Journal of Health Informatics in Developing Countries
http://www.jhidc.org/
Vol. 20 No. 2, 2026

Submitted: April 6th, 2026 Accepted: Nov 1st, 2026

Electronic healthcare management system in Nigeria: current progress, challenges, and opportunities

Olayemi Olawumi[1,2,*], Sunday Olaleye[2,3], Adedayo Olawuni[2,4]

[1] *School of Computing, University of Eastern Finland, FI-70211 Kuopio, Finland.*

[2] *Centre for Multidisciplinary Research and Innovation (CEMRI), 80160 Joensuu, Finland*

[3] *Business School, Jamk University of Applied Sciences, Rajakatu 35, 40200 Jyvaskyla, Finland*

[4] *Department of Family Medicine, University of Calgary, Calgary, Alberta, Canada*

Abstract

Electronic Healthcare Management Systems (EHMS) offer significant opportunities to improve healthcare delivery in Nigeria. However, their adoption and implementation remain constrained by substantial infrastructural, financial, technical, and policy-related barriers. This qualitative study examines the current state of EHMS adoption and implementation in Nigeria, identifying the progress achieved, challenges encountered, and opportunities for improvement. Data were collected from healthcare providers, patients, and policymakers and analyzed using thematic analysis. The findings reveal limited and uneven adoption of EHMS across healthcare institutions, with notable disparities between private and public facilities and between urban and rural settings. Key challenges include inadequate technological infrastructure, financial constraints, insufficient digital competencies among healthcare personnel, and the absence of coherent and supportive policies. These interconnected barriers continue to hinder the widespread adoption and effective implementation of EHMS within Nigeria's healthcare system. Addressing these challenges through targeted investment, workforce capacity development, improved infrastructure, and strengthened policy frameworks is essential to advancing EHMS adoption and enhancing the quality, accessibility, and efficiency of healthcare delivery in Nigeria.

Keywords: e-health; Electronic Healthcare Management System (EHMS); Electronic health records (EHRs); Nigeria; Private Healthcare Institution; Public Healthcare Institution.

* Olayemi Olawumi- School of Computing, University of Eastern Finland, FI-70211 Kuopio, Finland; Email: olayemi.olawumi@gmail.com.

1. Introduction

eHealth, the use of information technology for healthcare, is a dynamic field that can improve health outcomes globally, particularly in Africa. Electronic Healthcare Management Systems (EHMS) apply information and communication technology (ICT) to support healthcare delivery, administration, and education, improving the efficiency and quality of healthcare services [1, 2].

The EHMS may be patient-centered (e.g., for maintaining healthcare records) or administrative (e.g., healthcare operations management). All these systems store and manipulate healthcare information of a patient for various functions, including medication monitoring, minimizing paper documentation through the EHRs, and better coordination of healthcare. EHMS can provide healthcare with more healthcare data access, clearer communication, less paper documentation, less dependence on paper, better healthcare, better delivery of medical services [3]. EHMS has started to be used in healthcare institutions from hospitals to clinics to laboratories to pharmacies [4]. A key part of EHMS is helping to integrate the collection and storage of patients' records with the goal of improving the healthcare delivery system in a timely and efficient way. On the other hand, EHMS adoption in Nigeria is limited by barriers to implementing EHMS, including cost, usability, and limited buy-in from healthcare professionals [5]. Although there have been some early attempts by public or private medical organizations to adopt EMR systems, adoption is still nascent, and the systems are functioning as isolated units. As a result, patients' records in each facility typically cannot be accessed by any other system. Patients in Nigeria have neither available data from the healthcare institution like the UK or Finland, which have integrated systems. In this study, the implementation of EHMS in Nigeria is examined, state of the art, current issues, and opportunities for adoption and implementation. Data are sought from health service providers, patients, and policymakers through a qualitative approach to ascertain the national landscape of EHMS in Nigeria.

Our research focused on providing answers to the following questions:

1. What is the current state of EHMS in Nigeria?
2. What are the obstacles / challenges faced in the implementation of the electronic healthcare management system (EHMS) in Nigeria?
3. What are the key issues hindering adoption of eHealth by healthcare professionals'/ policy makers within public and private healthcare settings.
4. Is there any ongoing work now to improve the current situation?
5. What are the factors that can further improve adoption and implementation of EHMS in Nigeria?
6. What are the social and societal impacts of EHMS?

2. Overview of Electronic Healthcare Management System

Electronic Healthcare Management Systems (EHMS) are electronic solutions integrated in a digital framework that provide integrated digital solutions that facilitate health care delivery by providing tools to manage, administer and maintain patient care and service delivery through various management, storage, collection, processing, and exchange of data [6, 7]. EHMS extends to technologies like Electronic Health Records (EHRs), mHealth apps, telemedicine, as well as other health information networks that manage medical information systems enabling patient's data in a patient-centered care, streamlining clinical processes and aiding decision making through data management and messaging with more efficient and data sharing tools [6, 8, 9]. The global use of EHMSs is continuously increasing because of the advent and the appreciation of new technology and benefits in terms of more accurate patient information, telemedical care by remote care delivery, real-time monitoring of the healthcare delivery as well as patient's health data and patient continuous monitoring [10, 11]. Nevertheless, different countries face different stages of EHMS implementation facing several issues and promising opportunities for healthcare transformation [12, 13].

2.1 Components of EHMS

EHRs are electronic versions of patients' medical histories maintained by healthcare providers during treatment. The data includes patient histories, diagnoses, treatments, and test results [12]. EHRs have high-accuracy data, they lower errors, and they help to ensure continuity of care as approved providers can retrieve patient information quickly [11]. Mobile Health (mHealth): mobile health applications provide health services and information on mobile devices, like tablets and other smartphones. These apps assist significantly in health monitoring, appointment scheduling and remote health consultations [14]. The availability of health resources and communications with health providers are enhanced, whereby patients engage in self-management [9]. With the use of telemedicine, the telemedicine technologies can include but are not limited to the video conferencing facility, telehealth services and remote diagnostics [15]. As seen with remote and underserved territories, telemedicine enables patients access to medical facilities and visit their healthcare providers virtually [16] HIS stands for Health Information System, a system that aggregates, monitors and analyzes health information. Systems may include but may not be limited to: patient record management, health outcome monitoring and administrative support systems [10]. They affect decision-making regarding resource allocation and are considered to have relevance to supporting the effectiveness of healthcare systems [13]. Tools that facilitate data management and analytics; Tools that enable health data collection, storage and analysis play a direct role in clinical and administrative decision-making processes. Such insights create space

for diagnosing health trends, evidence-based practice, predictive modeling, and population health management [6, 8]. Blockchain technology, health information security, and maintaining the integrity of health information in electronic health records is one of the popular fields of Blockchain Technology. Blockchain technologies, in particular, prevent the manipulation of data and fraud by securing an immutable and decentralized ledger. This enhances the reliability and security of EHMS [16]. In a more efficient, secure and more patient-centered system of access to treatment and management, these are the foundations for EHMS.

2.2 Global Trends in EHMS Adoption

Digital health technologies are integrated into healthcare systems globally, especially those nations that have adopted electronic health systems (EHMS) to reformulate how healthcare is dispensed and delivered. As evidenced by a high use of Electronic Health Records (EHRs), mHealth (mobile health)-based applications, and telemedicine [6, 8]. Within health systems, EHRs are an accessible source of timely and accurate patient data that may help clinicians to be more informed [12]. With more access to smartphones and mobile connections, mHealth applications are used as one of the ways to manage chronic disease, monitor health status, and educate patients, leading to the development of care more patient-centered [9, 14]. Telemedicine has also become an increasingly important aspect of EHMS in recent years, especially since COVID-19 [11, 15] and virtual consultation, remote diagnosis and teletherapy with regards to geographic barriers to health care provision. Data security is also becoming more important as the need for digital health applications increases, which is along with the significant importance of how data can be regulated in terms of the potential impacts of data privacy and security of users' data. Healthcare providers are also increasingly placing emphasis on developing security protocols and adhering to regulations, including the General Data Protection Regulation (GDPR) and Health Insurance Portability and Accountability Act (HIPAA), to ensure security of their sensitive health information [16]. Blockchain has been extensively studied on data integrity and data safety in the EHMS deployment environment [8]. The second major trend was the application of big data analytics and artificial intelligence (AI) to EHMS on an industrial scale. These techniques allow predictive modelling, evidence-based decision support, and favorable patient outcomes, and hence are seen as a backbone of data driven health care and precision medicine globally in the field [6].

2.3 EHMS in Nigeria: Current Situation

They argue that Electronic Healthcare Management Systems (EHMS) are an opportunity to improve healthcare delivery by reducing service delivery error, access efficiency, and data-driven care delivery for patients within a single system. EHMS adoption in Nigeria indicates that a considerable step

towards addressing chronic issues like a country with insufficient infrastructure, poor access to medical records, and ineffective methodology to deliver the quality of services [7]. There are multiple barriers within Nigeria's public health system with high health service delivery burden and poor quality of patients, in addition to low infrastructure and limited access to medical records are also challenges that are difficult to scale up with EHMS as Nigeria has an intricate health care system composed of complex tertiary health systems and underserved primary health facilities [10]. However, telemedicine platforms, Electronic Health Records (EHR) systems and mHealth applications show some improvement in the first place [9, 16]. They improve care and patient management, especially in underprivileged areas. Efficacy: Evidence for telemedicine in Nigeria is consistent with literature regarding telemedicine services using digital health technology, including the NIGCOMHEALTH [15] and satellite connectivity-based telemedicine [6].

2.4 Current Application and Perception

We began to see the adoption of EHMS in Nigeria's cities, also private healthcare institutions. This is being propelled forward by recent technology advancements including Electronic Health Records (EHRs), mobile health (mHealth) applications and telemedicine to improve the delivery of healthcare services. These include RiDokita (virtual consultations, appointment scheduling) as well as plans such as One2One and NIGCOMHEALTH, which are seeking to increase awareness of health services and assessment activities in underserved areas [9, 15, 16]. But the adoption of EHMS is scattered. A number of urban hospitals use EHRs and telemedicine services while many rural health clinics still deliver paper-based care to patients due to the lack of technical support, internet access, facility and cost [11, 12]. Not infrequently, EHMS adoption and use varies from person to person among health professionals. Owolabi et al. (2018), in their study the authors asserted that mHealth information and knowledge about mHealth concepts, mHealth applications were limited as well as the mobile phone usage of healthcare personnel in Lagos State by the nurses[14]. Similarly, Aleke et al. (2020) indicated that while all members of staff use mobile phones for health care work in Lagos State are mobile phone users however, awareness among the workforce is mostly low in regard to mHealth and mHealth applications[17]. Moreover, Zayyad et al., (2018) highlighted that eHealth knowledge was high among healthcare workers as against the low usage among healthcare workers in the Federal Teaching Hospital Abakaliki primarily because of infrastructure or training and technology accessibility issues [13].

Various studies have identified significant predictors for the uptake of digital health technology in Nigeria. Chukwu et al. (2016) identified positive attitudes of health providers and patients in Abuja towards mobile technology-integrated health insurance schemes[18]. Similarly, Akwaowo et al. (2022),

knowledge, perceived usefulness, and critical success factors had an impact on acceptance of Electronic Medical Record (EMR), with data security as the primary consideration[19]. Idoga et al. (2018) identified perceived benefits, ease of use, data protection, and social influence as major factors regarding willingness to take up cloud-based healthcare systems[20]. Furthermore, Okuzu et al. (2022) focused on providing services through digital health insurance systems, including the MedStrat digital health insurance management platform, which can support health insurance enrolment and care services for the poor [21]. Although EHMS has made progress in this process, this is a significant advancement in the modernization of health care in Nigeria, but disparities concerning access to services, awareness, and infrastructure are roadblocks to equity in both regional and health care service delivery.

2.5 Impact of EHMS on Healthcare Delivery

Digital healthcare management systems (EHMS) have brought new and improved access, quality and productivity to health services for the entire population in Nigeria. These include improved accessibility and broader healthcare options resulting from telemedicine and mobile health applications, which is also being augmented through remote consultations, improving geographical access control in rural under-served geographical areas that have a low percentage of people using them [9, 15]. Another important aspect of health service is that EHMS are also changing the quality of care. Healthcare institutions implemented electronic health records (EHRs); which ensure the integrity and completeness of the patient data, facilitate the clinical decision-making process that can reduce the risk of clinical errors and human errors and ensure that care is provided in an integrated manner among professionals [12]. Indeed, EHRs have the potential to boost patient care and reduce waiting lists which translates to better outcomes [6]. EHMS provides an efficient way for health professionals to complete operations (accommodating appointment schedules, patient registration, and billing), it reduces administrative burden, which can in turn relieve the resource burden on health professionals and improves services [8]. But it brings on new technologies such as Nigeria's satellite communication or mobile networks for better data management and involves patients and staff who are very keen on health-related service delivery [10, 22]. Therefore, effective EHMS has enhanced the accessibility of the patients to care, the service provision and the functioning of the health system in Nigeria.

3. Methodology

The primary research aim of the present study was to apply qualitative research design to study the prospects, barriers and the expansion of Electronic Healthcare Management Systems (EHMS) deployment in Nigeria. Participants in this study were patients, health professionals and policymakers in their experiences, perceptions and attitudes on use and adoption of Electronic Healthcare Management

Systems (EHMS). The use of a qualitative methodology in this study is justified if we intend to see into the real in-country implementation of EHMS in Nigeria, as well as to elucidate the obstacles that hinder and the gaps that still need to be bridged. Overall, the results of this study provide very important implications and recommendations to facilitate the effective implementation of EHMS in the Nigerian health care system.

3.1.Research Design

This qualitative phenomenological study sought to understand the experiences and issues of patients, health practitioners and policymakers with Electronic Healthcare Management Systems (EHMS) in Nigeria. A phenomenological study can offer perspective about the specific lived experiences of people, and how they were interpreted in an individual phenomenological way[23]. The purpose of these findings was to construct meanings on the EHMS: The purpose of these results is to study the meaning of implementation and use of the EHMS, as the researchers tried to identify what were common and important parts that contributed towards the perception and experience of each respondent.

Phenomenological reduction and bracketing were applied to gain unbiased participant perspectives. To limit the influence of researcher's personal bias, and allow the participants' experiences to surface themselves, bracketing was used to highlight and eliminate any personal attributions, prior knowledge or biases about the EHMS. The data was analyzed using phenomenological reduction according to the participants' descriptions, which has provided profound and descriptive insights in EHMS implementation in Nigeria for the researchers. Next, these research findings were extended on a larger scale to understand attitudes, meanings and perceptions of EHMS adoption across disciplines and to contribute to the understanding of the phenomenon.

3.1.1 Approaches to Managing Bias

The potential biases which we dealt with, as well as reducing these biases and the trustworthiness and credibility of our research were examined on the basis of a series of guidelines. Reflexive journaling, a way to document the data collected and analyzed over time, served as a constant way to store participants' comments and responses, reflections and potential sources of bias for the researchers. The next step was heightened awareness of biases in addition to the ongoing and iterative reflection of these researchers so that when they become aware of the potential biases that come with researchers' assumptions, this allows them to consider how the possible biases may affect the understanding of the findings.

The research team also synthesized and interrogated interpretations and emergent themes through repeated peer debriefing. These dialogues act as a diagnostic tool for possible bias to re-articulate

underlying assumptions or both and helped ensure the findings weren't based on one's own judgement but data. We also employed member checking, where participants were asked to confirm initial interpretations to ensure findings reflected their experiences and perceptions, and member checking was integral to the study. It would lower misinterpretation and show validity. One argued that these approaches bolstered the rigor of the research and reduced researcher bias, combined with phenomenological reduction and bracketing ensured that the experiences of the participants were perceived how accurately as possible.

3.2. Data Collection

Data was collected from semi-structured interviews with patients, healthcare providers, and policymakers. Interviews were conducted face to face, in person and through videoconference as appropriate for individual participants and recorded and transcribed word-for-word. Moreover, the literature and reports on EHMS in Nigeria also were selected to add a bit of context and further confirm that triangulation of information would be possible.

3.2.1 Sampling

A purposive sampling was used to select the sample (Information and practices on Electronic Healthcare Management System (EHMS) in Nigeria). The population of interest were healthcare practitioners (physicians, nurses, administrators), patients and policymakers (i.e., officials and regulatory bodies, and health administrators). We employed purposive sampling as a sampling technique for the selection of participants with knowledge of implementation, use, barriers and opportunities in EHMS. Participants were divided into the following three categories, to acquire as much diversity in participants as possible, such that a broad perspective could be obtained: EHMS usage experience, professional role, and physical geography (i.e., location). Meaningful criteria of use (i.e. experience, professional role, location).

The participants included healthcare workers with EHMS and policymakers within digital health programs plus patients who had used EHMS on healthcare settings. To overcome geographical limitations due to different levels of the available digital infrastructure (e.g., digital health care services), healthcare delivery (e.g. hospitals or healthcare facilities), using EHMS availability in different areas in Nigeria, we diversified a sample that included various professional sectors and population in urban and rural areas.

Virtual and real-world recruitment techniques were utilized to ensure participants have an equal opportunity to participate to consider geographical restrictions as well. In this study, virtual recruitment was primarily used to recruit subjects from locations, which were geographically scattered, in Northern Nigeria, who were recruited through intermediaries and hospital staff. This approach increased access and

flexibility at a geographical level, at the threat of excluding access to the internet and digital literacy. For physical recruitment, we recruited at the Federal Medical Centre Abeokuta, Neuropsychiatric Hospital Aro, General Hospital Ogba and Matador Medicare Services.

This methodological decision would have been more inclusive, inviting participants with limited access to digital technology. With a mixed recruitment strategy, it enhanced accessibility and participant heterogeneity and reduced risks resulting from geographical restrictions. Through examining both experience and professional profile, and geographical diversity, the study intended to shed light on the complexities associated with EHMS adoption in Nigeria's healthcare environment.

Pre-Screening: Based on data collected from 28 responders and 14 participants they confirmed that they use EMRs for their day-to-day professional work. Seven participants attended scheduled interviews, six were conducted and one was unable to complete due to technical limitations/scheduling problems. Two of the interview recordings were lost, and four full responses were retrieved with this approach.

Physical Recruitment Approach:

Recruitment outcomes are summarized in Table 1 at the six health facilities:

- **Federal Medical Centre, Abeokuta:** 13 applications/interests; 6 final interviews.
- **Neuropsychiatric Hospital, Aro, Abeokuta:** 11 recruits, 5 interviews, 1 lost recording.
- **General Hospital**, **Ota**: no subjects have been recruited, as personnel did not have experience with EMR.
- **General Hospital, Ogba**: 4 participants recruited (3 physical interviews and 1 virtual interview).
- **General Hospital, Gbagada**: Recruitment was not pursued due to a lengthy approval process.
- **Matador Medicare Services**: 6 expressions of interest; 4 completed interviews.

Table (1) Response Statistics

Sources	Total Recruited	Total Interviewed	Interview Format (Physical)	Interview Format (Virtual)
Matador Medicare Services	6	4	0	4
General Hospital Ota	0	0	0	0
General Hospital Ogba	4	4	3	1
General Hospital Gbagada	0	0	0	0
Federal Medical Centre, Abeokuta	13	6	0	6
Neuropsychiatric Hospital, Aro	11	6	1	5
Virtual link	14	6	0	6
Mouth-to-mouth recruitment	2	2	0	2

Figure 1 provides an overall summary of recruitment outcomes, including one incomplete interview, four lost data records, and two responses excluded as irrelevant. Table 2 summarizes the characteristics of the 21 participants, including their healthcare facilities, professions, regions, gender, and

interview durations.

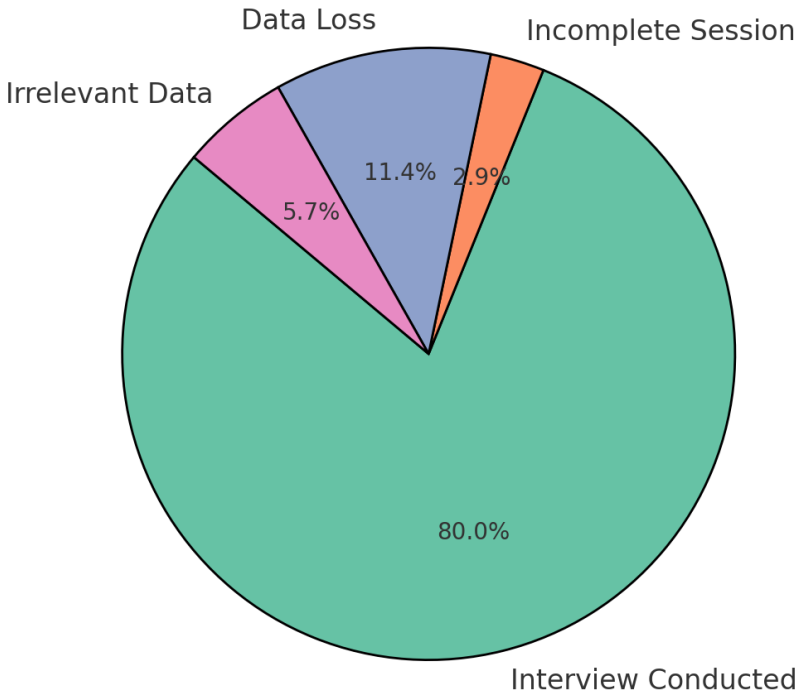


Figure 1: Response Summary of Interviews

Table (2) The 21 Participants in the Study

Participant	Health Facility	Profession	Region	Gender	Duration (mins)
Participant 001	Neuropsychiatric Hospital, Aro	Mental Health Physician	Southwest	Male	48.05
Participant 002	Neuropsychiatric Hospital, Aro	Psychiatrists	Southwest	Male	40.31
Participant 003	Federal Teaching Hospital, Gombe	Medical Laboratory Scientist.	Northeast	Male	22.31
Participant 004	Private Facility	Accountant	Northeast	Female	34.02
Participant 005	Federal Facility	Registered Nurse	North Central	Female	32.02
Participant 006	Private Facility	Admin/Account officer	Southwest	Male	36.41
Participant 007	Teaching Hospital	Registered Nurse	Northeast	Female	60.19
Participant 008	Neuropsychiatric Hospital, Aro	Psychiatrists	Southwest	Male	57.56
Participant 009	Neuropsychiatric Hospital, Aro	Medical Doctor	Southwest	Male	85.07
Participant 010	Government-owned Facility	Senior community health care worker	Southwest	Female	48.12
Participant 011	Private Facility	Medical Record Officer	Southwest	Female	53.45
Participant 012	Private Facility	Nursing Assistant	Southwest	Female	59.73

Participant 013	Government-owned Facility	Physiotherapist	Southwest	Male	29.24
Participant 014	Government-owned Facility	Registered Nurse	Southwest	Female	47.12
Participant 015	Government-owned facility (FMC Abeokuta)	Intern Nurse	Southwest	Female	43.52
Participant 016	General Hospital, Ogba	Intern (Health Information Manager)	Southwest	Female	54.59
Participant 017	General Hospital, Ogba	Physiotherapist	Southwest	Male	31.42
Participant 018	Federal Medical Centre, Abeokuta	Chief Nurse	Southwest	Female	46.34
Participant 019	FMC Abeokuta	Registered Nurse	Southwest	Female	34.22
Participant 020	FMC Abeokuta	Registered Nurse	Southwest	Female	45.33
Participant 021	FMC Abeokuta	Registered Nurse	Southwest	Female	59.54

3.3. Data Analysis

Interview data were analyzed thematically using the approach described by Braun and Clarke (2006)[24]. These interview data were transcribed and organized into common themes regarding the progress, obstacles and potential of EHMS implementation in Nigeria. Data were structured, coded and analyzed employing qualitative data analysis software NVivo to elucidate the overall patterns, ideas and structures found in the experiences of participants. Further, content analysis was utilized to develop a framework for EHMS as well as its implementation within the Nigerian healthcare service [25].

3.4. Coding and Thematic Analysis Procedures

It was evident that every step in the analysis process from iterative coding cycles, peer review and saturation testing had been used to identify how reliable and credible our findings were. NVivo was used throughout our study to organize, monitor and assess the qualitative findings. Open coding of the interview data was done with open codes on the post-transcriptions.

Transcripts of each interview were scrupulously annotated by the researchers to note words, phrases, ideas, and themes of interest which were related to the aims of the study. Descriptive coding was conducted in order to get early patterns and ideas flowing and patterns were detected without any known pre-existing direction. The coding was done iteratively, through multiple rounds of verifying different codes (check codes several times in the code to edit, merge or separate codes as needed). At this time, a codebook was produced in order to keep the code consistent in the dataset.

Line of code definitions and examples were included in the codebook to make interpretative work that supported analysis through interpretation practice. Axial coding was employed after initial coding to explore codes and to group into themes. The codes were subsequently categorized and grouped into themes using thematic and sub-categories in NVivo to create patterns in the data that related to the research

questions. At least one other researcher independently reviewed the themes to increase reliability. Interpretation differences were discussed and resolved with the aim of reducing individual bias to ensure that findings would be more accurate but also more credible to address disagreement on interpretation.

Saturation checks were conducted at various stages of analysis to confirm they didn't reveal any new themes or new meaningful insights. NVivo was used to help analysis to analyze as well in data frequency counting and matrix coding and visualization apps (word clouds; hierarchical structure of nodes). It supported the identification of codes relationships, theme validation and a transparent audit trail from raw data to the final thematic framework.

In conclusion, iterative coding (the way common codes are identified), peer review process, saturation checks and NVivo analysis (assessment of study) was performed together to produce stronger quality, transparency and validity using the study analysis.

3.5. Ethical Considerations

Ethical principles and principles for conduct of human subject's research (informed consent, confidentiality, participants' voluntary participation, etc.) guided the study. Consist of principles fundamental to human subject studies, per Denzin and Lincoln (2011)[26]. Before conducting interviews, informed consent was obtained from all the participants. Participants gave their contact information and stated when they would be reached as part of the initial screening phase. Oral consent was obtained before conducting each interview for participation in the research.

4. Results and Analysis

This section details the performance of our study. We then move on to research questions articulated in our initial questions in section 1, and then present findings that now seem thematically structured to capture the rest of our questions.

4.1 Themes and Sub-Themes

4.1.1 Theme 1: The State of EHMS Implementation in Nigeria

Many Nigerian healthcare providers or the wider nation also differs from one another on the prevalence and low adoption of Electronic Healthcare Management Systems (EHMS). While EHMS is accepted by some institutions; and private and urban based facilities, adoption of EHMS for the public and rural health facilities is an emerging field.

Sub-theme 1.1: Stage of implementation and adoption

Based on our findings, EHMS adoption in Nigeria is limited and mostly is not digitized in most healthcare institutions. Within the sampled territories, the use of EHMS is often below its expectation.

"It has appeared this has dramatically streamlined the usual work," another participant said. But within my native areas that only 6 out of 10 had tried the electronic system, the usage has not been 100%" (Participant 011). Another wrote that "most hospitals, even some government hospitals are not using electronic healthcare management system" (Participant 013).

In facilities where EHMS implementation has been active or ongoing it is generally partial, with departments that are not utilizing electronic records representing the exception or are maintaining paper-based processes. This kind of fragmentation makes the EHMS service useless if the records or processes are not all coherent. Moreover, EHMS use is highly variable by region as well as urban centers, Federal Teaching hospitals and the richer districts report a higher intention to use EHMS than those in rural/poor areas. But the exceptions, mostly limited to Lagos State exist where EHMS has started in some primary care and other facilities and tertiary and specialist facilities.

Participants also reported differences between private and public health institutions. Participant 017 elaborates, "Not all hospitals implement an electronic healthcare management system at present. Private hospitals could have advantages and disadvantages relative to public hospitals implementing computer technology in their operation." Respondents 006 worked at private sector facilities with EHMS system coverage in place for more than a year. They were "over average in performance," which implies that more systems were introduced into private hospitals (higher degree of better implementation) compared to public hospitals.

Private hospitals have more financial, administrative slack and resources than they use in the public sector, and that they invest more in building the digital infrastructure of the system and educating their staff, the results show. There are multiple hurdles that hospitals in government owned or public sector have along with this in it like bureaucratic, financial and other limitations. New systems of digital health care in recent years have developed as an important reform force of health care.

These five fundamental challenges facing healthcare delivery providers include: access, infrastructure and staff availability, cost, and institutional capacity. However, according to the researchers, there remains a scarcity of EHMS in different regions of Nigeria, particularly in rural and public health districts. The problems were most obvious in the public and rural hospital environments.

4.1.2 Theme 2: Limitation of EHMS Adoption & Implementation

The findings revealed several barriers to the adoption and implementation of EHMS in Nigeria, including inadequate infrastructure, financial constraints, limited technical expertise, interoperability challenges, and insufficient policy support. These challenges were particularly evident in public and rural healthcare facilities.

Sub-theme 2.1: Challenges (barriers of non-existent systems and technologies)

Infrastructure was arguably the most obvious barrier of EHMS. Unreliable electricity supply, presence of online facilities is considered as primary factor in low system utilization in the second section below; as a result, most of the respondents cited unavailability of electricity and the absence of web services. 'Participant 011 told us, "For hours, our electronic healthcare management system was down and we couldn't reach them," a fact that suggests the system works well under usage but suffers from all sorts of issues.

As Participant 016 mentioned, without light the electronic medical records would not be functional, so an uninterrupted operation of the EHMS requires an electricity supply. Thus, poor infrastructure can have negative impacts on EHMS availability and dependability, and it also may be disadvantageous to the utility, especially in less affluent and rural areas where power and connectivity are unreliable.

Sub-theme 2.2: Financial Constraints

A second barrier to EHMS might have been financial. Procurement, installations and service costs such as this one can often be prohibitive for many providers, including public hospitals, contributors noted. Participant 013 said, "Most hospitals, and government hospitals in particular don't have this system because it's just too expensive for them to adopt." Participant 021 added, "These systems simply are too expensive to run and build." Digital health infrastructure is underfunded by financial constraints in most healthcare institutions and paper-based systems are now in their dust.

Sub-theme 2.3: Limited Skills and Expertise

One barrier identified regarding the use of EHMS was weak yet adequate healthcare workforce training and digital literacy. Poor staffing arrangements hinder the correct introduction of EHMS (Participant 021). Likewise with Participant 017, we must become computer literate, since average people refuse most problems of our day. Some of the issues the respondents described were also age-related and less about how often elderly healthcare workers felt less connected with digital technology. The results showed that use of EHMS across the health systems of any institution, with few sources of training, was not uniform.

Sub-theme 2.4: Integration and Interoperability Issues

According to the participants, three key concepts which were claimed to be the key subjects of this study were integration and interoperability between any new EHMS systems and existing systems and interoperability issues with health systems. "The gap between what we do and what has been crafted is confusing with how medical records are managed in the old way, however in the new electronic

systems," Participant 009 said, while Participant 007 stated that "if we can't easily transfer our digital information to any other institutions, we defeat the purpose of having an electronic system."

In practice, low interoperability means poor knowledge transfer at facility level on one hand, whereas patient referral/transfer through the EHMS is low.

Sub-theme 2.5: Policy Void and Government Support

Participants perceive poor policy direction and supportive government as a barrier in setting up an EHMS. The state government has not taken this initiative (participant 015), which indicates differing degrees of regulatory adoption. The lack of uniformity in EHMS adoption within health facilities was also demonstrated by the absence of any common framework for promotion and implementation of EHMS as well as support and institutional guidance for implementation. These challenges are apparent by the lack of effective EHMS implementation plans.

4.1.3 Theme 3: Continuing Work and Processes of Improvement

Despite the challenges associated with EHMS adoption in Nigeria, participants identified several ongoing initiatives aimed at improving implementation and expanding usage. These efforts include pilot programs, policy development initiatives, the provision of technical support, and capacity-building programs designed to address operational and technical barriers to EHMS adoption.

Sub-theme 3.1: Pilot Programs and Policy Proposals

Respondents noted pilot EHMS began only at the hospitals on data, efficiency and effectiveness of the digital systems used in hospitals to provide patient care and record-keeping in the hospitals. "There are improvements in the use of electronic devices," Participant 011 said, so institutions on EHMS are adapting slowly more generally and more gradually. Pilot programs appear to be informative to measure usability, readiness of staff, and operational trouble before deployment at an organization wide level, the findings show.

The results also highlighted the need for System Level outreach campaigns that can be applied to help embed the practice of EHMS systematically in health care, particularly among health-care practitioners in the public-sector setting. Pilot and process development efforts were perceived as essential to the growth of EHMS in Nigeria.

Sub-theme 3.2: EHMS Implementation and Information Technology Support Access

The implementation of EHMS with IT professionals is the focus of this research article. Respondents also wanted swift technical assistance to aid in fixing system crashes, connectivity and program development problems. "We are expected to be a united team with our problems because IT staff will be available to troubleshoot," Respondent 006 says.

The results indicate that the EHMS users with technical support provided experienced less service interruptions and felt more comfortable using EHMS. The IT staff and the facilitators and participants described by them are also providing informal support as a network; to reduce barriers of entry, and to eventually create a hospital management which is technologically literate and comfortable on digital systems.

Sub-theme 3.3: Training and Capacity Building

Training and capacity-building initiatives were identified as vital measures for improving EHMS utilization. Healthcare Providers, local and national providers have also developed workshops, refresher courses and on-the-job training programs to fill these gaps. Participant 018 explained that "most of these things are like teaching yourself; maybe they'll just train you for like one or two or three days," but acknowledged that additional workshops were being provided to support continued learning.

Participants also emphasized the importance of digital literacy for effective EHMS use. As Participant 017 stated, "computer literacy" is essential for healthcare professionals working with electronic systems. The findings suggest that continuous training enhances users' confidence, improves system utilization, and equips healthcare workers with the skills needed to adapt to evolving digital health technologies.

4.1.4 Theme 4: Factors for Encouraging and Improving EHMS Adoption

Participants identified several factors that could promote the sustainable adoption and effective implementation of EHMS in Nigeria. These include improvements in infrastructure, financial and policy support from government, and enhanced digital literacy and professional training.

Sub-theme 4.1: Infrastructure Development

Participants consistently highlighted the importance of reliable infrastructure, particularly stable electricity and internet connectivity, for successful EHMS implementation. Participant 017 noted that "sometimes you have no network to access the electronic healthcare management system or the internet," while Participant 016 emphasized that electronic medical records cannot function effectively without a reliable power supply.

These findings suggest that inadequate infrastructure remains a major obstacle to EHMS utilization, particularly in rural and underserved areas. Participants emphasized that improving power supply and internet connectivity would significantly enhance the reliability and effectiveness of EHMS across healthcare facilities.

Sub-theme 4.2: Financial Incentives and Government Support

Financial support and policy commitment were identified as essential for sustaining EHMS

adoption, particularly in public healthcare institutions. Participant 013 highlighted the financial burden associated with implementation, stating that "it mostly costs money to implement it, especially in government hospitals." Similarly, Participant 015 noted that the absence of standardised policies contributes to variations in adoption across healthcare facilities.

The findings indicate that government support through funding, incentives, and clear policy frameworks could reduce implementation barriers and promote more consistent EHMS adoption across the healthcare sector.

Sub-theme 4.3: Digital Literacy and Professional Training

Participants emphasized the importance of digital literacy and continuous training in supporting effective EHMS utilization. Participant 017 stated that "we should just be computer literate because most problems we are having these days… the person will say no," while Participant 021 observed that "there is a lack of proper training for staff, which hampers the effective use of EHMS."

The findings suggest that improved digital literacy and regular training programs would enhance users' confidence and competence in using EHMS. Participants further indicated that continuous professional development and knowledge-sharing among healthcare workers could support the long-term adoption and effective use of digital health technologies.

4.1.5 Theme 5: The Social and Societal Impacts of EHMS

Participants identified several social and societal benefits associated with EHMS adoption in Nigeria, including improved patient care, enhanced data security, and better support for public health planning and research. The findings suggest that the benefits of EHMS extend beyond healthcare facilities, contributing to improved healthcare delivery, trust, and evidence-based decision-making.

Sub-theme 5.1: Better Patient Care and Less Waiting Times

EHMS improves the service offering, reduces the waiting time of the patient, and streamlines the healthcare process according to the participants. Participant 011 said, "an electronic healthcare management system has helped patients a lot with waiting rate" and Participant 020 said that it "makes the length of time that the patient will spend in the hospital shorter." Because when patients can get data and do logs of the data themselves, there is no stopping them from faster access to real-time and up-to-date information about a patient. These processes are said to culminate in improved patient satisfaction and greater trust in health care delivery.

Sub-theme 5.2: Improved Data Security and Confidentiality

Participants highlighted enhanced data security as a key benefit of EHMS. Electronic records had a higher level of trustworthiness as regards protecting the patients' files against information loss,

damage, or unauthorized access compared to paper records. Respondent 013 reported “Their record is there for a long time; it does not get damaged or misplaced” and participant 021 added “patient data is far better protected as a result and less likely to have been lost or damaged”.

The findings demonstrate how EHMS enhances information security and confidentiality in building trust into medical services and meeting data privacy norms by allowing controlled access to patients' records.

Sub-theme 5.3: Improved Public Health Data and Research

EHMS was perceived to improve the handling and research of health data. The EHMS has advantages like being able to “have the statistical purpose and not while using folders” (Participant 014), highlighting the benefits of electronic data for analysis and research. Similarly, Participant 012 noted that EHMS improves data retrieval and accessibility.

Our findings correspond to the concept that the development of such electronic health records assists in data collection, storage and data analysis, to monitor the trend in disease, use and health of population and health service utilization. This kind of data may contribute to making data-driven decisions, informing resource allocation, health care planning and health care exploration, survey respondents said.

Further, findings echo the findings in other LMICs that lack technological infrastructure, unreliable electricity and Internet connectivity, financial constraints, shortage of skilled health informatics staff and organizational readiness remain the biggest barriers to the implementation and sustainability of EHMS [27-29]. The same issues were noticed in Ghana, Kenya, Tanzania, Uganda and Bangladesh where fragmented digital-health initiatives, lack of a cohesive workforce capacity, inconsistent implementation by policy, feeble data governance systems and poor interoperability remain obstructions to comprehensive health-system integration nationally [30-34].

But a few LMICs have made more headway with more cohesive national approaches. Rwanda, for instance, has further enhanced its digital health system with long-term government support, national-level coordination, investment in local health-informatics capability and the systematic implementation of electronic medical-record platforms [35].

Implementation of EHMS in Nigeria, however, is fragmented and piecemeal, disparate across health institutions, programs and levels of government. These comparisons demonstrate the fact that digital-health transformation is not an infrastructure in technology only. Sustained political commitment, coordinated national governance, uniformity in regulatory and interoperability standards, ongoing workforce development, effective stakeholder coordination and sustainable financing mechanisms are

also needed for the same [27, 28].

This picture illustrates the conceptual relationships generated by thematic analysis and the qualitative evidence summarized above. It posits that the successful introduction of EHMS in a developing economy is through a multifactorial interplay of infrastructure, organizational, policy, financial, and human capacity factors.

Thus, it makes the necessary enabling conditions also provide incentives for the widespread adoption of EHMS in healthcare, promoting quality of health service, operational efficiencies, and evidence-based decision making. Professionals' interviews on Electronic Medical Records (EMRs) in Nigeria provided a larger perspective; these informed the interview of different experiences of public hospitals and private institutions regarding using EMR in Nigeria. In total, for the participants, EMRs were found by the participants to be efficient, accessible and linked with care quality.

4.2 Content Analysis

The study also noted that electricity supply, internet connectivity and other infrastructure problems continued to be tied to the challenge. On the opposite, it was an optimistic feeling of potential in treating and operationalizing usage in attitude domains, especially the positive statement in how EMR technology needs to be implemented and the relevant support factors surrounding how EMR technology would be utilized and, this means that the more fundamental necessities in this arena need to be confronted and EMR systems must be introduced and used on a fundamental level.

In Nigeria, coherent policy interventions, government support and collaboration provide a sound basis to implement Electronic Healthcare Management Systems (EHMS), which is a cost-effective and economically effective system. This can be ensured through targeted consideration across multiple healthcare facilities enabling equitable access to digital healthcare services across urban and rural healthcare systems.

Figure 2 illustrates the conceptual framework derived from the thematic analysis, highlighting the relationships between infrastructure, government policy, financial investment, digital literacy, interoperability, EHMS adoption, and healthcare quality.

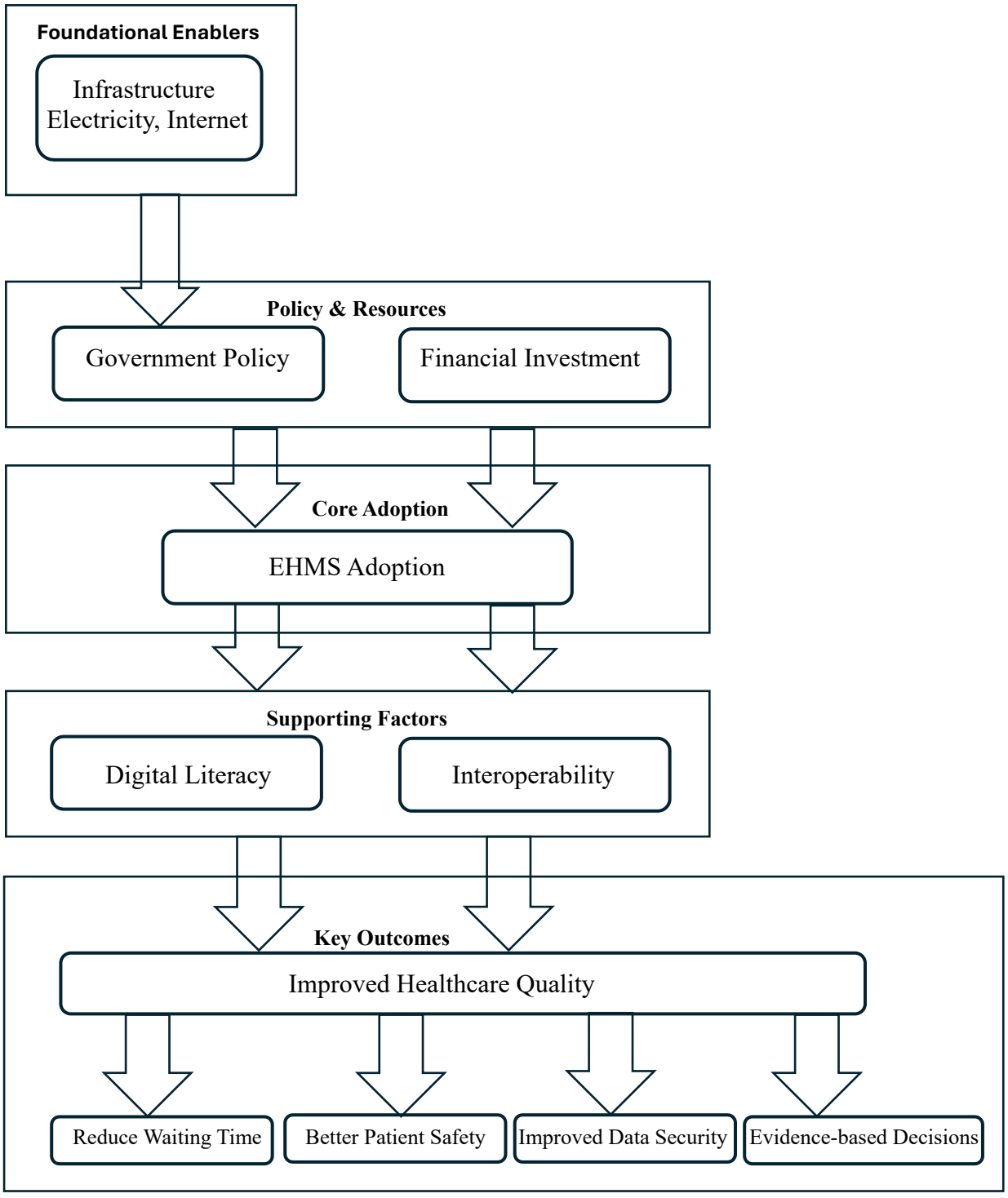


Figure (2) Conceptual Framework of Electronic Healthcare Management System in Nigeria

5. Policy Implications and Recommendations

Such policy and government action and collaborative initiatives should be complemented and supplemented by the complementary support, coordination and investment as necessary for effective and

smooth implementation of Electronic Healthcare Management Systems (EHMS) provision during the implementation in Nigeria. In order to harmonize the urban to rural access to digital health care between urban and rural healthcare systems, it is imperative to be mindful of the differences of the level of local versus remote service needs of health care provision in the two domains of health care.

Financial support and incentives: There should be support for public hospitals and rural clinics that finance the acquisition, installation, training and maintenance of EHMS. These could take the form of grants, low-interest loans, technology upgrades, and a combination of specialized tax breaks for these establishments who are developing and maintaining their EHMS. This will decrease the financial barriers and encourage the development in marginalized populations.

Enabling Digital Literacies and Workforce Capacity: Improving digital literacy among healthcare professionals is essential for the effective use of EHMS. Government, educational institutions, and industry stakeholders should collaborate to develop continuous training programs, including workshops, e-learning courses, certification programs, and refresher training. Special attention should be given to rural healthcare workers through mobile training units and locally adapted learning materials to ensure equitable access to digital skills development.

Strategic Partnerships and Stakeholder Collaboration: Partnerships between government, private technology firms, telecommunications providers, non-governmental organizations, and international development agencies should be strengthened to support EHMS implementation. Such collaborations can provide funding, technical expertise, infrastructure support, and knowledge transfer. Public-private partnerships (PPPs) and collaboration with organizations such as the World Health Organization (WHO) and United Nations agencies can further accelerate EHMS adoption and sustainability.

Infrastructure Development for Urban and Rural Healthcare Facilities: Infrastructure improvements remain critical to successful EHMS implementation. In urban areas, policies should focus on strengthening interoperability, network infrastructure, and data-sharing systems across healthcare facilities. In rural areas, priority should be given to improving internet connectivity, telemedicine services, and reliable power supply. Investments in solar-powered energy solutions and satellite-enabled connectivity can help ensure uninterrupted access to EHMS in underserved communities.

Data Security, Privacy, and Regulatory Frameworks: A comprehensive national framework for EHMS governance, data security, and privacy protection should be established and enforced. Healthcare providers should be required to implement appropriate security measures, including encryption, access controls, and regular security audits. In addition, healthcare workers should receive training on data protection and privacy regulations to ensure the confidentiality and integrity of patient information while

maintaining compliance with international best practices.

National Policy Standardization and Implementation: The government should develop and enforce standardized national policies for EHMS adoption and implementation across all levels of healthcare. Clear guidelines, accountability mechanisms, and implementation standards would promote consistency, improve interoperability, and reduce disparities in EHMS utilization between healthcare facilities and regions.

5.1 Limitations

Though informative, this study also possesses limitations. In Nigeria, EHMS implementation and issues are both given an insightful perspective here. The quality of the virtual interviews (also in the rural part of the nation) was compromised, mainly because some interviews had difficulty reaching the data and part of this reason was reasons why some of the interview data disappeared. Lastly, due to operational availability and scheduling challenges for health workers, interviews were delayed or not conducted entirely, something that might have impacted on how many responses there were, or how complex, or how deep they remained from certain respondents.

Although purposive sampling was applied to support the diversity of the population the sample was not representative of the general population (Nigeria health-care population, particularly in rural and under-served communities). Sample size was small for some geographic population, may affect accessing generalizability of results to the broader healthcare setting. Also, by including the contributions of a wide variety of health care providers and public servants in different institutions and localities as participants, the perspective of those that are from contexts where EHMS is not universally accepted may not be adequately reported on.

Studies of small and remote communities, particularly in rural areas, health care facilities, or communities and regions that are less served, would equally benefit from the inclusion of smaller and more geographically diverse samples. Despite these limitations, the study offers important lessons for the current scenario, constraints and opportunities of implementing EHMS in Nigeria.

5.2 Research Directions & Future Work

The steady emergence of Electronic Healthcare Management System (EHMS) in Nigerian healthcare has led to more research planned in the following sectors: mobile EHMSs, utilization of health providers through telemedicine visits or through eHealth systems. Such initiatives must be complemented by targeted interventions in low-resourced settings to address digital literacy of healthcare workers and EHMS use.

Current evidence on online and in-person training would help to provide insight into the direct and

subsequent effect of new digital technologies on competency and retention of a skill or a system. Longitudinal studies are also needed to evaluate the impact of EHMS implementation on patients' health related to their outcome, quality, patient satisfaction and the service delivery (waiting time, diagnostic accuracy, continuity of care).

But these studies will support the long-term benefits of EHMS, particularly in low-resource settings, in the long run. However, comparative studies involving Nigeria or low-middle-income countries may expose best practices, obstacles of implementation and policy success. These findings could be important input for policy making to provide further context for policymakers to interpret and adapt successful policies in Nigeria. For instance, the following future research might consider implementing EHMS in mHealth technologies for rural and underserved populations.

But the extent to which it's helpful will necessarily have to be tested where mobile platforms are going to appear vital to people who need to manage electronic records management, telemedicine and access medical care if only they are in places with minimal digital infrastructure. Finally, there is sustainable financing of EHMS deployments. Other sources for these sources could include public-private partnerships, government backing, donor funding, and international financing mechanisms.

The use of this information shall contribute to practical recommendations and guidance on scaling up and sustainability of EHMS implementation to Nigeria's health context. These are the co-constructed aims of these research lines, we maintain, and they will be built based on EHMS adoption and lay the foundation for developing equitable, sustainable and effective digital healthcare systems for the people of Nigeria.

6. Summary and Conclusion

EHMS adoption in Nigeria is vital to the successful implementation of digitalization in the healthcare sector. The studies demonstrated that EHMS adoption is growing but implementation is inconsistent nationally while use of EHMS has enhanced and taken place in private and urban health-care systems compared to public and rural health care systems. The main barrier to the global adoption of these systems includes lack of investment in infrastructure, financial capacity, health care workers` digital literacy and lack of health care professionals' and remote areas policy support.

Nonetheless, the continued nature of pilot schemes, development of public policy, technology assistance and employee training indicates increased support for larger EHMS programs rollout. Another implication is that sustained adoption will require joint investment in infrastructure, digital capacity building, and government-led policy and financial support. It also highlights the positive impact of EHMS, such as more patient care and shorter wait times, greater data privacy, increasing investment into public

health planning and research.

The implementation of Electronic Healthcare Management Systems (EHMS) has the potential to significantly improve healthcare service delivery in Nigeria. By enhancing the accessibility, accuracy, and availability of patient information, these systems can support more informed clinical decision-making, improve operational efficiency, and strengthen the overall quality of healthcare services. These potential benefits highlight the importance of adopting and effectively integrating EHMS into Nigeria's healthcare system.

Overall, realizing the full potential of EHMS will require collaborative efforts among government agencies, healthcare institutions, private-sector partners, and other stakeholders. Addressing existing barriers while strengthening ongoing implementation efforts will be essential to achieving an integrated, equitable, and sustainable digital healthcare system capable of improving health outcomes for all Nigerians

7. Declarations

7.1 Conflict of Interest Statement

The authors have no conflict of interests to declare.

7.2 Funding Disclosure

This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors.

8. References

[1]. Adebayo KJ, Ofoegbu EO. Issues on e-health adoption in Nigeria. International Journal of Modern Education and Computer Science. 2014;6(9):36

[2]. Olawumi O, Olaleye S, Adusei-Mensah F, Olawuni A, Agjei RO. Adoption and implementation of electronic healthcare management system-a bibliometric approach. International Journal of Electronic Healthcare. 2022;12(1):54-96

[3]. Salehahmadi Z, Hajialiasghari F. Telemedicine in Iran: chances and challenges. World journal of plastic surgery. 2013;2(1):18

[4]. Evans RS. Electronic health records: then, now, and in the future. Yearbook of medical informatics. 2016;25(S 01):S48-S61

[5]. Ajami S, Bagheri-Tadi T. Barriers for adopting electronic health records (EHRs) by physicians. Acta Informatica Medica. 2013;21(2):129

[6]. Akaba GO, Dirisu O, Yalma RM, Allisop MJ, Ebenso B. Innovative application of digital health solutions to strengthen health systems and improve health outcomes in rural populations of Abuja, Nigeria. Tropical Journal of Obstetrics and Gynaecology. 2023;39(3):383-97

[7]. Olowoyo KS, Esan DT, Adeyanju BT, Olawade DB, Oyinloye BE, Olowoyo P. Telemedicine as a tool to prevent multi-drug resistant tuberculosis in poor resource settings: Lessons from Nigeria. Journal of Clinical Tuberculosis and Other Mycobacterial Diseases. 2024;35:100423

[8]. Gafa L, Eru A, Atoyebi T. Smart Health Care Delivery System: The Nigerian Secondary Health Care Perspective. InInternational Conference on Technological Advancements2024.

[9]. Oloyede MO, Abdulrahman MD, Ogundile OO, Oluyomi OM. RiDokita: A viable electronic visit system for remote medical consultation in Nigeria. TASFUED Journal of Pure and Applied Sciences. 2023;2(1):27-38

[10]. Ajaegbu C, Okikiola SO, Ajaegbu OO, Adediran O. Transforming Healthcare in Nigeria Through Ict: An in-Depth Analysis at Federal Medical Centre Idi-Aba, Abeokuta. International Journal of Modeling and Applied Science Research. 2024

[11]. Idris U, Abdulkarim L, Arkwright B. The systematic overview of remote patient monitoring in Nigeria (West Africa). Telehealth and Medicine Today. 2022;7(3)

[12]. Elikwu IM, Igbokwe AC, Emokhare G. Effect of electronic health information system on medical records management in public healthcare institutions. Unizik Journal of Business. 2020;3(1):43

[13]. Zayyad MA, Toycan M. Factors affecting sustainable adoption of e-health technology in developing countries: an exploratory survey of Nigerian hospitals from the perspective of healthcare professionals. PeerJ. 2018;6:e4436.10.7717/peerj.4436

[14]. Owolabi BS, Odugbemi TO, Odeyemi KA, Onigbogi OO. mHealth: knowledge and use among doctors and nurses in public secondary health-care facilities of Lagos, Nigeria. Journal of Clinical Sciences. 2018;15(1):27-31

[15]. Lawal LS, Aibinu AM, Chatwin C, Davey G, Jafaar A, Udoyen U, et al. Digital health inclusion: a pilot study of health services deployment using communications satellite for the underserved in Nigeria. 2022

[16]. Chika EU, Dike Ujunwa Precious B, Ahuchaogu King-David B, Gabriel Ezenri B, Nneji Tobechukwu Okechukwu B, Chidozie C, et al. Digital healthcare tools in Nigeria: Strengthening public health and pandemic preparedness-Insights from the COVID-19 crisis. Telehealth and Medicine Today. 2024;9(1)

[17]. Aleke CO, Omaka-Amari LN, Nwafor JN, Omeje CB, Onyechi N, Ochiaka RE, et al. Knowledge and utilization of e-Health care delivery among health care professionals in Federal Teaching Hospital Abakaliki, Ebonyi State, Nigeria. Int J Med Health Sci Res. 2020;7:19-30

[18]. Chukwu E, Garg L, Eze G. Mobile health insurance system and associated costs: a cross-sectional survey of primary health centers in Abuja, Nigeria. JMIR mHealth and uHealth. 2016;4(2):e37

[19]. Akwaowo CD, Sabi HM, Ekpenyong N, Isiguzo CM, Andem NF, Maduka O, et al. Adoption of electronic medical records in developing countries—A multi-state study of the Nigerian healthcare system. Frontiers in Digital Health. 2022;4:1017231

[20]. Idoga PE, Toycan M, Nadiri H, Çelebi E. Factors affecting the successful adoption of e-health cloud based health system from healthcare consumers' perspective. IEEE Access. 2018;6:71216-28

[21]. Okuzu O, Malaga R, Okereafor K, Amos U, Dosunmu A, Oyeneyin A, et al. Role of digital health insurance management systems in scaling health insurance coverage in low-and Middle-Income Countries: A case study from Nigeria. Frontiers in digital health. 2022;4:1008458

[22]. Akeju D, Okusanya B, Okunade K, Ajepe A, Allsop MJ, Ebenso B. Sustainability of the effects and impacts of using digital technology to extend maternal health services to rural and hard-to-reach populations: experience from Southwest Nigeria. Frontiers in Global Women's Health. 2022;3:696529
[23]. Creswell JW, Poth CN. Qualitative Inquiry and Research Design: Choosing Among Five Approaches: SAGE Publications; 2023.
[24]. Braun V, Clarke V. Using thematic analysis in psychology. Qualitative research in psychology. 2006;3(2):77-101
[25]. Elo S, Kyngäs H. The qualitative content analysis process. Journal of advanced nursing. 2008;62(1):107-15
[26]. Denzin NK, Lincoln YS. The Sage handbook of qualitative research: sage; 2011.
[27]. Fritz F, Tilahun B, Dugas M. Success criteria for electronic medical record implementations in low-resource settings: a systematic review. Journal of the American Medical Informatics Association. 2015;22(2):479-88
[28]. Luna D, Almerares A, Mayan JC, de Quirós FGB, Otero C. Health informatics in developing countries: going beyond pilot practices to sustainable implementations: a review of the current challenges. Healthcare informatics research. 2014;20(1):3-10
[29]. Odekunle FF, Odekunle RO, Shankar S. Why sub-Saharan Africa lags in electronic health record adoption and possible strategies to increase its adoption in this region. International journal of health sciences. 2017;11(4):59
[30]. Ahmed T, Lucas H, Khan AS, Islam R, Bhuiya A, Iqbal M. eHealth and mHealth initiatives in Bangladesh: a scoping study. BMC health services research. 2014;14(1):260
[31]. Kajirunga A, Kalegele K. Analysis of activities and operations in the current E-Health landscape in Tanzania: focus on interoperability and collaboration. arXiv preprint arXiv:150700176. 2015
[32]. Kiberu VM, Mars M, Scott RE. Barriers and opportunities to implementation of sustainable e-Health programmes in Uganda: A literature review. African Journal of Primary Health Care and Family Medicine. 2017;9(1):1-10
[33]. Muinga N, Magare S, Monda J, English M, Fraser H, Powell J, et al. Digital health Systems in Kenyan Public Hospitals: a mixed-methods survey. BMC medical informatics and decision making. 2020;20(1):2
[34]. Odei-Lartey EO, Prah RKD, Anane EA, Danwonno H, Gyaase S, Oppong FB, et al. Utilization of the national cluster of district health information system for health service decision-making at the district, sub-district and community levels in selected districts of the Brong Ahafo region in Ghana. BMC health services research. 2020;20(1):514
[35]. Allen C, Jazayeri D, Miranda J, Biondich PG, Mamlin BW, Wolfe BA, et al. Experience in implementing the OpenMRS medical record system to support HIV treatment in Rwanda. Studies in health technology and informatics. 2007;129(1):382