, the study found that only 21.6% of the Primary Healthcare Settings were using electronic health records while about 78.4% were still relying on paper records. This shows that the adoption rate of electronic health records is still low in primary healthcare settings.

Ojo and Adegbile (2021), in their descriptive cross-sectional study, determine the "Perception of nurses in a federal and state-owned hospital in Nigeria toward electronic health record integration". The study was conducted in selected federal and state hospitals in Ibadan, Oyo State. The sampling technique used for the recruitment of 384 nurses was a simple random sampling technique. The 384 nurses completed a well-structured questionnaire to assess their perception and barriers that could hinder the proper incorporation of the electronic health record. The result showed that poor perceptions of electronic health record integration were held by 57.0% of the respondents. Some obstacles to the use of electronic health records were linked to a lack of internet

connectivity, poor electricity supply and infeasibility of electronic health record integration. No association was found between the level of academic qualifications, work experience and participant perceptions about electronic health record integration. This suggests that there is a need to train nurses both in public, private and primary healthcare centres in Nigeria on the need to integrate and incorporate electronic health records in care and follow-up of their patients so as to improve the standard of care patients receive.

A quantitative study by Irinonye et al. (2018) to determine "Nurses' perception and barriers to the use of information communication technology in a Nigerian Teaching Hospital. The result showed that about 37.8% of the nurses in that facility had no formal training in information communication technology. Many had little or no skill in the use of Excel spreadsheets and databases. However, some barrier to the use of information technology was linked to high work demand, unreliable network connection, and inadequate number of computers in the facility. This demonstrates the need to equip healthcare facilities with ICT gadgets and the need for improved nurse training on ICT to ensure competence in the use of electronic health records.

Don et al. (2019) conducted a qualitative study on the "Knowledge and attitudes of nurses in community health centres about electronic medical records" in 3 community health centres in South Africa. In this study, 33 staff members aged between 25 – 65 years were interviewed. Out of these 33 staff members, 25 were nurses, while eight were enrolled nursing assistants (26 women and seven men). The study concluded that the use of electronic medical records would reduce medication errors, prevent loss of data, promote remote access to patient data and reduce the nurses' workload. However, this study concentrated on nurses' perceptions of the use of electronic medical records rather than their use of these electronic medical records in patient care or patient follow-up. The authors only determined the staff use of cellphones for text messages (n = 33), voice call (n = 30), internet searches (n = 16), internet banking (n = 10) and social networking (n = 17) and did not link it to their use of these devices in communicating with their patients. Also, the interview method was adopted in data collection, and there is a possibility of this interview having an element of bias as the respondents may likely have given fabricated answers which is a demerit of the use of interview research.

In a cross-sectional study by Adeleke et al. (2019) to ascertain the "ICT knowledge, utilization and perception among healthcare providers at National Hospital Abuja, Nigeria, the 260 participants were made up of 121 nurses, 90 doctors, 16 medical laboratory scientists, 19 health information management professionals and 14 pharmacists. The result of the study showed that only 5% of the respondents showed poor knowledge of ICT use. They further stated that age, sex and ownership of a laptop were closely linked to the use of ICT. The study recommended intensive ICT training for all healthcare staff and that healthcare facilities should make ICT infrastructures available for staff use to improve patient care. This shows the need for regular staff training on the use of ICT to promote remote patient access by caregivers.

A quantitative cross-sectional study by Alwan et al. (2018) to determine knowledge and utilization of computers among health professionals in a developing country examined 482 health professionals working in 10 private clinics, seven hospitals, and 19 primary health centres in Ethiopia. The result showed that 90 respondents (18.7%) had good knowledge of computer use, while 142 respondents had good competence in computer use. The result further revealed that the health professionals working in the primary health centres had the slightest knowledge of computers (3.4%) and poor knowledge of computer use (18.4%). The study recommended training and continuous retraining of health professionals working in Primary Health Centres so as to ensure the implementation of eHealth systems in Primary Health Centres. This suggests that primary health centres may not have been receiving enough funding and may not have adequate infrastructures for proper patient care and follow-up hence the need for government to pay attention to these centres and equip them with electronic devices and ICT equipment to promote service delivery.

Ebrahim et al. (2019), in their quantitative cross-sectional study conducted by Addis Ababa hospitals in Ethiopia, determined the "Knowledge and utilization of computers among health workers and computer literacy in the health sector". The population of the study was 270, with an age range of 21 to 60. The result showed that 33.7 % of the respondents had good knowledge of computers, 40% had adequate understanding, and 26.3 % exhibited inadequate knowledge. Additionally, 14.1% adequately utilized computers, 5.2% showed reasonable utilization, while the majority, 80.7% of the respondents, could not use computers. This suggests that knowledge and use of computers are still poor among healthcare providers, including nurses. The study recommended increased access to computers by health care workers to improve the diffusion rate of technology to the health sector. Therefore, it is crucial to adopt electronic medical records in patient care so that those in rural areas can be remotely accessed.

A descriptive study by Sesan et al. (2022) to determine the use of ICT among primary Health Care workers in Ekiti State used a simple random sampling method to select the 301 respondents used for the study. The result of the study showed that the majority of the respondents working there were female, aged between 40 -60, on grade levels 13 – 16 in civil service but did not have an email and had no knowledge of computers. The study established low access to computers by staff, poor ICT knowledge of staff and negative attitude of the

healthcare workers on the use of ICT for patient care. This demonstrates that there is a need for sensitization of the importance of the use of ICT for patient follow-up care so that staff can accept and adopt its use.

Research Gaps

Several studies have been conducted on the use of ICT for follow-up care by doctors and other healthcare professionals. Many of these studies were conducted outside Nigeria and the researches were not focused on nurses most of the time. However, little research has been carried out on the use of ICT for patient follow-up care by Primary Healthcare Nurses. Thus, there is dearth of literature on the knowledge and use of ICT by Primary Healthcare Nurses in Rivers State. Hence, the importance of this study to determine Primary Healthcare Nurses use of ICT in patients follow-up care and the barriers that can hinder it.

res were both used. Some nurses do not have android phones and were not able to participate using the electronic questionnaires. Some that had android phones were not conversant with the use of their phones to answer questionnaires. This impacted the responses received as some questions were skipped and not answered by the respondents.

IV. DATA PRESENTATION, ANALYSIS AND DISCUSSION OF FINDINGS

4.1. Data Presentation

Table 4.1: Socio-demographic Features

Variables	Categories	Frequencies	Percentages
Age	20 – 30	76	33
	36 – 45	52	23
	46 – 60	99	44
Marital Status	Married	139	61
	Single	79	35
	Widowed	6	3
	Divorced	3	1
Gender	Male	27	12
	Female	200	88

Table 4.2 Determination of the level of knowledge & use of computer applications for follow-up care Variables		Frequencies	Percentages
Do you use a computer to store Patients data in your facility?	YES	89	40
	NO	138	60
How do you store patients records or data?	Notebook	185	81
	Computer	42	19
How do you follow-up your patients?	Follow-up cards	113	50
	Email	3	1
	Phone calls	81	36
	SMS	10	4
	None	17	8
Do you know how to use the excel spreadsheet to store and retrieve data?	YES	89	40
	NO	138	60

Table 4.3 Barriers to the use of ICT tools for healthcare follow-up

Variables	Frequencies	Percentages
What are the barriers to the use of ICT in patient follow-up care?		
Poor ICT knowledge of Primary Healthcare Nurses	124	55
Lack of Internet connectivity	104	46
Lack of electricity	94	41
The busy schedule of Primary Healthcare Nurses	97	43
No computers and ICT accessories in the facilities	154	68

Source: field data

Analysis and discussion of findings:
The result showed that out of the 264 participants used for the study, only 227 responses were obtained from the questionnaire which indicated 86% response.
Analysis of Research Question 1: Do Primary Healthcare Nurses use information technology in patient care?
Table 4.2 showed that the level of utilization of information technology by Primary Healthcare Nurses in Rivers State is poor and below average (40%). Many of the PHN (81%) still use notebooks to store and record patients data. While more than half (60%) of the PHN cannot use the excel spreadsheet to store or retrieve their patients data. Also despite the advantages of the use of ICT – for instance promoting continuity of care and easy access to patients laboratory results, the PHN still use appointment cards. This findings is not in agreement with the findings of Adesuyi et al (2020) who investigated the level of ICT use among Primary Healthcare Nurses in Ile-Ife and concluded that there was a high level of ICT utilization during healthcare delivery. However, Rabiu (2019) and a more recent study by Busayo et al (2022) agrees with the findings of this study that there is poor knowledge and use of ICT by the Primary Healthcare Workers in Jigawa State and Ado Local Government Area, Ekiti State respectively. Thus there is need for training of the PHN on the use of ICT so as to improve its use for follow-up care of patient.
Analysis of Research Question 2: What are the barriers that influence Primary Healthcare Nurses in their use of information technology for follow-up care?
Table 4.3 showed that poor ICT knowledge of Primary Healthcare Nurses and lack of computers & ICT accessories are the top barriers influencing the use of ICT by PHN. This is followed by lack of internet connectivity, PHN busy schedule and lack of electricity. Although Odiwuor et al (2019) noted lack of maintenance culture as an organizational factor that can pose a barrier to the use of ICT by healthcare professionals, they concluded that lack of electricity and poor internet connection could pose as a barrier to the use of ICT in the healthcare facility which is in line with this study. These findings correlates with Adesuyi et al (2020)s study who reported that availability of electricity and internet connections was a barrier to the accessibility of ICT in Primary Health Centres in Ile-Ife. Adesuyi added that Computer repair and maintenance could affect the utilization of ICT among PHN as well. Although a similar study in Kenya by Udousoro (2019) reported that access to internet connectivity and lack of computers were major barriers, however different levels of ICT use was observed. Similarly, Ceo et al (2019) also reported that in Yenegoa 21.4% reported that internet connectivity is one of the barriers to the use of ICT for patient care in their facility. This suggests that ICT facilities are used in various capacities to aid healthcare delivery.

V. SUMMARY, CONCLUSION AND RECOMMENDATION

In this chapter, a summary of the study is presented, a conclusion is drawn, and recommendations are given based on the research findings.

5.1 Summary

The research was carried out to examine the knowledge and use of information technology for follow-up care among primary healthcare nurses in Rivers State, Nigeria. Some of the specific objectives of the study were to assess Primary Healthcare Nurse's (PHCN) knowledge of the use of information technology (IT) for follow-up care of patients, to assess Primary Healthcare Nurse's knowledge and skills of IT for follow-up patient care, to determine Primary Healthcare Nurses knowledge and competence on the use of IT in patient care & follow-up, to determine the association between socio-demographic variables (age, educational qualification and years of experience) and the use of IT for follow-up care, to identify the barriers to Primary Healthcare Nurses Knowledge and the use of ICT for follow-up care.

A descriptive survey was adopted for the study of 264 male and female primary health care nurses who constituted the population of the study, from which a sample of 227 was obtained via the total enumeration method. The instrument was a questionnaire validated by experts who embellished it in terms of content validity. The corrected instrument was subsequently used for data collection.

A pilot study was used to determine how reliability the instrument is using a test-retest method which was administered to 15 nurses who were not part of the sample. The result was analyzed using the Pearson Product Moment Correlation Coefficient to ascertain the reliability of the instrument. Analysis of data highlighted some significant findings of the research. The effect of regression analysis rejected all four null hypotheses at a 0.05 level of significance. All predictive variables added statistically to the prediction, $P < 0.5$. Thus it was found that the majority of nurses in the study area have information technology knowledge to drive follow-up care. also, there are poor electricity supply, lack of internet connectivity and, the infeasibility of the

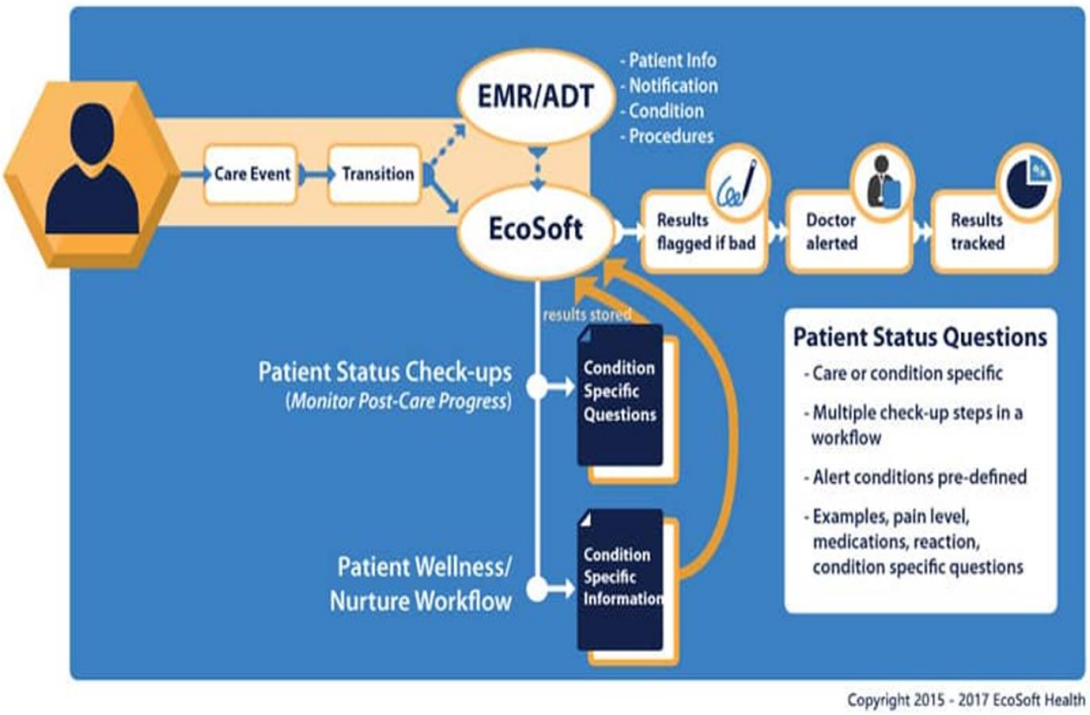
electronic health record and high work demand, unreliable network connection, inadequate number of computers in the facility are some of the barriers to the use of the electronic health records.

5.2 Conclusion

Based on the findings, this study concludes that some of the primary healthcare nurses have knowledge of information technology, and this affects patients' follow-up care passively; the level of knowledge primary healthcare nurses has on the use of information technology boost patient care and follow-up. There is an association between Healthcare nurses' knowledge and competence in the use of IT in patient care & follow-up. There is an association between socio-demographic variables (age, educational qualification and years of experience) and the use of IT for follow-up care, and there are barriers such as poor electricity supply, lack of internet connectivity and infeasibility of electronic health records and high work demand, unreliable network connection, inadequate number of computers in the facility are some of the barriers to the use of the electronic health records are some of the barriers to Primary Healthcare Nurses Knowledge to the use of ICT for follow-up care in Obio-Akpor Local Government Area of Rivers State primary health care.

5.3 Recommendations

The following recommendations were proffered based on the findings of this study.



Source: EcoSoft Health (2017). Post-Care Followup [online]. EcoSoft. Available from: https://www.ecosofthealth.com/post-care-followup/ [Accessed 12/06/2023]

1. Adopting an Electronic Medical Record (EMR) / Automated Data Transfer (ADT) system is highly recommended in primary healthcare facilities to promote continuity of care and prompt intervention, and prompt tracking of patients' test results, as seen in the diagram above.
2. Primary Healthcare Nurses should be trained regularly on how to use information technology (IT) for follow-up care of patients in the study area.
3. Evaluation should be done for all the Primary Healthcare Nurses in the study area to ascertain their knowledge and skills in information technology to enable them follow-up patient care.
4. The barriers to Primary Healthcare Nurse's Knowledge and the use of ICT for follow-up care should be looked into to boost the healthcare system in the study area.

5.4 Suggestions for Further Studies

The following suggestion is recommended.

1. Further studies should be done on the knowledge and use of information technology for follow-up care among primary healthcare nurses in Rivers State.

2. Studies should be done on challenges to the use of information technology for follow-up care among primary healthcare nurses in Rivers State.
3. The impact of Knowledge and use of information Technology for Follow-up care among primary Healthcare nurses in Rivers State

REFERENCES

[1]. Abejirinde, I. (2018). Diagnostic and clinical decision support systems for antenatal care: is mHealth the future in low-resource settings? Erasmus Mundus Joint Doctorate Trans Global Health Programme.
[2]. Adesuyi, A.B., Abolarinwa C.O., Haux, R., Pohl, U., Rebel, S., & Ziegler, S. (2020). A randomised evaluation of a computer-based nursing documentation system. Methods Informatics Medicine, 40 (2), 61-8.
[3]. Adebayo, K. J., & Ofoegbu, E. O. (2018). Issues on E-health Adoption in Nigeria. International Journal of Modern Education and Computer Science, 6(9), 36.
[4]. Alwan, K., Awoke, T., Tilahun B. (2019). Knowledge and utilization of computers among health practitioners in a developing country: A cross-sectional study. J Med Internet Res;2:e4.
[5]. Arditi, C., Rège-Walther, M., Wyatt, J.C., Durieux, P., & Burnand, B. (2019). Computer-generated reminders delivered on paper to healthcare professionals; effects on professional practice and health care outcomes. Cochrane Database Systematic Reviews,12 (12), 23-35.
[6]. Awad, A., Trenfield, S. J., Pollard, T. D., Ong, J. J., Elbadawi, M., McCoubrey, L. E.,. & Basit, A. W. (2021). Connected healthcare: Improving patient care using digital health technologies. Advanced Drug Delivery Reviews, 178, 113958.
[7]. Barry, M., Doherty, K., Marcano, B.J. (2019). Health for maternal mental health: everyday wisdom in ethical design. Proceedings of the 2019 CHI Conference on Human Factors in Computing Systems: ACM.
[8]. Bettany-Saltikov, J. (2013). How to do a systematic literature review in nursing: a step-by-step guide. Maidenhead: McGraw-Hill/Open University Press.
[9]. Bexci, M.M. & Subramani, R. (2019). Follow-up Treatment: A Case Report of Surgeon and Parent use of Skype Communication. Indian Journal of Medicine and Healthcare. 4 (3), 278-296.
[10]. Bosman, R.J., Rood, E., Oudemans-van Straaten, H.M., Van der Spoel, J.I., Wester, J.P., & Zandstra, D.F. (2019). Intensive care information system reduces the documentation time of the nurses after cardiothoracic surgery. Intensive Care Medicine, 29 (1),83-90.
[11]. Buntin, M., Burke, M., Hoaglin, M., & Blumenthal, D. (2019). The benefits of health information technology: a review of the recent literature shows predominantly positive results. Health Affairs (Millwood). 30 (3), 464-71.
[12]. Busayo, S., Olajide, O., Fagbuaro, F. & Ajeyomi, K. (2022). The Use of Information and Communication Technology (ICT) Among Primary Health Care Workers In Ado Local Government Area, Ekiti State, Nigeria. Academia Letters, Article 4947.
[13]. Carlfjord, S., Lindberg, M., Bendtsen, P., Nilsen, P., & Andersson, A. (2010). Key factors influencing adoption of an innovation in primary health care: a qualitative study based on implementation theory. BMC family practice, 11(1), 1-11.
[14]. Centers for Disease Control and Prevention (2021). Community Assessment for Public Health Emergency Response (CASPER): Analyze & Report [online]. CDC. Retrieved from https://www.cdc.gov/nceh/casper/phase34.htm# on 30th September, 2022.
[15]. Chib, A., Lwin, M. O., Ang, J., Lin, H., & Santoso, F. (2008). Midwives and mobiles: using ICTs to improve healthcare in Aceh Besar, Indonesia. Asian Journal of Communication, 18(4), 348-364.
[16]. Cohen, D, McDaniel, R.R. Jr, Crabtree, B.F., Ruhe, M.C., Weyer, S.M., Talia, A., Miller, W.L., Goodwin, M.A., Nutting, P., Solberg, L.I., Zyzanski, S.J., Jaén, C.R., Gilchrist, V., & Stange ,K.C. (2014). A practice change model for quality improvement in primary care practice. Journal of healthcare management/American College of Healthcare Executives. 49:155.
[17]. Christiansen L, Fagerström C, Nilsson L. (2019). Nurses' Use and Perception of an Information and Communication Technology System for Improving Coordination During Hospital Discharges: A Survey in Swedish Primary Healthcare. Computer Informatics Nursing. 35(7):358-363. doi: 10.1097/CIN.0000000000000335. PMID: 28679125.
[18]. Dalton, J. A., Rodger, D. L., Wilmore, M., Skuse, A. J., Humphreys, S., Flabouris, M., & Clifton, V. L. (2018). "Who's afraid?" attitudes of midwives to the use of information and communication technologies (ICTs) for delivery of pregnancy-related health information. Women and Birth, 27(3), 168-173.
[19]. Daly, J.M., Buckwalter, K., & Maas, M. (2018). Written and computerised care plans. Organisational processes and effect on patient outcomes. Journal of Gerontology Nursing, 28 (9),14-23. doi: 10.3928/0098-9134-20020901-05. PMID: 12240516.
[20]. Darvish, A., Bahramnezhad, F., Keyhanian, S., & Navidhamidi, M. (2018). The Role of Nursing Informatics on Promoting Quality of Health Care and the Need for Appropriate Education. Global Journal of Health Science, 6(6), 11-18.
[21]. Dearing, J. and Cox, J. (2018) Diffusion of Innovation Theory, Principles and Practice. Health Affairs. 37 (2), 183-190.
[22]. De-lone, W.H, & McLean, E.R. (2019). The De-Lone and McLean model of information systems success: a ten-year update Manage Inform Syst.19 (4):9–30.
[23]. Deshmuch, M, & Michael, P. (2013). Addressing gender and women's empowerment in m-health for MNCH: An analytical framework Washington (DC): m-Health Alliance.
[24]. Dokas, I.M. (2015). Developing web sites for web-based expert systems: a web engineering approach. In: Proceedings of the Information Technologies in Environmental Engineering – ITEE2007, Otto-von-Guericke Universidad, Magdeburg, Germany, 25–27.
[25]. Durrani, H., Khoja, S., Naseem, A., Scott, R. E., Gul, A., & Jan, R. (2019). Health needs and eHealth readiness assessment of health care organizations in Kabul and Bamyan, Afghanistan, Eastern Mediterranean Health Journal, 18(6): 663.
[26]. Eason, K., & Waterson, P. (2018). The implications of e-health system delivery strategies for integrated healthcare: lessons from England. International journal of medical informatics, 82(5), e96-e106.
[27]. EcoSoft Health (2017). Post-Care Followup [online]. EcoSoft. Available from: https://www.ecosofthealth.com/post-care-followup/
[28]. Ferraro, N. (2018). Africa's portal to the Internet, Information Week, February 04, Pp. 36-42. Theoretical models, Communications of the ACM, 3(5): 982-1003.
[29]. Furusa, S. S., & Coleman, A. (2018). Factors influencing e-health implementation by medical doctors in public hospitals in Zimbabwe. South African Journal of Information Management, 20(1), 1-9
[30]. Grönvall ,E., Verdezoto, N. (2018). Beyond self-monitoring: understanding non-functional aspects of home-based healthcare technology. Proceedings of the 2018 ACM international joint conference on Pervasive and ubiquitous computing: ACM.

[31]. Hebda, T., & Czar, P. (2013). Handbook of Informatics for Nurses and Healthcare Professionals. Fifth Edition. New Jersey, Pearson Education Incorporated. United States of America.
[32]. Hefler, M., Kerrigan, V., Henryks, J., Freeman, B., & Thomas, D. P. (2019). Social media and health information sharing among Australian Indigenous people. Health Promotion International, 34(4), 706-715.
[33]. Holden, R.J., Karsh, B.T. (2018). The technology willingness model: it's past and it is future in health care. J Biomed Inform; 43 (01):159–172.
[34]. Hoque, M. R., Bao, Y., & Sorwar, G. (2018). Investigating factors influencing the adoption of e-Health in developing countries: A patient's perspective. Informatics for Health and Social Care, 42(1), 1-17.
[35]. Hughson, J.P., Daly, J.O., Woodward, R., Hajek, J, Story, D. (2018). The rise of pregnancy Apps and the implications for culturally and linguistically diverse women: Narrative Review. JMIR m-Health and eHealth; 6(11):e189.
[36]. International Confederation of Midwives (2017). International Definition of the Midwife, The Hague, Netherlands: International Confederation of Midwives.
[37]. Irinoye, O.O., Ayandiran, E.O., Fakunle, I., Mtshali, N. (2019). Nurses' Perception and Barriers To Use of Information Communication Technology In A Teaching Hospital In Nigeria. Computers, Informatics, Nursing 31(8), 394-400. 10.1097/Nxn.0b013e3182997a6e.
[38]. Iqbal, U., Ho, C., Li, Y.J., Nguyen, P., Jian, W. and Wen, H. (2018). The relationship between usage intention and adoption of electronic health records at primary care clinics. Computer Methods and Programs in Biomedicine. 112 (3), 731-737.
[39]. Källander, K., Tibenderana, J.K., Akpogheneta O.J. (2019) .Mobile health (mHealth) approaches and lessons for increased performance and retention of community health workers in low- and middle-income countries: a review. J Med Internet Res.15 (1):e17.
[40]. Kemp, S. (2020). Global digital overview. Data Reportal . Available from: https://datareportal.com/reports/digital-2020-global-digital-overview.
[41]. Khoja, S., Durrani H., Nayani, P., & Fahim, A. (2019). Scope of policy issues in eHealth: Results from a structured literature review, Journal of Medical Internet Research, 14(1): 34-39.
[42]. Kibera V. M., Mars, M., & Scott, R.E. (2018). Barriers and opportunities to implementation of sustainable e-health programs in Uganda: a literature review. Afro J Prim Health Care FAM Med. 9(1):a1277.
[43]. Kiberu, V. M., Scott, R. E., & Mars, M. (2019). Assessing core, e-learning, clinical and technology readiness to integrate telemedicine at public health facilities in Uganda: a health facility–based survey. BMC health services research, 19(1), 1-11.
[44]. Kiberu, V. M., Scott, R. E., & Mars, M. (2019b). Assessment of health provider readiness for telemedicine services in Uganda. Health Information Management Journal, 48(1), 33-41.
[45]. Kiberu, V., Matovu J., Makumbi, F., Kyozira, C., Mukooyo, and E., Wanyenze, R.K. (2018). Strengthening district-based health reporting through the district health management information software system: the Ugandan experience. BMC Med Inform Decis. 14:40.
[46]. Kim, M., Coiera, E., & Magrabi, F. (2019). Problems with health information technology and their effects on care delivery and patient outcomes: a systematic review. Journal of American Medical Information Association. 24 (20), 246-250.
[47]. Kontos, E., Blake, K.D., Chou W-YS, (2018). Predictors of eHealth usage: insights on the digital divide from the Health Information National Trends Survey 2012. Journal of Medical Internet Research; 16(7):e172.
[48]. Kraai, I. & Lesman, I. (2019). The value of telemonitoring and ICT-guided disease management in heart failure: Results from the IN TOUCH study. International Journal of Medical Informatics, 85 (1), 53-60.
[49]. Lapointe, L., Lamothe, L., & Fortin, J. (2019). The dynamics of IT adoption in a major change process in healthcare delivery. In Spil, T.A.M., & Schuring, R.W. (Eds.) E-health systems diffusion and use: The innovation, the user and the use IT model, London, The Idea Group Publishing.
[50]. LeFevre, A. E., Mohan, D., Hutchful, D., Jennings, L., Mehl, G., Labrique, A., & Moorthy, A. (2018). Mobile Technology for Community Health in Ghana: what happens when technical functionality threatens the effectiveness of digital health programs?. BMC medical informatics and decision making, 17(1), 1-17.
[51]. Lindberg, B., Nilsson, C., & Skar, L. (2018). Using Information and Communication Technology in Home Care for Communication between Patients, Family Members, and Healthcare Professionals: A Systematic Review. International Journal of Telemedicine Applications. 10 (3), 23-27.
[52]. Long, L. A., Pariyo, G., & Kallander, K. (2018). Digital technologies for health workforce development in low-and middle-income countries: a scoping review. Global Health: Science and Practice, 6(Supplement 1), S41-S48.
[53]. Luna, D., Almerares, A., Mayan, J. C., de Quirós, F. G. B., & Otero, C. (2018). Health informatics in developing countries: going beyond pilot practices to sustainable implementations: a review of the current challenges. Healthcare informatics research, 20(1), 3-10.
[54]. Mackert, M., Mabry-Flynn, A., Champlin, S., Donovan, E. E., & Pounders, K. (2019). Health literacy and health information technology adoption: the potential for a new digital divide. Journal of medical Internet research, 18(10), e6349.
[55]. Mair, F. S., May, C., O'Donnell, C., Finch, T., Sullivan, F., & Murray, E. (2019). Factors that promote or inhibit the implementation of e-health systems: an explanatory systematic review. Bulletin of the World Health Organization, 90, 357-364.
[56]. Mather, C. A., & Cummings, E. (2019). Developing and sustaining digital professionalism: a model for assessing readiness of healthcare environments and capability of nurses. BMJ health & care informatics, 26(1).
[57]. Mauco, K. L., Scott, R.E., & Mars, M. (2018). Critical analysis of e-health readiness assessment frameworks: suitability for application in developing countries. J Telemed Telecare. 24(2):110–7.
[58]. Mayes, M. E., Wilkinson, C., Kuah, S., Matthews, G., & Turnbull, D. (2018). Change in practice: a qualitative exploration of midwives' and doctors' views about the introduction of STan monitoring in an Australian hospital. BMC health services research, 18(1), 1-9.
[59]. Mendoza G, Okoko L, Morgan G, Konopka S.et al. (2018). MHealth compendium: African strategies for health project, management sciences for health.2:1- 80.
[60]. Mengiste, S. A. (2018). Analyzing the challenges of IT implementation in public health institutions of a developing country: The need for flexible strategies, Journal of Health Informatics in Developing Countries, 4(2): 22-36.
[61]. Mitchell, M., & Kan, L. (2019). Digital technology and the future of health systems. Health Systems & Reform, 5(2), 113-120.
[62]. Moorhead, S.A., Hazlett D.E., Harrison, L., Carroll J.K., Irwin, A., Hoving, C. (2018). A new dimension of health care: a systematic review of the uses, benefits, and limitations of social media for health communication. J Med Internet Res; 15 (4):e85.
[63]. Mosse, E., & Sahay, S. (2018). Counter networks, communication, and health information systems: A case study from Mozambique, In the IFIP TC8 & TC9/WG8.2+9.4 Working Conference on Information Systems Perspectives and Challenges in the Context of Globalization. M. Korpela, R. Montealegre and A. Poulymenakou , Athens, Greece. 35-51.

[64]. Mustafa, M., Batool, A., Fatima, B., Nawaz, F., Toyama, K., & Raza, A. A. (2020). Patriarchy, Maternal Health, and Spiritual Healing: Designing Maternal Health Interventions in Pakistan. In: Proceedings of the 2020 CHI Conference on Human Factors in Computing Systems: 1–13.

[65]. Nadri, H., Rahimi, B., Lotfnezhad. H., Samadbeik, M., & Gravened, A. (2018). Factors affecting the willingness of hospital information systems based on extended technology willingness model: a case study in three Para clinical departments. Applied Clinical Informatics 9(02): 238–247.

[66]. Namusobya, S. (2018). Litigating the Right to Health in Uganda: The Necessity for innovation and activism. Litigating the Right to Health in Africa: Challenges and Prospects, 119-39.

[67]. National Coordinator for Health Information Technology (2018). Non-federal acute care hospital health IT adoption and use: health IT dashboard [online]. Retrieved from https://dashboard.healthit.gov/apps/hospital-health-it on 26th September, 2022.

[68]. National Coordinator for Health Information Technology (2018). Benefits of Health Information Technology. Washington, DC: US Department of Health and Human Services.

[69]. Neilson, J.P. (2015). Fetal electrocardiogram (ECG) for fetal monitoring during labor. In Cochrane Database of Systematic Reviews; Chihester.

[70]. Neter, E., & Brainin, E. (2018). eHealth literacy: extending the digital divide to the realm of health information. Journal of medical Internet research, 14(1), e1619.

[71]. Nunes, F., Verdezoto, N., Fitzpatrick G. (2018). Self-care technologies in HCI: Trends, tensions, and opportunities. ACM Transactions on Computer-Human Interaction (TOCHI); 22 (6):33.

[72]. Ojo, I.O. & Adegbile, F. I. (2021). Perception of Nurses in a Federal and State-Owned Hospital in Nigeria Toward Electronic Health Record Integration. CIN: Computers, Informatics, Nursing 39(11): 741-746.| 10.1097/CIN.0000000000000713.

[73]. Ojo, I. O., Müller, S.M., Akinola, B. & Adereti, S. (2022). Perception of Healthcare Workers on the Integration of Electronic Health Records in Primary Health Centers in Nigeria. Computers, Informatics, Nursing 40(11), 786-794, November 2022. | DOI: 10.1097/CIN.0000000000000874.

[74]. Perez, S. (2019). App stores saw record 204 billion app downloads in 2019, consumer spend of $120 billion. TechCrunch https://techcrunch.com/2020/01/15/app-stores-saw-record-204-billion-app-downloads-in-2019-consumer-spend-of-120-billion/

[75]. Pimmer, C., & Tulenko, K. (2018). The convergence of mobile and social media: Affordances and constraints of mobile networked communication for health workers in low-and middle-income countries. Mobile Media & Communication, 4(2), 252-269.

[76]. Pouschter J., Stewart R. (2018). Smartphone ownership and Internet usage continues to climb in emerging economies but advanced economies still have higher rates of technology use. Pew Research Center. http://www.pewglobal.org/2016/02/22/smartphone-ownership-and-internet -usage-continues-to-climb-in-emerging- professionals in the United Kingdom.; 1:1-10.

[77]. Rouleau, G., Gagnon, M.P., & Côté J. (2019). Impacts of information and communication technologies on nursing care: an overview of systematic reviews (protocol). Systematic Reviews. 75 (4). doi: 10.1186/s13643-015-0062-y.

[78]. Secginli, S., Erdogan, S. and Monsen, K.A. (2018) Attitudes of health professionals towards electronic health records in primary health care settings: a questionnaire survey. Informatics for Health and Social Care. 39(1), 15-32.

[79]. Siltig, D.F., Wright, A., Ash, J., & Singh, H. (2019). New unintended adverse consequences of electronic health records. Yearbook of Medical Informatics. 10 (1), 7-12.

[80]. Simba, D.O. (2018). Application of ICT in strengthening health information systems in developing countries in the wake of globalisation. African Health Science, 5 (1), 85.

[81]. Speciale, A. M., & Freytsis, M. (2018). mHealth for midwives: a call economies/. Journal of Model Management 2(03): 251–280.

[82]. Stisen, A., Verdezoto, N., Blunck, H. (2018). Accounting for the invisible work of hospital orderlies: Designing for local and global coordination. Proceedings of the 19th ACM Conference on Computer-Supported Cooperative Work & Social Computing: ACM.

[83]. Surendran, P. (2013). Technology willingness model: a survey of the literature. Int J Business Soc 2(04):4

[84]. Thapa, S., Nielsen, J. B., Aldahmash, A. M., Qadri, F. R., & Leppin, A. (2021). Willingness to use digital health tools in patient care among health care professionals and students at a University Hospital in Saudi Arabia: quantitative cross-sectional survey. JMIR medical education, 7(1), e18590.

[85]. Terry, A., Brown, J., Bestard, D.L., Thind, A., & Stewart, M. (2019). Perspectives on electronic medical record implementation after two years of use in primary healthcare practice. Journal of American Board of Family Medicine. 25 (4), 522-527.

[86]. Tubaishat, A. (2021). The Adoption of Electronic Health Records in Primary Healthcare Settings. CIN: Computers, Informatics, Nursing 39(12): 883-889. DOI: 10.1097/CIN.00000000000007.

[87]. ULUC, C. İ., & Ferman, M. (2016). A comparative analysis of user insights for e-health development challenges in Turkey, Kingdom of Saudi Arabia, Egypt and United Arab Emirates. Journal of Management Marketing and Logistics, 3(2), 176-189.

[88]. Van, J. (2013). Inequalities in the Network Society. In: Orton-Johnson K, Prior N. (eds.) Digital Sociology Critical Perspectives. Hampshire, UK: Palgrave MacMillan.

[89]. While, A., & Dewsbury, G. (2016). Nursing and information and communication technology (ICT): A discussion of trends and future directions. International Journal of Nursing Studies, 48(10), 1302– 1310. doi:10.1016/j.ijnurstu.2011.02.020.

[90]. World Health Organization. (2019a). Recommendations on digital interventions for health system strengthening: web supplement 2: summary of findings and GRADE tables no. WHO/RHR/19.7. World Health Organization; Geneva.

[91]. World Health Organization. (2019b).The roadmap for health measurement and accountability Geneva and Washington (DC):www.who.int/rh/documents/roadmap4health-measurement_accountability.pdf.

[92]. World Health Organization. (2019c). Maternal mortality: evidence brief (No. WHO/RHR/19.20). World Health Organization; Geneva.

[93]. World Health Organization (2018a). Global Observatory for eHealth [online]. WHO.

[94]. Retrieved from: https://www.who.int/goe/en/ on 26th September, 2022.

[95]. World Health Organization. (2018b). Good practices in nursing and midwifery–from expert to expert. A manual for creating country case studies. World Health Organization; Geneva.

[96]. World Health Organization. (2018c) mHealth: New Horizons for Health through Mobile Technologies. Global Observatory for eHealth Series.3:1-111.

[97]. World Health Organization. (2017). Medical Devices: Managing the Mismatch: An Outcome of the Priority Medical Devices Project. In: Organization WH. World Health Organization; Geneva.

[98]. World Health Organization. (2016). New horizons for health through mobile technologies. Geneva: Global Observatory for eHealth series, volume 3; http://www.who.int/goe/ publications/goe_mhealth_web.pdf, accessed February 2022

[99]. World Health Organization. (2016b). the roadmap for health measurement and accountability Geneva and Washington (DC): World Bank Group, United States Agency for International Development and World Health Organization; www.who.int/rh/documents/roadmap4health-measurement_accountability.pdf, accessed January 2022.
[100]. Yagos, W. O., Tabo Olok, G., & Ovuga, E. (2018). Use of information and communication technology and retention of health workers in rural post-war conflict Northern Uganda: findings from a qualitative study. BMC medical informatics and decision making, 17(1), 1-8.
[101]. Yarbrough, A.K., & Smith, T.B. (2018). Technology willingness among physicians: a new take on TAM. Med Care 64(06): 650–672.
[102]. Yousafzai, S.Y., Fox all, G.R., & Pallister, J.G. (2018). Technology willingness: a meta-analysis of the TAM: part 1. Journal of Model Management 2(3): 251–280.
[103]. Zadvinskis, I.M., Smith, J.G., & Yen, P. (2018). Nurses' Experience With Health Information Technology: Longitudinal Qualitative Study. JMIR Medical Informatics. 6 (2), e38.
[104]. Zayyad, M. A., & Toycan, M. (2018). Factors affecting sustainable adoption of e-health technology in developing countries: an exploratory survey of Nigerian hospitals from the perspective of healthcare professionals. PeerJ, 6, e4436.