Impact of Electronic Health Records on Healthcare Delivery in Public Hospitals in Calabar Metropolis, Cross River State

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Direct Research Journal of Public Health and Environmental Technology

Direct RESEARCH JOURNALS

Vol. 11(1), Pp. 120-124, April 2026

https://journals.directresearchpublisher.org/index.php/drjphet; https://www.ajol.info/index.php/drjphet

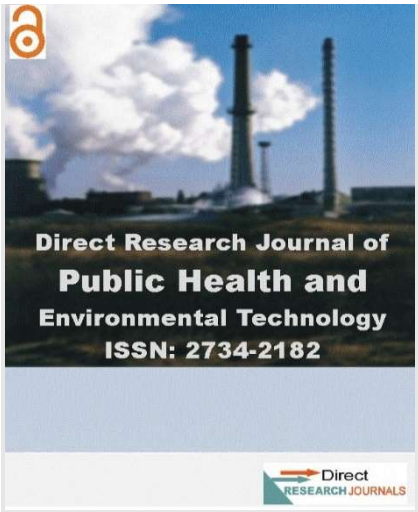
Research Article
ISSN: 2734-2182

Received 20 March 2026, Accepted 7 April 2026, Published 14 April 2026

ABSTRACT

This study examined the impact of Electronic Health Records (EHR) on healthcare delivery and identified the facilitators and barriers to EHR implementation across public hospitals in Calabar Metropolis. A cross-sectional descriptive design was employed among 334 healthcare workers. Near-universal recognition of EHR benefits was documented: improved communication (99.7%), centralized data storage (99.1%), and quick record access (95.78%). Attitude toward EHR emerged as the strongest predictor of perceived impact (β=0.378, p<0.001). Leading barriers included lack of user involvement (94.19%), distrust in system quality (85.98%), and poor training and support (84.38%). Knowledge and attitude significantly predicted facilitator scores. The study recommends participatory EHR design, sustained training, and financial investment to accelerate implementation.

Keywords: *EHR Impact, Healthcare Delivery, EHR Facilitators, EHR Barriers, Calabar Metropolis, Nigeria.*



Citation: Edu E. E., & Isaruk I.O.E.D. (2026). Impact of Electronic Health Records on Healthcare Delivery in Public Hospitals in Calabar Metropolis, Cross River State. *Direct Research Journal of Public Health and Environmental.* Vol. 11(1), Pp. 120-124. https://doi.org/10.26765/DRJPHET36577643

INTRODUCTION

Electronic Health Records are widely recognized as transformative tools for healthcare delivery, enabling real-time clinical data exchange, care coordination, and evidence-based clinical decision-making (Tang & McDonald, 2020). The anticipated benefits of EHR include reduced medical errors, improved patient safety, streamlined administrative processes, and enhanced population health monitoring (Boonstra et al., 2017). However, realizing these benefits is contingent on overcoming a complex array of technical, organizational,

Table 1: Perceived Impact of EHR on Healthcare Delivery

Perceived EHR Benefit / Impact Area	Agreed (n)	Percentage (%)
Improved communication among healthcare providers	333	99.70
Centralized storage of patient data	331	99.10
Quick and easy access to patient records	320	95.78
Reduction in medical errors and duplication	312	93.41
Enhanced clinical decision-making support	308	92.22
Improved patient safety and care quality	304	91.02
Streamlined administrative and billing processes	298	89.22
Support for population health monitoring	289	86.53
Facilitated research and data analytics	276	82.63
Reduced workload and documentation burden	261	78.14

financial, and behavioral barriers that have been documented across healthcare systems globally. In Nigeria, EHR adoption lags significantly behind global trends, constrained by infrastructural deficits, funding limitations, and systemic implementation challenges (WHO, 2019). In Calabar Metropolis, where EHR implementation levels are predominantly low to moderate, understanding the perceived impact of existing EHR deployments and the facilitators and barriers shaping adoption trajectories is essential for developing evidence-based policy and institutional strategies. This study provides such evidence, directly informing the strategic priorities for EHR scale-up across public hospitals in the region.

Despite institutional investments in EHR infrastructure, the full potential of electronic health records in Calabar Metropolis hospitals remains unrealized. While healthcare workers may acknowledge EHR benefits in principle, systemic barriers including inadequate user involvement in EHR design, poor training, limited system interoperability, and distrust in system reliability collectively constrain adoption outcomes (Kruse et al., 2018). Without systematic identification of the barriers and facilitators unique to the Calabar Metropolis context, health authorities cannot design appropriately targeted interventions to accelerate EHR adoption and optimize its impact on healthcare delivery.

SPECIFIC OBJECTIVES

1.To assess the perceived impact of EHR on healthcare delivery across the study hospitals.
2.To identify the major facilitators of EHR implementation across the study hospitals.
3.To identify the major barriers to EHR implementation across the study hospitals.
4.To determine the influence of knowledge, attitude, perception, and implementation level on EHR impact, facilitator, and barrier scores.

LITERATURE REVIEW

The impact of EHR on healthcare delivery has been extensively documented. Boonstra et al. (2017) identified key EHR benefits including improved care quality, reduced documentation time, enhanced inter-professional communication, and better clinical decision support. In low- and middle-income countries (LMICs), EHR systems have been associated with improved data completeness, enhanced follow-up care, and strengthened health information systems (Oluoch et al., 2019). However, impact realization is significantly moderated by adoption depth; facilities with shallow EHR integration report limited functional benefits compared to those with comprehensive system utilization. Facilitators of EHR adoption include management support, adequate training, user involvement in design, interoperability with existing systems, financial investment, and positive peer influence (Plantinga et al., 2019). Barriers documented in LMIC contexts include poor ICT infrastructure, inadequate funding, digital literacy deficits, resistance among long-serving staff, and lack of system integration (Holroyd-Leduc et al., 2021). The Technology-Organization-Environment (TOE) framework provides a useful lens for classifying these facilitators and barriers, categorizing them as technological (system features), organizational (institutional capacity and culture), and environmental (policy and regulatory contexts) factors.

METHODOLOGY

A cross-sectional descriptive design was adopted across five public hospitals in Calabar Metropolis. A sample of 334 healthcare workers was derived from a total staff population of 4,106. Proportionate-to-size sampling was employed. Data were collected from June 1 to October 1, 2025, using a validated structured questionnaire with Cronbach alpha reliability of 0.87. The EHR impact subscale comprised 10 items assessing perceived benefits of EHR on healthcare delivery. Facilitator and barrier subscales assessed 10 items each. Data were analyzed with descriptive statistics and multivariate regression using IBM SPSS Version 25.0.

RESULTS

As shown in (Table 1), near-universal agreement on EHR benefits confirms that healthcare workers in the study

Table 2: Facilitators of EHR Implementation

Facilitator	Frequency (n)	Percentage (%)
Management and leadership support	312	93.41
Availability of adequate funding and resources	305	91.32
Access to reliable ICT infrastructure	298	89.22
Comprehensive staff training programs	291	87.13
User-friendly EHR system design	284	85.03
Interoperability with existing hospital systems	279	83.53
Peer support and professional champions	265	79.34
Clear EHR governance policies and standards	252	75.45

Table 3: Barriers to EHR Implementation

Barrier	Frequency (n)	Percentage (%)
Lack of user involvement in EHR design	314	94.19
Lack of trust in system quality and reliability	287	85.98
Poor training and technical support	282	84.38
Low digital literacy and EHR skill gaps	280	83.78
Poor EHR system integration across departments	278	83.18
Inadequate institutional funding for EHR	271	81.14
Resistance and negative attitude among staff	256	76.65
Unstable power supply and internet connectivity	248	74.25
Inadequate data security and privacy protections	234	70.06
High cost of EHR implementation and maintenance	221	66.17

hospitals broadly recognize the theoretical and practical value of electronic health records across all assessed dimensions. The highest recognition for improved communication (99.70%) and centralized data storage (99.10%) reflects awareness of EHR's most fundamental functions. High agreement for error reduction (93.41%) and clinical decision support (92.22%) indicates that staff understand EHR's patient safety potential. The slightly lower agreement for reduced workload (78.14%) suggests residual uncertainty about whether current EHR implementations actually ease or add to staff documentation burdens-a critical consideration for system design and workflow integration. Management and leadership support (93.41%) emerged as the leading recognized facilitator, consistent with TOE framework evidence that organizational leadership commitment is the most influential driver of EHR adoption. As illustrated in Table 2, adequate funding (91.32%) and reliable ICT infrastructure (89.22%) were similarly highly endorsed, reinforcing that structural and financial enablers are perceived as foundational prerequisites. Comprehensive staff training (87.13%) and user-friendly system design (85.03%) reflect the workforce's awareness that technical usability and competency development are critical success factors. The relatively lower endorsement of peer support (79.34%) and governance policies (75.45%) suggests these softer enabling mechanisms are underappreciated despite their documented facilitation value. The identification of lack of user involvement in EHR design as the leading barrier (94.19%) is a critical finding, indicating that participatory design processes have been absent or inadequate in the study hospitals. When end-users are excluded from EHR design and configuration, system-workflow misalignment inevitably follows, reducing adoption rates and system utility. As shown in Table 3, distrust in system quality (85.98%) likely reflects prior experiences with unreliable systems or hearsay about system failures, perpetuating cautious adoption behaviors. Poor training and technical support (84.38%) and digital literacy gaps (83.78%) confirm that workforce preparation has not kept pace with EHR deployment. The prevalence of poor system integration (83.18%) highlights the absence of interoperability standards, which undermines the EHR's core function as a unified data platform. Collectively, these barriers describe a systemic adoption environment where technological, organizational, and human factors simultaneously constrain EHR effectiveness.

Attitude toward EHR was the strongest and most consistent predictor across all outcome domains. Its strong positive prediction of perceived impact ($\beta=0.378$, $p<0.001$) confirms that workers with positive EHR attitudes are more likely to recognize and report EHR benefits in their clinical workflows. As indicated in Table 4, attitude also significantly predicted facilitator scores ($\beta=0.312$, $p<0.001$) and negatively predicted barrier scores ($\beta=-0.267$, $p<0.001$), demonstrating that attitudinal disposition shapes both the recognition of enabling factors and the perceived severity of implementation obstacles. EHR knowledge ($\beta=0.289$, $p<0.001$ for facilitators) and perception ($\beta=0.241$, $p=0.001$) were significant positive predictors of facilitator recognition, indicating that more knowledgeable

Table 4: Multivariate Regression-Predictors of EHR Impact, Facilitator and Barrier Scores

Predictor	Impact β	Impact p	Facilitator β	Facilitator p	Barrier β / p
EHR Knowledge	0.214	0.004*	0.289	<0.001*	-0.201 / 0.006*
EHR Attitude	0.378	<0.001*	0.312	<0.001*	-0.267 / <0.001*
EHR Perception	0.198	0.009*	0.241	0.001*	-0.183 / 0.014*
Implementation Level	0.167	0.023*	0.198	0.008*	-0.144 / 0.041*
Professional Category	0.143	0.049*	0.178	0.019*	-0.112 / 0.117

and positively-disposed workers are better positioned to leverage enabling conditions. Higher EHR implementation levels were associated with greater perceived impact (β=0.167, p=0.023) and facilitator recognition (β=0.198, p=0.008), confirming that contextual EHR exposure promotes more nuanced appreciation of system benefits and enablers.

DISCUSSION

The near-universal recognition of EHR benefits-particularly improved communication (99.70%) and centralized data storage (99.10%) indicates that healthcare workers in Calabar Metropolis are conceptually aligned with EHR's value proposition, consistent with global literature documenting strong perceived benefit awareness even in low-implementation settings (Boonstra et al., 2017). However, the co-existence of high benefit awareness with persistent adoption barriers creates an 'intention-action gap' characteristic of healthcare technology transitions where systemic constraints prevent knowledge-informed behavior change.

The identification of lack of user involvement in EHR design as the leading barrier (94.19%) is particularly significant. Participatory EHR design has been consistently associated with higher adoption rates, better workflow alignment, and greater staff satisfaction in international implementation studies (Plantinga et al., 2019). Its absence in Calabar Metropolis hospitals suggests that EHR systems have been imposed rather than co-developed, contributing to distrust and workflow resistance. The strong attitudinal prediction of impact, facilitator, and barrier scores (β=0.378, β=0.312, β=-0.267 respectively) underscores attitude as the pivotal behavioral determinant in EHR adoption, consistent with Technology Acceptance Model predictions (Davis, 1989).

Conclusion

Healthcare workers in public hospitals in Calabar Metropolis broadly recognize the benefits of EHR on healthcare delivery, particularly for communication, data centralization, and clinical decision support. However, this recognition has not translated into successful adoption due to a constellation of significant barriers, most critically the exclusion of users from EHR design processes, distrust in system quality, and inadequate training. Attitude toward EHR is the most influential predictor of perceived impact, facilitator recognition, and barrier experience. Overcoming adoption barriers requires participatory EHR design, sustained capacity building, reliable infrastructure investment, and a supportive institutional culture that positions EHR adoption as a shared organizational and professional priority.

Recommendations

i. Health facility managers should adopt participatory EHR design and configuration processes, ensuring that clinical staff across all professional categories are actively involved in workflow customization before and during system deployment.
ii. System quality assurance frameworks should be established, including regular system audits, user feedback mechanisms, and transparent communication about system reliability to rebuild trust among skeptical staff.
iii. Institutions should invest in comprehensive, role-differentiated EHR training programs delivered through multiple modalities including workshops, visual training, and peer-learning circles, with scheduled refresher sessions.
iv. Policymakers and hospital leadership should develop interoperability standards ensuring that EHR systems interface seamlessly across departments and facilities, eliminating the fragmented data environments that currently constrain EHR utility.
v. Attitudinal change programs should be integrated into EHR implementation plans, leveraging positive peer champions, success story communication, and visible leadership endorsement to shift the workforce from moderate to positive EHR acceptance.

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