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# **Implementing the Electronic Health Record in a Nigerian Secondary Healthcare Facility: Prospects and Challenges.**

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## ABSTRACT

Nigeria is witnessing continuing advocacy and increase in number of individuals yearning for computerization of health information and healthcare processes. However, little is known about the opinions of the diverse healthcare providers who would ensure the successful implementation and meaningful use of health information technology in the country (Adeleke, Erinle et al. 2015).

This study explores the perceived challenges and prospects from the perspectives of doctors, through their knowledge and experience, that may be associated with the implementation of an electronic health record at the General Hospitals where they work. The study also sought their views on the benefits of the system if implemented. With an interpretive case study research approach, empirical material was collected from doctors in General Hospitals in three different states of Nigeria using informal phone discussions.

Findings from the survey revealed that challenges associated with the implementation of EHRs in General Hospitals in Nigeria include infrastructure issues like power supply and inadequate ICT equipment; human factors issues like inadequate computer skill among non-medical and non-clinical staff; as well as political issues such as poor administration, corruption and financial constraints. And while the participants believed that willingness of the doctors to adopt the EHR system and good knowledge of computer use among the doctors were prospects to implementing the EHR, the participants agreed that benefits such as improved access to and enhanced confidentiality and safety of patient data as well as enhanced service delivery will be derived from implementing the EHR at the hospitals where they work.

**Keywords:** Electronic Health Records, Information Infrastructure, Secondary Healthcare Facility, Nigeria, Implementation, Prospects, Challenges

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## LIST OF ABBREVIATIONS

AMA	American Medical Association
ANT	Actor-Network Theory
CBHI	Community Based Health Insurance
CDSS	Clinical Decision Support System
CISCO	Computer Information System Company
CMR	Computerized Medical Record
CPOE	Computerized Physician Order Entry
EHIMS	Electronic Health Information Management System
EHR	Electronic Health Record
EMR	Electronic Medical Record
EPR	Electronic Patient Record
FMoH	Federal Ministry of Health
GDP	Gross Domestic Product
HIT	Health Information Technology
ICT	Information and Communication Technology
II	Information Infrastructure
IMF	International Monetary Fund
IOM	Institute of Medicine
IS	Information Systems
ISO	International Standards Organization

IT	Information Technology
LGA	Local Government Area
NHIS	National Health Insurance Scheme
NSHDP	National Strategic Health Development Plan
NHMIS	National Health Management Information Systems
OAUTHC	Obafemi Awolowo University Teaching Hospital
PCIS	Patient Care Information System
PHC	Primary Health Care
PHI	Private Health Insurance
PPP	Public Private Partnership
SHONET	State Hospital Network
SMoH	State Ministry of Health
THE	Total Health Expenditure
UPS	Uninterrupted Power Supply
VA	Veteran Administration
WHO	World Health Organization





## CHAPTER ONE

### INTRODUCTION

#### 1.1 Background of study

The healthcare delivery system of a nation hinges, amongst other things, on how well its hospitals can deliver qualitative and affordable healthcare to its citizens. Thus, the role of hospitals in the healthcare delivery system of a nation cannot be overemphasized (Ojo and Popoola 2015). Health records are essential for good healthcare and good quality healthcare data play a vital role in the planning, development and maintenance of optimal healthcare (Adeleke 2014). The amount and quality of information available to healthcare professionals in patient care impact the outcome and continuity of patient care. Furthermore, medical information needed for clinical decision making continues to increase, especially in developing countries. However, the organization and accessibility of medical information remain poor, usually resulting in inappropriate decisions and medical errors (Delpierre, Cuzin et al. 2004). Electronic Health Information Management Systems (EHIMS) are therefore seen as crucial for increasing accessibility and management of medical information (Bleich, Beckley et al. 1985).

The history of health informatics in Nigeria started in the late 80s when a collaborative research project between the Computing Centre of the University of Kuopio, Finland; the Obafemi Awolowo University; and the Obafemi Awolowo University Teaching Hospital (OAUTHC), Nigeria was initiated (Idowu, Ogunbodede et al. 2003a). The joint project produced a very rudimentary hospital information system based on the Veterans Administration's (VA) Admission Discharge Transfer running on a stand-alone PC which was in use at OAUTHC in 1991 (Daini, Korpela et al. 1992). In the late 1990s, the Finnish/Nigerian research team decided to expand their rudimentary hospital information system with the aim of developing a comprehensive system suitable for use in all Nigerian Teaching Hospitals and medical centres. The plan then was that by 2001 all the Teaching Hospitals in Nigeria would have health informatics units which could make use of standardised software. Unfortunately, the system was not tested at OAUTHC and only five teaching hospitals and medical centres use the system as at 2007. The primary reason for this limited use is the cost of purchasing the commercial software (Idowu, Cornford et al. 2008). In 2003, a non-commercial software package called the State Hospital Network (SHONET) was developed for sharing of hospital resources over the computer network in Nigeria. The philosophy behind the development of the software was

to minimize the cost of running state hospitals (Idowu, Adagunodo et al. 2003b). In 2004, another system was developed at the Department of Computer Science & Engineering, Obafemi Awolowo University, Nigeria. The system was designed for referral of patients from one hospital to another such that patient's case file, referral note and medical examination result that were transferred manually from one hospital to another could be transferred over a computer network (Idowu, Adagunodo et al. 2004).

Nigeria is witnessing continuing advocacy and increase in number of individuals yearning for computerization of health information and healthcare processes. On the other hand, the Government is evolving plans and strategies for the adoption and implementation of health information technology (Adeleke, Erinle et al. 2015). To improve the use of ICT in healthcare delivery in the country, the Nigerian Government developed a 5-year Strategic plan on health with health information system taking a strategic position. The goal is to provide an effective National Health Management Information System (NHMIS) by all the governments of the Federation to be used as a management tool for informed decision making at all levels and for improved healthcare (Adeleke, Erinle et al. 2015). In furtherance of her efforts to achieve the plan, the Government recognized the need to have a harmonized health information management through Health Information Technology (HIT). It was on this premise that the first National Conference on HIT was organized by the Federal Ministry of Health (FMoH) between November 2 and 4 2011. The focus of the conference was to have one harmonized health data management system and the specific objectives were to compile a list of health information system applications in use in the country, to review the interoperability of the existing systems, to review the Health Information Technology components of the country's ehealth strategies and to propose strategies for the establishments of interoperability standards and capacity building. Subsequently, the National Council on Health in August 2013 approved the deployment of EHRs in all thirty six states of the federation, including the Federal Capital Territory (Adeleke, Erinle et al. 2015). Furthermore, in pursuance of plans to ensure Universal Health Coverage for all citizens by the year 2020 through leverage on the vast potentials of ICT, the FMoH through her National Health ICT Strategic Framework 2015-2020 intends to scale-up ICT infrastructure in all health facilities across the country to ensure they are in step with Health ICT and health system priorities (FMoH 2016a).

## 1.2 Statement of problem

With many Secondary Healthcare facilities (General Hospitals) in Nigeria without electronic health records, healthcare delivery is sometimes impaired with the current use of temporary cards. The upsurge in the number of patients seeking health care services requires a fast and efficient records keeping. This is one of the driving forces behind the research into the barriers militating against the implementation of the EHR in a Nigerian Secondary Healthcare facility.

The introduction of ICT-based initiatives to transform existing paper-based information management systems in most public health institutions in developing countries has usually been a difficult process of change, often fraught with several context-sensitive challenges and problems such as lack of adequate resources (poor financial resources) and uneven infrastructural development (Mosse and Sahay 2003, AbouZahr and Boerma 2005), inadequate skills and knowledge at a local level to handle new systems and technologies (Kimaro and Nhampossa 2005), fragmented and uncoordinated organizational structure and heterogeneity of stakeholders (Chilundo and Aanestad 2004), political and bureaucratic constraints (Heeks 2002, Mosse and Sahay 2003). Studies have also reported attempts, by governments and donors, concerning the design, development, and implementation of Electronic Health Information Management Systems in different developing countries (Rubona 2001, Lungo 2003). However, many of these efforts have proven to be unsustainable because of political, socioeconomic, and technological factors (Mursu, Olufokunbi et al. 2000). It has been reported that political factors such as change in the government, eagerness to invest on the part of the government, government policy, tools for quality assurance, and a flexible government bureaucracy, will influence the successful implementation of EHIMS in Nigerian tertiary hospitals. The more the political factors are taken care of, the more will be the success of EHIMS (Ojo and Popoola 2015). It is therefore essential that the actors in the health information systems fully engage in politics to acquire sustainability (Braa, Monteiro et al. 2004).

Given the high failure rate of EHIMS, successful implementation is imperative to actualize its benefits. An effective EHIMS is one that serves its intended purposes after implementation (Ojo and Popoola 2015). The success of the system is achieved through user satisfaction with the system, which is a result of prolonged use, consequently producing the desired benefits. The success of EHIMS or its efficiency can be measured along several themes of quality dimension (system quality, information quality, and service quality) as well as usage (Marasovic, Kenney et al. 1997, Cork, Detmer et al. 1998, Lee, Yeh et al. 2002, DeLone and

McLean 2003). The understanding of the factors responsible for the success of the EHIMS is therefore critical to improved healthcare as a whole.

### 1.3 Purpose of study

The purpose of the study is to explore the prospects and challenges of implementing the EHR in a Nigerian Secondary Healthcare facility. We believe that an exploration of these factors will help in developing and proposing a framework to understand the design, development, and implementation of a successful EHR in a Nigerian secondary healthcare facility, taking into consideration the complexities of the health environment. The study can lead to a good understanding of the dynamics of these complexities and thus offer opportunities and strategies that can enable a successful implementation of the system. Lessons learnt from this research can be used to inform decisions and guide the implementation of the system in such healthcare facilities across the country as well as serve as a framework on which health managers and stakeholders can develop strategic policies that can enable the implementation of the system in a secondary healthcare facility. In addition, it can serve as a source of information to the stakeholders in the Nigerian health sector as well as international stakeholders in health including the World Health Organization (WHO) and the International Monetary Fund (IMF).

### 1.4 Research questions

1. How much knowledge of the EHR system do the healthcare professionals in a Nigerian secondary healthcare facility have?
2. What do the healthcare professionals perceive are the challenges to the implementation of the EHR in their facility?
3. What do the healthcare professionals believe are the prospects/facilitators to implementing the EHR in their facility?

### 1.5 Motivation for the study

The motivation for the study stems from the fact that despite the opportunities inherent in the use of EHR, several government hospitals in Nigeria are yet to adopt the system. A previous study indicated that providers and stakeholders of the Nigerian healthcare system are quite abreast of the benefits of the EHR and are willing to embrace the technology in their workflow. These healthcare providers exhibited readiness to adopt the technology and the government as well is positively disposed to the nationwide implementations of the technology (Adeleke, Erinle et al. 2015). I chose to carry out the study in General Hospitals because they are located mostly in the sub-urban areas of Nigeria often fraught with infrastructural and manpower

issues. This study will unearth the prospects and challenges of implementing an EHR in a Nigerian public hospital and can serve as a framework for other hospitals on the verge of implementing an EHR to follow.

### 1.6 Expected contribution of the study

As the first study in Nigeria, to the best of the researcher's knowledge, to seek the views of doctors working in a Nigerian Secondary Healthcare facility on the prospects and challenges of implementing an EHR in their facility, insights generated could serve as a guide to future efforts to install the system in such settings.

The study can also guide system developers and healthcare managers in the design and implementation of EHR systems that are sustainable vis-a-vis the peculiarities of Nigerian Secondary Healthcare facilities, most of which are in sub-urban towns in Nigeria often plagued by various infrastructural challenges like inadequate power supply, inadequate qualified medical personnel, poor road network and poor internet access among other things.

As efforts are currently underway by the FMOH to scale-up ICT infrastructure in all health facilities, findings from this study may be valuable for policy formulation and implementation of electronic health records. It will also contribute to existing knowledge on issues associated with deployment and implementation of electronic health records in developing countries.

### 1.7 Organization of thesis

The document has been organized into six main chapters. Chapter one entails the introductory aspect of the study that captures the background, statement of the problem, objectives of the study, research questions and the significance of the study; Chapter two sheds light on literature review and theoretical perspective; Chapter three presents the methodology used in the conduct of the study as well as the detailed description of the study country and study facility; Chapter four includes findings from informal phone discussions; Chapter five discusses the findings of the study in relation to theories and literature on the topic; and Chapter six contains the presentation of overall study findings, the study's conclusion and recommendations for further research.



## CHAPTER TWO

# THEORITICAL FRAMEWORK AND LITERATURE REVIEW

## 2.0 Introduction

Information from a patient's record is critical in making health-related decisions and timely access to this information in healthcare facilities is paramount to achieving efficient care delivery (Kumar 2011). The purpose of a patient record is to recall observations, to inform others, to instruct students, to gain knowledge, to monitor performance, and to justify interventions (Reiser 1991). However, observational studies of physicians' use of the paper-based record find logistical, organizational, and other practical limitations reduce the effectiveness of the traditional records for storing and organizing an ever-increasing number of diverse data (Tang and McDonald 2006). An electronic health record (EHR) is designed to overcome many of these limitations, as well as to provide additional benefits that cannot be attained by a static view of events (*Ibid*).

This section gives an overview of the theories that underscore the study, as it reviews EHR as an Information Infrastructure and as an actor in the Actor-Network Theory. It then proceeds to evaluate the two ways of record keeping in healthcare facilities: paper-based system and electronic health record system. An in-depth exploration of the EHR was presented which highlighted the structure, benefits and challenges associated with its implementation. The section concludes with a summary and the rationale for the present study.

## 2.1 Theoretical framework

This study is predicated on the concept of Information Infrastructure (II) and the Actor-Network Theory (ANT). Bowker, Baker et al. (2010) stated that when dealing with information infrastructures, we need to look to the whole array of organizational forms, practices, and institutions that accompany, make possible, and inflect the development of new technology, their related practices, and their distributions. They noted further that people, routines, forms, and classification systems are as integral to information handling as computers, ethernet cables, and web protocols. Moreover, they explained that the boundary between technological and organizational means of information processing is both diffuse and mobile and can be shifted in either direction because technological mechanisms can only substitute for human and organizational ones when the latter are prepared to support such substitution (*Ibid*). It can be deduced that the successful implementation of the EHR in a Nigerian secondary healthcare



facility therefore depends on both the system and the people (organization) that will be involved in its implementation and use.

Monteiro (2000) described the development, introduction and use of II as an involved socio-technical process of negotiation where non-technical issues sometimes get dressed up in technical disguise therefore requiring an analytical vehicle like the ANT to unravel issues related to the ‘management’ of such processes. He stated further that “*ANT provides an effective platform from which to critically assess and unravel a set of problematic set of explicit and implicit assumptions made from the management perspective on information infrastructure*” (*Ibid*). In a similar vein, McMaster, Vidgen et al. (1997) opined that since the nature of EHR implementation is a political-negotiating process, ANT provides an analytical framework for studying power processes within a socio-technical context. They argued further that ANT distances itself from the view that technologies are stable entities that are passed from community to community and then put into use, rather ANT pays attention to the diverse interplay between human and non-human actors (*Ibid*). Similarly, Tatnall and Gilding (1999) contended that the ANT can be useful for studies of information systems in situations where interactions of the social, technological and political are regarded as particularly important. From the foregoing, ANT is also suitable to study the prospects and challenges of implementing an EHR in a Nigeria secondary Healthcare facility because it helps explore how actor networks are formed, hold together, or fall apart (McMaster, Vidgen et al. 1997).

The researcher therefore chose the concept of II and ANT because they complement each other well and provide a good theoretical basis for the study (Gammon, Johannsen et al. 2008). Also, these theories have previously been adopted to determine the relationship between information systems and organizational issues (Hanseth and Monteiro 1998).

### **2.1.1 The concept of information infrastructure**

The term information Infrastructure (II) gained its rhetorical thrust from visions initiated by the Bill Clinton administration in the United States (1993-2001) which was followed up by the European Union’s plan for Pan European II. These visions were seen as means to launching the information society (Hanseth and Monteiro 1998). Hanseth (2002) defined II as “an awesome shared, evolving, open, standardized, and heterogeneous installed base” while Pironti (2006) defined it as all of the people, processes, procedures, tools, facilities, and technology which supports the creation, use, transport, storage, and destruction of information. An information infrastructure that is non-local and distributed, like the EHR, will encompass

multiple actors that may have different needs and interests that may not be aligned. For an information infrastructure to work, some working resolution between the multiple local interests and the over-arching or “global” interests of the network as a whole, needs to be found (Star and Ruhleder 1996). A key characteristic of II is that infrastructures evolve and grow slowly over time where the existing infrastructure- the installed base- strongly influences how it can be improved. The installed base should therefore be seen both as a material to be shaped (improved and extended) at the same time as it is an actor that often appears to live a life of its own outside the control of designers and users (Hanseth 2002). In the process, the infrastructure shapes and is shaped by the work practice in an on-going co-construction process between technical and social elements. Installation of new infrastructure like the EHR in a Nigerian secondary healthcare facility therefore requires that we put existing infrastructure into consideration in such a way that it develops through extending and improving the installed base. This will include also the social aspect (users) because the social and the technical aspects interoperate (Hanseth and Monteiro 1998). To build (or grow) infrastructures is a challenging endeavour for several reasons: IIs expand through integrating previously separate systems, however, integration is not only a technical concern of achieving interoperability, rather a process embedding political and institutional interests. For instance, in the context of implementing an EHR in a Nigerian Secondary Healthcare setting, a number of heterogeneous actors, including developers, the government, and users’, are involved with diverging interests, which requires ongoing political negotiations (Sahay, Monteiro et al. 2009). It is worthy of note that infrastructure development is characterized by uncertainty. It is basically an open process due to the many interdependencies that need to be dealt with. Furthermore, unintended side effects and the participating actors’ reflexivity can add to the complexity (Hanseth and Ciborra 2007). It has also been noted that the success and failure of an EHR depends on the design-reality gap that exists between ‘current realities’ and ‘design conceptions of the EHR’ (Heeks 2006). A successful implementation of the EHR in a Nigerian secondary Healthcare facility hinges on how effectively the above issues are dealt with.

### ***Functions/Characteristics of Information Infrastructure***

According to Hanseth and Monteiro (1998), II possesses some functions or characteristics that make them different from other information systems. These functions are: *enabling, shared, open, socio-technical, heterogeneous and installed base.*

### *The Enabling Function of II*

The enabling function of IIs means it is designed to support a wide range of activities and intended to open-up a field of new activities, not just improving or automating something existing (Hanseth and Monteiro 1998). The EHR in a Nigerian Secondary Healthcare facility should be designed to surpass the single function of automation of health records but should support new field of activities like access to patient records across organizations. This will make service delivery easier when a patient seeks healthcare service in a different hospital.

### *The Shared Function of II*

II allow for sharing of information by the members of a community in the sense that it is the one and same single object (EHR) used by all of them to achieve the same goal. Although it may appear differently, the components are interdependent. Due to this shared function, II are irreducible. This implies that all the various users use the infrastructure as the system cannot be split into separate parts used by different groups independently (Hanseth and Monteiro 1998). This shared function of IIs was explained by Schneider and Wagner (1993) who stated that an EHR system in a hospital supports collaborative work by enlarging and enriching the area of shared information, providing actors with an overview of information distributed over space and time, supporting the negotiation of norms and rules, facilitating the coordination of effort, and helping to establish a certain degree of discipline and rigor. The EHR in the Nigerian Secondary Healthcare facilities should facilitate data sharing among the healthcare personnel in the facility, make it possible for them to access the health information of patients per time and should make it possible for the various healthcare workers to achieve a desired goal.

### *The Open Function of II*

Where systems are defined as open, it means that inputs and outputs can pass through their borders and interfaces. IIs are open in the sense that there are no limits for the number of users, stakeholders, vendors involved, nodes in the network and other technological components, application areas or network operators. It does not mean that everything is included in every II but does imply that one cannot draw a strict boundary between what is on one side of the II and what is on the other side. The openness of IIs also means that they are dynamic and always shifting, thus there is need for every II to be flexible to some extent in order to enjoy stability over a period of time (Hanseth and Monteiro 1998). When implementing the EHR in a Secondary Healthcare facility, it should be borne in mind that it is open to various users, it will

involve both human and non-human actors and it should be designed in such a way as to adapt to future changes.

### *The Socio-Technical Network Function of II*

IIs as socio-technical networks emphasize both the technological aspect of the infrastructure and the social dynamics that are brought to bear on the infrastructure from the organization, its members and the community at large. IIs will not work without the support people and the users using it properly (Hanseth and Monteiro 1998). As technology defines every organization, so are they too in turn redefined by the organization (Hughes 1994). Technology and organization cannot be separated but are co-constructed. In effect, implementation of the EHR must be considered as a process in which both technology and organization are transformed in unpredictable ways through interlocking, and where it is problematic to single out critical success and failure factors (Berg 2001). Likewise, organizational impact cannot be measured by standards such as support/non-support, because entirely new effects arise, which are not easily evaluated. Therefore, design and implementation cannot be pre-planned and centrally orchestrated, but must be seen as processes of experimentation, political negotiation and inventiveness (Berg and Toussaint 2003). Therefore, the users and other social elements should be considered as imperative to the successful implementation of the EHR in a Nigerian Secondary Healthcare facility and not just the technology (EHR) alone. Coiera (2003) buttressed this fact when he observed that the triumph of any system (EHR in this regard) in healthcare delivery is partly determined by how well the users are able to interact with the system.

### *The heterogeneous function of II*

IIs are heterogeneous because of their socio-technical nature; encompassing technological components, humans, organizations, and institutions. They will only work well with proper support and usage by the users. IIs thus constitute an ecology of networks by connecting various components into an interdependent network. IIs are also heterogeneous in the sense that the seemingly same function might be implemented in several different ways (Hanseth and Monteiro 1998). Implementation of the EHR in a Nigerian Secondary Healthcare facility should take into consideration the needs of all the users.

## *II as an Installed base*

IIs are never designed from scratch, but they develop through the evolution of an installed base (Hanseth and Monteiro 1998). Hanseth and Lyytinen (2010) define an installed base as the existing “set of ICT capabilities and their users, operations, and design communities”, and it also encompasses existing institutional and organizational components (Lanzara 2014). The installed base serves as the foundation for any change or development and can be both enabling and constraining (Aanestad, Grisot et al. 2017). In a Nigeria Secondary Healthcare facility for example, an installed base may encompass existing patients record systems, various groups of professionals as users (nurses, clinicians), dispensing practices, regulations etc. Aanestad, Grisot et al. (2017) argues that implementation of a project like the EHR in a Nigeria Secondary Healthcare facility will be shaped by the existing installed base: the organizational, institutional, regulatory, sociotechnical arrangements that are already in place. Thus, the implementation of the EHR in the facility should be seen as replacing or substituting an existing infrastructure (paper-based record system). The successful implementation therefore depends on how well it can be integrated into or substitute a part of the existing system (Hanseth 2002).

### **2.1.2 The Actor Network Theory (ANT)**

The increasing scale of computerization of modern healthcare highlights the need for a more sophisticated view of relationships between humans and objects as technologies become ever more complex (Cresswell, Worth et al. 2010). The ANT was elaborated chiefly by Michel Callon, Bruno Latour, and John Law. It is concerned with the creation and maintenance of coextensive networks of human and nonhuman elements which, in the case of information technology, include people, organizations, software, computer and communications hardware, and infrastructure standards (Walsham 1997). The ANT treats the social and technical aspects of a system as inseparable, and argues that people and artefacts should be analyzed with the same conceptual apparatus. This point was further buttressed by Latour (1996) who opined that the two systems (social and technical) are now coextensive. The Actor-Network Theory (ANT) is an increasingly influential approach to understand humans and their interactions with inanimate objects. The ANT is of the view that technology emerged from social interests and thus has the potential to shape social interactions (Prout 1996). It has been suggested that the ANT can be helpful in investigating technology implementations in healthcare settings. The theory is useful in helping to appreciate the complexity of reality (including the complexity of organizations) and the active role of technology in this context (Cresswell, Worth et al. 2010). ANT helps to conceptualize how different realities are experienced and enacted by different

actors, resulting in a more nuanced picture of dynamic relationships between different actors without neglecting their inter-relatedness. This is important when considering the fast-moving and ever-changing area of healthcare itself, and particularly so in relation to government-led change initiatives and resulting changes in power relationships (Robertson, Cresswell et al. 2010). This knowledge can contribute to a more holistic appreciation of the complexity of technology introduction in healthcare settings. It can also prove practically useful in providing a theoretically informed approach to sampling (by drawing on informants that are related to the technology in question) and analysis (by providing a conceptual tool and vocabulary that can form the basis for interpretations) (Cresswell, Worth et al. 2010).

There are two central attributes of the ANT: *translation* and *inscription*.

### ***Translation***

Translation involves associating “heterogeneous entities” to form an actor-world through assigning, to each, “an identity, interests, a role to play, a course of action to follow, and projects to carry out” (Callon 1986; 24). It involves reconciling the different meanings the actors hold of a given phenomenon. During translation, actors interact with each other to work out a scenario of how the system will work and will be used. In implementing an EHR, it is imperative to ascertain the interests of all the actors, and possibly manoeuvre the interests of others, in order to forestall any hindrances.

According to Callon (1986; 24), the process of translation occurs in four steps: problematization, interessement, enrolment and mobilization. During the first stage called problematization, a focal actor identifies other actors that have goals and interests consistent with its own, and establishes itself as an obligatory passage point which is a mechanism that has to be passed by all the actors in order to satisfy the interests that have been attributed to them by the focal factor. In other words, the focal actor frames a problem or an opportunity and attempts to persuade other actors in the network that the problem/opportunity is worthy of having resources dedicated to it. The second moment of translation is interessement, which means the process of persuading the other actors to accept the definitions initially provided by the focal actor. At the enrolment stage, the other actors in the network put into action the roles defined for them during the problematization stage. Latour (1987) suggests five strategies for enrolment (1) cater for others’ interests; (2) convince others that their usual ways are cut off; (3) to seduce them through a detour; (4) reshuffle interests and goals and (5) becoming indispensable to others. In the mobilization stage, the main actor assumes a spokesperson role

for passive network actors and seek to mobilize them to action. This stage is about stabilizing the network by making durable and irreversible relations (Callon 1986; 24).

### ***Inscription***

The notion of inscription refers to the way technical artefacts embody patterns of use (Monteiro 2000). Inscription is the process whereby translation of one's interests are embodied into technical artefacts. That is, a translation presupposes a material into which it is inscribed: text, software, skill, etc. The inscription includes program of action for the users, and it defines roles to be played by users and the system (Monteiro 2000). When a program of action is inscribed into a piece of technology, the technology becomes an actor imposing its inscribed program of action on its users. There are four interesting aspects of the notion of inscriptions: (1) What is inscribed: which anticipations of use are envisioned; (2) how are these anticipations inscribed: what is the materials for inscriptions; (3) who inscribes them; and (4) the strength of the inscriptions: how much effort does it take to oppose an inscription. The strength of inscriptions, whether they must be followed or whether they can be avoided, depends on the irreversibility of the actor network into which they are inscribed (Monteiro 2000).

## **2.2 Literature review**

### **2.2.1 Record keeping in healthcare delivery**

The issue of record keeping in healthcare service delivery is very important as evident in the evolvement of hospital record management as a core discipline in the area of hospital management in recent times (Ajala, Awokola et al. 2015). To be useful, the record system must make it easy to access and display needed data, to analyse them, and to share them among colleagues and with secondary users of the record who are not involved in direct patient care (Berg and Toussaint 2003). There are two major means of keeping medical records of patients in any healthcare delivery facility: the paper-based record keeping system and the electronic health record (EHR) system.

### **2.2.2 Paper-based record keeping in healthcare delivery**

The traditional paper-based medical record arose in the nineteenth century as a highly personalized 'lab notebook' that clinicians could use to record their observations and plans so that they could be reminded of pertinent details when they next saw the same patient. The traditional paper-based approach to clinical documentation has become overwhelmed by information exchange demands among health care providers, financial and legal complexities of the modern health care environment, the increasing rate of biomedical knowledge, growing

chronic care needs from an aging population, and medical errors associated with handwritten notes (Chiang, Read-Brown et al. 2013). Furthermore, it comes with other challenges like; inadequate physical space to keep the cards in case of high number of patients, inconsistency in handwriting of individuals as well as vulnerability to termite attack or other attacks. Retrieval of patient information will take a longer time and patients may be privy to confidential information in situations where they must take these paper-based records from one unit of the hospital to another (Ajala, Awokola et al. 2015). Also, there are certain patients that registered with several healthcare providers and these patient records are never shared with other physicians, laboratories and hospitals. Hence information becomes fragmented causing disruption, delay and error in patient care (Overhage, Dexter et al. 2002). Patients most times do not have access to their accurate and reliable information which could be used by them to meet their need. Studies revealed that patients who understand their condition and are involved with doctors in making decisions are better able to deal with their illness or diseases (Gustafson, Hawkins et al. 1999).

### **2.2.3 Electronic health record (EHR) in healthcare delivery**

There are numerous acronyms for systems handling patient data: Electronic Medical record (EMR), Electronic Patient Record (EPR), Computerized Medical Record (CMR), Computer-Based Patient Record (CPR), and Electronic Health record (EHR). There are only minor differences in the meanings depending on the defining country of origin, health sector, professional discipline, and period of time (Nøhr 2006). The acronym EHR is preferred in this study. The electronic health record has been acknowledged as an important driving force for modern organizational productivity, efficiency and performance effectiveness in healthcare delivery (Lopez 2003). The EHR can be defined as a longitudinal health record with entries by healthcare practitioners in multiple sites where care is provided. It is used primarily for purpose of setting objectives and planning patient care, documenting the delivery of care and assessing the outcomes of care. It includes information regarding patient needs during episode of care provided by different healthcare professionals (Häyrinen, Saranto et al. 2008).

### ***Functionalities of the EHR***

A committee of the Institute of Medicine of the National Academies in the United States has identified a set of eight core care delivery functions that electronic health record systems should be capable of performing in order to promote greater safety, quality and efficiency in health care delivery (IOM. 2003). They include:



*Health information and data:* An EHR must contain certain data about patients as physicians and other care providers require this information to make sound clinical decisions. EHR systems with defined dataset that includes such items as, medical and nursing diagnoses, a medication list, allergies, demographics, clinical narratives, and laboratory test results, can therefore ensure improved access to at least some types of information needed by care providers when they need it (IOM. 2003).

*Results management:* Computerized results can be accessed more easily by the provider at the time and place they are needed; the reduced time lag increases both efficiency and patient safety by allowing for quicker recognition and treatment of medical problems. Electronic results can also allow for better interpretation and for easier detection of anomalies (Bates, Ebell et al. 2003).

*Order entry/Order management:* It allow providers to enter orders (e.g. for drugs, laboratory tests, radiology, physical therapy) into a computer rather than doing so on paper. The use of computerized order entry, in conjunction with an electronic health record, has been shown to demonstrate a positive effect on clinician productivity (Overhage, Perkins et al. 2001). This functionality can improve workflow processes by eliminating lost orders and ambiguities caused by illegible handwriting, generating related orders automatically, monitoring for duplicate orders, and reducing the time to fill orders (Mekhjian, Kumar et al. 2002).

*Clinical decision support:* It assists the provider in making decisions with regards to patient care through provision of the latest information about a drug, cross-referencing a patient allergy to a medication, and alerts for drug interactions and other potential patient issues that are flagged by the computer (Menachemi and Collum 2011).

*Electronic communication and connectivity:* EHR systems should enable communication among care partners, such as laboratory, pharmacy and radiology. Effective communication among health care team members and other care partners and with patients is critical to quality health care (IOM. 2003) while its lack can contribute to the occurrence of adverse events (Bates and Gawande 2003).

*Patient support:* EHR systems allow for patient education. Patient education has demonstrated significant effectiveness in improving control of chronic illnesses (Weingarten, Henning et al. 2002) while computer-based patient education has been found to be successful in primary care (Balas, Austin et al. 1996).

*Administrative processes:* EHR systems should have electronic scheduling systems for hospital admissions, inpatient and outpatient procedures, and appointments (IOM. 2003). This will increase the efficiency of health care organizations and provide better, more timely service to patients (Woods 2001, Everett 2002).

*Reporting and Population Health Management:* EHRs can improve reporting and surveillance by making it easier to collect standardized, systematic data in a form that can be shared across multiple health care organizations. This can assist Public health organizations to better monitor, prevent, and manage disease thereby improving population health outcomes (HealthIT 2013). In New York City, for example, public health officials designed a program that leverages EHRs to deploy public health alerts to clinicians (Lurio, Morrison et al. 2010).

### ***Structure of EHR***

According to Dickinson, Fischetti et al. (2004), every effective EHR system possess three structures: direct care functions, supportive function and Information Infrastructure.

#### ***Direct care functions of an EHR***

Direct care functions are employed in the provision of care to individual patients and it is basically associated with general clinical tasks. Subsets of direct care functions include care management, clinical decision support, and operations management & communication. The principal users of these functions are expected to be authorized healthcare providers (Dickinson, Fischetti et al. 2004). The functions include diagnosis, goal setting on patient management, planning and carrying out interventions, examination and evaluation of results (Bernstein, Bruun-Rasmussen et al. 2005). It also includes alerts which prompts for contraindications and wrong prescription of medication to patients (Dickinson, Fischetti et al. 2004) as well as past medical history, referral, treatment, medication and discharge (Häyriinen, Saranto et al. 2008).

#### ***The supportive function***

Supportive functions are functions that support the delivery and optimization of care, but generally do not impact the direct care of an individual patient. These functions assist with the administrative and financial requirements associated with the delivery of healthcare, provide support for medical research and public health, and improve the global quality of healthcare. The principal users of this function are the support staff but, under certain circumstances, the Healthcare providers might be expected to perform certain administrative functions

(Dickinson, Fischetti et al. 2004). Examples of these support functions are optimizing patient bed assignments, provision of health guidelines and resources available, administrative and financial coding assignments, electronically query local immunization registries to ensure that a child is currently registered and determine the child's immunization status, as well as the provision of providers' location in the facility.

### ***Information Infrastructure function***

This function defines the heuristics of a system necessary for reliable, secure and interoperable computing. These functions are not involved in the provision of healthcare, but are necessary to ensure that the information system provides safeguards for patient safety, privacy and information security, as well as operational efficiencies and minimum standards for interoperability. These functions are expected to be performed transparently by EHR system applications on behalf of the end users (Dickinson, Fischetti et al. 2004). The system administrator is expected to be involved in all operations related to configuring and managing the EHR system operation. The functions for this section include security, health record information and management, registry and directory services, standard terminologies and terminology services, standards-based interoperability, business rules management, workflow management (Dickinson, Fischetti et al. 2004).

## **2.3 The Hybrid Health Record System**

The shift from paper to an electronic health record creates many challenges and has resulted in a transitional phase creating a "Hybrid" medical record. These challenges include workflows becoming more complicated thereby making the system costly and billings being affected due to multiple location of information (Perez 2013). However, a study noted that the complete migration to the EHR may take many years longer as healthcare providers continue to rely heavily on paper documents as a common medium for exchange between providers in the patient care continuum (Varga 2011).

## **2.4 Evaluating an Electronic Health Record**

There are different methods for evaluating EHR systems but the complexity of the systems and the environment in which they function make evaluations of EHRs complicated (Nøhr 2006). With the current increase in the use of electronic health records (referred to as Patient Care Information Systems (PCIS) by Stoop and Berg (2003) in their study), evaluating these applications has become important to ascertain if their purpose of enhanced quality and efficiency of care is being met. It is imperative to learn from the success and failures of

implementing different PCISs, using different implementation methods, in different healthcare organizations in order to avoid similar pitfalls (Stoop and Berg 2003). When evaluating PCISs, it is crucial to be aware of the different priorities of the different stakeholders. While managers may want to know the organizational impact of the PCIS and whether their investment was economically worthwhile, healthcare professionals might be primarily interested in patient outcomes, workers' satisfaction, or other quality-related indicators. Patients on the other hand might be particularly interested in patient outcomes and patient satisfaction (Talmon, Enning et al. 1999). Thus, an overall 'success' measure of information systems is rarely relevant (Southon 1999).

According to Stoop and Berg (2003), evaluation of EHRs could be done along two dimensions; the *domain* of evaluation and the *phases* of evaluation. Domain refers to the different viewpoints that an evaluation can take: technical, professional, organizational, economic, ethical and legal. The authors opined that though the list is not exhaustive, it does seem to cover all evaluation items that are relevant for the organizational decision-maker. The focus of the *technical domain* is to assess software and hardware performance as well as stability with regards system downtime and how often they occur. The *economic domain* is concerned with cost-benefit analysis. It measures quantifiable costs like buying a PCIS, training personnel, maintenance etc. as well as unquantifiable cost and benefits such as improved doctor-nurse communication, reduced waiting times or changes in tasks and responsibilities of staff. The *professional domain* evaluates user friendliness, impact on patient outcomes and effectiveness of work. The *organizational domain* examines the readiness of the different stakeholders, adjustments/preparations that need to be made in advance and impact of the EHR on work processes and the organization as a whole. The *ethical domain* evaluates data access and security issues while the *legal domain* evaluates the role electronic patient data plays in legal matters as well as the consequences of use of electronic patient data (Stoop and Berg 2003).

Three phases can be distinguished: *pre-implementation*, during *implementation* and *post-implementation*. The aim of evaluation in the three phases is usually different. While the *pre-implementation* phase test for feasibility of the EHR, evaluations during the *implementation* phase are concerned with providing feedback to help optimize the implementation process, which is called '*formative evaluation*'. Evaluations during the *post-implementation* phase is usually about the final outcomes or impacts of the intervention and is called '*summative evaluation*' (Friedman and Wyatt 1997).

Evaluation of EHRs can take a qualitative or quantitative approach depending on the moment of evaluation or the domain to be assessed. For example, quantitative research methods can be used to measure costs like reduction of administrative staff, whereas qualitative methods can be used to analyse changes in doctor-nurse communication.

## 2.5 Benefits of EHR

The EHR has distinct advantages over paper records which have enabled its wide acceptability in industrialized nations (Black, Car et al. 2011). These include: the opportunity for healthcare organizations to improve the quality of patient care and safety, potential to reduce cost and improve efficiency of the workplace (Jha, DesRoches et al. 2009), enabled access to medical records from remote locations, improved speed and ease of retrieval of records, avenues to flag abnormal results and elimination of handwritten prescriptions which reduces the occurrence of prescription errors (Greenhalgh, Hinder et al. 2010, Ohemeng-Dapaah, Pronyk et al. 2010, Gaylin, Moiduddin et al. 2011), simultaneous access to patient records by multiple users and the ability to perform data queries to inform decision making (Black, Car et al. 2011).

### 2.5.1 Improve quality of care and patient safety

EHRs have the potential to improve quality of care, particularly when they are coupled with imbedded features such as CPOE and CDSS (Agrawal 2002). Research indicates that EHR is linked to improved outcomes including better infection control (Fitzmaurice, Adams et al. 2002), improved prescribing practices (Teich, Merchia et al. 2000) and improved disease management (Erstad 2003) in hospitals. Similarly, the EHR can specifically result in improved patient safety through the reduction in medication errors in hospitals by utilizing computerized prescription entry, predicting drug interactions and displaying a warning for health-care provider, assisting clinicians in reconciling patient medications, and maintaining a detailed and legible medical record (Bates, Leape et al. 1998). The EHR can help clinicians identify root causes of adverse events in hospitals and outpatient settings after they occur (Bates, Evans et al. 2003). Moreover, EHR can enable providers to rapidly identify and notify individual patients about important changes in drug therapy such as those related to the Vioxx withdrawal (Jain, Atreja et al. 2005). Also, the EHR alert system ensures that proper dosage and drug utilization are administered to patients (Alpert 2016). Park, Howie-Esquivel et al. (2015) noted that the EHR had the potential to improve patient adherence to prescribed drug therapy.

### 2.5.2 Enhance productivity and efficiency

Implementation of EHR increases the opportunity for enhanced productivity and efficiency. For example, EHRs help to eliminate the manual task of extracting data from charts or filling out specialized datasheets. EHR use can improve medical staff relations by increasing physicians' workflow efficiency and satisfying the information needs of practicing clinicians (Chaiken 2003). The scheduling systems can greatly improve hospital and clinic efficiency and provide more timely service for patients (Alpert 2016). A study on EHR by Keenan, Nguyen et al. (2006) found improvement in daily work and enhanced patient care: (a) medication turnaround times fell from 5:28 hours to 1:51 hours; (b) radiology procedure completion times fell from 7:37 hours to 4:21 hours; and (c) lab results reporting times fell from 31:3 minutes to 23:4 minutes. In the same study, transcribing errors for orders declined, length of hospital stay decreased and transmit time of test results decreased by reducing the time taken to deliver paper versions.

### 2.5.3 Improve care coordination and communication

The EHR allow a patient to be seen sequentially by different providers with up-to-date information immediately available to all providers. It gives the healthcare provider instant access to other clinicians' evaluations, as well as diagnostic tests (Alpert 2016). With an EHR, clinicians can more easily coordinate and track patient care across practices and facilities. Clinicians across specialties and disciplines also collaborate on patient outcomes as a team to ensure better care overall (Burton, Anderson et al. 2004, Alpert 2016), and specifically for chronic care management (Bodenheimer, Wagner et al. 2002, Epping-Jordan, Pruitt et al. 2004). The system also make it possible for the services a patient needs - office visits, testing, surgery, hospital visits - to be coordinated and scheduled over the course of a single visit, rather than time-consuming multiple visits (Alpert 2016).

Additionally, the email feature built into many EHRs can result in improved communication by allowing staff the ability to message each other from any workstation (Erstad 2003). The built-in email feature also allows for real-time communication regarding shared responsibility among clinicians. This provides the ability to simultaneously accomplish tasks and may yield significant time savings (Cooper 2004).

### 2.5.4 Reduction of cost and enhanced revenue

A cost-benefit-analysis study performed by Wang, Middleton et al. (2003) over a 5-year period by aggregating data from their installed EHR, other published studies, and from expert opinion

demonstrated a positive return on investment with the primary areas of savings including reductions in drug expenditures, improved utilization of radiology tests, improvement in charge capture, and decreased billing errors. Similarly, another study to examine the economic effect of implementing a commercial EHR showed that the system was associated with direct reductions in spending and increases in revenue during the study period. A first-year savings of almost \$1 million directly attributable to the EHR was reported. The savings were realized from reduction in transcription expenses, improved coding, elimination of need to develop new patient charts, lower space requirements and cost avoidance due to no increase in chart room full-time-employees while patient volume had doubled (Barlow, Johnson et al. 2004).

#### 2.5.5 Privacy of patient records

The use of EHR allows for increased security of data and enhanced patient confidentiality through controlled provider access (Menachemi and Brooks 2006). Regulations for patient record privacy place stringent demands on healthcare providers to protect patient information while implementing electronic methods for sharing with other caregivers and patients. Therefore, access to patients' information is highly restricted as it allows only authorized users access to all patient information available within an organization. Moreover, the EHR provides resilient security to protect patient record information across the entire wired and wireless environment (CISCO 2005).

#### 2.5.6 Improved ability to conduct research

Electronically available data for EHR systems will allow for improved ability to quantitatively analyse trends and identify evidence based best practices more easily (Menachemi and Brooks 2006). For example, the data needed for a study can often be derived directly from the EHR, thus making much of what is required for research data collection simply a by-product of routine clinical record keeping. Data from EHRs could be de-identified and integrated into larger data repositories where research can be conducted to improve patient safety, medical knowledge, and public health (Aspden, Corrigan et al. 2003).

### 2.6 Challenges of EHR implementation

The challenges experienced with EHR implementation in developed countries is somewhat different from those experienced in developing countries (Sood, Nwabueze et al. 2008). By reason of the research objectives of this study, the focus of this section will be restricted to the challenges peculiar to public hospitals in developing countries like Nigeria. The availability of EHR in Sub-Saharan Africa has increased over the last decade, but it has not been without

challenges (Akanbi, Ocheke et al. 2012). And while some private hospitals in Nigeria have fully functional EHRs (Akor and John-Mensah 2016), Government institutions appear to be slow in implementing EHR and other appropriate ICTs which are required to improve healthcare delivery (Akanbi, Ocheke et al. 2012, Akor and John-Mensah 2016). Government policy and strategy; lack of ICT infrastructure; lack of basic ICT skills/knowledge; poor internet connectivity; financial issues/constraints; and inadequate electric power supply were identified as the major challenges that hinder the successful implementation of EHR systems in developing countries like Nigeria.

#### 2.6.1 Government Policy and strategy

It has been suggested that government policies might constitute the major barriers hindering the adoption of electronic patient record in Nigeria (Benson 2011). A bulletin of the World Health Organization in 2008 identified the need for a robust government policy on healthcare technologies in Nigeria to facilitate the implementation of e-health initiatives (WHO 2008). Successive governments have strived to improve the health status of Nigerians through series of national developmental plans and annual budgets, however, only modest progress was made in the past (FMoH 2010). It was suggested that even the implementation of the 2001 IT policy in Nigeria did not have the desired results on the health sector (Hassan, Siyanbola et al. 2011). The current plan termed National Strategic Health Development Plan (NSHDP) 2010-2015 was prepared through an elaborate collaborative process involving all major stakeholders and actors towards delivery on a shared results framework, to which each and every one will be held accountable for achieving the goals and targets as contained in the results framework. National Health Management Information System is one of the 8 strategic priority areas. Among other things, it aims to provide infrastructural support and ICT of health databases, strengthening of the use of information technology on Health Information Systems, establishment of public-private partnerships in the management of data warehouses as well as deployment of acquisition systems for database software at all levels. Since monitoring is imperative towards achieving this targets, a monitoring and evaluating system was proposed to provide accurate, reliable and timely information on progress made by the NSHDP and provide regular reporting on the performance indicators (FMoH 2010).

#### 2.6.2 Lack of ICT infrastructure

The ease of adoption of EHR is dependent on existing infrastructure in a hospital or healthcare organization (Ward, Jaana et al. 2006). A previous study had identified inadequate ICT infrastructure as one of the barriers for electronic health information implementation (Ouma



and Herselman 2009). Unlike the developed countries that boast of robust healthcare infrastructures with ample financial support from their governments, the reverse is the case in most developing countries (Sood, Nwabueze et al. 2008). Thus limited access to computers and other ICT facilities remain a challenge to the successful implementation of EHR (Martinez, Villarroel et al. 2005).

### 2.6.3 Lack of basic ICT knowledge/skills

Training is considered central to any healthcare delivery system but little information is available on the level of training and utilization of IT among healthcare professionals in developing countries (Bello, Arogundade et al. 2004). While clinicians in developed countries are currently being trained by means of cutting edge technologies like 3D simulations, virtual reality, and robotics, their counterparts in developing countries lack such exposure. This lack of exposure to advanced concepts in medical training tend to widen the gap between clinicians on the two sides of the divide which may reflect in the efficiency and success of EHR implementation in developing countries (Sood, Nwabueze et al. 2008). Although medical doctors in Nigeria, because of their formal training and access to personal computers & other devices, may be able to quickly adapt to the EHR system, the same cannot be said of other support staff who have had little access to computers and other ICT facilities.

### 2.6.4 Poor internet connectivity

Internet connectivity can transform the flow of information in the health sector through effective data management systems, picture archival, and communication systems, and is specifically important for running of radiological information systems and teleradiology (Benson 2011). Access to the internet has dramatically improved in the last 10 years, and all countries in Africa now have direct access to the internet (Bukachi and Pakenham-Walsh 2007). But the low speed and expensive internet bandwidth in Nigeria (Osuagwu, Okide et al. 2013) will hinder the implementation of the EHR because a high bandwidth is required for transmission of large images between institutions and as well as accessing the EHR itself especially if they contain videos and images (National Research Council 2000).

### 2.6.5 Financial issues/constraints

The implementation of the EHR comes with huge financial responsibilities in the form of purchasing necessary software and hardware, installation, training hospital staff and maintenance which may deter governments and institutions from embarking on such projects (Martinez, Villarroel et al. 2005, Al Shorbaji 2008, Alverson, Swinfen et al. 2009, Durrani and

Khoja 2009). However, as EHR technologies have become more commonplace over the past decade, the initial cost of systems has come down dramatically (Menachemi and Collum 2011). The cost of EHR adoption, implementation, and ongoing maintenance are compounded by the fact that many financial benefits of the EHR generally do not accrue to the provider (who is required to make the upfront investment) but rather to the third-party payers in the form of errors averted and improved efficiencies, which translate into reduced claims payment. This misalignment of incentives for health care organizations, along with high upfront costs, creates a barrier to adoption and implementation of an EHR, especially for smaller practices (*Ibid*).

#### 2.6.6 Inadequate electric power supply

Any country that finds it difficult to provide Uninterrupted Power Supply (UPS) to its citizens will definitely have problems with deployment of good ICT services like the EHR (Idowu, Cornford et al. 2008). An uninterrupted power supply is a prerequisite for adoption of hospital information systems (EHR) and ensures avoidance of unintended shutdowns that could lead to loss of data or permanent system damage. The power supply is erratic or non-existent in many regions of the Sub-Saharan Africa (Benson 2011). For example, only few cities and towns in Nigeria have stable and reliable electricity for ten consecutive hours a day. This has resulted in most internet facilities in Nigeria suffering frequent downtime and equipment damage due to power interruptions (Idowu, Cornford et al. 2008).

#### 2.7 Cyberattacks and Electronic Health records

The increasing dependence of healthcare delivery on the internet has increased the likelihood of individuals or organizations conducting cyberattacks through the internet that will cause physical and/or psychological harm. Cyberterrorism is defined as the convergence of terrorism and cyberspace. It is generally understood to mean unlawful attacks against computers, networks, and the information stored therein when done to intimidate or coerce a government or its people in furtherance of political or social objections. Attacks that result in violence against persons or property, or at least cause enough harm to generate fear qualify as cyberterrorism. Examples include attacks that lead to death or bodily injury, explosions, plane crashes, water contamination, or severe economic loss (Harries and Yellowlees 2013). Cyberattacks in healthcare may include bringing down a hospital computer system or publicly revealing private medical records which in turn compromises patient care and diminishes trust in the health system (Harries and Yellowlees 2013). Areas of particular concern to healthcare-related facilities include the potential for cyberterrorism-related events to erase or alter computerized medical, pharmacy, or health insurance records (Clem, Galwankar et al. 2003).

The risk is more acute in larger healthcare organizations such as hospitals, which have moved away from stand-alone workstations to more tightly integrated platforms that are attached to networks. The ability to deliver healthcare would be crippled if terrorists disabled crucial parts of a nation's IT system using cyber methods to alter, delete, or steal vital health information (Harries and Yellowlees 2013). These attacks can result in substantial cost implications in the form of payment of ransoms and disruption of services. For example, the attack on the Hollywood Presbyterian Medical Center in February 2016 led to the hospital paying hackers a ransom of \$17,000 in Bitcoin for the release of its electronic medical records and system. Also, on May 12, 2017, 16 hospitals in England were affected by a major cyberattack along with dozens of countries around the world, including the U.S., Russia, Ukraine, Taiwan and Spain which led to cancellation of appointments (Paul 2017).

There is evidence to suggest that cyber threats are increasing and the healthcare system is ill equipped to deal with this daunting challenge. Healthcare organizations should therefore prepare themselves by ensuring they have appropriate measures in place to secure important systems that could be potential targets for terrorists (Harries and Yellowlees 2013).

## 2.8 Usability and User Satisfaction

Usability is the extent to which a product can be used by specified users to achieve specified goals with effectiveness, efficiency and satisfaction in a specified context of use (ISO 1998). It represents an important yet often overlooked factor impacting the adoption and appropriate utilization of electronic health record (EHR) systems (McDonnell, Werner et al. 2010). Without usable systems, doctors, medical technicians, nurses, administrative staff, consumers, and other users cannot gain the potential benefits and functions of EHR systems.

### 2.8.1 Factors That Impede Usability

The 'failure to use human factors design principles' in the design of EHR systems has been identified as a major factor that impede usability and user satisfaction (Schumacher, Berkowitz et al. 2010). Some EHR users lament that health IT seems designed more for clinical transactions than for clinical care, and may not be easy to use in some care settings (Walker, Carayon et al. 2008). On the basis of field research in five health clinics, Hollin, Griffin et al. (2012) identified eight aspects of usability relevant to EHR design. These aspects include: the nature of user-software interaction, learnability of software, facilitation of user cognition, degree of user control and software flexibility, degree of matching of system structure and content to that of real-world tasks, design of graphics, system navigation, and editing capability

and consistency among interfaces. Other factors that affect usability include; reluctance to adapt to new technology (Fitzgerald, Pirus et al. 2008), perception of health workers of the degree to which telemedicine technology is easy to use (Chau and Hu 2002), inadequate training on the use of the EHR system (AMA 2014), and lack of consistency within and across applications especially for physicians who deal with two or more EHRs (Schumacher 2010).

### 2.8.2 Measures to increase usability

Usable designs do not come in a flash of brilliance. Instead, they are based on systematic analysis of end-user needs, workflow development, application of design guidelines and standards, and user testing, driven by dedication to create the most usable interface possible (Schumacher 2010). Also, Schumacher, Berkowitz et al. (2010) noted that in order to increase usability and user satisfaction, the EHR system must be seen to be smarter and add to the overall intellectual value of health professionals after an encounter with a patient.

Measures to ensure usability and maximum user satisfaction of EHRs include; continuous awareness and training workshops or courses concerning basic ICT skills as well as the actual usage of EHR systems (Walker, Bieber et al. 2005, AMA 2014), cultivation of a positive attitude by users towards using the technology (Chau and Hu 2002), and the development of a common style guide-designed through collaboration between physicians and vendors-so that physicians who practice in different care settings can move easily from one EHR to another (AMA 2014).

## 2.9 Summary of the Chapter

This chapter commenced with an introduction of the theories relevant to the implementation of the EHR in a General Hospital in Nigeria. This include the Information Infrastructure theory which views the EHR as an Information Infrastructure as well as the Actor-Network Theory which require that all actors that will be involved in its implementation be identified and their interests taken into consideration to ensure a successful implementation.

The chapter progressed with the literature review which identified some challenges with the traditional paper-based records in healthcare delivery which the electronic health records helps to address. The literature highlighted some benefits of the electronic health records which include improved quality of care, enhanced productivity and efficiency among other things. It also indicated that the implementation of the EHR is dependent upon human, organisational and technological factors which varies in developed and developing countries although some of the challenges are common to both. To this end, evaluation of the EHR at various levels of

implementation (pre-implementation, implementation and post-implementation stages) is recommended to minimise failure rates associated with the process. Evaluation of implemented EHR systems or feasibility studies on the prospects and challenges of implementing an EHR in a Nigerian public hospital are lacking. Hence, this study seeks to explore the prospects and challenges that may be associated with implementing the EHR system in a secondary healthcare facility in Nigeria.

## CHAPTER THREE

### RESEARCH SETTING AND METHODOLOGY

#### 3.0 Introduction

The main objective of the research is to explore the views of doctors regarding the prospects and challenges of implementing an EHR in a secondary Healthcare facility in Nigeria. To achieve this, the study will focus on the following;

- Knowledge of the EHR, including its benefits, among the healthcare professionals
- Examine the challenges to the implementation of the system
- Examine the prospects of implementing the system

The literature reviewed in chapter two identified three phases of EHR evaluation: *pre-implementation*, *implementation* and *post-implementation* phases. While the *pre-implementation* phase test for feasibility of the EHR, evaluations during the *implementation* phase are concerned with providing feedback to help optimize the implementation process, which is called '*formative evaluation*'. Evaluations during the *post-implementation* phase is usually about the final outcomes or impacts of the intervention and is called '*summative evaluation*' (Friedman and Wyatt 1997). This study is therefore a *pre-implementation* evaluation as the EHR has not yet been implemented in the health facilities. According to McGowan, Cusack et al. (2008), the pre-implementation evaluation accomplishes two things. First, it engages users in the implementation process and can garner buy-in among all future system users by soliciting feedback and acting upon suggestions. Second, it can be used to identify any organizational constructs that could serve as roadblocks to successful implementation. For example, if a readiness assessment determines that the institution cannot gain from implementation because the staff is not prepared to accept the new technology, then the staff might attempt to undermine the implementation.

This chapter expatiates on the planning and execution of the research process to achieve the study objectives. The profile of the study country, Nigeria and her healthcare system are described. The chapter also include the research approach and the data analysis strategy as well as a description of the limitations to the study approach and a reflection on the adopted study processes.

### 3.1 Research setting

The researcher did not visit any healthcare facility to perform the study. The empirical material collected was based on informal phone conversations held with doctors working in secondary healthcare facilities in 3 different states of Nigeria.

The researcher chose secondary healthcare facilities because they are situated mostly in the sub-urban parts of the country, and will thus provide an insight into challenges faced by such facilities in their efforts to adopt a basic eHealth facility like the EHR.

#### 3.1.1 Profile of study country – Nigeria

Nigeria is situated in West Africa and occupies an area of 923, 768 square kilometres. She has a population of about 186, 988, 000 made up of several ethnic groups (UNdata 2017). Nigeria gained independence from Britain on October 1<sup>st</sup>, 1960 and adopted English as the official language.

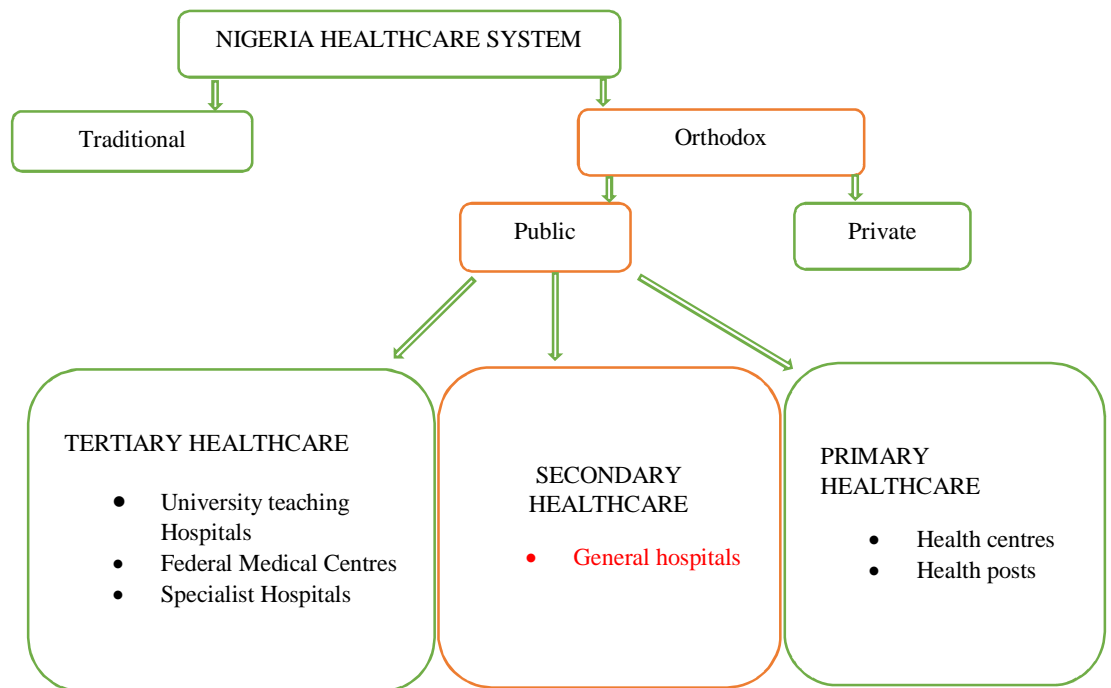


Figure 1. Map of Nigeria showing the 36 states and the Federal Capital Territory. [Source: (NigerianMuse 2009)]. Empirical materials were collected from the states with ‘stars’.

Administratively, Nigeria is divided into 36 states and a Federal Capital Territory. Each state is divided into Local Government Areas (LGAs). There is a total of 774 LGAs in the country. Nigeria operates a three-tier system of administration- the Federal, the State and the Local governments.

### 3.1.2 The Nigeria Healthcare System

Nigeria as a nation operates a pluralistic health care delivery system (orthodox and traditional health care delivery systems). Orthodox healthcare services are provided by private and public sectors. The Nigeria Public Health System operates three levels of health care, which corresponds to the tiers of government and interacts through a referral system. The national health policy recommends the Primary Health Care (PHC) as the entry point to health care system.



**Figure 2. Diagram of the healthcare delivery system in Nigeria**

However, these PHCs are poorly managed leading to underutilization. Therefore, people usually attend any facility that will meet their needs, not considering the appropriateness of the level of care (Abodunrin, Akande et al. 2010). The primary healthcare system is managed by the government at LGAs (with support from their respective State Ministries of Health) where health services are organized through the wards. Primary health Care facilities include health posts, health centres, and comprehensive health centres. At the State level, the State Ministries of Health (SMOH) are responsible for secondary hospitals and for the regulation and technical



support for primary health care services. Secondary Health Care facilities are mainly General hospitals. At the Federal level, the Federal Ministry of Health (FMOH) provides tertiary and specialist health care services through the University Teaching Hospitals, Specialist Hospitals and the Federal Medical Centres as well as being responsible for policy and technical support to the overall health system (WHO 2004). While the organization of the health sector seems well coordinated, the practical workings of the system is not as seamless as depicted. There is often duplication and confusion of roles and responsibilities among the different tiers of government (Adeyemo 2005). The private health sector is growing and it engages in the training of human resources for health, manufacturing of pharmaceuticals, and direct delivery of services among other things. It is estimated that the private sector provides 65.70% of health care delivery in Nigeria (WHO 2004).

The most common source of healthcare financing in Nigeria is the out-of-pocket payment which is estimated at 69% of the total funding sources. The National Health Insurance Scheme (NHIS) was introduced in Nigeria in 2005 to guarantee accessibility to healthcare without making significant out-of-pocket payments at the point of receiving care. But only those employed in Federal formal sector, which is less than 5% of the working population have been enrolled. Employees of most corporate organizations in Nigeria are covered by Private Health Insurance (PHI) financed by the organizations. An estimated 1 million people are covered in the PHI (Uzochukwu, Ughasoro et al. 2015). Still, only those employed and members of their family are covered by these schemes thereby leaving the unemployed vulnerable to inadequate health care. However, plans are underway for the establishment of Community-Based Health Insurance (CBHI) schemes within the context of the NHIS to expand cover to the informal and rural populations which make up 70% of the population as a strategy towards achieving universal health coverage (Ejughemre 2014).

Nigeria's health expenditure is relatively low, even when compared with other African countries. The total health expenditure (THE) as percentage of the gross domestic product (GDP) from 1998 to 2000 was less than 5%, falling behind the THE/GDP ratio in other developing countries such as Kenya (5.3%), Zambia (6.2%), Tanzania (6.8%), Malawi (7.2%), and South Africa (7.5%) (Soyinbo 2005). As of 2014, Nigeria's total expenditure on health as a percentage of GDP stood at 3.7% (UNdata 2017). This has resulted in the gross under performance of the country's health sector over the years. In the year 2000, Nigeria occupied the 187<sup>th</sup> position on the list of the rankings of the Health System Performance of 191 countries released by the World Health Organization (Oyibocho, Irinoye et al. 2014). This is not

surprising considering that Nigeria parades one of the lowest health practitioner-to-patient ratio in Sub-Saharan Africa: 0.3 Physicians per 1000 persons, 1.7 hospitals beds per 1000 persons, 1.7 Nurses, 0.02 Dentists, 0.05 Pharmacists, 0.91 Community Health Workers and 1.7 Midwives, per 1000 persons respectively (Adefolaju 2014). Interestingly, many of these skilled personnel have migrated to Europe, America and the Middle-east to practice and thereby constituting a brain drain costing much money and also a supply gap in the country (Kelland 2011).

In addition to inadequate funding of the sector, other challenges confronting the Nigeria Healthcare system include: Counterfeit and adulterated drugs, poor health care financing and sustainability; increased out-of-pocket expenditure; inadequate basic infrastructure and equipment; inadequate supply and inequitable distribution of essential drugs; poor remuneration of health care workers; bribery and corruption that results in the embezzlement of healthcare budgets and shortage of healthcare personnel (Oyibocho, Irinoye et al. 2014).

#### *3.1.2.1 The General Hospital*

General Hospitals have the provision for accident and emergency unit and diagnosis unit [including X-ray, scan machines and other pathological services] among other services (Badru 2003). According to the Medical and Dental Council of Nigeria, there should be a minimum of three doctors who are to provide medical, surgical, paediatric and obstetric care in any General Hospital. Furthermore, the General Hospitals incorporates the facilities of the primary healthcare into its own to play its role as a second-tier health institution (Ademiluyi and Aluko-Arowolo 2009). To be qualified a General Hospital, it should provide simple surgical services, supported by beds and bedding for minimum of 30 patients. General Hospitals are often within the control of State Governments (*Ibid*).

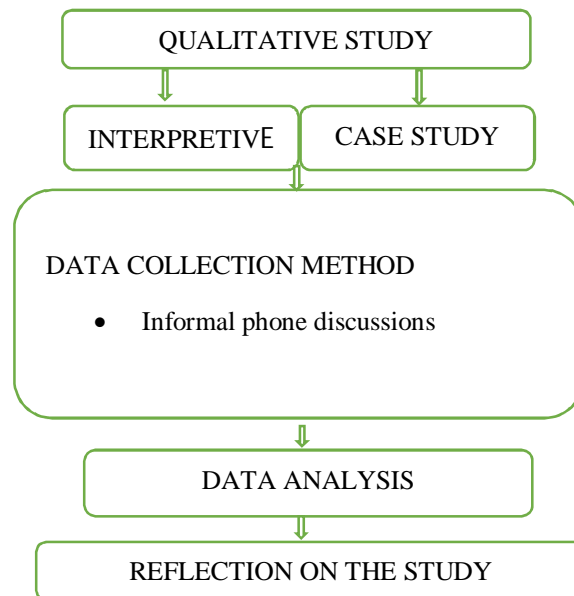
#### *3.1.3 E-Health in Nigeria*

Efforts to develop eHealth in Nigeria started in 1994 but these efforts are piecemeal, uncoordinated and largely pilots yet to be scaled up (Adebola 2013). In 2014, when an assessment on number of Health ICT Implementations was conducted, 84 Health ICT projects were identified. 28% of those initiatives were pilots and 24% were in the process of scaling up from pilot implementations (FMoH 2016a). Over the years, the Nigerian Government developed a 5-year strategic plan on health which among other things aim to provide an effective National Health Management Information System (NHMIS) by all the governments of the Federation to be used as a management tool for informed decision making at all levels and for improved healthcare (Adeleke, Erinle et al. 2015).

Barriers to eHealth implementation in Nigeria include; lack of national eHealth strategy and policy, lack of eHealth legislative framework, epileptic electric power supply, inadequate government commitment (policy, legislation, funding, etc.), inadequate ICT infrastructure, and low internet connectivity (Adebola 2013).

### 3.2 Research approach

The main aim of the study was to explore the views of doctors working in Nigerian Secondary Healthcare facilities on the prospects and challenges of implementing the electronic health record in such facilities. For the remainder of the thesis, the Nigerian Secondary Healthcare Facility will be referred to as a General Hospital. To achieve this objective, informal phone conversations were held with doctors working in General Hospitals in 3 different states of Nigeria to meet the set goals of the study. A diagrammatic representation of the study approach is presented below;



**Figure 3. Diagrammatic representation of the study approach.**

#### 3.2.1 Study design

Although most IS researchers do either quantitative or qualitative research work, some researchers have suggested combining one or more research methods in the one study called triangulation (Myers 1997). However, this study adopted a qualitative research design because it will help the researcher understand people and the social and cultural contexts within which they live (Stoop and Berg 2003). Also according to Kaplan and Maxwell (1994), the goal of understanding a phenomenon from the point of view of the participants and its particular social and institutional context is largely lost when textual data are quantified.

### *3.2.1.1 Qualitative study approach*

Qualitative research involves the use of qualitative data, such as interviews, documents, and participant observation data, to understand and explain social phenomena. In Information Systems, there has been a general shift in IS research away from technological to managerial and organizational issues, hence an increasing interest in the application of qualitative research methods (Myers 1997). The goal of qualitative research is understanding issues by investigating the perspectives and behaviour of the people in these situations and the context within which they act. To accomplish this, qualitative research is conducted in natural settings and uses data in the form of words rather than numbers (Kaplan and Maxwell 2005).

### *3.2.1.2 Interpretive Research Approach*

Interpretive research has emerged as an important strand in information systems (IS) research in recent years and can help IS researchers to understand human thought and action in social and organizational contexts; it has the potential to produce deep insights into information systems phenomena including the management of information systems and information systems development (Klein and Myers 1999). In interpretive research, it is assumed that knowledge of reality is gained only through social constructions such as language, consciousness, shared meanings, documents, tools, and other artefacts. It does not predefine dependent and independent variables, but focuses on the complexity of human sense making as the situation emerges (Kaplan and Maxwell 1994). In addition, interpretive research attempts to understand phenomena through the meanings that people assign to them (Boland 1985, Orlikowski and Baroudi 1991) and is “aimed at producing an understanding of the context of the information system, and the process whereby the information system influences and is influenced by the context” (Walsham 1993). In other words, interpretive research investigates more the social reality as it assumes that people create and associate their own subjective and intersubjective meanings as they interact with the world around them. It thus attempts to understand phenomena within cultural and contextual situations through accessing the meanings that participants assign to them. Interpretive studies therefore rejects the possibility of an “objective” or “factual” account of events and situations, seeking instead relativistic, albeit shared understanding of phenomena (Orlikowski and Baroudi 1991). Hence an interpretive research approach was adopted in the study to unearth the complexities surrounding the implementation of an EHR in a General Hospital.

However, despite the increased interest in interpretive research, questions have been raised as to how it should be conducted and how its quality can be assessed. To this end, Klein and

Myers (1999) suggests a set of principles for the conduct and evaluation of interpretive field research in information systems. But the authors cautioned that the set of principles suggested applies mostly to the conduct and evaluation of interpretive research of a hermeneutic nature. Furthermore, the authors concluded that while not all the principles may apply in every situation, their systematic consideration is likely to improve the quality of future interpretive field research in information systems (especially that of a hermeneutic nature) (*Ibid*).

The first principle called the *Fundamental Principle of the Hermeneutic Circle* suggests that “all human understanding is achieved by iterating between considering the interdependent meaning of parts and the whole that they form”. It is the most fundamental of the principles and is in effect a meta-principle upon which the other six principles expand. The second principle called the *Principle of Contextualization* requires critical reflection of the social and historical background of the research setting, so that the intended audience can see how the current situation under investigation emerged. The third principle; *The Principle of Interaction Between Researchers and the Subjects* requires critical reflection on how the research materials (or “data”) were socially constructed through the interaction between the researchers and participants. *The Principle of Abstraction and Generalization*, which is the fourth principle, requires relating the idiographic details revealed by the data interpretation through the application of principles one and two to theoretical, general concepts that describe the nature of human understanding and social action. *The Principle of Dialogical Reasoning*, which is the fifth principle, requires sensitivity to possible contradictions between the theoretical preconceptions guiding the research design and actual findings (“the story which the data tell”) with subsequent cycles of revision. The sixth principle (*The Principle of Multiple Interpretations*) requires sensitivity to possible differences in interpretations among the participants as are typically expressed in multiple narratives or stories of the same sequence of events under study. Similar to multiple witness accounts even if all tell it as they saw it. The seventh principle (*The Principle of Suspicion*) requires sensitivity to possible “biases” and systematic “distortions” in the narratives collected from the participants (Klein and Myers 1999). These principles served as a guideline during the collection of empirical material to examine the prospects and challenges of implementing the EHR in a General Hospital.

### *3.2.1.3 Case Study*

Case study research is the most common qualitative method used in information systems (Orlikowski and Baroudi 1991). It can be used to describe a unit of analysis (e.g. a case study of a particular organization) or to describe a research method (Myers 1997). Yin (1999) defines

a case study as an empirical inquiry that investigates a contemporary phenomenon within its real-life context, especially when the boundaries between phenomenon and context are not clearly evident. In a similar vein, Simons (2009) defined a case study as “an in-depth exploration from multiple perspectives of the complexity and uniqueness of a particular project, policy, institution, program or system in a “real life””.

### 3.2.2 Sampling techniques

The population of this study were doctors working in General Hospitals. However, the study was limited to doctors who had some knowledge of the EHR.

#### 3.2.2.1 Sampling method and sample size

In qualitative research, sample selection has a profound effect on the ultimate quality of the research (Coyne 1997). The study adopted the dimensional and convenience sampling techniques in selecting the respondents.

*Dimensional sampling* which was introduced by Arnold (1970), involved selecting a small number of cases from a universe of potential cases according to previously determined dimensions. This approach ensures a certain representativeness of the selected cases regarding the “universe which one wishes to generalise”. The “universe” in this study thus refers to a General Hospital.

*Convenience sampling*, used in drawing on predefined populations such as participants in medical clinics (Luborsky and Rubinstein 1995), was then used to include as many doctors as possible.

Finally, the principle of saturation was employed in determining the sample size. Saturation is the point in the data collection process where no new categories or themes emerge (Mason 2010). The researcher believes that most of the perceptions that might be important were uncovered.

#### 3.2.2.2 Selection of Respondents

Those included in the study were participants who had some knowledge of the electronic health record. These participants will have an idea of the social and technical issues surrounding the implementation of the system. Also, the participants should have spent some time at the facility to be able to identify cultural issues that may be associated with implementation of the system. Thus, respondents who have been at the facility for at least one year were included.

Respondents who were included in the study were also literates who could understand and speak the English language.

### 3.2.3 Empirical Materials collection method

Due to inability of the researcher to travel to the home country, data was collected via phone conversations.

#### 3.2.3.1 *Informal phone discussions*

The purpose of the qualitative research interview is to contribute to a body of knowledge that is conceptual and theoretical and is based on the meanings that life experiences hold for the respondents. The respondent is therefore more a participant in meaning making than a conduit from which information is retrieved (DiCicco-Bloom and Crabtree 2006).

Formal interviews were not conducted because ethical approval could not be obtained hence informal phone discussions were the primary source of empirical materials collection. The phone discussions lasted between 30 minutes to 40 minutes. The discussions were not recorded and were open-ended to encourage the respondents to share as much information as possible, unselfconsciously in their own words. However, the researcher took down notes of the salient points mentioned during the discussions but no personal identification information was written down in the notes.

### 3.3 Data analysis strategy

According to DiCicco-Bloom and Crabtree (2006), qualitative data analysis ideally occurs concurrently with data collection so that investigators can generate an emerging understanding about research questions, which in turn informs both the sampling and the questions being asked. For easy analysis of the data generated from this study, the phone discussions in the study were structured according to themes to reflect the main objectives of the study and aid the easy analysis of data. The themes which are directed at evaluating the challenges and prospects of implementing the EHR in a General Hospital reiterates the challenges mentioned in the literature review as well as reflects the study objectives. The data from the study was thus analyzed based on the themes that includes; healthcare professionals' knowledge of the system and willingness to adopt the system, prospects of implementation, challenges that may be associated with its implementation.

### 3.4 Reflection on the study approach

According to Blavin, Ramos et al. (2013), organizations that successfully implemented EHRs did a number of things early on which among other things included engaging staff at all levels.

They added that for EHRs to reach their full potential, it will be important to consider how to encourage and support organizations to continually modify and optimize their systems to meet the needs of their organization, their staff, and ultimately their patients. The purpose of this present study was to examine the prospects and challenges of implementing an electronic health record in a General Hospital. To achieve this goal, an interpretive case study was adopted as it will enable the researcher to get a proper understanding of the participants' point of view regarding the social, cultural, and technical issues that may impede the implementation of the system. Thus, this approach was most suitable for the study.

#### 3.4.1 Access to the participants

Recruiting the participants was pretty straight forward as some of them were the researcher's former classmates while the other participants were those recruited on his behalf by his former classmates.

Since the researcher is familiar to some of the participants, an informal way was used in approaching the respondents. The researcher made appointment with those he knew while his former classmates made other appointments on his behalf and thereafter sent him the phone numbers of the participant.

After the necessary introduction during the phone call, the participants were briefed on the purpose of the research and the nature of questions to expect. They were also assured that their responses will be anonymous and treated confidentially. This was very much appreciated by the participants and they were very cooperative during the discussions.

#### 3.4.2 Reflections on Klein & Meyers (1999): Principles to interpretive research

The conduct of the study was consistent with Klein and Myers (1999) seven principles of conducting and evaluating interpretive studies discussed earlier in this chapter. The researcher reflected on the social and historical background of the research setting which may have given rise to the present situation (*the principle of contextualization*). During the discussions, the researcher ensured that the interactions were social to generate facts and deeper insights which could be concealed by relying only on the historical data (*the principle of interaction*). However, with regards to the fourth principle (*the principle of generalisation and abstraction*), the findings of the study cannot be generalised but can serve as a guide to conduct similar studies in research settings with similar characteristics. In accordance *with the principle of Dialogical reasoning*, the researcher compared the theoretical preconceptions guiding the research design and the literature reviewed in chapter 2 with the actual findings of the study in



chapter 4 for possible contradictions. This comparison was done in Chapter 5. The collection of data from different respondents could have led to the violation of the sixth principle (*the principle of multiple interpretation*), but the researcher was sensitive to possible differences in interpretations among the participants and these was non-existent. Thus, the principle was fulfilled. To prevent violation of the seventh principle (*the principle of suspicion*), the researcher compared the responses of the participants and discovered no biases.

### 3.4.3 Ethics and safety

The purpose of the study was to explore the views of doctors working in General Hospitals on the prospects and challenges of implementing an electronic health record in their facility. Due to inability to get an ethical approval, the researcher used informal phone discussions as the only means of empirical materials collection.

### 3.4.4 Limitations to the study approach

The result of this study cannot be generalised because the data was not collected in an objective and formal way. However, the researcher has no intention of generalising the findings of the study but the insights generated could form the basis for further research and can also help healthcare managers understand the kind of challenges to tackle prior to implementing an electronic health record system in a secondary healthcare facility in Nigeria.

Inability to get ethical approval was another limitation of the study. The process was quite complicated due to the inability of the researcher to travel to his home country therefore the researcher opted to carry out the study using an informal approach. This approach did not permit the researcher to probe deep and ask sensitive questions during the discussion with the respondents but he believes the information volunteered by the respondents would not have been different had the data collection been formal.

Some of the participants were the researcher's classmates. This familiarity may have influenced the information given. But since the participants were informed that their answers, names and place of work were strictly anonymous and highly confidential, and the research was purely based on their opinion, the researcher believes that the participants were objective in their responses.

## CHAPTER FOUR

### RESEARCH FINDINGS AND INTERPRETATIONS

#### 4.0 Introduction

This chapter of the thesis presents the views of the doctors from informal phone discussions. The views were from doctors working in General Hospitals in 3 different states of Nigeria. The result collated are presented in three sub-sections, each corresponding to the three research questions. The aim of the first research question, presented in the first sub-section, was to ascertain how much of the EHR system the healthcare professionals know. A good knowledge of the system will help the doctors appreciate what may be the likely challenges and prospects to implementation. The second and third sub-sections presents the prospects and challenges respectively as highlighted by the doctors.

#### 4.1. Knowledge of the Electronic Health Records among the respondents

All the respondents had some idea of what an electronic health record is. The most common definition/meaning assigned to the EHR among the respondents was:

*“Electronic Health Record is such that the patient’s medical records are kept electronically on the computer system, with a kind of central database, whereby clinicians from their different offices can assess it.”*

From the views of the doctors, some of the benefits that can be derived from the EHR include:

*“It can enhance service delivery by shortening patient waiting time.”*

*“Enhance confidentiality and security of patient data because unauthorized personnel sometimes withdraw folders when in transit and sometimes in the record room.”*

*“Prevents loss of data. Sometimes folders are misplaced when files move between units in the event of a patient receiving care in two or more units.”*

It was necessary to ask this question because a good understanding of the system will give the respondents an idea of what is required for a successful implementation. This will enable the respondents identify factors that could be challenges or prospects to the implementation of the system in their respective facilities vis-à-vis the current state of infrastructural resources or otherwise.

## 4.2 Prospects to the implementation of the EHR

The discussions revealed two prospects that will facilitate the implementation of the system in a General Hospital; willingness of the doctors to adopt the EHR system and good knowledge of computer use among the doctors.

### 4.2.1. Willingness of doctors to adopt the system

The doctors were desirous of the implementation of the system because they felt it would help them serve patients better. Some of them were also of the view that since people are presently more technologically-oriented, it will be easy to convince their colleagues to embrace the system. The doctors were also willing to recommend its implementation in their hospital. This was aptly put by one of the doctors who when asked if he would recommend the implementation of the EHR, responded thus;

*“I will definitely recommend it. Everyone will love what will make his/her work easier. It will also help address the issue of loss of patients’ file, damage to cards resulting from exposure to moisture, and difficulty in retrieving patient file in the event when a patient loses his/her personal card which is needed to trace their hospital file as this can be traced in an EHR by searching the system using the patients name”.*

### 4.2.2. Good knowledge of computers among the doctors

The respondents all had good knowledge of computer use and some of them have had some form of training on the use of the electronic health record and the use of telemedicine applications like videoconferencing.

## 4.3. Challenges to the implementation of the Electronic Health Record

The challenges highlighted by the doctors will be presented along three themes. These are; infrastructure issues, human factors issues and political issues.

### 4.3.1 Infrastructure issues

#### **Poor power supply**

Power supply in the towns where the General Hospitals used for this study are located is presently poor and erratic. The towns could sometimes be without power for days and thus rely on generators as an alternative source of power supply. One of the respondents noted that in a bid to reduce the overhead costs of running the generators, during the nights, patients on admission are sometimes moved to a smaller ward which can be powered using a small generator while other units of the hospital are without power.

### **Poor internet connectivity and availability.**

The internet connectivity in the towns is poor and epileptic. One participant noted that sometimes the mobile network data disappears for up to three days. He added that the poor internet connectivity and penetration in sub-urban towns where General Hospitals are located might be a problem if network is needed for the EHR system to run.

### **Inadequate ICT equipment**

In one of the centres, a respondent observed that only the secretary to the hospital had a computer in his office which serves the entire hospital. The lack of relevant hardware will be a challenge to the implementation of the electronic health record.

#### 4.3.2. Human factors issues

### **Inadequate computer skill among non-medical and non-clinical staff**

Many non-medical and non-clinical healthcare workers in General hospitals lack the basic knowledge to operate and use a computer properly. Implementing the system may mean bringing in qualified people which will lead to loss of jobs for the previous staff, most of whom may not be able to acquire the necessary skills to use the new system.

### **Low level of awareness on eHealth**

Telemedicine is not well accepted. Many healthcare workers, especially in the records department, are not yet aware of the possibility of storing patient information in electronic format while some are yet to come to terms with the use of computers in healthcare delivery. This is due to a dearth of qualified manpower in the records section of public hospitals.

### **Resistance from staff**

Staff of the hospital who feel they could lose their jobs may resist the implementation and create bottlenecks. The workforce in the records section for example may be reduced and staff who feel their jobs are threatened will most likely kick against implementation. Besides, the staff who may be affected will do all it takes, such as using their unions to lobby the government, to frustrate the implementation.

### 4.3.3 Political issues

#### **Poor administration**

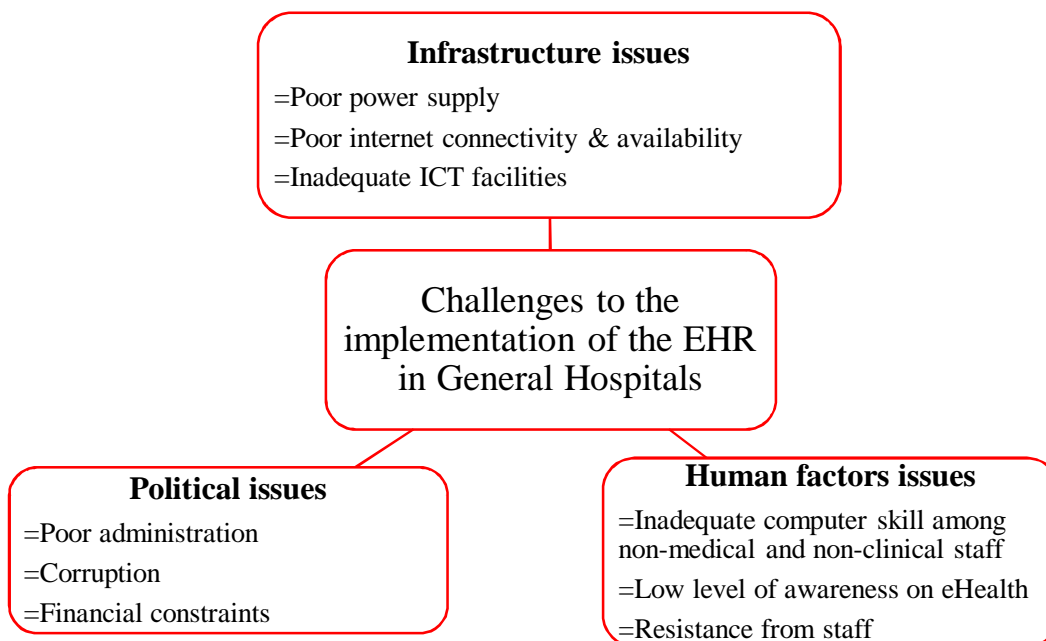
Politicians who run the government and take decisions on budgetary allocations are most times not in tune with advances in healthcare and often require competent advisers to recommend and push for the implementation of such novel ideas.

#### **Corruption**

The respondents identified corruption as one of the challenges. It manifests most times in the form of non-execution of awarded contracts or supply of sub-standard equipment. Other times, in their bid to make profit, the contractors cut corners and deliver outdated equipment to the hospitals thus making the hospital a dumping ground. This equipment begins to malfunction within a few months of installation leading to high cost of maintenance.

#### **Financial constraints**

This was identified as one of the major challenges as General Hospitals, and indeed all government hospitals are grossly underfunded. The scarce resources have resulted in the inability to maintenance existing infrastructure and equally invest in new ones.



**Figure 4. Challenges to the implementation of the EHR in General Hospitals**

#### 4.4 Recommendations/suggestions from the respondents

These were solutions proffered by the doctors to the challenges mentioned. This information came up during the discussions and were noted by the researcher. But since it is not one of the focus of the thesis, they won't be discussed in the next chapter.

A respondent suggested that to overcome the challenge of lack of government initiative, only qualified and visionary people should be appointed into offices. He gave an analogy to buttress his point:

*“When the president and health minister are positively disposed to a programme, it will aid development as available resources can be re-directed. For example, the current minister’s interest in Tuberculosis (TB) has led to the diversion of resources to innovative ideas aimed at eradicating the disease. The Health Minister has declared the year 2017 “the year of accelerated development in TB”. Lots of resources have been channelled to the TB programme like the mobile diagnostic van inaugurated last week in addition to looking for shorter treatment regimen from 18 months to 9 months. The TB programme is so dear to the minister’s heart and he has ensured the channelling of resources to it. The key to the successful implementation of any programme is to appoint the right policy makers. They are the ones that matter. From experience, it is only programmes that get to the right policy makers that see the light of day. The policy makers should be able to present the programmes clearly to the politicians regarding what they stand to gain in terms of political goodwill from the public. No matter how beneficial a program is, it won’t receive support from the politicians unless it is communicated to them in a way they can understand.”*

Another respondent was of the view that when there is a will, there is a way. He opined that even if the current budgetary allocation to the facility is inadequate, it might be possible to redirect funds to the project if the management of the healthcare facility are willing. He added that if people put in all it takes to do whatever they want to do, it can be done. It may be difficult but not impossible. He suggested that the system be test run using a target hospital. The results from the pilot study could be a catalyst to advocate for attitudinal change and a change of mindset for those who don't believe the system will work.

Another respondent recommended the education of people in charge of running the General Hospitals on the importance and advantages of such form of record keeping. This may spur them to redirect funds into implementing the system. It was also suggested that the staff

involved in the current manual entry be trained on the electronic health record system to mitigate the possible scenario of resistance.

#### 4.5 Summary of findings

Findings from the informal phone conversations showed that the doctors are computer literate and were willing to adopt the electronic health record system. These two variables are prospects that will facilitate the implementation of the electronic health records in a General Hospital setting. Infrastructure issues like poor power supply, political issues like poor administration and human factors issues like inadequate computer skill among the non-medical and non-clinical staff were the three major categories of barriers and challenges in the way of successful implementation of EHRs in General Hospitals. The respondents noted that a strong initiative on the part of the Hospital Management (and to some extent the State Governments which own the General Hospitals) was the panacea to overcoming the myriad of challenges hindering the implementation of the system.

## CHAPTER FIVE

# DISCUSSION

### 5.0 Introduction

This chapter discusses the findings presented in chapter four and compares them with literature reviewed in previous chapters. Based on the aim of this project, the discussion will be categorized under two main themes; (1) Prospects to implementation (2) Challenges that will hinder the implementation.

### 5.1 Prospects to EHR implementation in the General Hospitals

There were two major prospects that will aid the implementation of the EHR in a General Hospital. These are: (1) Willingness of the doctors to adopt the EHR system (2) Good knowledge of computer use among the doctors

#### 5.1.1 Willingness of the doctors to adopt the EHR system

Resistance to change has been identified as a barrier to EHR implementation (Ajami and Arab-Chadegani 2013). But the respondents were willing to change from the paper-based system to the EHR and majority were willing to recommend its implementation to the government because they believe it will improve their work rate and care delivery to the patients. Willingness of healthcare professionals to use IT applications is essential for successful eHealth implementation (Akhtar, Akram et al. 2016). While Khoja, Scott et al. (2007) defined willingness for eHealth as preparedness of healthcare institutions to adopt IS/ICTs for performance, Saleem (2010) argues that willingness for eHealth systems by healthcare organizations is the ability of these organizations to encourage and sustain the growth of eHealth devices and gadgets, infrastructural set up, and users' skills. Also, a previous study observed a significant positive relationship between organizational factors, such as the organization's commitment, and the success of Electronic Health Information Management System (EHIMS) implementation in Nigerian teaching hospitals (Ojo and Popoola 2015). However, there is need to test the willingness expressed by the respondents in this study with a more accurate instrument like the "Electronic Health Information Management System Success Factors" (EHIMSSF) which has been used in a Nigerian teaching hospital (Ojo and Popoola 2015). Be that as it may, the willingness expressed by the respondents, if translated to practice, will aid a successful implementation of the EHR in the General Hospitals.

#### 5.1.2 Good knowledge of computer use among the doctors

Majority of the respondents have good knowledge of how to use basic computer programs while some have had training on the use of EHR. The others indicated interest to improve their



skills both for job related functions and for their personnel development. The researcher believes this will make for a smooth transition from the paper-based system in the event of an EHR implementation. According to Terry, Thorpe et al. (2008), physicians, nurses and other providers who have high computer skills would welcome the implementation of EHR. In addition, it has been reported that baseline levels of computer knowledge have a positive influence on the implementation process of an EHR (Dansky, Gamm et al. 1999, Akomolafe 2014, Biruk, Yilma et al. 2014). This is because it is one of the determinant factors for readiness of healthcare professionals for EHR implementation. The researcher therefore considers the computer skills of the respondents as a prospect for the implementation of the EHR in the General Hospitals.

On the contrary, a study of family medicine residents found that prior experience with computers was not associated with implementation challenges (Aaronson, Murphy-Cullen et al. 2001). This view was also expressed by some of the respondents who believe that a lack of skill will most likely impact the user's ability to perform tasks with the system rather than the implementation of the system. That notwithstanding, majority of the respondents believe that adequate pre-implementation training will address any challenges related to users' computer skill.

## 5.2 Challenges associated with EHR implementation in a General Hospital

### 5.2.1 Infrastructure issues

#### **Poor power supply**

Electricity has an immense role to play in healthcare delivery so much so that the United Kingdom department of health named electricity as the 'most vital of all infrastructures services' because 'without it most other services will not function' (Odiawa 2017). Nigeria's electricity demand, according to figures from the Federal Ministry of Power, Works & Housing, was placed at 12,600 megawatts while current supply still hovers below 4,000 megawatts (*Ibid*). In a bid to make up for the inadequate power supply to the General Hospitals resulting from the shortfall in the nation's electricity generation, the hospitals have resorted to alternative sources of power supply like generators and solar energy. Despite the high overhead costs involved with the use of generators, they are usually the preferred alternative source of power supply in the General Hospitals probably because of the ease of maintenance with regards to availability of technical expertise. Although low power generation and lack of technical expertise to maintain solar panels have been identified as some of the issues with

solar solution, a solar-powered EHR solution has been deployed in some parts of Northern Nigeria (Odiawa 2017). The General Hospitals can adopt this model as a solution to the problem of inadequate power supply. Interestingly, a doctor at one of the General Hospitals in this study mentioned that solar panels are presently being installed at their facility and hopes it will solve the problem of inadequate power supply.

### **Poor internet connectivity**

The General Hospitals do not have internet connectivity. The respondents attributed this to the cost of acquisition and maintenance which cannot be supported by the funding the institutions receive. It had previously been reported that the low speed and expensive internet bandwidth in most sub-urban parts of Nigeria (Osugwu, Okide et al. 2013) will be a barrier to the implementation of the EHR because a high bandwidth is required for assessing the EHR (National Research Council 2000). The lack of affordable connectivity and bandwidth has also been described as the primary obstacle to several of the most promising health applications for rural areas, including telemedicine and other real-time diagnostic support and training initiatives (Blantz 2010). Although mobile networks provide internet connectivity in the sub-urban areas of Nigeria, the services are sometimes epileptic as observed by the respondents. The development of Open protocols, such as WIFI, which are durable, inexpensive, and certified appropriate for rural wireless networks may offer an alternative (Blantz 2010).

### **Inadequate ICT facilities**

Current ICT infrastructure in the General Hospitals for possible installation of the EHR system is inadequate. The distribution of medical service delivery as well as infrastructure distribution of healthcare in Nigeria has always favoured the urban population (where the educated, the rich, and government functionaries reside) at the expense of the rural settlers (Ademiluyi and Aluko-Arowolo 2009). As mentioned earlier, one respondent observed that only the secretary's office at his facility has a computer in the entire hospital. For a successful implementation, there is need for more ICT infrastructure in the General Hospitals. The lack of ICT infrastructure had previously been identified as a barrier to EHR implementation (Martinez, Villarroel et al. 2005, Ward, Jaana et al. 2006, Ouma and Herselman 2009). Unfortunately, the funding needed to tackle this challenge is currently inadequate (Ejughemre 2014). This view was also echoed by Akinsete (2016) who noted that the provision of and improvement in healthcare infrastructure in Nigeria has been hindered by gaps in financing as the traditional funding model through fiscal budgets and Internally Generated Revenues have become

increasingly inadequate. Akinsete (2016) therefore suggested the use of Public Private Partnerships (PPP) as a strategy to improve healthcare infrastructure and operations as evidence supports this.

### 5.2.2 Political issues

#### **Poor administration**

Poor administration and a lack of initiative from the government was identified by the respondents as a major challenge because decisions typically involve a top-bottom approach. Previous studies reported that poor administration have contributed greatly to the fragile health systems in many African states (Chen, Evans et al. 2004, Senkubuge, Modisenyane et al. 2014). The government is also responsible for all recruitments and appointments. Therefore, public hospitals experience uncertainty problems in the selection or appointment of chief executive officers; the outcome of which may be dependent on how connected the candidate is, and not necessarily based on the most experienced or one with the best leadership qualities (Anyika 2014). A previous study in Teaching Hospitals in Nigeria identified a significant positive relationship between political factors and the successful implementation of EHIMS. The study concluded that the more the political factors are taken care of, the more will be the success of EHIMS in Nigerian teaching hospitals (Ojo and Popoola 2015). The influence of politics on the adoption of information systems in healthcare has also been reported by other studies (Braa, Monteiro et al. 2004, Lin and Silva 2005). This influence of government on EHR implementation was summed up by Benson (2011) who noted that the lack of strategic government programs has culminated in the poor adoption of hospital information technologies in health care facilities across Nigeria. To minimise the effect of political factors and ensure stability in policy implementation, the State Governments may need to adopt the idea of public-private partnerships recommended by the Federal Ministry of Health (FMoH 2010). Incorporating the private organizations in the running of the General Hospitals can reduce some of the bureaucracy associated with public institutions. The role of government in healthcare delivery can be summed up with the opinion of Adelaye, David et al. (2017) who noted that without a driving, systemic and structural change in health governance, the prevailing crises in the health workforce and service delivery may continue.

#### **Corruption**

While Nigeria has over the years improved on the Transparency International Corruption Perception Index being ranked in the 136<sup>th</sup> position on the 170 countries listed in 2017

(Transparency International 2017), compared to being one of the ten most corrupt countries between 1998 and 2003 (Anyika 2014), Ogbeyi (2012) had reported that corruption in the country has made the healthcare delivery system comatose, a view shared by the respondents in this study. Health system corruption prevails in Nigeria because there is no adherence to the rule of law, coupled with lack of transparency and trust. In addition, the public sector in Nigeria is ruled by ineffective civil service codes and weak accountability mechanisms, among others (Adegboyega and Abdulkareem 2012). Sometimes, funds intended for aid and capital investment are diverted by corrupt officials (*Ibid*). (Husmann 2011) argues that there is a critical link between corruption and health service delivery. He stresses that corruption makes health policy, health initiatives, the provision of care and international aid less effective, undermining efforts to increase better coverage and quality in the health systems and to improve the health status of the population. It has been suggested that to mitigate corruption in the health systems in Nigeria, there should be adequate measures in forms of checks and balances coupled with effective monitoring and evaluation of health resources and outcomes (Adegboyega and Abdulkareem 2012).

### **Financial constraints**

The respondents identified inadequate funding as another challenge as the hospitals' funding is dependent on budgetary allocation from the State Governments. Previous studies reported that continued underinvestment in health have contributed greatly to the fragile health systems in African states (Chen, Evans et al. 2004, Senkubuge, Modisenyane et al. 2014). At present, Nigeria's health sector is grossly underfunded as evident by the low allocation (Ejughemre 2014). A previous study in Nigerian teaching hospitals observed a significant positive relationship between financial factors and the success of EHIMS implementation (Ojo and Popoola 2015). A similar finding was corroborated elsewhere by the revelation of Yoon, Chang et al. (2012) that of the factors that impede or facilitate the adoption of EHRs in Korea, financial aspects were reported to be the most important facilitator of the EHR adoption as well as a barrier. This result, is however, contrary to the findings of Raymond (1997), who opined that greater financial investment in computer hardware and software had no direct effect on the success of the system. Guy and Marie-Claude (2007) on the other hand opined that demonstrating the financial viability of an electronic health information system project is a necessity but not sufficient condition for success. All in all, it is believed that in a resource-constrained setting like Nigeria where finances are hard to come by, funding will definitely associate with success (Ojo and Popoola 2015). To address this shortfall, it has been suggested

that the Nigerian Government can scale up healthcare financing by leveraging private resources, innovations and expertise (Ejughemre 2014). It has also been suggested that to maximize funds, health research can be directed towards low-cost technology rather than expensive high-tech medical equipment, which requires extensive human, technical and financial resources to maintain (Adeloye, David et al. 2017).

### 5.2.3 Human factors issues

#### **Inadequate computer skill among non-medical and non-clinical staff**

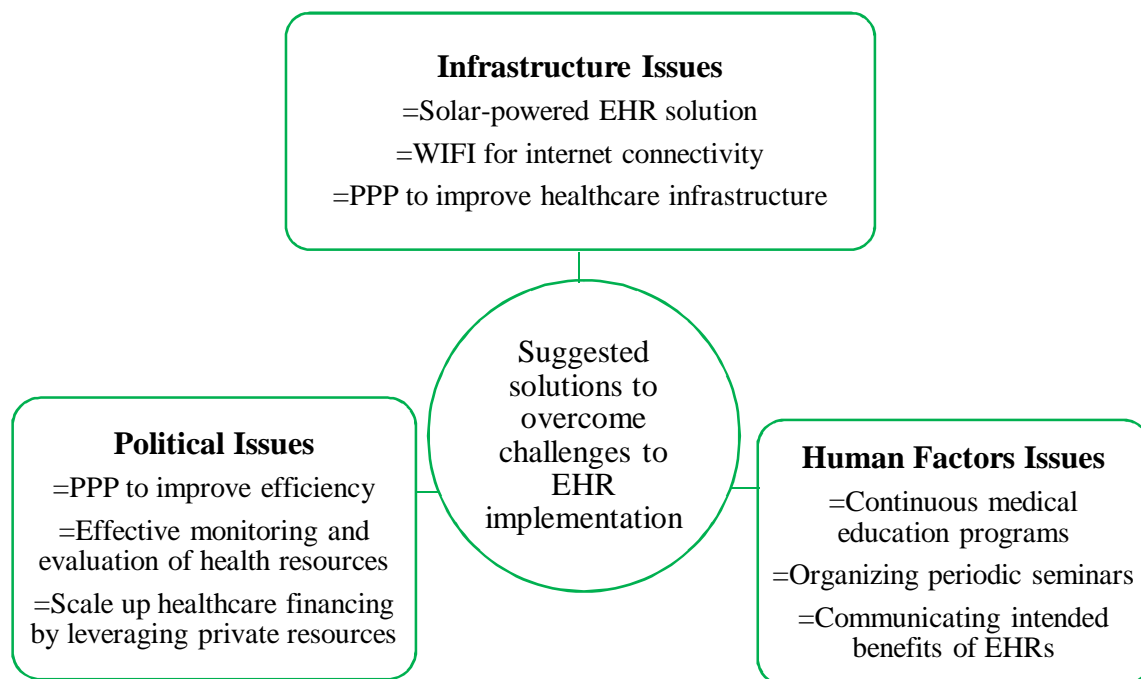
While previous computer experience by staff has been noted as a critical issue for successful implementation of the EHR (Øvretveit J et al 2007), health staff in developing countries often have less experience using computers (Scholl, Syed-Abdul et al. 2011). The respondents in this study observed that many non-medical and non-clinical staff in government hospitals lack the basic knowledge to operate and use a computer effectively, and may have difficulty acquiring the necessary skills to use the EHR. They opined that implementing the system may require staff restructuring in the form of bringing new staff who are “computerate” and laying off those who may have difficulty adjusting to the system. A previous study suggested that the panacea to tackling the challenge of lack of experience of computer applications can include short courses for healthcare professionals and continuous medical education programs provided about EHRs and health information management. These programs, the study noted, should be implemented by the Ministry of Health and its formal channels for all healthcare professionals at all types of hospitals and healthcare organizations. It further suggested the need to develop and enhance the taught computer science courses in medical schools, nursing education, and the training curriculum of other future healthcare workers (Khalifa 2013).

#### **Low level of awareness on eHealth**

The views of the respondents was consistent with previous studies which identified a lack of stakeholders’ awareness for moving to adopt new system as one of the factors responsible for the low adoption of EHR in developing countries (Diero, Rotich et al. 2006, Fullerton, Aponte et al. 2006). Mitigating this challenge may entail adopting strategies like organizing periodic seminars for healthcare professionals to keep them abreast of advances in healthcare delivery as suggested by some respondents. Khalifa (2013) also suggested that the importance of EHRs and their applications should be made an integral part of the medical education programs as a way of tackling the challenge.

## Resistance from staff

Staff resistance to change has previously been identified as a barrier to the successful implementation of the EHR (Jennett, Gagnon et al. 2005, Ludwick and Doucette 2009, Saliba, Legido-Quigley et al. 2012). This was also the view of the participants in this study. Strategies that have been suggested to mitigate this challenge include involving the eventual users of the systems in the development and implementation (Police, Foster et al. 2010), better education (Orwat, Graefe et al. 2008), and clearly and prospectively communicating intended benefits and realistic expectations for the system (Studer 2005).



**Figure 5. Suggested solutions to overcome the challenges to implementation of EHRs**

### 5.3 Summary of the Chapter

According to the WHO, a strong health system has a robust finance structure, well-remunerated and trained workforce, sufficient and highly maintained facilities, logistics for medicines, vaccines and technologies and a reliable and regularly updated health information system (WHO 2010). These attributes are presently lacking in the General Hospitals from where the doctors who took part in this survey practice. But it was noted that these challenges can be addressed with appropriate governance (WHO 2010). This view was also shared by the doctors in this study who believed that solutions such as the use of solar-powered EHRs, effective

monitoring and evaluation of health resources, and continuous medical education programs that have been proffered as ways to navigate the barriers to implementing and EHR in the General Hospitals will require a strong initiative on the part of the Government for their actualization.

## CHAPTER SIX

### RECOMMENDATIONS AND CONCLUSION

#### 6.0 Introduction

The main objective of this study was to identify the prospects and challenges that may be associated with implementing an electronic health record in a Nigerian Secondary Healthcare Facility (i.e. a General Hospital) as perceived by doctors working in three of such facility, each located in different States of the country. It was necessary to understand these factors in the context of General Hospitals in Nigeria to enhance EHR adoption in these facilities. This chapter of the thesis presents the conclusion based on the findings from the study and make recommendations for future research.

#### 6.1 Conclusion

The participants believed that infrastructure issues like power supply and inadequate ICT equipment; human factors issues like inadequate computer skill among non-medical and non-clinical staff; as well as political issues such as poor administration, corruption and financial constraints are the major challenges hindering the implementation of the EHR in General Hospitals in Nigeria. All the participants agreed on the benefits of implementing the EHR at the hospitals where they work, most importantly the potential of the EHRs to improve access to and enhance confidentiality and safety of patient data as well as enhance service delivery.

Suffice to say that the General Hospitals had similar challenges irrespective of their location in the country, there was some variation in the magnitude of these challenges and current efforts to alleviate them across the different hospitals which, to some extent, was reflective of the administration of the facilities. For instance, only one of the General Hospitals was installing solar energy as an alternative to the erratic power supply from the public power company. It was against this backdrop that the respondents noted that a strong initiative on the part of the Hospital Management (and to a large extent the State Governments which own the General Hospitals) was the panacea to overcoming the myriad of challenges hindering the implementation of the EHR.

The importance of this study comes from its aim to focus on the factors that will be associated with implementing EHRs in General Hospitals in Nigeria as this is the first study, to the best of the researcher's knowledge, to be conducted in a Secondary Healthcare Facility in Nigeria. The findings from this study can shed more light on the barriers which represents stumbling blocks on the path of successful implementation of EHRs in General Hospitals and can form



the basis for further research especially as the Federal Government is evolving plans and strategies for the adoption and implementation of health information technology (Adeleke, Erinle et al. 2015).

## 6.2 Recommendations for further studies

Since the findings from this study was based on the opinions of only the doctors, it is recommended that further studies be inclusive of other non-medical and non-clinical staff as well as the State Governments, which are the focal actors in the General Hospital network, to get their views which may be contrary to those expressed by the doctors.

From the identified limitations to the approach used in this study, it is recommended for further studies to adopt both quantitative and qualitative research approaches in similar studies to objectively measure some of the responses presented by the participants in this study.

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