A Literature Review of eHealth Sector and Challenges in Nigeria

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***Abstract*- Health sector has evolved significantly in the previous years in accordance to electronic health (eHealth) deployments which utilizes health resources (e.g. information, medicine, and so on) and health care by electronic means. Provision of effective and efficient healthcare services have always been a challenge in developing countries, many factors have been identified by different researchers and other stakeholders as the reason for lack of adequate healthcare services: however, the challenges differs from one country to another. A detailed literature review was conducted to realize the currently eHealth adoption level in Federal Republic of Nigeria while considering facilitating conditions and barriers towards eHealth technologies. It was realized from the literature review that a full scale implementation which would consider organizational structure, technology platform, policy, legislation, social benefits and change management is required.**

Keywords – eHealth; eHealth care system; eHealth in Nigeria; telemedicine; EMR; EHRs; CPOE.

I. INTRODUCTION

The eHealth technology is deemed as a system in which in order to deliver efficient patient record keeping system, streamlined operations by coordinating the activities of the various departments of a hospital into a single repository unit and by so doing, enhanced administration and proper control. The technology is utilized to store and access healthcare records electronically via information and telecommunications technologies (ICTs) instead of manual collection and recording of patients' information. Successful eHealth applications (Electronic Medical Records – EMRs, telemedicine, mobile health - mHealth) are regarded as important tools for providing effective medical services [1-2].

The benefits of eHealth system to the institutions could be summarized as: effectiveness and efficiency in the process, easy accessibility to patient's record, Organized database, centralized database access, provide management and control systems, improved protection and security, aid proper decision making and finally, enables visualized resource allocation.

On the other hand, eHealth adoption is not quite the same in most of the developing countries, such as Nigeria, Uganda, Zimbabwe, Rwanda, Namibia, India, Afghanistan, Malaysia, Libya, and so on: provision of good and affordable healthcare services have always been a problem due to numerous factors such as: poor ICT infrastructure, lack of constant electricity, inadequate health policies and lack of qualified personnel. Consequently, medical institutions in developing countries are poorly facilitated, which makes it difficult for them to handle some of the critical cases of the many patients that rely on them for medical services [3]. Figure 1 illustrates the model of eHealth challenges in most developing countries.

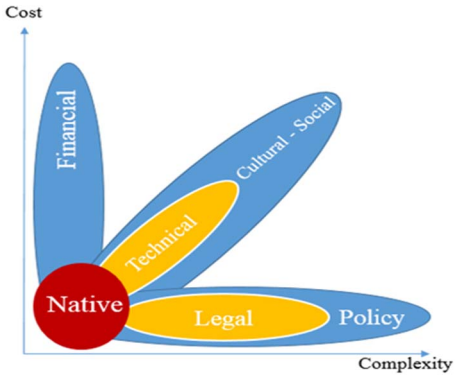

Fig.1 The model of eHealth challenges in most developing countries [15].

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It could be stated from Figure 1 that it is a crucial objective to investigate the readiness factors of the countries, or communities before the implementation of eHealth technologies. Native point represents the optimum solution that will be beneficial with little cost and complexity. In order to achieve a native solution for a specific country, assessment should be considered to comprehend the challenges that may likely hinder the successful implementation of the system. The outcomes of these assessments would enhance both the policy makers and service providers with better understanding while minimizing the chances of failure and also maximize the rate of successful implementation of the new system [3]. Hence, it is important to identify the factors (such as physical infrastructures, policies, legislation and organizational structure) in early stages of adoption process that may affect the success of the eHealth system. Federal Republic of Nigeria is a developing country and currently uses a National Health Care system in which the system provides basic health amenities to its citizens. However, the health care system has gradually shifted to a very dilapidated state during the previous years. Despite the several attempt on health reforms, there is still high maternal and infant death rates (10%) for the country [4].

The aim of this paper is to identify the level of eHealth adoption in Nigeria while considering challenges and barriers for successful implementation by review of relevant articles and journals in the literature. This will enable many health sectors to review and employ suitable technologies in their daily operations.

II. METHODOLOGY

This research reviewed relevant journals and articles on eHealth and telemedicine that have specifically considered the country of Nigeria. All the papers considered (inclusion criteria) in this research are those which studied eHealth/Telemedicine, EMRs, ICT, Electronic Health Records (EHRs), Computerized provider order Entry (CPOE) and written in English language only. While the exclusion criteria is vice-versa.

The whole research, for reviewed literature, was finalized on August 10th 2016 and three main databases were considered. For Science Direct search, the filter was set from 2012 to 2016 while obtaining both abstract and full text articles. Keywords were “eHealth” and “telemedicine” and 6,149 articles were found. Another search was carried out for eHealth in Nigeria without changing the configuration of the filter; extracting both the abstract and the full text also. In this regard, a total number of 39 articles were found. By combining the two searches, it was found that 17 articles meet up with the inclusion criteria.

The search from the Institute of Electrical and Electronics Engineering (IEEE) resulted in 319 articles when the keyword eHealth was used, 5 articles when the keyword telemedicine was used which yielded a total of 324 articles. For both searches, the filter was set from 2012 to 2016. By using the keyword eHealth in Nigeria, only 2 articles was displayed and none of the 2 meet the inclusion criteria so that after careful review, just 4 meet the inclusion criteria.

The last search was done on Springer. Telemedicine or eHealth was used as the keywords in this search and it yielded a total of 13,247 articles and the search using the keyword eHealth in Nigeria resulted in 153 articles. The combination of both searches resulted in 9 articles which met the inclusion criteria. Putting into consideration the three databases according to the inclusion criteria, a total of 30 articles was retrieved and carefully reviewed. The three databases were selected for the purpose of convenience while also considering access to the databases.

III. RESULTS AND DISCUSSION: SUMMARY OF THE LITERATURE

The number of total reviewed articles were 30 and all were written in English. The articles considered includes 17 quantitative, 1 qualitative, 9 conceptual and 3 experimental analyses. Eight articles discussed the state of eHealth in Nigeria. The history of eHealth could be traced back to the early 80s where institutions and healthcare professionals attempted to use a clinical integrated workstation with just a single point of entry into medical systems [5]. It was mentioned in [6] that this workstation had also provided assistance for financial and administrative issues. It was realized that different eHealth applications are used to monitor patients’ vital signs for prompt and real time diagnosis with treatments [7]. According to [8], attempt to start up an eHealth care system in Nigeria started in 1994 by the department of Planning Research and Statistics who provided the required documentations. Some initiatives put together by the Nigerian government for eHealth implementation, such as the endorsement of a district health information system (DHIS) as a tool for reporting corporate data at all levels and mHealth Rapid SMS action supported by UNICEF to track the spread of malaria etc.

In 2013, it was stated in the World Health organization’s (WHO) health care services report that Nigeria attempted the adoption of the eHealth system when it introduced in 2011, the Electronic information System. The aim of this system was to gather reports on birth rate, death rate and it causes. They observed however that the system does not have a Resource Tracking system which should be able to dispatch general health expenses by funding authority and also a Resource Tracking System that could record the overall reproductive child health and maternal newborn [12].

National Healthcare System in Nigeria has three tier systems that includes the federal, state and local government with decentralized services. They are all saddled with the responsibilities of providing adequate health programs and services to the people. The federal government stipulates the health polices and insures that these policies are hewed to by the state and local governments [9]. Nigerian inability to implement and adopt the eHealth system has resulted in several difficulties. According to WHO report, of the 500,000 women that dies because of maternal infant mortality in the world, ten percent of this figure is said to be from Nigeria; and this is majorly because of inadequate care and poor management of data [10].

There are some effort by the Nigerian government to implement the open Medical Record System (OpenMRS). OpenMRS is expected to provide adequate medical aid to maternal/child healthcare assistance which is believed to be of low computing power abilities such that can be used for a maximum of eight hours without the use of a power generating set. This system is expected to give real and up to date medical information of patients necessary to administer drugs and prescription as well as any other medical services [11].

Two articles have discussed the state of ICTs for an eHealth enabling environment. As far back as in 2005, a national information and communication technology (ICT) plan for health was implemented. This plan aim to cut cost of health ICTs infrastructures and at the same time, provide funds for internet connectivity and training of medical health practitioners. Despite this national plan, it was observed that politics, inadequate technical support and lack/ insufficient funding poses an existential threats to the existence of ICTs infrastructures [12]. ICTs in Nigeria as stated by [13] has gained more success compared with ICT polices for health resulting in some bottlenecks that hinders the growth of projects. A framework for the ICTs status in Nigeria has been designed by the WHO and International Telecommunication Union (ITU). This framework, describes the levels of advancement of the Nigerian ICTs for health. Nigeria, being viewed as a country transitioning from experimentation/early acceptance into advancing/building is in the categories of countries mandated to strengthen already existing systems, make sure that adequate policies are set and enforced, enact means of funds and put in place strategies that will aid complete transition and an enabling atmosphere [14] [15].

Two articles discusses the policies and strategy of Nigeria. It was realized from the papers that annual allocation for healthcare services should be increased since 1% of centralized revenue made available by the federal government of Nigeria as annual allocation is very small compared with other developing countries [16-17]. For instance, Uganda allocated 11% of government's budget to healthcare system in 2005.

Two articles pointed out the challenges hindering the adoption of eHealth in Nigeria. The WHO noted from their observation on why the Nigerian state has not been able to implement the eHealth system. According to them, certain basic amenities needs to be addressed and put in place. This according to them are: inadequate implemented national standards suitable for the deployment of eHealth services, no or inadequate finance/reimbursement by concerned authorities, inadequate and accessible infrastructure and inadequate experienced health practitioners [11].

The authors in [9] through a comprehensive survey, interview and questionnaire administration in some chosen local governments in Oyo state Nigeria, asserted that the healthcare system in Nigeria is found to be inefficient as a result of the following: no provision for a national integrated healthcare data collection table, inadequate budgetary allotment possible of meeting the needs of the health sector, no or inadequate ICTs facilities, relatively low developmental structure and lack/inadequate conservation culture, deadlock in hospital referral system as well as insufficient professionals.

From the issues mentioned above, it could be stated that it is only when these issues are properly addressed, only then will the Nigerian state be able to embark on a full implementation of the eHealth system. Khoja et al [18] represented a model known as the Khoja-Durrani-Scot (KDS) framework for evaluating eHealth based on Needs-Based evaluation and Behavioral shift method and other associated eHealth approach. These theories and concepts where thoroughly examined and aligned based on their relativity with eHealth and its life cycle. The framework, consist of themes of evaluation and stages in eHealth cycle process. This framework has so many dimensions and considered most appropriate areas such as health, ethics, technology, policies, social and economic that are altered by eHealth interventions. The necessities of the framework is seen in its ability to consider many judgmental approaches in the implementation stages. The researchers trust that the framework is competent for evaluating eHealth services since it provide an extensive access to eHealth plan and a platform upon which other assessment mechanisms could be created.

The remaining 13 articles focuses on telemedicine in Nigeria. These articles portrays that although eHealth is not fully implemented in Nigeria; few organizations employ the use of telemedicine [19] [20] [21-22] as according to them, ICTs when used in teleconsultations, tele-monitoring, tele-expertise and tele-assistance could go a long way to meet the needs and care of patients since it can cover a very wide geographic area and possess the potentials of benefiting hamlets and isolated

communities. Fischer [23] through a qualitative research pointed out that the 'Intelligent Hospital' is not only mandatory but a requisite for the growth of all health institutions in Nigeria. According to the authors, EMRs and Advanced Monitoring Devices (AMDs) which are relevant for the care of special need patients are already in use in some private/government health facilities in Lagos State, Nigeria.

Agbele et al [24] developed a model for advancing ICTs and data integrity in eHealth systems. The model considered three factors which are, healthcare ICT Readiness, healthcare ICT information sharing and healthcare ICT SMART impart. The authors believed that since telemedicine is the provision of accessible healthcare services/interactions between healthcare practitioners and patients over a distance and to remote areas, their model could help developing countries such as Nigeria to attain their health goals, improve their health sector and provide an appropriate window for health development.

As regard clinical decision support system, 2 articles [25] [26] discuss the understanding of clinical practices for cross-boundary decision support systems. A conceptual framework was developed such that aid information sharing and collaboration among health institutions. [27] conducted a research using a cross-sectional approach on the management of breast cancer in Lagos, Nigeria. 20 breast cancer patients were selected based on convenience. It was shown from the result of the research that most of the patients overcame their fears based on the support of their caregivers which was mostly done through the usage of mobile phones for constant communications.

Finally, in terms of Computerized Provider Order System, Fadare et al [28-29] used a cross-sectional retrospective by random selection of prescription of some selected walk-in patient of various hospital/clinics in South-West rural communities in Nigeria over the period of October 1st 2010 to 31st March 2011. The result of the research shows that there is high need for enhancement in the nature of drug prescription by health practitioners and the adoption of CPOE will seriously help in this regard. The study of [30] presented a model for analyzing workflow impact variations in healthcare as a result of the adoption of CPOE. The authors believe that their model is capable of evaluating workflow impact which falls within the conference of their framework.

CONCLUSION AND FUTURE WORK

Regardless of the many potentials that lies in the deployment of eHealth care system to enhance and give accessibility to health care services, it was realized that eHealth technologies are not fully utilized in Federal Republic of Nigeria. Technology acceptance assessment is an essential requirement for the preparedness of healthcare institutions or societies to implement a successful implementation of the healthcare technologies. It could measure both the service provider's ability and society's adaptability to the new implementation, including technical infrastructure, policy and technical skills of the employees.

This review is limited by factors such as limited availability of retrieved studies on eHealth in Nigeria, some of the retrieved literatures studied only a part of Nigeria and not the whole country in it entity, because some journal database takes time to index, it is likely that very recent articles are not yet on the databases used. Finally, the page limit placed is also a limitation to this review. From this review, it could be concluded that a holistic full scale implementation which will put into consideration the organizational structure, technology platform, policy, legislation, social benefits and change management, is necessary for sustainable solutions. Future work will consider more databases with focus on the analysis of primary healthcare services in Nigeria.

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