

ASSESSMENT OF ELECTRONIC HEALTH RECORDS (EHR) IMPLEMENTATION IN NIGERIAN PUBLIC HOSPITALS: CHALLENGES AND OPPORTUNITIES

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Abstract

The digital transformation of healthcare is a growing global imperative aimed at enhancing the quality, accessibility, and efficiency of health service delivery. At the core of this transformation is Electronic Health Record (EHR), a digital version of patients' paper-based charts. EHR systems are critical for the successful delivery of healthcare services and have been linked to improved information quality, reduced medical errors, and enhanced coordination of patient care. In Nigeria, the adoption of EHR systems is gaining momentum, especially in the tertiary institutions. The implementation of EHR in Nigeria has been gradual and uneven: the private healthcare facilities are leading in the adoption of EHR, some public facilities have piloted EHR modules while many facilities remain primarily paper-based or operate hybrid systems. These practices lead to fragmented care and inconsistent documentation. Globally, the adoption of EHR has been associated with improved patient safety, higher quality of care, and more efficient management of health resources. This study tried to study the Challenges and Opportunities of implementing Electronic Health Records (EHR) in Nigerian Public Hospitals and offer suggestions on emerging technologies that can enhance the implementation of EHR in the Hospitals. This study is based on secondary data which is collected from various reports, journals and websites. The study accesses the implementation of EHR in some selected public facilities and highlighted the challenges and benefits of EHR implementation in Nigerian Public Hospitals. It offers recommendations for enhancing EHR deployment and implementation in Nigeria and the future trends and emerging technologies for improving healthcare services delivery.

Keywords: *Electronic Health Record, Public Health Facilities, Computerization and digitalization*

Introduction

The digital transformation of healthcare is a growing global imperative aimed at enhancing the quality, accessibility, and efficiency of health service delivery. At the core of this transformation is Electronic Health Record (EHR), a digital version of patients' paper-based charts. EHR systems are critical for the successful delivery of healthcare services and have been linked to improved information quality, reduced medical errors, and enhanced coordination of patient care (Katurura & Cilliers, 2018). EHR systems are designed to facilitate the storage, retrieval, updating, and sharing of patient information across different healthcare settings. Beyond simple recordkeeping, EHRs support clinical decision-making, enhance communication among healthcare providers, and enable more integrated, patient-centered care. Globally, the adoption of EHR has been associated with improved patient safety, higher quality of care, and more efficient management of health resources (Adeleke *et al.*, 2021; Ojo *et al.*, 2022).

In Nigeria, the adoption of EHR systems is gaining momentum, especially in the tertiary institutions. They are at different stages of implementing Electronic Health Record Systems, often with government funding, support from international partners, or local ICT firms. However, these efforts are frequently hindered by systemic barriers, including poor internet connectivity, unreliable power supply, lack of interoperability between systems, limited digital literacy among healthcare workers, and inadequate funding mechanisms. These challenges can be viewed from two perspectives: on one hand, are the long-standing issues in healthcare

delivery such as underfunded infrastructure, workforce shortages, and inadequate access to care and on the other hand, are the deployment of modern information and communication technologies that can revolutionize service delivery.

Despite the recognized benefits, the adoption of EHR systems in Nigeria Public facilities remains relatively low, only 18% to 23% of healthcare facilities in Nigeria have implemented EHR systems, and even where systems are available, utilization rates are often suboptimal (Ojo et al., 2022; Adeleke et al., 2021). A major shift began with the implementation of OpenMRS, an open-source EMR platform by the Institute of Human Virology Nigeria (IHVN) between 2011 and 2012, initially piloted in 23 health facilities in Nasarawa State for HIV care (OpenMRS Talk, 2016). By 2013, it had expanded to over 400 health facilities, enabling full elimination of paper records in several locations. In 2018, also, the University of Abuja Teaching Hospital adopted OpenMRS (OpenMRS.org, 2018).

Today, many health facilities operate hybrid systems that combine paper and electronic records, leading to fragmented care and inconsistent documentation. According to Akpan *et al.*, (2023), 83.6% of healthcare providers had moderate to strong knowledge of EHRs, with 77.6% affirming that their use improved patient care and reduced waiting time. Also, a study conducted in Lagos found that 93.9% of healthcare workers believed EHRs are faster and safer than paper records, and 95.4% expressed a willingness to adopt them, despite issues like computer shortages (The Guardian Nigeria, 2023). The lack of fully implemented EHR in hospitals today is responsible for poor service delivery, increase patients' waiting time, poor clinical decisions and communication among others, which may be because of poor readiness factor.

The Nigerian Health Information System Policy of 2014 laid out the national framework for data governance, architecture, and standards essential for EHR adoption (NDHI, 2023). Despite its importance, implementation has been slow due to weak enforcement, inadequate training, and procurement delays. Despite the progress achieved so far, there are multiple challenges that persist. In a study conducted at UNIMEDTH, it identified critical obstacles of implementing EHR as: limited funding, inadequate ICT infrastructure, erratic electricity supply, and insufficient internet access, all contributing to poor EHR implementation (Adewole *et al.*, 2024).

Therefore, the Objectives of the Study is to identify key challenges limiting the widespread use of EHRs, highlight the opportunities of implementing EHRs system and to recommend emerging technologies that can be used in implementing EHR system to boost the potential digital innovations in the Nigerian Public facilities.

Research Methodology

This study is based on secondary data which is collected from various reports, journals and websites. This study tried to study the Challenges and Opportunities of implementing Electronic Health Records (EHR) in Nigerian Public Hospitals and offer suggestions on emerging technologies that can enhance the implementation of EHR in the Hospitals.

Implementation of EHR in selected Nigerian Public Hospitals

The Nigerian government has initiated policies to promote the use of digital technology in healthcare, including the Nigeria Digital in Health Initiative (NDHI). This initiative aims to develop a national unified EHR platform to enhance health system efficiency, ensure robust monitoring of public health and disease outbreaks, and facilitate seamless data exchange (NDHI, 2023; WHO, 2022). The Health Information System (HIS) Policy of 2014 provides a

framework for data governance, architecture, and indicators, which are essential for the successful implementation of EHR systems (NDHI, 2023).

The implementation of EHR in Nigeria has been gradual and uneven: the private healthcare facilities are leading in the adoption of EHR, some tertiary hospitals and teaching institutions have piloted EHR modules while many facilities remain primarily paper-based or operate hybrid systems. The literature commonly documents incremental adoption pathways (start with registration/billing or LIS/RIS and add clinical modules), with attendant limitations in clinical coverage and interoperability.

According to Olukorode *et al.* (2024), Multiple reviews and empirical studies indicate that EHR introduction in Nigeria generally improves data quality and creates opportunities for improved service delivery and management, but that most implementations are partial and module-based rather than fully integrated clinical EHRs. The lack of standardization and integration across institutions further impedes the effective use of EHRs in Nigeria (Ojo *et al.*, 2022).

In this study, some public facilities were selected to assess their EHR implementation, to gain understanding of the present stage of implementation and the challenges experienced in the implementation of EHR. To achieve that, we adopted the following pragmatic staging for synthesis of EHR implementation in Nigerian Hospitals.

- Stage 0 — Paper only
- Stage 1 — Digital registration / billing only
- Stage 2 — Hybrid (registration + selected modules: lab, pharmacy, billing)
- Stage 3 — Partial clinical EHR (clinical notes, some workflows digitised)
- Stage 4 — Integrated interoperable EHR (comprehensive clinical modules + analytics + standards-based interoperability)

Table 3.1: Stages of EHR implementation in selected Public Hospitals

Hospital	Stage	Implementation
University College Hospital (UCH), Ibadan	Stage 2 → 3	UCH has automated patient registration and billing processes. It digitized select records processes and implemented hybrid (paper + electronic) systems in the Health Records Department, but the system is not fully integrated or utilized for all clinical purposes.
Lagos University Teaching Hospital (LUTH)	Stage 2	LUTH has digitalized patient registration and billing, some module-level pilots and strong staff readiness—but lacks operational clinical EMRs deployed across hospital departments.
National Hospital, Abuja (NHA)	Stage 1 → 2	NHA has active digitalization of administrative and billing function but absence of confirmed clinical EHR deployment.
Ahmadu Bello University Teaching Hospital (ABUTH), Zaria	Stage 1 → 2	ABUTH has digital registration/billing system, it has some administrative and modules digitalized, however, no actual EHR implementation, although awareness and support are strong for digital transformation.
Jos University Teaching Hospital	Stage 1	JUTH has limited digital tools (e.g., trauma registry), but JUTH is still largely reliant on paper-based records, no comprehensive EMR; awareness studies exist without indication of active systems.

Table 1.1 shows that, University College Hospital (UCH), Ibadan shows evidence of meaningful steps toward EHR adoption — computerisation in the health records department, module pilots and private-suite vendor deployments — but is still working toward a hospital-wide integrated clinical EHR. It has engaged in incremental digitisation efforts over the last decade, from

computerisation of administrative/records functions to module pilots and private-suite EMR deployments, but full hospital-wide, integrated clinical EHR usage remains limited (The Nation, 2025). It is believed that a full EHR integration can be achieved through clinician-centred modular rollouts, shoring up infrastructure and formalising governance and budgeting, with this approach, UCH can move from pilot projects to sustained, interoperable EMR use that improves clinical care and management.

According to iTeleMedia (2025) LUTH has implemented Helium Health's EHR, leading to reduced patient wait times by 45% and lowered prescription errors by 55%. It is evidence that LUTH has engaged in incremental digital health activity from digitised administrative/records functions to module pilots (lab/pathology, outpatient systems) and targeted innovations (e.g., voice recognition trials at the cancer centre). Most evidence shows partial/module-based adoption rather than a single hospital-wide, interoperable clinical EHR. Lagos is deploying EMRs across 326 primary healthcare centres, anchored by the Smart Health Information Platform (SHIP) initiative—showing sub-national feasibility at scale.

There is evidence that National hospital, Abuja is focusing and progressing in adopting and utilizing electronic systems for managing patient records. In December 2024, the Chief Medical Director of NHA reported that the hospital's adoption of digital medical records led to a significant increase in internally generated revenue (IGR), now exceeding ₦400 million per month, up from ₦180–200 million previously (Natiometrics, 2024). This indicates active use of digital systems to manage registration or billing processes. A 2024 study of awareness among nurses at NHA found a high level of awareness of EHRs among the staff. Nonetheless, actual usage remains inconsistent and varies based on training availability, system usability and technical support presence (Wada *et al.*, 2024).

ABUTH has digital registration/billing system and some administrative and modules digitalized, however, no actual EHR full implementation, although awareness and support are strong for digital transformation. A 2021 study involving healthcare workers at ABUTH found high levels of awareness and positive attitudes toward EHRs: 46% had fair knowledge; 35% had *good* knowledge. All respondents expressed positive attitudes, and 96.9% held favorable perceptions of EHRs (Mu'awiyah *et al.*, 2021). A 2024 survey of Health Information Management professionals revealed strong recognition of the benefits of digital health records but highlighted persistent challenges electricity instability (13%), insufficient ICT infrastructure (20%), lack of basic ICT skills (27%), fund constraints (20%), high cost and poor internet connectivity (Umar, 2024).

A 2024 study reveals that electronic health record implementation significantly influences patient satisfaction with the quality of service provided by JUTH. Besides this, the results demonstrated that existence of operational efficiency is a significant moderator in infrastructure function and patient satisfaction (Micah AG, *et al.* 2024).

The Nigerian government has initiated efforts to modernize the healthcare sector and promote the use of digital technology, including EHRs. However, despite these efforts, the adoption of EHRs has been slow, and more regulations and incentives are needed to encourage their widespread use (NDHI, 2023). While the adoption rate in Nigeria is low, it is part of a broader trend in developing countries where the transition from paper-based to electronic systems is gradual due to similar challenges (Sub-Saharan Africa Overview, 2020).

EHR implementation in Nigeria shows measurable progress in several tertiary hospitals and federal centres yet remains inconsistent and limited in clinical depth. Moving from digital registration and module pilots to integrated, interoperable clinical EHR systems require

coordinated policy, sustainable financing, robust infrastructure, capacity building and ongoing evaluation. With targeted investments and governance, EHRs can deliver clinical, managerial and public-health benefits for Nigerian hospitals.

Comparative studies with other African countries highlight the importance of context-specific strategies, stakeholder engagement, and leveraging successful models from countries like Rwanda and Kenya, where EHR systems have improved patient care and data accuracy (Katurura & Cilliers, 2018). These countries have demonstrated that with strategic planning and international support, the challenges of EHR implementation can be overcome to some extent.

Challenges of EHR Implementation in Nigerian Public Hospitals

Infrastructural Barriers

A major barrier to EHR adoption in Nigeria is the lack of basic national infrastructure, including stable electricity and reliable internet connectivity. Frequent power outages and poor internet access are common, especially in rural areas, making it difficult to maintain and operate EHR systems effectively (Adeleke *et al.*, 2021; Ojo *et al.*, 2022; Ogunyemi *et al.*, 2020). The limited availability of modern computing devices in healthcare facilities further exacerbates these challenges, hindering the digital transformation of healthcare services.

Financial Constraints

The high initial and ongoing costs associated with EHR systems, such as software acquisition, software licenses, hardware procurement, and system maintenance, pose significant financial challenges. Many hospitals, particularly in the public sector, lack the necessary funding to invest in and sustain EHR systems (Ojo *et al.*, 2022; Adeleke *et al.*, 2021). Financial constraints are compounded by competing priorities in the healthcare sector, making it difficult to allocate sufficient resources for digital health initiatives.

Technical and Interoperability Issues

EHR systems in Nigeria often suffer from poor interoperability and a lack of standardization, making it difficult to integrate different systems and share information across platforms (Ogunyemi *et al.*, 2020; Ojo *et al.*, 2022). The complexity of EHR technology can also overwhelm healthcare providers, requiring substantial time and resources for management and troubleshooting. The absence of standardized protocols for data exchange exacerbates the fragmentation of health information systems, limiting the potential benefits of EHRs.

Human Resource and Training Deficits

There is a shortage of trained personnel capable of managing and operating EHR systems. The existing workforce often lacks adequate training in digital health, and the ongoing brain drain exacerbates this shortage (Adeleke *et al.*, 2021; Ojo *et al.*, 2022). Insufficient training and a lack of user-friendly systems further hinder effective adoption. Effective government funding and policy initiatives, similar to the Health Information Technology for Economic and Clinical Health (HITECH) Act in the United States, are needed to train health information technology workers and establish regional extension centers (Ojo *et al.*, 2022).

Privacy and Security Concerns

Concerns about the privacy and security of patient data are significant. Many healthcare providers are concerned about unauthorized access and data breaches, which can erode trust in digital health systems (Ogunyemi *et al.*, 2020). The lack of full enforcement and implementation of the Nigerian Data Protection Regulation (NDPR) as a regulatory framework

aimed at protecting personal data, has exacerbated the confidentiality and integrity of health record. Which is crucial for secure use of EHRs (Ogunyemi *et al.*, 2020).

Policy and Governance Issues

The absence of robust government policies and supportive regulatory frameworks has slowed the pace of EHR adoption. Clear policies and strategic direction are needed to guide the integration and use of EHR systems in healthcare facilities (WHO, 2022; NDHI, 2023). The National Health Information Management Board (NHIMB) is responsible for setting standards and guidelines for the use of EHRs in Nigeria, and the National Health ICT Strategic Framework 2015-2020 outlines strategic measures for Health ICT initiatives (NDHI, 2023). There is a call for the legislative arm of the government to enact laws that support the adoption, implementation, and use of EHR systems (Ojo *et al.*, 2022).

Benefits of Implementing EHR system in Nigerian Public Hospitals

Improved Healthcare Delivery and Data Quality

EHR systems have the potential to revolutionize healthcare delivery by improving the completeness and accuracy of patient records, facilitating efficient data exchange among providers, and enhancing patient safety (Adeleke *et al.*, 2021; Ojo *et al.*, 2022). Studies have shown that EHR implementation can lead to significant improvements in data quality (Impact of Electronic Medical Records on Healthcare Delivery in Nigeria, 2022). Improved data quality is crucial for better patient outcomes and more effective public health surveillance. It Provides real-time access to patient histories, lab results, and medications and enhances diagnosis accuracy and treatment decisions through clinical decision support tools.

Enhanced Efficiency and Cost Savings

Hospitals that have successfully implemented EHR systems report improved data management, reduced administrative costs, and streamlined processes such as electronic patient registration and cashless payment integration (Ojo *et al.*, 2022; Implementing Electronic Health System in Nigeria, 2021). For example, at Kogi State Specialist Hospital, reductions in transcription costs, paperwork, and administrative costs were reported, along with improved data capture and service provision (Implementing Electronic Health System in Nigeria, 2021). It streamlines workflow processes (admission, treatment, discharge) in the hospitals and helps to reduce duplication of tests and investigations since results are stored digitally.

Efficient Data Management, communication and collaboration

EHR system eliminates paper-based records that are often lost, incomplete, or damaged (Olukorode *et. al.* 2024). It centralizes patient data for easier retrieval, updating, and sharing among authorized staff, especially for doctors to easy track patients' health over time. The system also facilitates information sharing among departments (lab, pharmacy, radiology, wards) and supports telemedicine and integration with national health databases.

Training and Research

Deployment and implementation of EHR systems in public health facilities in Nigeria will facilitate the provision of reliable datasets for medical research, training, and academic purposes. These datasets will support Nigerian universities and teaching hospitals in developing machine learning/AI health solutions, which will help improve the quality of medical education and services by offering case records for learning.

Public Health and Policy Benefits

The datasets generated from the implementation of EHR system in public health hospitals will generate accurate health data for disease surveillance and epidemiology. It will assist government in healthcare planning, budgeting, and policymaking and helps in monitoring outbreaks (e.g., malaria, Lassa fever, cholera) and guide evidence-based interventions (Uba *et. al.* 2021)

Recommendations

1. **Adoption of Open-Source EHR Systems:** Open-source platforms like OpenMRS have been successfully implemented in various low- and middle-income countries and in some health facilities in Nigeria. It provides a flexible framework that can be tailored to specific healthcare settings that can be implemented in phases and integrated with other platforms.
2. **Comprehensive Training Programs:** Training is a critical success factor for EHR implementation. Comprehensive training programs for healthcare providers ensure that users are comfortable and proficient with the new systems.
3. **Infrastructure Development:** Developing a robust information and communication technology (ICT) infrastructure is essential in all public health facilities for the successful implementation of EHR systems. Alternative power supply should be deployed with stable internet connectivity.
4. **Government Support and Policy Frameworks:** Strong government support and the establishment of clear policy frameworks are vital for EHR implementation. The relevant government agency should ensure compliance with the Nigerian Data Protection Regulation by all health service providers to improve data confidentiality and integrity. Ensuring data privacy and security is a fundamental aspect of EHR implementation.
5. **Stakeholder Engagement and Collaboration:** Engaging stakeholders, including healthcare providers, patients, and policymakers, is crucial for the successful adoption of EHR systems.
6. **Utilization of International Standards:** Adopting international standards for EHR systems can enhance interoperability and ensure that systems meet global benchmarks for quality and performance. Leveraging on the countries' success stories and learning from the mistakes to avoid making the same mistakes.

Future Trends and Emerging Technologies for healthcare services

The future of EHR systems in Nigeria and other developing countries will be shaped by several technological advancements:

- i. **Cloud Computing:** Facilitates scalable and cost-effective EHR solutions, allowing for easier data access and sharing among healthcare providers.
- ii. **Artificial Intelligence and Machine Learning:** Enhance data analysis, predictive analytics, and clinical decision support, helping in diagnosing diseases, suggesting treatments, and predicting health risks.
- iii. **Blockchain Technology:** Improves data security and integrity, addressing concerns about unauthorized access and data breaches.
- iv. **Mobile Health (mHealth) and Telemedicine:** Increases accessibility, especially in remote areas, by enabling healthcare professionals to access patient data securely and update records in real-time.
- v. **User-Centered Design:** Improves usability and adoption rates, making EHR systems more accessible to healthcare providers and patients.

- vi. Data Privacy and Security Enhancements: Strengthens patient data protection, which is crucial for building trust in digital health systems.
- vii. Internet of Things (IoT): Enables real-time health monitoring and data collection, supporting preventive care and the management of chronic conditions.
- viii. Advanced Analytics and Big Data: Supports population health management and resource optimization, enabling more effective public health interventions.
- ix. Standardization and Interoperability Frameworks: Facilitates cohesive healthcare ecosystems, allowing for seamless data exchange across different platforms.

Emerging trends such as wearable technology, remote patient monitoring, and 3D printing are also expected to impact Nigerian healthcare by improving access, efficiency, and patient outcomes. The integration of EHR systems with wearable devices is expected to increase, providing healthcare providers with real-time patient data and enhancing preventive care.

Conclusion

The implementation of EHR systems in Nigerian hospitals is at a critical juncture. While significant challenges persist—ranging from infrastructural deficits and financial constraints to human resource shortages and policy gaps—there are clear opportunities for improvement. By addressing these barriers, learning from successful case studies, adopting international best practices, and leveraging technological advancements, Nigeria can harness the transformative potential of EHRs to improve healthcare delivery and patient outcomes. The ongoing efforts by the government, such as the Nigeria Digital in Health Initiative, represent a significant step towards creating a more integrated and efficient digital health environment (NDHI, 2023; WHO, 2022).

The Nigerian experience could offer valuable lessons for other developing countries facing similar challenges. Strategic planning, stakeholder engagement, and investment in infrastructure and workforce development are essential for the successful adoption of EHR systems. As technological advancements continue to reshape the healthcare landscape, Nigeria has the opportunity to leapfrog traditional barriers and build a more resilient and responsive health system for the future.

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