UPTAKE AND LEVEL OF UTILIZATION OF ELECTRONIC HEALTH RECORD SYSTEMS ACROSS SELECTED HOSPITALS IN BENIN CITY, EDO STATE.

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BEING A ONE YEAR PROJECT PRESENTED TO THE DEPARTMENT OF PUBLIC HEALTH AND COMMUNITY MEDICINE, SCHOOL OF MEDICINE, COLLEGE OF MEDICAL SCIENCES, UNIVERSITY OF BENIN, BENIN CITY, EDO STATE, NIGERIA

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MAY, 2026

DECLARATION

I hereby declare that this project work titled "UPTAKE AND LEVEL OF UTILIZATION OF ELECTRONIC HEALTH RECORD SYSTEMS ACROSS SELECTED HOSPITALS IN BENIN CITY, EDO STATE." was conducted under the supervision of Prof. A.I. OBI and has not been submitted elsewhere for the award of a degree or certificate.

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CERTIFICATION

This is to certify that this research titled "**UPTAKE AND LEVEL OF UTILIZATION OF ELECTRONIC HEALTH RECORD SYSTEMS ACROSS SELECTED HOSPITALS IN BENIN CITY, EDO STATE.**" was carried out by **ESHIRAMHE CALLISTUS** with the matriculation number **MED1807401** under the supervision of **PROF. A.I OBI**, in the Department of Public Health and Community Medicine, College of Medical Sciences, University of Benin, Benin city, Edo State Nigeria as part of the requirements for the award of Bachelor of Medicine, Bachelor of Surgery (MBBS) degree.

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DEDICATION

This project is dedicated to God Almighty, my Creator who never fails and also to my parents, Mr and MrsOgbedo for their constant and overwhelming love and care for me. It is also dedicated to my siblings, Felicitas, Fortune and Isabella.

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LIST OF ABBREVIATIONS

DHT Digital Health Technology

EHR Electronic Health Record

EMR Electronic Medical Record

EPHR Electronic Personal Health Record

HIM Health Information Manager

HIT Health Information Technology

IBM SPSS International Business Machines Statistical Package for Social Science

ICT Information Communication Technology

LMIC Low and Middle Income Countries

PIS Patient Information System

PEOU Perceived Ease of Use

PU Perceived Usefulness

TAM Technology Acceptance Model

UTAUT Unified Theory of Acceptance and Use of Technology

WHO World Health Organization

DEFINITION OF TERMS

Clinical Decision Support (CDS): a functional component of an EHR that provides clinicians, staff, or patients with knowledge and person-specific information, intelligently filtered or presented at appropriate times, to enhance health and healthcare.

Digital Health Technology (DHT): a broad umbrella term encompassing the use of computing platforms, connectivity, software, and sensors for healthcare and related purposes.

Digital Literacy: the ability of a healthcare worker to find, evaluate, and communicate information through various digital platforms and software interfaces within the clinical environment.

eHealth: a broad concept which refers to the use of information and communication technologies (ICT) to support healthcare services, education, research, and health management.

Electronic Health Record (EHR): digital versions of patient records that extend beyond the limited scope of EMRs by providing a comprehensive and interoperable record that includes clinical data from multiple healthcare providers and facilitates the sharing of information across various settings.

Electronic Health Record (EHR) System: a secure, longitudinal, and real-time digital platform that systematically collects and manages comprehensive health information, designed to facilitate the seamless and authorized exchange of clinical data across diverse healthcare settings.

Electronic Medical Records (EMRs): digital versions of the paper charts traditionally used in clinician offices, containing a patient's medical history and treatments, but confined to the specific practice where they are maintained.

Electronic Personal Health Record (EPHR): a digital version of a patient's health information that is maintained and controlled by the individual, including history, medications, allergies, and lab results.

Healthcare Professional (HCP): a licensed individual with specialized academic training and clinical certification (e.g., Doctors, Nurses, Pharmacists) who has the legal authority to make autonomous clinical decisions and is governed by a professional regulatory body.

Healthcare Worker (HCW): an all-encompassing term for everyone engaged in the health system which includes professionals providing direct care, as well as support staff (e.g., administrative clerks, technicians, and sanitary workers) whose roles are essential to hospital operations.

Hybrid System: a transitional state in a healthcare facility where both electronic health records and traditional paper-based charts are used concurrently for the same patient.

Interoperability: the ability of different information systems, devices, and applications to access, exchange, integrate, and cooperatively use data in a coordinated manner within and across organizational boundaries.

Longitudinal Record: a permanent, digital health record that traces a patient’s medical history over a long period, across multiple clinical encounters and various healthcare providers.

Unified Theory of Acceptance and Use of Technology (UTAUT): A theoretical framework used to explain user intentions to use an information system based on four key constructs: performance expectancy, effort expectancy, social influence, and facilitating conditions.

User-Centric Design: An iterative design process in which designers focus on the users and their needs in each phase of the design process, specifically aimed at reducing "cognitive load" for clinicians.

Digitalization: is the process of converting analogue information, processes, and interactions into digital formats and workflows, and reorganizing organisational practices to use digital technologies to create, store, transmit, analyse, and act on data.

ABSTRACT

Background:

Electronic Health Record (EHR) systems are increasingly recognized as essential components of modern healthcare delivery, with the potential to improve patient outcomes, enhance data management, reduce medical errors, and strengthen health system efficiency. Despite these benefits, the adoption and effective utilization of EHR systems in many low- and middle-income countries, including Nigeria, remain low and with influence ranging from multiple individual, institutional, and infrastructural factors.

Objective:

This study aimed to determine healthcare workers' knowledge of EHR systems in patient care, assess their attitudes toward EHR utilization, determine uptake and the level of EHR utilization, and identify factors influencing their use across selected hospitals in Benin City, Edo State.

Methods:

A analytical cross-sectional study design was conducted among 478 healthcare workers selected from public and private hospitals using a multistage sampling technique. Data were collected using a structured, pre-tested, self-administered questionnaire comprising sections on socio-demographic characteristics, knowledge, attitude, utilization, and factors influencing EHR use. Knowledge and utilization scores were categorized based on a 70% cut-off, while attitude was assessed using a 5-point Likert scale which was grouped into appropriate and inappropriate responses and scored using a cut-off of 70%. Data were analyzed using SPSS version 27. Descriptive statistics were summarized as frequencies and percentages, while inferential analysis was conducted using chi-square tests and fisher's exact and multivariate logistic regression to

identify predictors of HER in line with study objectives. Statistical significance was set at $p < 0.050$, and 95% confidence interval.

Results:

The majority of respondents were aged 20–39 years (86.8%), with a mean age of 31.22 ± 8.32 years, and females constituted 63.4% of the study population. Nurses formed the largest professional group, and most respondents had less than five years of professional experience. Awareness of EHR systems was high (93.3%), and an equal proportion demonstrated good knowledge (93.3%). Respondents showed strong knowledge in areas such as data privacy, reduction of medical errors, and improvement of healthcare delivery.

A majority of respondents (78.2%) had a positive attitude toward EHR utilization, with most agreeing that EHR systems improve patient management (98.1%) and enhance the speed of care delivery (93.3%). However, a considerable proportion expressed neutrality regarding preference for EHR over paper-based records, indicating a transitional phase in adoption.

EHR systems were available in most facilities (84.7%), and utilization was high across multiple domains, including clinical documentation (94.1%), patient registration (93.3%), prescribing (92.1%), and laboratory result access (90.6%). Utilization patterns varied significantly by profession and facility type at the bivariate level.

Multivariate logistic regression analysis identified knowledge level, sex, and facility type as independent predictors of EHR utilization. Respondents with poor knowledge were significantly less likely to utilize EHR systems compared to those with good knowledge (OR = 0.22; 95% CI: 0.06–0.86; $p = 0.029$). Male respondents had lower odds of utilization compared to females (OR

= 0.32; 95% CI: 0.11–0.89; p = 0.029), while those working in private facilities were less likely to utilize EHR systems compared to those in public facilities (OR = 0.15; 95% CI: 0.03–0.74; p = 0.019). Factors such as training (OR = 5.83; 95% CI: 2.46–13.81; p = <0.001), stability of electricity supply (OR = 7.25; 95% CI: 1.88–27.94; p = 0.004), and availability of hospital policy (OR = 1.99; 95% CI: 1.15–3.47; p = 0.014) were significant predictors of utilization at the multivariate level.

Conclusion:

This study demonstrates that healthcare workers in Benin City possess relatively high levels of knowledge, positive attitudes, and increasing level of utilization of EHR systems, indicating a strong foundation for digital health integration. However, persistent gaps in training, infrastructure, and organizational support limit optimal utilization. Addressing these challenges through targeted capacity building, improved infrastructural investment, and strengthened institutional policies will be critical for maximizing the benefits of EHR systems and improving healthcare delivery outcomes.

Keywords: Electronic Health Records, healthcare workers, knowledge, attitude, utilization, predictors, digital health, Nigeria.

CHAPTER ONE

INTRODUCTION

1.1 Background to the Study

The global healthcare industry is currently experiencing a comprehensive digital revolution, with the growing necessity and widespread utilisation of Health Information Technology (HIT) and subsequent digitalisation becoming a central strategic focus for health system administrators and policymakers across the world [1, 2] This profound transformation is motivated by the potential for significant economic efficiencies and the widely held, evidence-based premise that digital systems, particularly the adoption of the Electronic Health Record (EHR), are critical instruments for elevating the quality and safety of patient care [1, 3, 4]. The process of automating medical records is, in fact, recognized as one of the most pivotal and significant processes currently being developed within contemporary healthcare services [2].

The documented benefits of successfully digitalizing patient health records are extensive, contributing significantly to improved service delivery [5]. Operationally, the shift to digital platforms can yield substantial advantages, including considerable time savings, enhanced charge capture, and a marked increase in the overall operational efficiency of healthcare facilities [6, 5]. Crucially, digitalisation directly addresses the inherent limitations of traditional paper-based documentation, which is highly susceptible to data quality issues, including transcription errors and missing data, especially when information is later digitized or retrospectively entered into an EHR [7]. The effective use of a Patient Information System (PIS) has been demonstrated to enhance service delivery in hospitals by improving the quality of patient care, significantly reducing documentation errors, and facilitating streamlined workflows, all of which contribute to

informed clinical decisions [5]. Furthermore, the successful integration of digital health technologies is deemed essential for broadening access to care and improving health outcomes in developing nations globally [8].

However, the realization of these anticipated benefits is not an automatic consequence of technology adoption. Research from a large-scale study indicates that merely funding and achieving the adoption of digital technologies may not, on its own, lead to significant positive effects on clinical outcomes or patient satisfaction [1]. Instead, the critical factor driving positive change is the higher user-perceived value or quality of the installed digital tools, underscoring the vital role of user acceptance [1]. Moreover, the introduction of EHR systems exerts a profound influence on the established clinical workflows and the intricate social dynamics of interprofessional collaboration within a hospital, necessitating careful investigation into the effects on various healthcare professional groups and their daily work [3]. As health systems in Nigeria continue to integrate digital health technologies, they face a unique intersection of global standards and localized infrastructural challenges [8]. A crucial local study conducted within Benin City specifically highlighted that while a significant majority of healthcare workers (96.2%) demonstrated good knowledge of e-Health, an overwhelming proportion (90.6%) cited the non-availability of Information and Communication Technology (ICT) facilities as a primary challenge to the successful implementation and utilisation of e-Health services [9]. This evident disparity between provider knowledge and resource availability necessitates a dedicated, localized study to fully assess the preparedness and challenges inherent in the digital transformation process in Benin City.

1.2 Statement of the Problem

Healthcare facilities in Benin City, Edo State, have begun implementing electronic health record systems, yet routine, reliable, and clinically meaningful utilisation of these systems by frontline healthcare providers remains limited. The problem is not simply one of procurement or installation; it is a problem of utilization, the consistent, accurate, and workflow aligned use of EHR functions such as clinical documentation, order entry, results review, and decision support. When utilisation is intermittent, superficial, or confined to a subset of functions, the core objectives of digitalization such as improved patient safety, higher data quality, timely clinical decision making, and efficient care coordination are not realized [10,12,14]. A cluster of interrelated human, technical, and organisational factors drives under utilisation in the local context.

First, infrastructural instability undermines continuous access to EHRs. Frequent power interruptions, limited numbers of functional computers or tablets at point of care, and unreliable internet connectivity force clinicians to revert to paper records or to maintain parallel systems, which fragments information and increases the risk of transcription errors and data loss [20,21]. Second, training and digital competence are inadequate or poorly targeted. Training programs that focus on menu navigation rather than on integrating EHR tasks into clinical workflows leave staff unable to use systems efficiently during patient encounters; this increases documentation time and reduces perceived usefulness, discouraging routine use [28,29]. Third, workflow misfit is pervasive; some EHR implementations do not reflect local clinical processes, resulting in additional steps, duplicated documentation, and longer patient encounters. These operational frictions produce workarounds that degrade data quality and compromise safety [24,25]

Fourth, institutional governance and management support are sometimes inconsistent. Where leadership does not set clear expectations, allocate resources for maintenance and training, or enforce policies for digital record keeping, clinicians lack accountability and motivation to sustain EHR use. The absence of explicit hospital policies and standard operating procedures for digital documentation contributes to inconsistent practice and uncertainty about legal and professional responsibilities [31,32]. Fifth, financial and sustainability constraints limit the capacity of facilities to maintain hardware, secure reliable connectivity, and provide ongoing technical support. High initial costs and recurrent maintenance expenses make continuous operation fragile in resource constrained settings, increasing the likelihood of system downtime and abandonment [34]. Sixth, privacy, interoperability, and trust issues reduce clinicians' confidence in EHRs. Unclear data protection rules, weak interoperability with laboratory and pharmacy systems, and concerns about confidentiality discourage full reliance on electronic records and promote selective or partial use [26,27].

These problems are mutually reinforcing. For example, inadequate infrastructure increases the time required to complete electronic documentation, which magnifies perceptions of workload burden and reduces willingness to engage with the system. Poorly designed training amplifies workflow misfit because staff are not shown how to perform routine tasks efficiently within the EHR. Weak management support means that when problems arise such as connectivity failures, software bugs, or user errors, there may not be rapid local mechanism for remediation, which erodes confidence and fosters abandonment. The cumulative effect is a pattern of intermittent utilisation, parallel paper systems, and incomplete records, which undermines the very benefits that motivated EHR adoption.

Beyond these operational drivers, there are important behavioural and social dimensions to the problem. Resistance to change, professional norms that privilege familiar paper based practices, and scepticism about the clinical value of EHRs all reduce uptake. Where clinicians do not perceive immediate clinical benefit such as faster access to test results or clearer medication histories, they are less likely to invest the additional time and cognitive effort required to document electronically. Attitudinal barriers are compounded by generational differences in digital literacy and by uneven distribution of responsibilities for documentation across professional cadres, which can create tensions and inconsistent use patterns across teams [12,18].

The consequences of low and inconsistent utilisation are concrete and measurable. Fragmented records and transcription errors increase the risk of medication mistakes, missed or delayed diagnoses, and poor continuity of care. Incomplete electronic data limit the utility of EHRs for quality measurement, clinical audit, and public health surveillance. Investments in software and hardware yield limited returns when systems are not embedded in routine practice, and the credibility of digital initiatives is undermined when clinicians and managers observe little improvement in day to day care. In short, under utilisation converts potential gains into persistent problems and may lead to wasted resources and lost opportunities for improvement [14,15,22]. Under utilisation undermines patient safety, data quality, and the broader goals of health system digitalisation. Addressing the problem requires empirical evidence that identifies the dominant local barriers and informs integrated, context appropriate strategies to promote routine, high quality use of EHRs across clinical setting

1.3 Justification for the Study

This study is a timely and essential investigation required to secure the anticipated benefits of EHR systems for the local populace and to contribute specific, localized data to the global health informatics field. The study is particularly relevant because it shifts the focus from merely tracking technological adoption to assessing the critical determinants of success the knowledge, attitude, and utilisation of the electronic systems by the primary users. By investigating these crucial human factors, the findings will generate highly actionable insights for hospital administration and policy development in Edo State. The fundamental problem addressed by this research is the potential disconnect between the policy goal of technological adoption and the practical reality of realizing positive clinical outcomes on the ground. Scientific literature confirms that the ultimate success of digitalisation, including the achievement of goals like improved patient safety and data quality, is realized only when the systems are perceived as user-friendly and valuable and are seamlessly integrated into daily clinical practice [1, 7].

Understanding the specific knowledge deficits and resistance factors will allow for the design of targeted interventions, including specialized training to address computer skills gaps or strategic infrastructural investments, which are paramount for establishing the requisite governance model to maintain data standardization, quality, patient safety, and privacy in the region. Furthermore, by quantifying the level of use, the study provides a measure of how effectively the Patient Information System is influencing service delivery and improving operational efficiency, thereby offering a crucial accountability measure for public spending. Finally, this study provides a vital regional perspective from Nigeria, enriching the international literature on digital health integration, which is currently dominated by nationwide studies from developed economies. Therefore, this study is required to move beyond general assumptions to accurately quantify the

level of use and identify the precise contextual factors impeding successful digitalisation in health facilities across Benin City, Edo State.

1.4 Research Questions

This study seeks to empirically address the key uncertainties surrounding the use of EHR for patients' record keeping by pursuing four main lines of inquiry.

1. What is the knowledge level currently possessed by healthcare providers concerning EHR within patients' healthcare delivery?
2. What is the prevailing attitude of these healthcare providers towards the utilisation of EHR systems in place?
3. What is the actual level of uptake and use of EHR by healthcare providers within the selected facilities?
4. What are the specific factors influencing the use of EHR systems in patient care across selected hospitals in Benin City, Edo State?

1.5 Study Objectives

General Objective

This research is to comprehensively investigate healthcare providers' knowledge and attitude towards the utilisation of EHR systems for record keeping, and to determine the factors that influence the use of EHR systems in patients' care within selected health facilities in Benin city Edo State.

Specific Objectives

1. To assess healthcare workers' knowledge of EHR in patients' healthcare delivery.
2. To ascertain the attitude of healthcare workers' towards the utilisation of EHR systems.
3. To determine the uptake and level of use of EHR systems by healthcare workers.
4. To identify the factors influencing the use of EHR in patients' care across selected hospitals in Benin City, Edo State.

CHAPTER TWO

2.1 BACKGROUND

This chapter reviews relevant literature on the uptake and level of utilization of Electronic Health Records (EHRs) in healthcare facilities. The review examines the transition from paper-based records to digital health systems and highlights the growing importance of EHRs in improving healthcare delivery, patient safety, clinical efficiency, and health information management [1,2]. The increasing digitization of healthcare systems globally has transformed clinical workflows, interprofessional collaboration, and operational efficiency within healthcare institutions [3,6]. Studies have shown that EHR systems contribute significantly to improved healthcare outcomes through better documentation, accessibility of patient information, and enhanced continuity of care [4,11].The chapter further explores the concept of EHR implementation and utilization within healthcare institutions, particularly in developing countries where adoption remains relatively slow due to infrastructural and organizational challenges [35,36]. In Nigeria, efforts toward digital transformation in healthcare have increased in recent years through the integration of digital health technologies and electronic medical records systems [4,8]. However, the effective uptake and utilization of EHR systems continue to be influenced by several factors including inadequate ICT infrastructure, limited technical support, poor internet connectivity, insufficient funding, and resistance to technological change among healthcare workers [24,33,38].

Knowledge and attitude of healthcare providers toward EHR systems are important determinants of successful implementation and utilization. Healthcare workers who possess adequate knowledge of EHR functions and positive perceptions of digital technologies are more likely to utilize EHR systems effectively in clinical practice [9,10,12]. Conversely, poor computer literacy,

inadequate training, and negative attitudes toward technology may hinder the acceptance and routine use of EHR systems [15,16]. Previous studies have also demonstrated that staff readiness, organizational support, and provider willingness significantly influence healthcare professionals' adoption of information technologies [14,17,39].In addition, this chapter examines factors affecting EHR utilization such as ICT infrastructure, staff training, leadership support, institutional readiness, and healthcare workers' perceptions [13,24,40]. These factors are important because successful implementation of EHR systems depends not only on technology availability but also on organizational commitment, user acceptance, and sustainability strategies [37,41]. Theoretical models including the Technology Acceptance Model and Diffusion of Innovation Theory are also reviewed because they provide useful explanations for technology adoption and utilization among healthcare professionals [26–29].

Furthermore, the chapter reviews empirical studies conducted globally, within Africa, and in Nigeria regarding EHR implementation, knowledge, attitudes, and utilization among healthcare workers. The review identifies existing gaps in literature and provides a foundation for understanding the factors influencing the uptake and level of utilization of EHR systems among healthcare workers. The literature reviewed in this chapter therefore serves as a basis for the present study and guides the interpretation of findings.

2.1.1 Evaluation of instruments in use in the literature

Several instruments and theoretical frameworks have been developed to assess healthcare workers' knowledge, attitude, acceptance, and utilization of Electronic Health Record (EHR) systems in healthcare delivery [50]. These tools are important in evaluating the extent to which healthcare professionals understand, accept, and effectively utilize EHR systems within

healthcare institutions. They also help researchers identify the factors influencing successful implementation and sustained utilization of digital health technologies [51]. Among the commonly used instruments are the Human-Organization-Technology Fit (HOT-fit) framework, the Task-Oriented EHR Evaluation Instrument, and the Agency for Healthcare Research and Quality (AHRQ) Health Information Technology Survey [52,53]. These instruments are particularly relevant to studies assessing uptake and level of utilization of EHR systems because they evaluate both individual and institutional determinants of EHR use [54].

The Human-Organization-Technology Fit (HOT-fit) framework is one of the most widely used models for evaluating electronic health information systems [55]. The framework explains that successful implementation and utilization of EHR systems depend on the interaction between human factors, organizational factors, and technological factors [55,56]. The human dimension of the framework assesses healthcare workers' knowledge, attitude, computer literacy, competence, satisfaction, and willingness to use EHR systems [55,57]. In relation to the objectives of this study, the HOT-fit framework can be used to assess healthcare workers' knowledge of EHR by evaluating their understanding of EHR functions, benefits, confidentiality, documentation procedures, and ability to use electronic systems effectively. The framework also assesses healthcare workers' attitudes toward EHR systems by examining perceptions regarding ease of use, usefulness, convenience, confidence, and acceptance of digital technologies in clinical practice [55,58].

Furthermore, the HOT-fit framework assesses the level of utilization of EHR systems by evaluating the frequency of system use, integration into routine clinical activities, dependence on electronic records during patient care, and extent of usage across different healthcare tasks [56]. In addition, the organizational and technological dimensions of the framework are useful in

identifying factors influencing EHR utilization [57]. These include availability of ICT infrastructure, internet connectivity, stable electricity supply, leadership support, management commitment, staff training opportunities, technical support, and institutional readiness for digital transformation [55,57] Due to its comprehensive nature, the HOT-fit framework is highly suitable for studies conducted in developing countries where infrastructural and organizational challenges significantly affect EHR adoption and utilization [59].

Another important instrument used in assessing EHR utilization is the Task-Oriented EHR Evaluation Instrument [60]. Unlike broader theoretical frameworks, this instrument focuses specifically on how EHR systems support healthcare workers in performing routine clinical tasks and activities [60,61]. The tool evaluates the extent to which EHR systems improve efficiency, workflow, communication, and documentation within healthcare settings [60]. In assessing knowledge of EHR systems, the task-oriented instrument examines healthcare workers' familiarity with electronic documentation procedures, patient information retrieval, medication ordering processes, and navigation of EHR interfaces [60,61]. It determines whether healthcare workers possess adequate practical understanding required for effective use of electronic records during clinical practice.

The instrument also assesses healthcare workers' attitudes toward EHR systems by evaluating their perceptions regarding workflow improvement, ease of documentation, reduction in workload, and convenience of electronic record systems compared to paper-based records [60,62]. Positive experiences during task performance are often associated with favorable attitudes toward EHR utilization [62]. In terms of level of utilization, the task-oriented instrument directly measures the frequency and extent to which healthcare workers use EHR systems for patient documentation, accessing laboratory results, reviewing patient history, prescribing medications,

scheduling appointments, and communicating with other healthcare professionals [60,61]. The instrument is particularly useful because it assesses actual system usage rather than merely perception or intention to use [62].

Additionally, the task-oriented instrument identifies factors affecting EHR utilization by evaluating barriers encountered during routine clinical use [60]. These barriers may include system downtime, slow computer processing, poor interface design, inadequate training, technical difficulties, workflow disruptions, and lack of technical support [60,61]. The instrument therefore provides practical insight into operational challenges affecting EHR implementation and sustained usage within healthcare facilities [62].

The Agency for Healthcare Research and Quality (AHRQ) Health Information Technology Survey is another widely used instrument for assessing healthcare workers' experiences with EHR systems and other digital health technologies [52,53]. The survey was designed to evaluate healthcare providers' knowledge, perceptions, satisfaction, and utilization of electronic health systems within healthcare institutions [52,64]. The instrument contains structured items that assess healthcare workers' familiarity with EHR systems, understanding of electronic documentation procedures, knowledge of system functionalities, and awareness of the benefits of digital health technologies [52,63]. These components make the survey useful for assessing healthcare workers' knowledge of EHR systems.

The AHRQ survey also evaluates healthcare workers' attitudes toward EHR systems by assessing perceived usefulness, ease of use, satisfaction, confidence, and acceptance of electronic records in patient care [52,64]. It examines whether healthcare workers believe that EHR systems improve communication, enhance patient safety, reduce medical errors, and improve quality of care [52,63].

Positive perceptions regarding these benefits are often associated with increased willingness to adopt and utilize EHR systems [62,64].

In assessing the level of utilization, the AHRQ survey measures the extent to which healthcare workers routinely use EHR systems during clinical practice [52,63]. It evaluates usage patterns related to patient documentation, retrieval of clinical information, electronic prescribing, appointment scheduling, and communication among healthcare professionals [52,64]. The survey also determines the consistency of EHR usage across different healthcare departments and clinical activities.

Furthermore, the AHRQ survey identifies factors influencing EHR utilization by assessing availability of training programs, technical support services, computer systems, internet connectivity, management support, and institutional policies related to digital health implementation [52,63]. It also examines challenges experienced by healthcare workers during EHR use, including system complexity, insufficient training, increased workload, and technical difficulties [52,64].

These instruments and frameworks are highly relevant to the present study because they collectively address the major variables under investigation, including healthcare workers' knowledge of EHR systems, attitudes toward EHR utilization, level of EHR usage, and factors influencing utilization within healthcare facilities[50,54]. The HOT-fit framework provides a strong theoretical basis for understanding the interaction between human, organizational, and technological factors affecting EHR implementation [55,56] while the Task-Oriented EHR Evaluation Instrument and AHRQ Health IT Survey provide practical approaches for assessing actual utilization and operational experiences among healthcare workers [52,60]. Together, these

tools provide a comprehensive approach for evaluating the uptake and level of utilization of Electronic Health Records in healthcare delivery [58,62].

2.2 Theoretical Framework

The theoretical framework for this study on assessment of EHR systems in patient healthcare delivery will be explained by applying the following theories:

2.2.1 Technology Acceptance Model (TAM)

The Technology Acceptance Model (TAM), originally proposed by Davis, is one of the most widely used frameworks for understanding technology adoption among healthcare providers [27]. The model posits that two specific beliefs Perceived Usefulness (PU) and Perceived Ease of Use (PEOU) are the primary determinants of an individual's Attitude toward using a system, which subsequently influences their actual Utilisation[27,19].

Perceived Usefulness: If healthcare providers in Benin City believe that digitalizing records will improve patient care and operational efficiency, they are more likely to adopt the technology.

Perceived Ease of Use: If the digital systems are seen as complex or time-consuming (a common concern in Nigerian hospitals due to poor user interface design), providers will develop a negative attitude [19,28].

2.2.2Unified Theory of Acceptance and Use of Technology (UTAUT)

The UTAUT model expands on TAM by incorporating four key constructs: Performance Expectancy, Effort Expectancy, Social Influence, and Facilitating Conditions [29].

Social Influence: This is particularly relevant in the Nigerian clinical setting, where the attitude of senior consultants or hospital management toward digitalisation significantly influences the adoption behavior of junior staff [19]. Facilitating Conditions aligns with the fourth objective regarding factors in Benin City. It refers to the degree to which an individual believes that an organizational and technical infrastructure exists to support the use of the system (e.g., stable power and high-speed internet provided by the Edo State Digital Policy initiatives) [25,29].

2.2.3 Organizational e-Health Readiness (OeHR) Model

While TAM and UTAUT focus on individual behavior, the OeHRmodel, assesses the institution's preparedness [13]. This model is essential for this research because digitalisation in Benin City is not just a personal choice but depends on the Core Readiness (needs assessment), Engagement Readiness (training), and Structural Readiness (ICT facilities) of the individual health facility [13,15].

2.2.4 The Diffusion of Innovation (DOI) Theory

This was proposed by Rogers, and the theory explains how, why, and at what rate new ideas and technology spread through a social system [30]. This study can use this to categorize healthcare providers in Benin City into:

Innovators/Early Adopters: Those already using digital tools. Laggards: Those resistant to shifting from paper records due to long-standing "work traditions" mentioned in the literature [6].

2.3 Policy Framework on Electronic Health Records (EHR)

The implementation of Electronic Health Records (EHRs) is strongly influenced by policy frameworks that guide standardization, interoperability, confidentiality, security, ethical use, and governance of patient information. Effective policy frameworks ensure that EHR systems improve healthcare delivery while maintaining patient privacy and supporting evidence-based decision-making. These policies exist at global, regional, and local levels and collectively shape the adoption and sustainability of EHR systems [67,68].

Global Perspective

At the global level, the World Health Organization plays the central role in establishing policy direction for digital health and EHR implementation. The WHO recognizes digital health as the use of information and communication technologies to support healthcare delivery, strengthen health systems, and improve access to quality healthcare services [67,69].

A major global policy instrument is the WHO Global Strategy on Digital Health 2020–2025, endorsed by the World Health Assembly in 2020. This strategy provides a roadmap for countries to strengthen healthcare systems through digital technologies, including EHRs. It emphasizes universal health coverage, patient-centered care, interoperability, health data governance, cybersecurity, equity, and sustainable digital infrastructure. The strategy encourages member states to develop national digital health governance structures and establish standards for secure health information exchange [67].

The WHO also developed recommendations on digital interventions for health system strengthening, which support the safe and effective implementation of EHRs. These guidelines stress that digital health investments should be evidence-based and aligned with national

healthcare priorities rather than driven solely by technology availability. Privacy, confidentiality, and patient rights remain central pillars of these global policies [68].

In addition to WHO, organizations such as the International Organization for Standardization and Health Level Seven International contribute technical standards for interoperability, data exchange, and information security within EHR systems [70,71].

Regional Perspective (Africa)

At the regional level, African countries align with policy directions developed by the African Union and the Africa Centres for Disease Control and Prevention. These institutions promote digital transformation in health systems across the continent and encourage stronger adoption of EHR systems [72].

Africa's regional digital health policies focus on strengthening health information systems, improving disease surveillance, and supporting continuity of care across healthcare institutions. These frameworks recognize the challenges faced by many African countries, including inadequate electricity supply, poor internet connectivity, limited funding, shortage of skilled health informatics personnel, and weak institutional capacity [72].

Regional strategies emphasize legal frameworks for data governance, patient privacy, interoperability, and sustainable financing for digital health programs. They also support the "one patient, one record" approach, which improves referral systems and continuity of care across primary, secondary, and tertiary healthcare institutions [72].

Cross-border interoperability is especially important within Africa due to regional migration, infectious disease outbreaks, and public health emergencies. Harmonized policies help ensure effective health surveillance and continuity of care across national boundaries [72].

Local Perspective (Nigeria)

In Nigeria, the policy framework for EHR implementation is primarily guided by the Federal Ministry of Health through the National Health Information System Policy, the National Health Information and Communication Technology Strategic Framework, and the National Digital Health Strategic Framework [73,76].

The National Health Information and Communication Technology Strategic Framework provides policy direction for the adoption of electronic health systems across primary, secondary, and tertiary healthcare institutions. It promotes digitization of patient records, interoperability, standardization of reporting systems, confidentiality, secure access to patient information, and institutional governance of health information systems [73].

The National Health Act 2014 further supports EHR implementation by providing legal protection for patient confidentiality and regulating the management of personal health information [74]. More recently, the Nigeria Data Protection Act 2023 strengthened legal safeguards for sensitive patient data stored in electronic systems and reinforced accountability in health information management [75].

At the institutional level, tertiary hospitals such as University of Benin Teaching Hospital increasingly utilize electronic systems for patient documentation, pharmacy services, laboratory reporting, appointment scheduling, and administrative functions. Secondary and primary

healthcare facilities are gradually adopting electronic medical records, although implementation remains inconsistent due to infrastructure limitations such as unstable power supply, inadequate funding, poor internet access, and limited staff training [73,76].

Nigeria's policy framework therefore aims to transition healthcare delivery from fragmented paper-based systems to integrated, secure, and interoperable EHR systems that improve quality of care and patient safety [73,76].

The policy framework for Electronic Health Records operates across global, regional, and local levels. Globally, the World Health Organization provides strategic direction for governance, interoperability, and digital health standards. Regionally, Africa focuses on strengthening infrastructure, legal frameworks, and cross-border harmonization of health information systems. Locally, Nigeria supports EHR implementation through national policies, legal protections, and institutional reforms. Alignment across these levels is essential for successful and sustainable EHR adoption [67,72,73] .

2.4 CONCEPTUAL FRAMEWORK

The digitalisation of healthcare records involves the transition from traditional paper-based documentation to integrated electronic systems designed to manage patient information and clinical workflows [6]. Within the Nigerian context, this transformation is characterized by the adoption of Electronic Health Records (EHR) to enhance operational efficiency and patient safety [4,8]

In Edo State, the conceptual framework for this shift is anchored in the Edo State Digital Policy. This policy outlines a strategic roadmap toward an "E-Government Masterplan," aimed at

reducing administrative bureaucracy and fostering a technology-driven governance structure [25]. Conceptually, the digitalisation of patient care is viewed not merely as a technical upgrade but as a "rethinking of management and operations" that integrates health services into the Industry 4.0 era, utilizing data to drive clinical outcomes [2]. This shift represents a departure from traditional "work traditions" toward a more transparent, accessible, and data-centric healthcare delivery model [6].

Figure 2.1: Conceptual Framework

2.5 HEALTHCARE PROVIDERS' KNOWLEDGE OF EHR IN PATIENTS' HEALTHCARE DELIVERY

The successful utilisation of Electronic Health Record (EHR) systems which is the foundational component of healthcare digitalisation, is inextricably linked to the intellectual capacity and functional proficiency of the end-users, that is, the healthcare providers [10, 8]. Knowledge in this context is defined as the provider's awareness, understanding, and factual information concerning the operational requirements, principles, benefits, and applications of digital record systems and broader e-Health services [9, 10].Across developed and developing economies, a strong consensus exists that a provider's knowledge is a prerequisite for realizing the benefits of digitalisation. International studies consistently find that high-quality utilisation, which is key to improving clinical outcomes, depends on a detailed understanding of the system's purpose and functionality [1, 7]. For instance, a comprehensive review on the impact of EHRs highlights that these systems can significantly improve patient care by enhancing accessibility to patient information, reducing medical errors, and streamlining clinical processes, all of which require the provider to possess the technical knowledge of how to use the system effectively [11].

Furthermore, research emphasizes that knowledge must be directly applicable to the digital environment. In a study examining healthcare professionals' knowledge and attitude toward electronic personal health record systems in a resource-limited setting, researchers emphasized that the required knowledge encompasses not only basic computer skills but also an understanding of data security, privacy protocols, and how the system supports clinical decision-making [10]. Similarly, an investigation into dental healthcare providers' attitudes towards EHRs in Saudi Arabia found that participants largely recognized the potential of the systems to reduce

errors and improve efficiency, demonstrating a baseline intellectual acceptance of the system's value [12]. These findings collectively suggest that, globally, healthcare professionals generally possess a theoretical understanding of the advantages of digitalisation, but the actual depth of their functional knowledge remains a critical determinant of successful adoption [10, 12]. In fact, an organizational e-Health readiness study underscores that robust and targeted training efforts are essential to prepare primary healthcare providers for digital transformation, confirming that system-specific functional knowledge is not inherent but must be actively built[13]. The empirical evidence from Africa, particularly Nigeria, presents a more complex picture where high theoretical knowledge often clashes with practical implementation barriers. A study investigating the utilisation of EHRs in a General Hospital in Kogi State, Nigeria, found that even where basic EHR functionalities were technically available, actual usage was severely limited by inadequate infrastructure and insufficient training [14]. Also, a research carried out in Uyo to assess the level of knowledge and perception among health personnel including doctors, nurses, and laboratory scientists, found that 83.6% of these providers had a "fair to good" knowledge of EHR technology[24]. This highlights that in the Nigerian context, the level of knowledge needed must be robust enough to integrate the digital record system into daily clinical workflows seamlessly, a process often hindered by challenges such as unstable internet connectivity and unreliable electricity supply [14, 8].

Furthermore, an essential local study conducted among health workers in Benin City, the focus area of this research, yielded a remarkably high finding. Approximately 96.2% of respondents demonstrated good knowledge of e-Health principles [9]. This suggests a strong theoretical foundation and widespread awareness among the local healthcare workforce regarding the digital shift in patient care delivery [5].However, this high knowledge level is frequently decoupled from

practical utilisation due to severe infrastructural and skill gaps [4, 14, 8]. A comprehensive review on the impact of electronic medical records in Nigeria corroborated that while the theoretical framework is known, the absence of requisite computer skills among staff is cited as a major barrier to effective adoption [4]. This observation confirms that the knowledge required is not simply an intellectual understanding of digital concepts but the functional ICT literacy necessary to operate the systems proficiently [4].

In summary, the literature confirms that knowledge is a non-negotiable prerequisite for successful digitalisation. While providers in Benin City appear to possess a high theoretical awareness of e-Health, the current study is critically positioned to investigate the depth of this knowledge specifically, the functional understanding required to overcome complex local barriers and efficiently use the digital records for critical tasks such as interprofessional collaboration and clinical decision-making [3, 8].

2.6 ATTITUDE OF HEALTHCARE PROVIDERS TOWARDS THE UTILISATION EHR SYSTEMS.

The successful transition to a digital healthcare environment is critically dependent on the attitude of frontline providers, which represents their subjective feelings, beliefs, and disposition toward the utilisation of digital record systems in their daily professional lives [10, 15, 9]. Attitude acts as a powerful mediator between the mere availability of technology and its effective adoption, with a provider's perceived value being a key factor driving positive outcomes [1].Globally, the literature presents a consistent pattern: healthcare providers generally possess a positive theoretical attitude toward digitalisation due to its potential benefits, but this attitude is fragile and highly sensitive to issues of usability and workflow integration. From a structural

perspective, a large-scale nationwide analysis across German hospitals found that the realization of beneficial effects on clinical outcomes and patient satisfaction was not guaranteed by the funding and adoption of Health Information Technology (HIT) alone [1]. Instead, the crucial factor was the higher user-perceived value or quality of the installed digital tools, underscoring that a positive attitude toward the system's effectiveness is the engine of successful change [1]. This attitude of perceived value is reinforced by studies like the one on measurement-based care, which acknowledged the potential of digitalisation to address data quality issues, such as transcription errors and missing data inherent in paper-based methods, inherently cultivating a favorable attitude toward the digital alternative [7]. Furthermore, dental healthcare providers in Saudi Arabia agreed that Electronic Health Records (EHRs) have the potential to reduce errors and improve efficiency, demonstrating a clear recognition of the technology's clinical utility and confirming a baseline positive disposition toward its adoption [12].

However, positive attitudes face significant friction when confronting the practical reality of implementation. Attitude is strongly tied to Effort Expectancy, a concept within the Unified Theory of Acceptance and Use of Technology (UTAUT) model, which measures the perceived ease of use [15]. The introduction of an Electronic Health Record (EHR) is known to profoundly influence established clinical workflows and the intricate social dynamics of interprofessionalcollaboration[3]. If a system is perceived as complex, time-consuming, or disruptive to a provider's familiar routine, the initial positive attitude can quickly erode, leading to resistance to change[3, 16]. Research on the attitude and willingness of providers in Ethiopia to use information technology highlighted that system complexity and a lack of training were significant predictors of a negative attitude and reduced interest in utilisation[17].

In the African context, especially in Nigeria, the positive professional attitude toward digitalisation is frequently undermined by the stark realities of the operational environment, leading to a crucial disconnect between belief and utilisation. Providers in this region typically maintain a positive attitude toward the potential of digital health systems, largely driven by the understanding that these systems enhance documentation and improve data management [18]. A study conducted in Benin City confirmed this high level of theoretical acceptance, where 96.2% of health workers possessed good knowledge of e-Health [9]. However, this intellectual readiness is severely challenged by the absence of facilitating conditions. The same Benin City study reported that a staggering 90.6% of health workers cited the non-availability of ICT facilities as a major challenge [9]. This contradiction supporting the concept but struggling with the practice creates a frustrating environment that ultimately fosters a negative pragmatic attitude toward daily system use, limiting the willingness to utilize the system fully [9]. Beyond the pervasive infrastructural issues like epileptic power supply and unstable internet, Nigerian studies identify specific human factors that contribute to a negative attitude, including resistance to change arising from a fear of technology or preference for the familiar paper system [4, 16], and the negative perceptions fueled by inadequate or generalized training, as untrained staff feel overwhelmed and incompetent when using the system [19]. Additionally, concerns regarding patient privacy and data security introduce caution and can lead to resistance to comprehensive data entry [12, 15]. In conclusion, the assessment of provider attitude in Benin City must move beyond measuring abstract support for e-Health. The empirical evidence necessitates a detailed investigation into how the local context's deficiencies in infrastructure, training, and workflow integration impact the practical, daily attitude toward utilisation. This distinction is vital for

understanding why a provider with high knowledge might still exhibit a negative attitude toward the utilisation of EHR systems in their specific setting.

2.7 THE LEVEL OF USE OF EHR BY HEALTHCARE PROVIDERS

The actual level of use or utilisation of digital options, such as Electronic Health Records (EHRs) and other e-Health systems, is the ultimate measure of successful digitalisation and is inextricably linked to achieving improved clinical and operational outcomes [6, 1]. Utilisation moves beyond mere presence or acceptance of the technology; it assesses the frequency, depth, and quality with which providers integrate the digital system into core clinical and administrative workflows [3, 18].

International literature suggests that while the need for and presence of electronic records have increased over the last decade, digitalisation is generally not yet fully implemented in clinical practice across the globe [20, 3]. The beneficial effects of Health Information Technology (HIT) on clinical outcomes and patient satisfaction are highly conditional, relying heavily on the user-perceived value and the quality of the deployed systems, which implies that mere use is insufficient; it must be effective use [1]. For instance, a systematic review consolidating evidence on the utilisation of digital health technologies noted that a variety of factors including infrastructure and technical barriers, and psychological issues like concerns over increasing working hours, significantly constrain actual utilisation levels [21]. The quality of use is often measured by the transition away from paper-based data collection, as digital systems are specifically intended to reduce transcription errors and data quality issues [7].

Conversely, the level of use in the regional and local African context, particularly in Nigeria, is characterized by low penetration and limited application depth, despite a general recognition of e-Health's advantages. A study in Ahmadu Bello University Teaching Hospital (ABUTH), Zaria, reported that the penetration of Electronic Medical Records (EMRs) in Nigeria is very low, with less than 10.0% of hospitals embracing it[16]. This low adoption rate signifies a fundamental barrier to utilisation on a national scale [4, 16]. Furthermore, even in facilities that have implemented digital systems, the use is often limited in scope. For example, a study in a General Hospital in Kogi State found that while basic EHR functionalities such as recording patient contact information, medication lists, and surgical history were available, their actual usage was constrained[14]. This limited utilisation prevents hospitals from implementing and benefiting from advanced EHR features like clinical decision support and computerized provider order entry [14].

On a more positive note, a cross-sectional study among health workers in Benin City revealed that a significant proportion, 63.5% of respondents, had ever used e-Health services[9]. Similarly, a survey in North-Central Nigeria focusing on nurses' perspectives aimed to understand the low utilisation of Digital Health Technology (DHT), confirming that while the technology may be available, its use is not seamless [22]. However, this reported utilisation level is immediately contextualized by severe barriers. The study in Benin City found that 90.6% of health workers highlighted the non-availability of ICT facilities as a challenge to utilisation[9]. This aligns with other regional findings, which consistently identify inadequate infrastructure, unstable internet connectivity, insufficient training, and a pervasive resistance to change as primary challenges that directly impede the level of use and sustainable adoption of digital tools across various Nigerian settings [23, 4, 19, 16]. Thus, while there is some use of digital options, the literature suggests the prevailing pattern in the local context is one of constrained and superficial

utilisation, far below the level required to reap the full clinical and operational benefits of digitalisation[18, 14].

2.8 FACTORS INFLUENCING USE OF EHR IN PATIENTS' CARE ACROSS SELECTED HOSPITALS IN BENIN CITY, EDO STATE

The successful implementation of EHR record systems is dependent upon overcoming a multifaceted array of constraints and studies consistently demonstrates that the ultimate success of digitalisation hinges not merely on the introduction of technology, but on mastering the specific factors that influence its sustained use [1, 20]. In Nigeria, where Electronic Medical Record (EMR) penetration is still low, reportedly less than 10.0% of hospitals nationally [16] identifying these constraining factors is paramount, particularly in targeted urban centers like Benin City.

The most critical challenge identified locally falls within the domain of Infrastructural and Technical Factors. A study conducted specifically among healthcare workers in Benin City revealed that a staggering 90.6% of respondents cited the non-availability of ICT facilities as a major barrier to the implementation and utilisation of e-Health services [9]. This finding is mirrored across other Nigerian states, where the failure of digital systems is frequently attributed to inadequate infrastructure, unreliable electricity (epileptic power supply), and unstable internet connectivity [14, 16]. These technical deficiencies create an environment of frustration, restricting the functionality of systems and preventing hospitals from utilizing advanced EHR features, such as clinical decision support, thus limiting the depth of digitalisation to basic record-keeping [14]. International systematic reviews corroborate that infrastructure and technical barriers are high-frequency global constraints that impede utilisation[20].

In addition to technical limitations, Behavioral and Competence Factors introduce significant friction. A recurring theme in Nigerian literature is resistance to change [4, 16], which arises from factors like fear of technology, concerns over data security, or simply a preference for the familiar paper-based routine [3, 16]. This resistance is compounded by deficiencies in digital literacy and competence among healthcare professionals, a globally recognized barrier to full digitalisation[21]. When staff feel ill-equipped or incompetent due to inadequate or generalized training, their initial positive attitude rapidly erodes, leading to negative perceptions and a reluctance to fully engage with the new systems [19, 17]. Furthermore, providers' caution regarding patient privacy and data security introduces wariness toward comprehensive data entry and system compliance, acting as a behavioral constraint on utilisation[12, 15].

Finally, Organizational and Systemic Factors frame the context for these challenges. These include macro issues such as the high cost of installation and sustained maintenance of EMR systems [16], and pervasive funding shortages that prevent necessary upgrades and training [14]. At the operational level, the introduction of digital tools profoundly influences established clinical workflows and the intricate social dynamics of interprofessional collaboration [3]. If a digital system is not effectively integrated into the existing flow of work, it is perceived as disruptive, regardless of its features, undermining the user-perceived value or quality that is essential for long-term successful adoption [1]. Therefore, a detailed assessment of these interwoven infrastructural, behavioral, and organizational determinants is crucial to understanding the factors that specifically constrain the potential of digital healthcare in Benin City.

Table 2.1. SUMMARY

Context	Author & Year	Study Focus	Key Findings	Critique	Research Gap for my Work
Global	Longhini et al. (2022)	Digital Health Competencies (Systematic Review)	Found that digitalisation is stalled globally by a lack of professional competencies and standardized assessment tools	Strength: Comprehensive global synthesis. Weakness: Does not account for specific infrastructural deficits (e.g., power) common in developing nations.	Provides the theoretical standard for competency against which Benin City providers can be measured.
Global	Borges do Nascimento (2023)	Barriers and Facilitators (Global Review)	Identified psychological issues and increased workload as universal barriers for physicians and nurses.	Strength: High-level certainty of evidence. Weakness: "Workload" in the West often refers to data entry, while in Nigeria, it includes manual-digital duplication	This study tests if these global barriers manifest differently under Edo State's specific digital mandate.
Regional	Ngusie et al. (2022)	EHR Readiness in Ethiopia	Readiness was low (44.3%); influenced by computer literacy and prior training.	Strength: Contextually similar resource-limited setting. Weakness: Focused on the "pre-implementation" phase, whereas Benin is in "active transition."	Fills the implementation gap by studying providers already interacting with live digital systems.

Regional	Olukorode et al. (2024)	Impact of EMR on Healthcare in Nigeria	Highlighted improved data retrieval but noted the "Nigerian factor" (power/funding) as a major inhibitor.	Strength: Broad national perspective. Weakness: As a review, it lacks fresh primary data from the South-South geopolitical zone	Provides the national benchmark to compare with specific findings from Edo State.
Regional	Udoh et al. (2023)	EMR Knowledge in Uyo, South-South Nigeria.	Cadre-based knowledge gaps; tertiary hospitals have better awareness but similar infrastructure issues.	Strength: Geographically close to your study area. Weakness: Limited to tertiary facilities; ignores the state-level public-private mix	Addresses the institutional gap by considering the wider "Edo Digital Policy" across various health sectors.
Local	Owoeye et al. (2022)	eHealthUtilisation in Benin City.	Documented a high knowledge (96%) vs. lower use (63%) among local health workers.	Strength: Direct local relevance. Weakness: Descriptive methodology; did not use a behavioral model (like TAM) to explain the gap.	Uses TAM/UTAUT to provide the "why" behind the statistics found by Owoeye.
Local	Osian et al. (2023)	ICT Use at St. Philomena, Benin City.	Utilisation was moderate but hampered by a lack of personal hardware and institutional support.	Strength: Facility-specific "on-the-ground" data. Weakness: Small sample; lacks the policy context of the Edo State Digital Policy (2023).	Bridges the policy gap by evaluating how the 2023 E-Government mandate has changed utilisation.

CHAPTER THREE

METHODOLOGY

3.1 STUDY AREA

This study was carried out in Benin city, Edo State, Nigeria. Edo state is one of the 36 states in Nigeria. It is located in the southern region of Nigeria, the state is bounded by Kogi state to the northeast and east, Delta state to the southeast and south, and Ondo state to the west and northwest; the River Niger flows along the state's eastern boundary and demarcate it with Anambra state.

This study was conducted in Benin City, the capital of Edo State, located in the South-South geopolitical zone of Nigeria. Benin City is one of the major urban centers in southern Nigeria and serves as an important center for healthcare delivery, education, and commerce. The city has a well-structured healthcare system comprising primary, secondary, and tertiary levels of care. The primary healthcare level in Benin City consists of health centers, maternity clinics, dispensaries, and community health posts managed mainly by the local government authorities. These facilities provide basic preventive, promotive, and curative services such as immunization, antenatal care, maternal and child health services, treatment of common illnesses, and health education. Primary healthcare facilities serve as the first point of contact for most residents seeking medical attention.

The secondary healthcare level includes general hospitals and specialist hospitals managed by the state government. These facilities provide more advanced diagnostic, therapeutic, and inpatient services and also serve as referral centers for patients from primary healthcare

institutions. The tertiary healthcare level consists of highly specialized institutions that provide advanced medical care, teaching, and research services. The major tertiary institution in Benin City is University of Benin Teaching Hospital, which serves as a referral center for Edo State and neighboring states. It provides specialist care in areas such as surgery, internal medicine, pediatrics, obstetrics and gynecology, oncology, nephrology, and intensive care services. It also plays a major role in medical training and health research.

3.2 STUDY DESIGN

An analytical cross-sectional survey design was utilized in this study.

3.3 STUDY POPULATION

1. The study was carried out among Medical Doctors, Nurses, Laboratory Scientists, Pharmacists, Health Information Managers, involved in handling health records in two public and two private health facilities in Benin City.

3.4 SELECTION CRITERIA

3.4.1 Inclusion Criteria

i. Registered health facilities.

ii. Medical Doctors, Nurses, Laboratory Scientists, Pharmacists, Health information managers present on the day of the survey who have worked for at least one year in the facility.

3.4.2 Exclusion Criteria

i. Facilities not willing to participate.

ii. Medical Doctors, Nurses, Laboratory Scientists, Pharmacists, Health information managers absent on the day of data collection.

iii. Medical Doctors, Nurses, Laboratory Scientists, Pharmacists, Health information managers too ill to participate.

3.5 STUDY DURATION

This study was carried out from December 2024 to May 2026.

3.6SAMPLE SIZE DETERMINATION

This was calculated using the Cochran's formula for descriptive study.

$$n = \frac{z^2 pq}{d^2}$$

Where:

n=minimum sample size

z= standard normal deviation= 1.96 at 95% confidence interval

p= prevalence or proportion with characteristics of interest.

p= 83.6% of providers had a "fair to good" knowledge of EHR technology according to a study carried out in Uyo[24]

q= 1-p

d = degree of precision desired set at 0.05

Hence:

$$n = \frac{(1.96)2 * 0.836 * (1 - 0.836)}{(0.05)2}$$

n = 210.68

n = Approximately 211

Non-Response rate

10% non-response rate was added to the sample size utilizing the formula for non-response rate

$$n_f = \frac{n}{1 - n_r} * e$$

Where:

n_f=Final minimum sample size

n = minimum sample size

n_r= non-response rate at 10% =0.1

e = design effect (2)

Then,

$$n_f = \frac{211}{1 - 0.1} * 2$$

$n_f = 468.889$

The final sample size used for this study was **478**

3.7 SAMPLING TECHNIQUE

Study Location and Facility Selection — Purposive Sampling

A multi-stage purposive sampling approach was used to select the study settings.

Stage 1 — Selection of Edo State: Edo State was purposively selected from the 36 states of Nigeria due to its mix of urban and semi-urban healthcare facilities, ongoing digital health initiatives by the Edo State Government, and the presence of hospitals with varying levels of EHR implementation.

Stage 2 — Selection of Benin City: Benin City, the state capital, was purposively selected as it hosts the highest concentration of healthcare facilities in the state.

Stage 3 — Selection of Healthcare Facilities: Four hospitals in Benin City were purposively selected: **University of Benin Teaching Hospital (UBTH)** (tertiary/public), **Edo Specialist Hospital** (secondary/public), **St. Philomena Hospital** (faith-based/private), and **Lily Hospital** (private).

This selection ensures representation across different levels and ownership types of healthcare delivery, all of which has implemented or is implementing EHR systems.

Study Participant Selection — Stratified Random Sampling

Healthcare workers at the four selected hospitals were selected using **stratified random sampling** to ensure proportional representation across professional cadres.

Stratification: The study population was divided into four strata:

Stratum 1: Medical doctors (consultants, residents and house officers)

Stratum 2: Nurses

Stratum 3: Allied health professionals (laboratory scientists and pharmacists)

Stratum 4: Health information management officers

3.8 DATA MANAGEMENT

3.8.1 Data Collection Tools

The primary instrument for data collection was a Structured Questionnaire, which was adapted from Human Organization Technology; HOT-fit Model-Based EHR Evaluation Questionnaire and Agency for Healthcare Research and Quality; AHRQ Healthcare Provider Health IT Survey and was divided into five sections:

Section A: Socio-demographic data.

This section contained questions that sought out the socio-demographic characteristics of the respondents such as sex, age (in years), marital status, profession, ethnic group, religion etc.

Section B: Knowledge of EHR Systems.

This evaluated respondents' knowledge of EHR systems using a series of 10 structured multiple-choice questions. This section included items on awareness, sources of information, and ten objective questions assessing conceptual understanding, operational requirements, benefits, challenges, and public health relevance of EHR systems

Section C: Attitudes Toward Use of EHR Systems.

This assessed respondents' attitudes toward EHR systems using a five-point Likert scale ranging from strongly agree to strongly disagree. The items explored perceptions of usefulness,

willingness to adopt EHR systems, perceived benefits, and resistance tendencies as seen in the Technology Acceptance Model (TAM). Ten questions were asked in this section

Section D: Uptake and Level of Utilisation of EHR systems.

This focused on the level of utilization of EHR systems and was measured using a frequency-based Likert scale ranging from "never" to "always." This section assessed the extent to which respondents used EHR systems across various clinical and administrative functions, including patient care, registration, clinical documentation, prescribing, laboratory result access, appointment scheduling, and data reporting. Seven clinical and administrative areas were assessed.

Section E: Factors Influencing Use of EHRs In Patients' Care.

This section assessed factors influencing the use of EHR systems using a binary (Yes/No) response format. The items covered a range of potential barriers and facilitators, including availability of infrastructure, adequacy of training, electricity supply, internet connectivity, management support, hospital policies, system complexity, data privacy concerns, cost, and workload. Responses were coded and analyzed individually.

3.8.2 Validity.

The questionnaire was subjected to Face and Content Validity by experts in Public Health.

3.8.3 Training of Research Assistants.

Undergraduate research assistants were adequately trained prior to data collection to ensure consistency and accuracy in the administration of questionnaires. The training focused on the objectives of the study, proper explanation of questionnaire items, ethical considerations such as obtaining informed consent, and maintaining confidentiality. They were also instructed on how to approach respondents respectfully and avoid influencing their responses. This helped to ensure standardization in data collection and improve the reliability of the study findings

3.8.4 Pretesting

The questionnaire was pre-tested among 47 healthcare workers (approximately 10% of the minimum sample size) at Edo State University Teaching Hospital Auchi, Etsako West Local Government Area, Edo State, who were not part of the main study. The pilot study assessed the clarity of questions, appropriateness of response options, and time required for completion. The internal consistency of the instrument was assessed using Cronbach's alpha coefficient. A Cronbach's α value of ≤0.70 was considered acceptable.

3.8.5 Method of Data Collection

Data was collected quantitatively through a self-administered online questionnaire containing both open-ended and closed-ended questions at the selected health facilities. The respondents were allowed to answer the questionnaires at their convenient time, and their privacy was ensured. Informed consent was obtained from the respondents, and they were assured of confidentiality.

3.8.6 Method of Data Analysis

The filled questionnaires were carefully sorted and checked for errors and incomplete filling or any discrepancies. Those that were completely and appropriately filled were entered and analyzed with the International Business Machines Corporation Statistical Package for Social Science (IBM SPSS) version 27.0 software.

Univariate analysis like mean, median and standard deviation were carried out on continuous variables like age and years of professional experience and then the result was summarized using frequency distribution tables.

Bivariate analysis using Chi square test and Fishers exact was used to test the association between socio-demographic characteristics of respondents and knowledge, attitude, level of utilisation and factors influencing use.

Multivariate analysis was used to identify the determinants of knowledge, attitude, level of utilisation and factors influencing utilization. The level of significance was set at $P<0.05$ and the result was presented in charts, tables and prose.

3.8.7 Scoring

Knowledge of EHR Systems

Knowledge was assessed using 10 questions. A correct response was assigned a score of 1 and an incorrect response was assigned a score of 0. Cumulative scores were obtained from addition of answers. The maximum score was 10 while the minimum score was 0. The scores were converted to percentages and classified as:

Poor knowledge: 0 – 69%

Good knowledge: ≥70%

Attitudes toward use of EHR Systems

For section c, the Likert Scale ranged from Strongly Agree, Agree, Neutral, Disagree and Strongly Disagree. Strongly Agree and Agree were merged and Strongly Disagree and Disagree were also merged. The responses were then analyzed based on appropriateness and a score of 1 was given to an appropriate response while inappropriate responses were assigned a score of 0. Ten (10) questions were you used to assess attitude. The average was taken and converted to a percentage.

In application:

0-69%: Negative Attitude

70-100%: Positive Attitude

Uptake and Level of Utilisation of EHR systems

For section d, the modified Likert Scale was used and it ranged from Never, Rare, Sometimes, Often and Always with respect to the level of utilisation. Level of utilisation was assessed using utilisation in seven (7) clinical and administrative functions in the health facility. The Likert scale was further categorized into Often Use and Rarely Use. A score of 1 was assigned to Often Use and 0 to rarely use. Average scores were calculated and converted to percentages.

In application:

0-69%: Low utilisation

70-100%: Highutilisation

3.9 DATA PRESENTATION

Results are presented in prose, frequency tables and charts.

3.10 ETHICAL APPROVAL

Institutional permission and ethical clearance was obtained from the Health Research Ethics Committee of the University of Benin Teaching Hospital (UBTH) **Ethical Clearance Number: ADM/E 22/A/VOL. VII/1486549127272**. Informed consent was also obtained from the health facilities and respondents before administering the questionnaires. The respondents were informed that they have the right to withdraw from the study at any time, and that doing so poses no loss or harm.

3.11 LIMITATION OF STUDY

This study involved a sample of health workers in a few selected health facilities in Benin city rather than the entire population of health workers in Benin city, so generalization to the general population will be made with caution. Given that the survey was completed independently by participants, response bias was not entirely eliminated, as socially desirable answers may have been provided. Being a cross-sectional study, it provides insights only at a specific point in time. Further longitudinal studies are recommended to gain a more comprehensive understanding of the situation in addition to qualitative study assessment.

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CHAPTER FOUR

RESULTS

A total of four (4) Hospitals in Benin City were visited to carry out this study, two of which are owned by the government (public) and the other two are owned by private bodies. A total of 478 Healthcare workers (Doctors, Nurses, Pharmacists, Laboratory Scientists, and Health Information Managers) participated in this study. The results are presented in sections below in line with research specific objectives:

Section A: Socio-demographic data.

Section B: Knowledge of Electronic Health Record (EHR) systems.

Section C: Attitudes toward use of EHR systems.

Section D: Level of utilization of EHR systems.

Section E: Factors influencing use of EHRs in patients' care.

Section A

Socio-demographic characteristics of healthcare workers

Table 1: Socio-demographic characteristics of healthcare workers.

Variables	Frequency (n = 478)	Percent (%)
Age (Years)		
20 – 39	415	86.8
40 – 59	61	12.8
≥ 60	2	0.4
Mean ± SD = 31.22 ± 8.32		
Sex		
Male	175	36.6
Female	303	63.4
Marital Status		
Single	254	53.0
Married	204	43.0
Cohabiting	7	1.4
Divorced	5	1.0
Separated	4	0.8
Widowed	4	0.8
Profession		
Nurse	226	47.3
Doctor	99	20.7
Laboratory Scientist	66	13.8
Health Information Manager	53	11.1
Pharmacist	34	7.1
Highest educational qualification		
BNSc	98	20.5
MBBS	77	16.1
BMLS	55	11.5
BSc	51	10.7
RM	42	8.8
RN	41	8.6
HND	35	7.3
PharmD	24	5.0
MSc	15	3.1
RM, RN	6	1.3
MWACP	5	1.0
RHIM	5	1.0
Bpharm	4	0.8
Diploma	4	0.8
FWACP	4	0.8
OND	3	0.6
PhD	3	0.6
MPH	2	0.4
MPSN, FPSN	2	0.4
AMLS, FMLS	1	0.2
NCE	1	0.2
Ethnic group (478)		
Benin	142	29.7
Igbo	82	17.2
Esan	79	16.5
Afemai	73	15.3
Urhobo	37	7.7
Yoruba	30	6.3
Efik	16	3.3
Tiv	7	1.5
Igbanke	6	1.3
Hausa	5	1.0
Yakkur	1	0.2
Religion (477)		
Christianity	456	95.6
Islam	19	4.0
ATR**	2	0.4
Years of Professional Experience (478)		
<6 years	312	65.3
≥ 6 years	166	34.7
Mean ± SD = 6.06 ± 6.00		
Number of Years in Facility		
<4 years	328	68.6
≥ 4 years	150	31.4
Mean ± SD = 3.87 ± 4.53		

ATR**: African Traditional Religion.

AMLS/FMLS: Associate/Fellow of Medical Laboratory Science, **BMLS:** Bachelor of Medical Laboratory Science, **BNSc:** Bachelor of Nursing Science, **Bpharm:** Bachelor of Pharmacy, **BSc:** Bachelor of Science, **FWACP:** Fellow of the West African College of Physicians, **HND:** Higher National Diploma, **MBBS:** Bachelor of Medicine, Bachelor of Surgery, **MPH:** Master of Public Health, **MPSN/FPSN:** Member/Fellow of the Pharmaceutical Society of Nigeria, **MSc:** Master of Science, **MWACP:** Member of the West African College of Physicians, **NCE:** National Certificate in Education, **OND:** Ordinary National Diploma, **PharmD:** Doctor of Pharmacy, **PhD:** Doctor of Philosophy, **RCHIM:** Registered College Health Information Manager, **RHIM:** Registered Health Information Manager, **RM:** Registered Midwife, **RN:** Registered Nurse.

Age was categorized into three groups to reflect the distribution of respondents across different career stages: 20–39 years (415; 86.8%), 40–59 years (61; 12.8%), and ≥60 years (2; 0.4%). The mean age of respondents was 31.22 ± 8.32 years, indicating a predominantly young workforce. Sex distribution showed a higher proportion of females (303; 63.4%) compared to males (175; 36.6%), based on self-reported gender. Marital status was categorized into single (254; 53.0%), married (204; 43.0%), cohabiting (7; 1.4%), divorced (5; 1.0%), separated (4; 0.8%), and widowed (4; 0.8%), reflecting varying family and social structures among respondents. Profession refers to the primary healthcare role of respondents, with nurses constituting the largest group (226; 47.3%), followed by doctors (99; 20.7%), laboratory scientists (66; 13.8%), health information managers (53; 11.1%), and pharmacists (34; 7.1%).

Highest educational qualification represents the highest academic or professional certification attained. The most common qualifications included Bachelor of Nursing Science (98; 20.5%) and MBBS (77; 16.1%), followed by BMLS (55; 11.5%), BSc (51; 10.7%), RM (42; 8.8%), RN (41; 8.6%), HND (35; 7.3%), and PharmD (24; 5.0%). Other qualifications such as MSc (15;

3.1%), MWACP (5; 1.0%), RHIM (5; 1.0%), FWACP (4; 0.8%), PhD (3; 0.6%), MPH (2; 0.4%), and others were less frequently reported. Ethnic group was self-reported, with the largest proportion being Benin (142; 29.7%), followed by Igbo (82; 17.2%), Esan (79; 16.5%), Afemai (73; 15.3%), Urhobo (37; 7.7%), Yoruba (30; 6.3%), and smaller proportions from other ethnic groups.

Religion was categorized into Christianity (456; 95.6%), Islam (19; 4.0%), and African Traditional Religion (2; 0.4%), indicating a predominantly Christian study population. Years of professional experience was grouped into 0–5 years (312; 65.3%), 6–10 years (83; 17.4%), 11–15 years (39; 8.1%), 16–20 years (28; 5.8%), 21–25 years (10; 2.1%), and 26–30 years (6; 1.3%), showing that most respondents were early in their careers. Number of years in facility refers to duration of employment in the current workplace and was categorized into 0–5 years (377; 78.9%), 6–10 years (68; 14.3%), 11–15 years (6; 1.2%), 16–20 years (24; 5.0%), and 21–25 years (3; 0.6%), indicating relatively short tenure for most respondents. All percentages were calculated based on the total number of respondents (n = 478), except where otherwise specified.

Section B

Knowledge of EHR systems among healthcare workers

Table 2 :Knowledge of EHR systems among healthcare workers

Variables	Frequency (478)	Percent (%)
Awareness (n = 478)		
Yes	446	93.3
No	32	6.7
Sources of Information (n=446)*		
Hospital Training/Seminar	361	80.9
Colleagues	146	32.7
Social Media	86	19.3
Television	41	9.2
Journals	25	5.6
Undergraduate Training	18	4.0

**Multiple Response Question*

Awareness of EHR systems was assessed as a binary variable and showed that the majority of respondents were aware (446; 93.3%), while a small proportion were not aware (32; 6.7%). Sources of information on EHR systems were assessed as a multiple-response variable among respondents who were aware (n = 446). The most common source was hospital training/seminars (361; 80.9%), followed by colleagues (146; 32.7%), social media (86; 19.3%), television (41; 9.2%), journals (25; 5.6%), and undergraduate training (18; 4.0%). Percentages exceed 100% due to multiple responses. All percentages were calculated based on the number of respondents in each category (n = 478 for awareness; n = 446 for sources of information).

Table 3: Knowledge response on EHR systems

Variables	Frequency (446)	Percent (%)
Conceptual Definition of HER		
Paper files stored in shelves	16	3.6
Electronic storage of patient health information	425	95.3
Verbal documentation of patient care	1	0.2
Manual record keeping only	4	0.9
Identification of EHR Examples		
Open Medical Record System	8	1.8
District Health Information Software, Version 2	18	4.0
Hospital Information System	22	4.9
Appointment Card	368	82.5
Knowledge of Major Advantages		
Increase paperwork	1	0.2
Reduce accessibility of patient data	21	4.7
Improve accuracy and legibility of information	414	92.8
Increase risk of data loss	10	2.2
Knowledge of Care Continuity Improvements		
Limiting access to patient information	17	3.8
Allowing healthcare providers access across departments	416	93.3
Increasing duplication of tests	8	1.8
Replacing healthcare workers	5	1.1
Identification of Operational Requirements		
Typewriter	10	2.2
Computers and internet access	424	95.1
Paper files	6	1.3
Filing cabinets	6	1.3
Knowledge of Medical Error Reduction		
Increasing patient waiting time	4	0.9
Eliminating documentation	8	1.8
Improving clarity of clinical documentation	428	96.0
Limiting clinical decision-making	4	0.9
Understanding of Data Privacy		
Patient data can be accessed by anyone	7	1.6
Patient information is protected from unauthorized access	434	97.3
Data can be shared freely without consent	4	0.9
Patient records do not need security	1	0.2
Identification of Potential Challenges		
Improved data storage	5	1.1
Easy retrieval of information	18	4.0
Risk of data breach if poorly secured	414	92.8
Faster communication	5	1.1
Knowledge of Clinical Decision Support		
Eliminating clinical judgment	13	2.2
Providing up-to-date patient information	398	89.2
Increasing diagnostic errors	20	3.0
Replacing patient history taking	25	5.6
Importance in Public Health		
Prevent disease reporting	8	1.8
Delay data sharing	15	3.4
Support disease surveillance and health planning	404	90.6
Replace public health professionals	19	4.2

α=0.937

Conceptual definition of EHR systems assessed respondents' understanding of the meaning of EHR. The majority correctly identified it as electronic storage of patient health information (425;

95.3%), while incorrect responses included paper files stored in shelves (16; 3.6%), manual record keeping (4; 0.9%), and verbal documentation (1; 0.2%). Identification of EHR examples evaluated respondents' ability to recognize EHR platforms. Most respondents selected appointment card (368; 82.5%), while fewer identified hospital information systems (22; 4.9%), DHIS2 (18; 4.0%), and Open Medical Record System (8; 1.8%). Knowledge of major advantages showed that most respondents correctly identified improved accuracy and legibility (414; 92.8%), while incorrect responses included reduced accessibility (21; 4.7%), increased risk of data loss (10; 2.2%), and increased paperwork (1; 0.2%).

Knowledge of care continuity improvements revealed that most respondents correctly identified improved interdepartmental access (416; 93.3%), while incorrect responses included limiting access (17; 3.8%), duplication of tests (8; 1.8%), and replacing healthcare workers (5; 1.1%). Identification of operational requirements showed that most respondents correctly identified computers and internet access (424; 95.1%), while incorrect options included typewriters (10; 2.2%), paper files (6; 1.3%), and filing cabinets (6; 1.3%). Knowledge of medical error reduction indicated that most respondents correctly selected improved clarity of documentation (428; 96.0%), while incorrect responses included eliminating documentation (8; 1.8%), increasing waiting time (4; 0.9%), and limiting clinical decision-making (4; 0.9%).

Understanding of data privacy showed that the majority correctly identified protection from unauthorized access (434; 97.3%), while incorrect responses included open access (7; 1.6%), free sharing (4; 0.9%), and lack of need for security (1; 0.2%). Identification of potential challenges revealed that most respondents correctly identified risk of data breach (414; 92.8%), while incorrect responses included improved storage (5; 1.1%), faster communication (5; 1.1%), and

easy retrieval (18; 4.0%). Knowledge of clinical decision support showed that most respondents correctly identified provision of up-to-date patient information (398; 89.2%), while incorrect responses included eliminating judgment (13; 2.2%), increasing diagnostic errors (20; 3.0%), and replacing history taking (25; 5.6%).

Importance in public health indicated that most respondents correctly identified support for disease surveillance and planning (404; 90.6%), while incorrect responses included preventing reporting (8; 1.8%), delaying sharing (15; 3.4%), and replacing professionals (19; 4.2%). All percentages were calculated based on respondents aware of EHR systems (n = 446).

Table 4: Correctness of knowledge responses on EHR systems

Variables	Knowledge Responses (n = 446)	
	Correct (%)	Incorrect (%)
Conceptual Definition of HER	425 (95.3)	21 (4.7)
Identification of EHR Examples	368 (82.5)	78 (17.5)
Knowledge of Major Advantages	414 (92.8)	32 (7.2)
Knowledge of Care Continuity Improvements	416 (93.3)	30 (6.7)
Identification of Operational Requirements	424 (95.1)	22 (4.9)
Knowledge of Medical Error Reduction	428 (96.0)	18 (4.0)
Understanding of Data Privacy	434 (97.3)	12 (2.7)
Identification of Potential Challenges	414 (92.8)	32 (7.2)
Knowledge of Clinical Decision Support	398 (89.2)	48 (10.8)
Importance in Public Health	404 (90.6)	42 (9.4)

α=0.937

This table presents the distribution of correct and incorrect responses to specific knowledge questions on EHR systems among respondents (n = 446). The majority of respondents provided correct answers across all domains assessed. The highest proportion of correct responses was observed for understanding of data privacy, 434 (97.3%), followed by knowledge of medical error reduction, 428 (96.0%), and conceptual definition of EHR systems, 425 (95.3%). Other areas with high correct responses included identification of operational requirements (95.1%) and care continuity improvements (93.3%).The lowest proportion of correct responses wasobserved in the identification of EHR examples, 368 (82.5%), although this still represents a substantial majority. Incorrect responses were generally low across all variables.

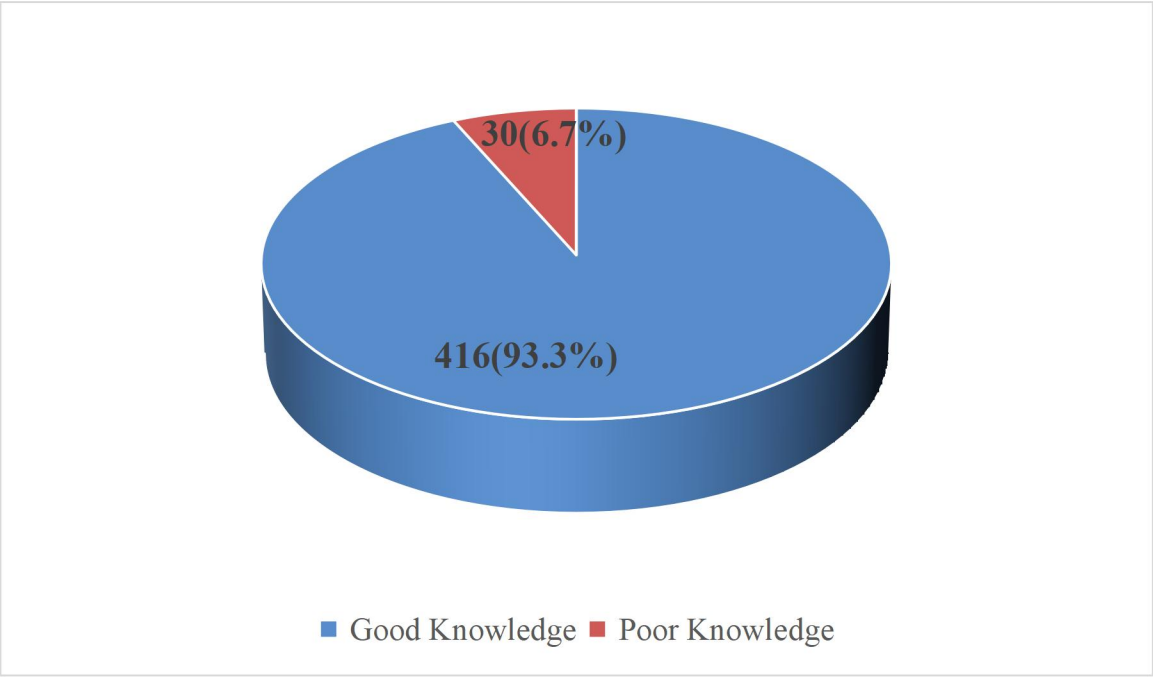

Figure 1: Level of knowledge EHR systems among healthcare workers

A great proportion, 416(93.3%) of the respondents had a good knowledge about Electronic Health Record system, while, 30 (6.7%), had poor knowledge.

Table 5: Factors associated with knowledge of EHR systems

Variables	Knowledge of EHR		Test statistic	p-value
	Good Freq (%) n = 446	Poor Freq (%) n = 30		
Age (Years)				
20 - 39	365 (95.1)	19 (4.9)	14.964	**<0.001**
40 - 59	49 (81.7)	11 (18.3)		
≥60	2 (100.0)	0 (0.0)		
Sex				
Male	157 (96.9)	5 (3.1)	5.373	**0.020**
Female	259 (91.2)	25 (8.8)		
Marital Status				
Ever Married	184 (91.1)	18 (8.9)	2.808	0.094
Never Married	232 (95.1)	12 (4.9)		
Profession				
Nurse	200 (93.9)	13 (6.1)	2.775*	0.591
Doctor	93 (94.9)	5 (5.1)		
Laboratory Scientist	55 (91.7)	5 (8.3)		
Health Information Manager	37 (88.1)	5 (11.9)		
Pharmacist	31 (93.9)	2 (6.7)		
Ethnic group				
Edo Indigenes	251 (91.9)	22 (8.1)	1.991	0.158
Non Edo Indigenes	165 (95.4)	8 (4.6)		
Religion				
Christian	392 (92.9)	30 (7.1)	1.829	0.176
Non Christian	24 (100)	0 (0.0)		
Years of Professional Experience				
<6 years	15 (5.3)	269 (94.7)	2.601	0.107
≥ 6 years	15 (9.3)	147 (90.7)		
Facility Type				
Public Hospital	304 (93.8)	20 (6.2)	0.578	0.447
Private Hospital	112 (91.8)	10 (8.2)		
Number of Years in Facility				
<4 years	13 (4.3)	287 (95.7)	8.365	**0.004**
≥ 4 years	17 (11.6)	129 (88.4)		

**Fishers exact test*

Age showed a significant association with knowledge ($p < 0.001$), with higher good knowledgeamong respondents aged 20–39 years (365; 95.1%) compared to 40–59 years (49; 81.7%). Sex was significantly associated with knowledge ($p = 0.020$), with males (157; 96.9%) having higher good knowledge than females (259; 91.2%). Marital status was not significantly associated ($p = 0.094$), though good knowledge was slightly higher among never married

respondents (232; 95.1%) compared to ever married (184; 91.1%). Profession showed no significant association (p = 0.591), although good knowledge was highest among doctors (93; 94.9%) and nurses (200; 93.9%). Ethnicity (p = 0.158) and religion (p = 0.176) were not significantly associated with knowledge. Years of professional experience showed a significant association (p = 0.017), with lower knowledge observed among those with 21–25 years (6; 60.0%). Facility type (p = 0.447) and years in facility (p = 0.065) were not significantly associated. Chi-square test was used, with Fisher's exact test applied where appropriate.

Table 6: Predictors of good knowledge of EHR among respondents

Predictors	β	Odds Ratio	95% CI for OR		p-value
			Lower	Upper	
Age (Years)	-0.036	0.965	0.902	1.032	0.302
Sex					
Male*		1			
Female	-1.402	0.246	0.078	0.778	**0.017**
Religion					
Christian*		1			
Non Christian	-18.728	0.000	0.000	0.000	0.998
Ethnicity					
Edo Indigene*		1			
Non Edo Indigene	-0.557	0.573	0.229	1.437	0.235
Marital Status					
Ever Married		1			
Never Married	-0.387	0.679	0.254	1.816	0.441
Profession					
Doctor*		1			
Health Information Manager	-0.981	0.375	0.055	2.576	0.319
Laboratory Scientist	-0.768	0.464	0.071	3.047	0.424
Nurse	-1.024	0.359	0.053	2.445	0.296
Pharmacist	0.757	2.132	0.382	11.906	0.388
Years in Facility					
<4 years		1			
≥ 4 years	1.068	2.909	1.372	6.168	**0.005**
Years of Professional Experience					
<6 years		1			
≥ 6 years	-0.746	0.474	0.134	1.679	**0.247**
Facility Type					
Public Hospital		1			
Private Hospital	1.119	3.062	1.084	8.648	**0.035**

*R^2 =6.0-16.6%, CI= Confidence Interval, OR= Odds ratio, *- reference category*

Logistic regression analysis identified predictors of good knowledge of EHR systems. Sex was a significant predictor, with males having higher odds of good knowledge compared to females (OR = 0.246; p = 0.017). Facility type was also significant, with respondents in private hospitals having higher odds of good knowledge (OR = 3.062; p = 0.035). Other variables including age (p

= 0.302), religion (p = 0.998), ethnicity (p = 0.235), marital status (p = 0.441), profession, years in facility (p = 0.182), and professional experience (p = 0.563) were not statistically significant predictors.

Section C

Attitudes toward use of EHR systems among healthcare workers.

Table 7:Attitudinal responses of healthcare workers towards the use of EHR systems.

Variables	Attitudinal Responses				
	SA (n=478) Freq (%)	A (n=478) Freq (%)	N (n=478) Freq (%)	D (n=478) Freq (%)	SD(n=478) Freq (%)
EHR improves patient management	243 (50.8)	226 (47.3)	9 (1.9)	0 (0.0)	0 (0.0)
EHR improves speed of care	188 (39.3)	258 (54.0)	27 (5.6)	4 (0.8)	1 (0.2)
Preference for EHR over paper records	87 (18.2)	137 (28.7)	240 (50.2)	13 (2.7)	1 (0.2)
Support for EHR implementation in Nigeria	174 (36.4)	277 (57.9)	25 (5.2)	2 (0.4)	0 (0.0)
Mandatory EHR training	161 (33.7)	210 (43.9)	103 (21.5)	0 (0.0)	4 (0.8)
Indifference to EHR use	18 (3.8)	76 (15.9)	86 (18.0)	220 (46.0)	78 (16.3)
Resistance to EHR implementation	20 (4.2)	13 (2.7)	27 (5.6)	273 (57.1)	145 (30.3)
EHR perceived as detrimental	10 (2.1)	36 (7.5)	124 (25.9)	192 (40.2)	116 (24.3)
Preference for digital records	143 (29.9)	220 (46.0)	51 (10.7)	48 (10.0)	16 (3.3)
Willingness for further EHR training	242 (50.6)	196 (41.0)	36 (7.5)	0 (0.0)	4 (0.8)

α = 0.884

***EHR = Electronic Health Record, SA=Strongly Agree, A = Agree, N = Neutral, D = Disagree, SD = Strongly Disagree**

This table shows respondents' attitudes toward the use of EHR systems using a Likert scale. A large proportion of respondents either strongly agreed or agreed that EHR improves patient management (98.1%) and speed of care delivery. Similarly, most respondents supported the implementation of EHR systems in Nigeria and indicated willingness to undergo further training. However, preference for EHR over paper records was less pronounced, with a substantial proportion of respondents remaining neutral (50.2%).Some respondents expressed indifference toward EHR use or perceived EHR systems as potentially detrimental, although these proportions were relatively small compared to those with positive attitude.

Table 8: Appropriateness of attitudinal responses of healthcare workers towards the use of EHR systems.

Variables	Attitudinal Responses	
	Appropriate	**Inappropriate**
	Freq (%)	**Freq (%)**
EHR improves patient management	469 (98.1)	9 (1.9)
EHR improves speed of care	446 (93.3)	32 (6.7)
Preference for EHR over paper records	224 (46.9)	254 (53.1)
Support for EHR implementation	451 (94.4)	27 (5.6)
Mandatory EHR training	371 (77.6)	107 (22.4)
Indifference to EHR use	298 (62.3)	180 (37.7)
Resistance to EHR implementation	418 (87.4)	60 (12.6)
EHR perceived as detrimental	308 (64.4)	170 (35.6)
Preference for digital records	363 (75.9)	115 (24.1)
Willingness for further EHR training	438 (91.6)	40 (8.4)

$\alpha = 0.884$

Attitude responses were dichotomized into appropriate and inappropriate categories. High appropriateness was observed for patient management (469; 98.1%), speed of care (446; 93.3%), and support for implementation (451; 94.4%). Lower appropriateness was observed in preference for EHR over paper records (224; 46.9%). Other domains such as training (371; 77.6%), digital preference (363; 75.9%), and willingness for training (438; 91.6%) showed generally positive attitudes.

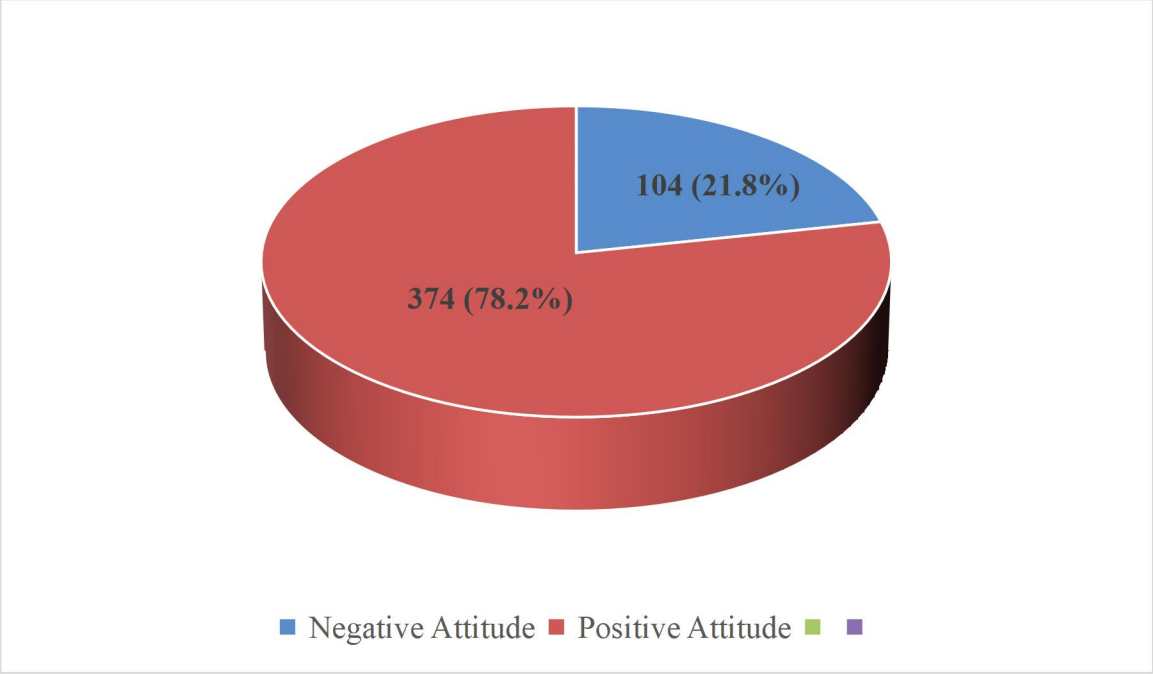

Figure 2: Attitude towards use of EHR systems among healthcare workers

About four fifth, 374 (78.2%) of the respondents had a positive attitude towards Electronic Health Record system, while about one fifth, 104 (21.8%), had a negative attitude.

Table 9: Factors associated with positive attitude towards use of EHR systems

Variables	Attitude		Test statistic	p-value
	Positive Freq (%) n = 374	Negative Freq (%) n = 104		
Age (Years)				
20 - 39	325 (78.3)	90 (21.7)	7.349	**0.025**
40 - 59	49 (80.3)	12 (19.7)		
≥60	0 (0.0)	2 (100)		
Sex				
Male	137(78.3)	38(21.7)	2.289	0.130
Female	254(83.8)	49(16.2)		
Marital Status				
Ever Married	164 (75.6)	210 (80.5)	1.660	0.198
Never Married	53 (24.4)	51 (19.5)		
Profession				
Doctor	78 (78.8)	21 (21.2)	0.356	0.986
Health Information Manager	40 (75.5)	13 (24.5)		
Laboratory Scientist	51 (77.3)	15 (22.7)		
Nurse	178 (78.8)	48 (21.2)		
Pharmacist	27 (79.4)	7 (20.6)		
Ethnic group				
Edo Indigene	64 (21.5)	234 (78.5)	0.037	0.848
Non Edo Indigene	140 (77.8)	40 (22.2)		
Religion				
Christian	357 (78.6)	97 (21.4)	0.815	0.367
Non Christian	17 (70.8)	7 (29.2)		
Years of Professional Experience				
<6 years	245 (78.5)	67 (21.5)	6.466	**0.011**
≥6 years	146 (88.0)	20 (12.0)		
Facility Type				
Public Hospital	260 (78.1)	73 (21.9)	0.017	0.895
Private Hospital	114 (78.6)	31 (21.4)		
Number of Years in Facility				
<4 years	261 (79.6)	67 (20.4)	3.479	0.062
≥4 years	130 (86.7)	20 (13.3)		
Knowledge				
Good	323 (77.6)	93 (22.4)	0.675	0.411
Poor	51 (82.3)	11 (17.7)		

Age demonstrated a statistically significant association with attitude towards EHR use (χ^2 = 7.349; p = 0.025). Respondents aged 40–59 years had slightly higher positive attitude (49; 80.3%) compared to those aged 20–39 years (325; 78.3%), while respondents aged ≥60 years showed no positive attitude (0; 0.0%) and entirely negative attitude (2; 100.0%). This suggests a possible age-related variation, although the small sample size in the ≥60 category limits interpretation. Sex was not significantly associated with attitude (χ^2 = 2.289; p = 0.130), although females showed a higher proportion of positive attitude (254; 83.8%) compared to males (137; 78.3%), suggesting a non-significant trend toward more favorable attitudes among female respondents. Marital status was not significantly associated (χ^2 = 1.660; p = 0.198). However, ever married respondents demonstrated slightly higher positive attitude proportions compared to never married, indicating a weak, non-significant trend.

Profession showed no statistically significant association (χ^2 = 0.356; p = 0.986), with relatively similar proportions of positive attitude across all professional groups: doctors (78; 78.8%), nurses (178; 78.8%), laboratory scientists (51; 77.3%), health information managers (40; 75.5%), and pharmacists (27; 79.4%), indicating uniformity of attitude across professions. Ethnicity was not significantly associated (χ^2 = 0.037; p = 0.848). However, there appears to be a distribution imbalance suggesting possible data inconsistency, though overall no meaningful trend can be inferred. Religion was also not significantly associated (χ^2 = 0.815; p = 0.367), although Christians had slightly higher positive attitude (357; 78.6%) compared to non-Christians (17; 70.8%), suggesting a weak, non-significant trend.

Years of professional experience showed a statistically significant association (χ^2 = 6.341; p = 0.012). Respondents with ≤10 years of experience had higher positive attitude (302; 80.7%)

compared to those with >10 years (72; 69.2%), indicating that less experienced healthcare workers may be more receptive to EHR adoption. Facility type ($\chi^2 = 0.017$; $p = 0.895$), number of years in facility ($\chi^2 = 1.722$; $p = 0.189$), and knowledge level ($\chi^2 = 0.675$; $p = 0.411$) were not significantly associated with attitude. However, respondents with good knowledge (323; 77.6%) showed slightly lower positive attitude than those with poor knowledge (51; 82.3%), suggesting an unexpected inverse but non-significant trend.

Table 10: Predictors of positive attitude towards use of EHR systems

Predictors	β	Odds ratio	95% CI for OR		p-value
			Lower	Upper	
Age (Years)	0.70	1.072	1.013	1.135	**0.016**
Sex					
Female*		1			
Male	0.710	2.034	1.126	3.675	**0.019**
Marital Status					
Ever Married*		1			
Never Married	-0.756	0.469	0.247	0.893	**0.021**
Profession					
Doctor*		1			
Health Information Manager	1.451	4.269	1.451	12.558	**0.008**
Laboratory Scientist	-0.170	0.843	0.301	2.366	0.746
Nurse	1.140	3.126	1.038	9.412	**0.043**
Pharmacist	-1.541	0.214	0.073	0.629	**0.005**
Ethnic group					
Edo Indigene*		1			
Non Edo Indigene	0.194	1.214	0.701	2.102	0.489
Religion					
Christian*		1			
Non Christian	-0.943	0.390	0.085	1.782	0.224
Years of Professional Experience					
<6 years		1			
≥ 6 years	-0.691	0.501	0.292	0.859	0.501
Facility Type					
Public Hospital*		1			
Private Hospital	0.132	1.141	0.619	2.103	0.672
Number of Years in Facility					
<4 years		1			
≥ 4 years	0.101	1.106	0.464	2.641	**0.820**
Knowledge					
Good*		1			
Poor	-1.289	0.276	0.140	0.542	**<0.001**

*R^2 =10.7 – 17.4%, CI= Confidence Interval, OR= Odd ratio, *- reference category*

Multivariate logistic regression analysis identified several significant predictors of positive attitude toward EHR use. Age was a significant predictor (OR = 1.072; 95% CI: 1.013–1.135; p = 0.016), indicating that with each unit increase in age, the likelihood of having a positive attitude increases modestly, suggesting that older respondents may be slightly more inclined toward favorable attitudes. Sex was also significant, with males having higher odds of positive

attitude compared to females (OR = 2.034; 95% CI: 1.126–3.675; p = 0.019), indicating that male respondents were about twice as likely to have a positive attitude. Marital status was significant (OR = 0.469; 95% CI: 0.247–0.893; p = 0.021), with never married respondents being less likely to have a positive attitude compared to ever married respondents.

Profession showed mixed effects: health information managers (OR = 4.269; p = 0.008) and nurses (OR = 3.126; p = 0.043) were significantly more likely to have positive attitudes compared to doctors, while pharmacists were significantly less likely (OR = 0.214; p = 0.005). Laboratory scientists showed no significant difference (p = 0.746), although a slight reduction in odds was observed. Knowledge level was a strong predictor, with poor knowledge significantly reducing the likelihood of positive attitude (OR = 0.276; 95% CI: 0.140–0.542; p < 0.001), highlighting the critical role of knowledge in shaping attitudes. Other variables including ethnicity (p = 0.489), religion (p = 0.224), years of professional experience (p = 0.679), facility type (p = 0.672), and years in facility (p = 0.613) were not statistically significant predictors, although some showed weak directional trends.

Section D

Level of utilization of EHR systems

Table 11:Uptake of EHR system

Variables	Frequency (n = 478)	Percent (%)
Uptake of EHR		
Yes	405	84.7
No	73	15.3

Uptake of EHR systems was assessed as a binary variable indicating the availability and use of EHR systems within respondents' healthcare facilities. The majority of respondents reported uptake (405; 84.7%), while a smaller proportion reported no uptake (73; 15.3%), suggesting widespread adoption of EHR systems across the selected hospitals. This high level of uptake indicates that most healthcare workers operate in environments where EHR systems are available, providing a foundational basis for assessing utilization patterns and related factors.

Table 12 : Factors associated with uptake of EHR system among healthcare workers

Variables	Uptake		Test Statistic	p-value
	Yes (n=405) Freq (%)	No (n=73) Freq (%)		
Age (Years)				
20–39	351 (84.6)	64 (15.4)	2.091	0.352
40–59	53 (86.9)	8 (13.1)		
Above 60	1 (50.0)	1 (50.0)		
Sex				
Male	160 (91.4)	15 (8.6)	9.579	**0.002**
Female	245 (80.9)	58 (19.1)		
Marital Status				
Ever Married	192 (88.5)	25 (11.5)	4.322	**0.038**
Never Married	213 (81.6)	48 (18.4)		
Profession				
Doctors	94 (94.9)	5 (5.1)	24.516	<**0.001**
Health Information Manager	36 (67.9)	17 (32.1)		
Laboratory Scientist	60 (90.9)	6 (9.1)		
Nurse	184 (81.4)	42 (18.6)		
Pharmacist	31 (91.2)	3 (8.8)		
Ethnic Group				
Edo	247 (82.9)	51 (17.1)	2.075	0.150
Non-Edo	158 (87.8)	22 (12.2)		
Religion				
Christian	385 (84.8)	69 (15.2)	0.038	0.845
Non-Christian	20 (83.3)	4 (16.7)		
Years of Professional Experience				
<6 years	257 (82.4)	55 (17.6)	3.855	**0.050**
≥ 6 years	148 (89.2)	18 (10.8)		
Facility Type				
Public Hospital	306 (91.9)	27 (8.1)	43.539	**<0.001**
Private Hospital	99 (68.3)	46 (31.7)		
Number of Years in Facility				
<4 years	270 (82.3)	58 (17.7)	4.695	**0.030**
≥ 4 years	135 (90.0)	15 (10.0)		
Knowledge				
Good	374 (89.9)	42 (10.1)	66.399	**<0.001**
Poor	31 (50.0)	31 (50.0)		
Attitude				
Positive	338 (86.4)	53 (13.6)	4.894	**0.027**
Negative	67 (77.0)	20 (23.0)		

This shows the associations between socio-demographic variables and the uptake of Electronic Health Record (EHR) systems. Throughout this table, the asterisk (*) denotes the reference category used for comparison, and results were considered statistically significant where the p-

value was less than 0.05. Significant associations with EHR uptake were specifically identified for sex ($p = 0.002$), marital status ($p = 0.038$), professional role ($p < 0.001$), facility type ($p < 0.001$), knowledge level ($p < 0.001$), and attitude ($p = 0.027$).

Table 13 : Predictors of uptake of EHR system among healthcare workers

Predictors	β	Odds ratio	95% CI for OR		p-value
			Lower	Upper	
Age (Years)	0.008	1.001	0.962	1.056	0.748
Sex					
Female*		1			
Male	0.617	1.854	0.860	3.999	0.115
Marital Status					
Ever Married*		1			
Never Married	-1.065	0.345	0.171	0.345	**0.003**
Profession					
Doctor*		1			
Health Information Manager	-2.048	0.129	0.036	0.457	**0.001**
Laboratory Scientist	-0.879	0.415	0.104	1.657	0.213
Nurse	-1.001	0.368	0.116	1.161	0.088
Pharmacist	-0.289	0.749	0.148	3.798	0.727
Ethnic group					
Edo Indigene*		1			
Non Edo Indigene	0.122	1.130	0.715	0.587	2.176
Religion					
Christian*		1			
Non Christian	-0.674	0.510	0.149	1.748	0.284
Years of Professional Experience					
<6 years*		1			
≥ 6 years	-0.190	0.827	0..346	1.979	0.670
Facility Type					
Public Hospital*		1			
Private Hospital	-1.273	0.280	0.145	0.542	**<0.001**
Number of Years in Facility					
<4 years*		1			
≥4 years	-0.659	0.517	0.283	0.946	**0.032**
Knowledge					
Good*		1			
Poor	2.047	7.741	3.788	15.821	**<0.001**
Attitude					
Positive*		1			
Negative	-0.284	0.753	0.326	1.737	0.506

*R^2 = 20.0 - 34.8%, CI= Confidence Interval, OR= Odds ratio, *- reference category*

A multivariate logistic regression model was employed to identify independent predictors of EHR uptake. The Odds Ratio (OR) and the 95% Confidence Interval (CI) quantify the likelihood of uptake occurring in a specific group relative to the reference category (*). The analysis

determined that being never married ($p = 0.003$), working as a Health Information Manager ($p = 0.001$), being employed in a private hospital ($p < 0.001$), and having poor knowledge of EHR systems ($p < 0.001$) served as significant independent predictors within the study population.

Table 14:Utilization of EHR system

Variables	Often Use (n = 405) Freq (%)	Rarely use (n = 405) Freq (%)
Health System Utilization Of EHR		
Clinical Documentation	381(94.1)	24(5.9)
Patient Registration	378(93.3)	27(6.7)
Medical Prescribing	373(92.1)	32(7.9)
Data Retrieval/Reporting	370(91.4)	35(8.6)
Laboratory Result Access	367(90.6)	38(9.4)
Patient Care	363(89.6)	42(10.4)
Appointment Scheduling	357(88.1)	48(11.9)

α = 0.901

Utilization of EHR systems was assessed across multiple functional domains among respondents who reported EHR availability (n = 405). Frequency of use was categorized into “often use” and “rarely use.” High levels of utilization were observed across all domains, indicating extensive integration of EHR systems into routine clinical practice. The highest utilization was seen in clinical documentation (381; 94.1%), followed closely by patient registration (378; 93.3%) and medical prescribing (373; 92.1%), suggesting that core clinical and administrative functions are highly digitized. Similarly, high utilization was reported for data retrieval/reporting (370; 91.4%) and laboratory result access (367; 90.6%), reflecting the role of EHR systems in supporting clinical decision-making and continuity of care.

Patient care activities also showed substantial utilization (363; 89.6%), while appointment scheduling (357; 88.1%) had slightly lower, though still high, utilization levels, possibly

reflecting partial reliance on alternative systems or workflows. Across all domains, the proportion of respondents who reported rarely using EHR systems remained low, ranging from clinical documentation (24; 5.9%) to appointment scheduling (48; 11.9%), indicating minimal resistance or barriers to routine use. Although no inferential statistical tests were applied in this table, a consistent pattern of high utilization across functions suggests strong operational integration of EHR systems within facilities.

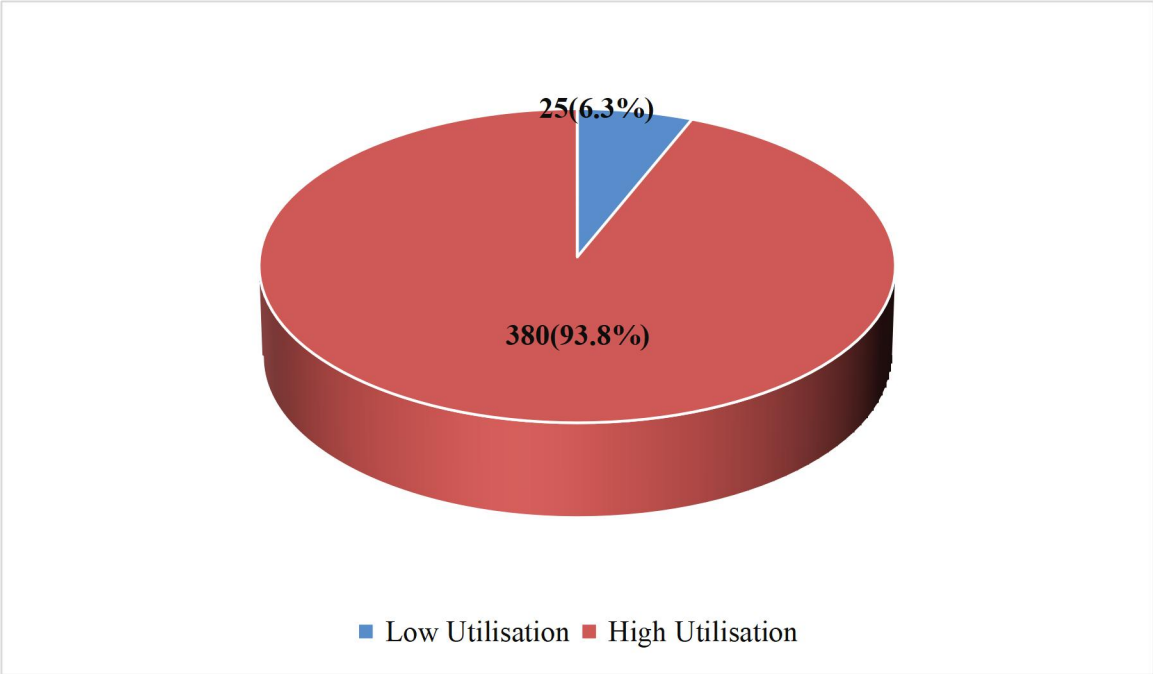

Figure 3: Level of utilisation of EHR systems across selected hospitals

A great proportion, 380 (93.8%) of the respondents had a High level of Utilisation of Electronic Health Record system, while, 25 (6.3%), Low level Utilization.

Table 15: Factors associated with level of utilisation of EHR system.

Variables	Level of Utilisation of EHR		Test statistic	p-value
	High (n = 380) Freq (%)	Low (n = 25) Freq (%)		
Age (Years)				
20 – 39	328 (79.0)	87 (21.0)	1.754	0.416
40 – 59	51 (83.6)	10 (16.4)		
≥60	1 (50.0)	1 (50.0)		
Sex				
Male	153(95.6)	7(4.4)	1.476	0.224
Female	227(92.7)	18(7.3)		
Marital Status				
Ever Married	184(95.8)	8(4.2)	2.537	0.111
Never Married	196(92.0)	17(8.0)		
Profession				
Doctor	83(88.3)	11(11.7)	10.939	**0.027**
Health Information Manager	34(94.4)	2(5.6)		
Laboratory Scientist	58(96.7)	2(3.3)		
Nurse	178(96.7)	6(3.3)		
Pharmacist	27(87.1)	4(12.9)		
Ethnic group				
Edo Indigene	233(94.3)	14(5.7)	0.279	0.598
Non Edo Indigene	147(93.0)	11(7.0)		
Religion				
Christian	362(94.0)	23(6.0)	0.532	0.466
Non Christian	18(90.0)	2(10.0)		
Years of Professional Experience				
<6 years*	241 (77.2)	71 (22.8)	2.801	0.094
≥ 6 years	139 (83.7)	27 (16.3)		
Facility Type				
Public Hospital*	283(92.5)	23(7.5)	3.901	**0.048**
Private Hospital	97(98.0)	2(2.0)		
Number of Years in Facility				
<4 years*	252 (76.8)	76 (23.2)	4.567	**0.033**
≥ 4 years	128 (85.3)	22 (14.7)		
Knowledge				
Good*	353(94.4)	21(5.6)	2.625	0.105
Poor	27(87.1)	4(12.9)		
Attitude				
Positive	294 (78.6)	80 (21.4)	0.832	0.362
Negative	86 (82.7)	18 (17.3)		

Profession showed a statistically significant association with level of utilization ($\chi^2 = 10.939$; $p = 0.027$). Nurses (178; 96.7%) and laboratory scientists (58; 96.7%) had higher proportions of high utilization compared to doctors (83; 88.3%) and pharmacists (27; 87.1%), suggesting that non-physician staff may rely more heavily on EHR systems. Facility type was also significant ($\chi^2 = 3.901$; $p = 0.048$), with higher utilization in private hospitals (97; 98.0%) compared to public hospitals (283; 92.5%), indicating potentially better infrastructure or enforcement in private settings. Age ($p = 0.416$), sex ($p = 0.224$), marital status ($p = 0.111$), ethnicity ($p = 0.598$), religion ($p = 0.466$), years of experience ($p = 0.760$), years in facility ($p = 0.561$), knowledge ($p = 0.105$), and attitude ($p = 0.362$) were not significantly associated. However, trends suggest slightly higher utilization among males (153; 95.6%) compared to females (227; 92.7%), and among those with good knowledge (353; 94.4%) compared to poor knowledge (27; 87.1%).

Table 16: Predictors of high level of utilisation of EHR system

Predictors	β	Odds ratio	95% CI for OR		p-value
			Lower	Upper	
Age (Years)	-0.064	0.938	0.848	1.037	0.211
Sex					
Female*		1			
Male	-1.152	0.316	0.112	0.890	**0.029**
Marital Status					
Ever Married*		1			
Never Married	1.168	3.217	0.887	11.670	0.076
Profession					
Doctor*		1			
Health Information Manager	-0.838	0.433	0.168	1.111	0.082
Laboratory Scientist	0.411	1.508	0.526	4.325	0.444
Nurse	0.149	1.161	0.522	2.581	0.714
Pharmacist	-0.165	0.848	0.279	2.576	0.771
Ethnic group					
Edo Indigene*		1			
Non Edo Indigene	-0.294	0.745	0.288	1.929	0.544
Religion					
Christian*		1			
Non Christian	0.802	2.229	0.382	13.024	0.373
Years of Professional Experience					
<6 years*		1			
≥ 6 years	0.003	1.003	0.470	2.139	0.995
Facility Type					
Public Hospital*		11			
Private Hospital	-1.876	0.153	0.032	0.739	**0.019**
Number of Years in Facility					
<4 years*		1			
≥4 years	-0.562	0.570	0.339	0.959	**0.034**
Knowledge					
Good*		1			
Poor	-1.495	0.224	0.058	0.860	**0.029**
Attitude					
Positive*		1			
Negative	1.641	5.158	0.623	42.743	0.128

*R^2 =16.9 - 26.5%, CI= Confidence Interval, OR= Odds ratio, *- reference category*

Sex was a significant predictor, with males less likely to have high utilization compared to females (OR = 0.316; 95% CI: 0.112–0.890; p = 0.029). Facility type was also significant, with private hospital workers less likely to have high utilization compared to public hospital workers

(OR = 0.153; 95% CI: 0.032–0.739; p = 0.019), suggesting contrasting effects compared to bivariate findings. Knowledge level was significant, with poor knowledge reducing the likelihood of high utilization (OR = 0.224; 95% CI: 0.058–0.860; p = 0.029). Other predictors including age (p = 0.211), marital status (p = 0.076), profession, ethnicity (p = 0.544), religion (p = 0.373), experience (p = 0.730), and attitude (p = 0.128) were not significant, though marital status showed a borderline trend toward significance.

Section E

Factors influencing use of EHR in patients' care

Table 17: Factors associated with high level of utilization of EHR systems

Variables	Frequency (n = 405)	Percent (%)
Availability of Computers and Tablets		
Yes	388	95.8
No	17	4.2
Adequacy of Training on Digital Systems		
Yes	221	54.6
No	184	45.4
Stability of Electricity Supply		
Yes	338	83.5
No	67	16.5
Reliability of Internet Connectivity		
Yes	262	64.7
No	143	35.3
Level of Management Support		
Yes	198	48.9
No	207	51.1
Availability of Hospital Policy		
Yes	173	42.7
No	232	57.3
Complexity of Digital Systems		
Yes	230	56.8
No	175	43.2
Concerns About Patient Data Privacy		
Yes	159	39.3
No	246	60.7
Cost of Implementation and Maintenance		
Yes	266	65.7
No	139	34.3
Workload and Time Constraints		
Yes	169	41.7
No	236	58.3

Availability of computers and tablets was reported by most respondents (388; 95.8%), indicating strong infrastructural readiness. Adequacy of training was moderate (221; 54.6%), suggesting gaps in capacity building. Electricity supply was relatively stable (338; 83.5%), while internet reliability was lower (262; 64.7%), highlighting infrastructural disparities. Management support (198; 48.9%) and hospital policy availability (173; 42.7%) were suboptimal, suggesting organizational limitations. Key perceived barriers included cost (266; 65.7%), system complexity (230; 56.8%), and workload constraints (169; 41.7%).

Table18: Factors influencing use of EHR Systems among Respondents.

Variables	Level of Utilisation of EHR		Test Statistic	p-Value
	High (n = 380) Frequency (%)	Low (n = 25) Frequency (%)		
Availability of Computers and Tablets				
No	17(100.0)	0(0.0)	1.167	0.280
Yes	363(93.6)	25(6.4)		
Adequacy of Training on Digital Systems				
No	181(98.4)	3(1.6)	12.013	**<0.001**
Yes	199(90.0)	22(10.0)		
Stability of Electricity Supply				
No	61(91.0)	6(9.0)	1.073	0.300
Yes	319(94.4)	19(5.6)		
Reliability of Internet Connectivity				
No	140(97.9)	3(2.1)	6.338	**0.012**
Yes	240(91.6)	22(8.4)		
Level of Management Support				
No	199(96.1)	8(3.9)	3.895	**0.048**
Yes	181(91.4)	17(8.6)		
Availability of Hospital Policy				
No	224(96.6)	8(3.4)	6.961	**0.008**
Yes	156(90.2)	17(9.8)		
Complexity of Digital Systems				
No	165(94.3)	10(5.7)	0.112	0.738
Yes	215(93.5)	15(6.5)		
Concerns About Patient Data Privacy				
No	233(94.7)	13(5.3)	0.854	0.356
Yes	147(92.5)	12(7.5)		
Cost of Implementation and Maintenance				
No	135(97.1)	4(2.9)	3.968	**0.046**
Yes	245(92.1)	21(7.9)		
Workload and Time Constraints				
No	225(95.3)	11(4.7)	2.232	0.135
Yes	155(91.7)	14(8.3)		

Adequacy of training showed a strong significant association ($\chi^2 = 12.013$; $p < 0.001$), with higher utilization among those without adequate training (181; 98.4%) compared to those with training (199; 90.0%), suggesting possible reverse causality or reporting bias. Internet connectivity was significant ($\chi^2 = 6.338$; $p = 0.012$), with higher utilization among those reporting poor connectivity (140; 97.9%), again suggesting contextual inconsistencies. Management support ($p = 0.048$), hospital policy ($p = 0.008$), and cost ($p = 0.046$) were also significant. Other variables including computers ($p = 0.280$), electricity ($p = 0.300$), system complexity ($p = 0.738$), data privacy ($p = 0.356$), and workload ($p = 0.135$) were not significant, though some showed directional tendencies.

Table19 : Factors predicting high utilization of EHR among respondents

Variables	β	Odds Ratio	95% CI for OR		p-value
			Lower	Upper	
Availability of Computers and Tablets					
No*		1			
Yes	0.379	1.462	0.309	6.913	0.632
Adequacy of Training on Digital Systems					
No*		1			
Yes	1.763	5.832	2.463	13.808	**<0.001**
Stability of Electricity Supply					
No*		1			
Yes	1.981	7.251	1.882	27.941	**0.004**
Reliability of Internet Connectivity					
No*		1			
Yes	0.902	2.466	0.988	6.153	0.053
Level of Management Support					
No*		1			
Yes	-0.160	0.852	0.216	3.359	0.819
Availability of Hospital Policy					
No*		1			
Yes	0.692	1.999	1.150	3.474	**0.014**
Complexity of Digital Systems					
No*		1			
Yes	0.824	2.280	0.761	6.829	0.141
Concerns About Patient Data Privacy					
No*		1			
Yes	0.297	1.345	0.492	3.682	0.564
Cost of Implementation and Maintenance					
No*		1			
Yes	-0.971	0.379	0.103	1.389	0.143
Workload and Time Constraints					
No*		1			
Yes	-0.481	0.618	0.246	1.551	0.305

*R^2 =14.7 - 23.0%, CI= Confidence Interval, OR= Odds ratio, *- reference category*

Adequacy of training was a strong predictor (OR = 5.832; 95% CI: 2.463–13.808; $p < 0.001$), indicating that respondents with training were significantly more likely to utilize EHR systems. Electricity supply was also significant (OR = 7.251; $p = 0.004$), highlighting infrastructure as a

key determinant. Availability of hospital policy was significant (OR = 1.999; p = 0.014), suggesting institutional frameworks enhance utilization. Other predictors including internet connectivity (p = 0.053) showed borderline significance, while computers (p = 0.632), management support (p = 0.819), system complexity (p = 0.141), data privacy (p = 0.564), cost (p = 0.143), and workload (p = 0.305) were not significant but demonstrated varying directional effects.

CHAPTER FIVE

DISCUSSION

This chapter discusses the findings presented in Chapter Four of this study, which assessed knowledge, attitude, uptake and level of utilization and factors influencing use of Electronic Health Record systems in patients' care within selected health facilities in Benin city, Edo State. The discussion follows the sequence of the study objectives and is situated within relevant local, regional, national and international literatures. This section speaks to the statistical results within the context of existing literature, highlighting where the data aligns with or diverges from previous research. It explores the methodological and environmental variables that might explain these variations and finishes with an overview of the study's core outcomes.

A total of 478 healthcare workers participated in this study, yielding a 100% response rate. The findings provide a comprehensive profile of the healthcare workforce in Benin City, revealing a demographic landscape that is heavily influenced by current national trends and the specific professional structures within the Nigerian health sector. The most striking observation is the youthful nature of the workforce, with the vast majority of participants nearly 87% falling within the 20 to 39-year age bracket. This concentration of young professionals is likely a direct consequence of the ongoing human resource crisis in Nigeria, often referred to as the "brain drain." As senior clinicians and experienced specialists increasingly seek opportunities abroad or transition into high-level administrative and academic roles, the day-to-day clinical operations are increasingly managed by early-career practitioners and recent graduates[23].

Regarding gender and professional roles, females constituted 63.4% of the respondents, and Nurses emerged as the largest professional group (47.3%). This finding reflects the broader

composition of the healthcare workforce, particularly the dominance of nursing professionals, which was also evident in this study where nurses constituted the largest professional group (47.3%). This is similar to a study which was carried out in Uyo where it was observed that nurses constituted the majority of the professional cadre, followed by doctors [24]. Globally, nursing remains a female-dominated profession, and this pattern is mirrored in many healthcare settings. The overrepresentation of females in this study is therefore not a bias but a reflection of workforce reality as seen in many countries under the World Health Organisation (WHO)[32]. Since nurses are the primary coordinators of patient care, their dominance in this study is a mechanical necessity, as they are the frontline users of any EHR system. This is supported by a study carried out in Uyo[24], were it was also found that nurses were the most critical cohort for the success of digital systems, and mirrors findings in Zaria [16], where female healthcare workers formed the core user base. This contrasts, however, with more specialized sectors like the dental providers studied by Sayed[12] in Saudi Arabia, where digital needs were more gender-balanced depending on the specific medical specialty.

The study further found that 53.0% of respondents were single, and marital status was identified as an independent predictor of EHR utilization. This high proportion of single respondents aligns with the youthful mean age of the respondents. This aligns with a study carried out in Northern Nigeria [23], where it was also identified that marital status is a statistically significant variable in Nigerian digital health adoption. Conversely, this finding contrasts with international literature [21], where marital status was rarely cited as a significant factor because digital competency is treated as a mandatory professional requirement regardless of personal status.

The professional diversity beyond nursing including Doctors (19.9%) and Health Information Managers (HIMs, 10.9%) is essential for "meaningful use." The inclusion of HIMs is particularly important; as specialists in data governance, their presence provides a technical "safety net" for clinical staff. The high participation of doctors suggests that EHRs are being used for active clinical decision-making, such as prescribing and lab reviews, rather than just administrative entry. This is consistent with a study which was carried out in Southwestern Nigeria [19], where it was argued that specialized data managers are a prerequisite for high-quality EHR evaluation. This contrasts with the situation at General Hospital, Ankpa, where a lack of professional diversity in the digital workflow meant that clinicians remained largely reliant on paper, leaving only administrative staff to utilize the system [14].

The findings of this study revealed that a significant majority of the respondents possessed a high level of knowledge regarding Electronic Health Records (EHR). Most healthcare workers were able to correctly identify the core functions of EHRs, including digital documentation, data storage, and the retrieval of patient information. This high level of awareness is consistent with a study conducted among healthcare professionals in tertiary hospitals across Nigeria, which reported that clinicians in these environments have attained a substantial conceptual understanding of health informatics due to the increasing national discourse on digital health [1].

However, a deeper analysis of the data suggests that while "general awareness" is high, "technical depth" varies significantly across professional cadres. For instance, Health Information Managers (HIMs) demonstrated a more comprehensive understanding of system interoperability and data confidentiality compared to other clinical staff. This disparity is supported by research conducted internationally among health information system users, which

suggests that technical knowledge is often "siloed" within specific departments that interact with the technology most frequently [2]. This implies that while doctors and nurses in Benin City understand the utility of an EHR, they may lack detailed knowledge of the backend processes that ensure data security.

Furthermore, the study observed that younger healthcare professionals displayed higher self-efficacy and more knowledge of EHR functionalities than their older counterparts. This finding mirrors results from a study among healthcare workers in low-resource settings in East Africa, which noted that prior exposure to personal computing and mobile technologies significantly lowers the "knowledge barrier" when a new clinical system is introduced[3]. In the context of the current study, this suggests that the level of knowledge is heavily influenced by informal digital literacy rather than structured institutional training alone.

Despite the high scores in the knowledge domain, there remains a disconnect between theoretical and procedural knowledge. While respondents understood the benefits of EHRs, many were less familiar with specific protocols for managing system downtimes. This gap indicates a trend similar to that found in a study of healthcare providers in South-south Nigeria, where it was observed that training programs often focus on the benefits of the technology rather than the operational technicalities required for a seamless transition from paper-based records [4].

The high level of awareness was further reinforced by the cumulative knowledge scores, where a vast majority of the participants demonstrated a robust understanding of the core functions of the technology. These findings suggest that the healthcare workforce in the study area has transitioned from basic awareness to functional literacy, a shift likely driven by the systematic digitization of hospital records in Edo State which has made digital competency a practical

necessity for daily clinical operations. This is consistent with findings in Northern Nigeria[16] where a similarly high awareness rate among healthcare workers was reported. It also aligns with research in Uyo[24], which noted that healthcare providers in tertiary settings are increasingly knowledgeable about how these systems mitigate medical errors and improve documentation. However, these results contrast with the situation in North-Central Nigeria, where it is noted that while awareness was present, the practical knowledge required to use the system effectively remained significantly lower than the levels observed in this study[22].

Regarding the primary sources of information, an overwhelming majority of healthcare workers identified hospital-based training and seminars as their main source of knowledge, while only a negligible fraction attributed their understanding to formal undergraduate education. This finding indicates a significant gap in the traditional medical and nursing school curricula in Nigeria, suggesting that while academic institutions provide the clinical foundation, the responsibility for digital health informatics training currently rests with the employing healthcare facilities through on-the-job professional development. This observation is supported by a study which in SoutwesternNigeria[19], where it was argued that in the Nigerian context, facility-led workshops and institutional peer-to-peer learning are the most effective drivers of digital competency. Conversely, this finding contrasts with the study carried out in Benin City, which proposed that the university setting should be the primary driver of information technology knowledge to ensure that new graduates possess immediate digital readiness upon entering the clinical workforce[26].

The analysis further revealed that several socio-demographic factors were significantly associated with the depth of knowledge, most notably age and sex. Younger respondents, specifically those in the early to mid-career stages, demonstrated higher knowledge levels than

their older counterparts. This higher proficiency among younger respondents likely stems from their easier tendency to use technological gadgets. Interestingly, this contrasts with the findings of in Ethiopia, where the specific professional degree held was the primary predictor of knowledge, whereas in this study, the professional cadre did not show a statistically significant association with knowledge levels[10]. Furthermore, the multivariate analysis identified the type of facility as a strong independent predictor, with those working in private hospitals having significantly higher odds of possessing good knowledge compared to those in public hospitals. The availability of a formal hospital policy was also a significant predictor of high knowledge scores.

The findings concerning the attitude towards EHR system indicated a predominantly positive disposition among healthcare workers, with nearly four-fifths of the respondents demonstrating a favorable attitude toward the transition to digital records. This professional outlook is rooted in the perceived utility of the system, with a vast majority of workers agreeing that digital platforms facilitate more efficient patient care and enhance the overall quality of clinical documentation. This positive trend is likely driven by the realization that EHRs reduce the clerical burden of searching for physical folders and minimize the risk of losing patient data. These results are highly consistent with the findings in Benin City, where a similar majority of health workers acknowledged that e-health interventions significantly improve patient management[9].

However, a notable point of contrast emerged regarding the preference for EHRs over traditional paper-based systems. While general attitudes were positive, nearly half of the respondents remained neutral when asked if they preferred digital systems to paper, suggesting a degree of "hybrid hesitancy." This points toward a lingering comfort with manual processes or concerns

regarding the increased cognitive load associated with data entry. This phenomenon aligns with the observations in a systematic review, where it was noted that even when professionals recognize the benefits of digital health, perceived technical complexity can act as a persistent attitudinal barrier[20]. Furthermore, the analysis confirmed that technical knowledge was a significant predictor of attitude; respondents with poor knowledge were far more likely to harbor negative perceptions. This relationship is supported by the Technology Acceptance Model (TAM), which posits that perceived ease of use is a direct precursor to a positive attitude.

Regarding the uptake and level of utilization of EHR, this study recorded a remarkably high uptake rate, with a vast majority of the sampled workforce actively using EHRs for clinical tasks. The depth of this utilization was evidenced by high rates of engagement with specific functional modules, such as accessing laboratory results and digital prescribing. This level of clinical integration suggests that the facilities have moved beyond basic administrative use and are achieving "meaningful use," where the technology directly informs medical decision-making. This trend is consistent with the findings in Germany.[1], where it was highlighted that the benefits of digitization are most tangible when systems are utilized for core clinical functions. It also mirrors the results found in Uyo[24], where high utilization was linked to the perception that the system reduces transcription errors and improves patient safety.

Despite this overall high utilization, the analysis revealed that certain professional roles specifically Health Information Managers demonstrated the highest frequency of use. Their professional mandate as custodians of data means they often serve as the technical bridge for other clinical cadres. This aligns with the findings in Southwestern Nigeria[19], where it was argued that the active involvement of data specialists is a prerequisite for high-level system

application. In contrast, the high utilization observed here differs from the situation at General Hospital, Ankpa[14], where utilization remained low because clinicians lacked functional terminals. This underscores that while individual readiness in Benin City is high, sustained use remains dependent on the continuous availability of hardware.

Concerning the additional factors that influence use, this analysis identified several critical institutional and technical factors that dictate the success of EHR adoption. The multivariate analysis highlighted that the stability of electricity supply and the availability of a formal hospital policy were the most significant predictors of use. In the Nigerian context, individual competence is often secondary to structural reliability. Without a consistent power supply, a digital system becomes a hindrance rather than an asset, forcing a return to manual records. This finding is strongly consistent with studies in Zaria[16] and in Uyo[24], both of which cited power instability as a primary barrier. However, this contrasts with literature from high-resource settings such as the United Kingdom or Germany, where infrastructure is taken for granted and the primary factors for use are related to data privacy and system interoperability[3, 31].

Furthermore, the existence of a formal hospital policy emerged as a vital institutional driver, ensuring that the transition to digital records is a mandatory professional requirement rather than a voluntary choice. This is also seen in a Nigerian study[8], where it was stated that policy frameworks are essential for bridging the gap between technological availability and actual clinical application. Interestingly, while management support and internet reliability were identified as concerns, they did not reach the same level of statistical significance as electricity and formal policy. This suggests that for healthcare workers in Benin City, the foundational requirements for use are primarily a reliable environment and a clear administrative mandate.

This contrasts with research carried out in Ethiopia [18], where user-friendly interface design was cited as a more significant barrier than institutional policy, highlighting the unique socio-technical landscape in Benin City.

CONCLUSION

The study demonstrates that there is a high level of theoretical knowledge regarding EHR systems among the healthcare workers. They are well-aware of the definitions, functions, and potential benefits of digital records. However, this knowledge is often influenced more by general digital literacy among younger "digital native" staff than by formal institutional induction. There remains a notable gap in "procedural knowledge," specifically regarding technical troubleshooting and protocols for system downtime.

The findings indicate a strongly positive attitude toward the adoption of EHRs. The majority of healthcare professionals perceive the technology as a vital tool for reducing medical errors and improving patient safety. Despite this, a degree of "technological skepticism" persists, leading to a cautious attitude where staff prefer maintaining paper-based backups as a safety net against perceived system unreliability.

The uptake and level of utilization is currentlyrelatively good. The system is highly utilized for administrative and financial tasks (such as patient registration and billing), its application in core clinical duties such as real-time bedside charting, prescription ordering, and inter-departmental data exchange is limited. The transition to a truly paperless clinical environment is yet to be completely realized.

The study identifies facilitating conditions as the primary predictor of utilization. Technical infrastructure, specifically the stability of the power supply and internet connectivity, outweighs individual willingness as a determinant of use. Furthermore, institutional support in the form of

continuous, cadre-specific training and the presence of 24/7 on-site technical assistance were identified as critical factors that encourage or inhibit the consistent use of the system.

RECOMMENDATIONS

To the Federal Government of Nigeria

1. Strengthen, and enforce standardized national policies and guidelines on EHR implementation and use.
2. Promote research, monitoring, and evaluation of digital health initiatives to guide policy and improvement.

To Healthcare Facilities

- Organize regular, structured, and hands-on training programs for all staff on EHR use.
- Implement continuous professional development programs focused on digital health competencies.
- Ensure strong managerial support and leadership commitment to EHR adoption and utilization.
- Provide and maintain adequate infrastructure, including functional computers, power backup systems, and stable internet connectivity.

To Healthcare Workers

- Engage in continuous learning and self-development in EHR use and digital health technologies.
- Actively participate in training and capacity-building programs organized by institutions.
- Maintain a positive and adaptable attitude toward EHR systems and digital innovations.
- Support colleagues through peer learning and knowledge sharing, especially for less tech-savvy staff.

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APPENDIX I

DEPARTMENT OF PUBLIC HEALTH AND COMMUNITY MEDICINE,

SCHOOL OF MEDICINE, UNIVERSITY OF BENIN

ASSESSMENT OF ELECTRONIC HEALTH RECORD SYSTEMS ACROSS

SELECTED HOSPITALS IN BENIN CITY, EDO STATE.

Dear respondent,

I am a final year medical student and I am carrying out a one year project which is designed to investigate healthcare providers' knowledge and attitude towards the utilisation of Electronic Health Records for record keeping, and to determine the factors that influence the use of Electronic Health Records in patients' care within selected health facilities.All responses will be treated with strict confidentiality and used solely for academic purposes.

Thank you for your cooperation.

SECTION A: SOCIO-DEMOGRAPHIC DATA

1. Sex: Male☐ Female☐
2. Age (in years): _____
3. Marital status: Single☐Married☐Divorced☐Widowed☐Cohabiting☐Separated☐
4. Profession: Doctor☐Nurse☐LaboratoryScientist☐Pharmacist☐Health Information Manager☐
5. Highest educational qualification:_____
6. Designation:MBBS☐ RN☐ RM☐BNSc☐ MLS☐ AMLS/FMLS☐RPh☐PharmD☐ MPSN/FPSN☐ HND☐ BSc☐ RHIM☐RCHIM☐Others_____
7. Years of professional experience:_____
8. Ethnicity: Benin☐Esan☐Etsako☐Ibo☐Yoruba☐Hausa☐Others(specify):_____
9. Religion: Christianity☐Islam☐African Traditional Religion☐ Others(specify):_____
10. Facility Type (Tick one): Public Hospital☐MissionHospital☐Private Hospital☐
11. Number of years in the facility:_____

SECTION B: KNOWLEDGE OF ELECTRONIC HEALTH RECORD SYSTEMS

Instruction: Tick the correct answer for each question.

12. Have you heard of Electronic Health Records (EHR) before? (a) Yes☐ (b) No☐

If No, skip to question 25

13. If Yes, what is your source of information? **(**Select all that apply**)**: Television☐Social media☐ Colleagues☐Journals☐Hospital training/seminars☐ Others (Specify) _____

Instruction: Pick a single response.

14. EHR refer to:Paper files stored in shelves☐Electronic storage of patient health information☐ Verbal documentation of patient care☐ Manual record keeping only☐
15. What are the types of EHR systems you know?

    _____
16. Which of the following is not an example of an EHR system? Open Medical Record System (OpenMRS)☐,District Health Information Software, Version 2(DHIS2)☐,Hospital Information System(HIS)☐, Appointment Card☐
17. One major advantage of EHR is that they: Increase paperwork☐ Reduce accessibility of patient data☐ Improve accuracy and legibility of information☐ Increase risk of data loss☐
18. Digitalisation of patient records can improve continuity of care by: Limiting access to patient information☐ Allowing healthcare providers to access patient data across departments☐ Increasing duplication of tests☐ Replacing healthcare workers☐
19. Which of the following is commonly required to operate EHR systems? Typewriter☐ Computers and internet access☐ Paper files☐ Filing cabinets☐
20. EHR help in reducing medical errors mainly by:Increasing patient waiting time☐ Eliminating documentation☐ Improving clarity of clinical documentation☐ Limiting clinical decision-making☐
21. Data privacy in EHR means:Patient data can be accessed by anyone☐ Patient information is protected from unauthorized access☐ Data can be shared freely without consent☐ Patient records do not need security☐
22. Which of the following is a potential challenge while using EHR?Improved data storage☐ Easy retrieval of information☐ Risk of data breach if poorly secured☐ Faster communication☐

23. EHR support clinical decision-making by:Eliminating clinical judgment☐ Providing up-to-date patient information☐ Increasing diagnostic errors☐ Replacing patient history taking☐

24. EHR systems are important in public health because they:Prevent disease reporting☐ Delay data sharing☐ Support disease surveillance and health planning☐ Replace public health professionals☐

SECTION C: ATTITUDE TOWARDS USE OF ELECTRONIC HEALTH RECORD SYSTEMS

Instruction:Please pick one answer per row, where SA = Strongly Agree, A = Agree, N= Neutral D = Disagree, SD = Strongly Disagree

	SA	**A**	**N**	**D**	**SD**
25.EHR will make patient management and follow up easier					
26.EHR when introduced aids faster patient care					
27. Healthcare workers prefer EHR than the paper based type					
28.EHR should be introduced into the healthcare system in Nigeria					
29.Training healthcare workers on EHR should be mandatory					
30.Healthcare workers should not be bothered about using EHR					
31. Healthcare workers should resist the introduction of EHR					
32.EHR is detrimental to healthcare in the long run					
33.I prefer digital records to paper-based records					
34. I am willing to receive further training on EHR systems					

SECTION D: LEVEL OF UTILISATION OF ELECTRONIC HEALTH RECORD SYSTEMS

35. Does your facility use Electronic Health Records (EHR)? Yes☐No☐

If No, skip to question 44

Instruction:Pleasetickone answer per row.

	Never	Rare	Sometimes	Often	Always
36. How often do you use digital records in patient care?					

Indicate how often you use digital systems for the following:	**Never**	**Rare**	**Sometimes**	**Often**	**Always**
37. Service Area					
38. Patient registration					
39. Clinical documentation					
40. Medical prescribing					
41. Laboratory result access					
42. Appointment scheduling					
43. Data retrieval/reporting					

SECTION E: FACTORS INFLUENCING USE OF ELECTRONIC HEALTH RECORDS IN PATIENTS' CARE

Instruction: Tick either Yes or No.

Factors	**Yes**	**No**
44. Lack of computers and tablets		
45. Lack of adequate training on digital systems		
46. Unstable electricity supply		
46. Unreliable internet connectivity		
47. Lack of management support		

48. Lack of hospital policy
49. Complexity of digital systems
50. Concerns about patient data privacy
51. High cost of implementation and maintenance
52. Increase workload and time constraints

Thank you for your time.

APPENDIX II
ETHICAL APPROVAL

CATHOLIC ARCHDIOCESE OF BENIN CITY

ST. PHILOMENA CATHOLIC HOSPITAL

23, Dawson Road, P. O. Box 2434, Benin City, Edo State, Nigeria.

Date: 19th March, 2026

Our Ref SRECC/19/2026/14

The Executive Secretary
Research Ethics/Collaboration Committee (RECC)
St. Philomena Catholic Hospital (SPECH)
23, Dawson Road
Benin City.

Callistus Eshiramhe (Mat No. MED1807401)
College of Medical Sciences,
University of Benin,
Benin City, Edo State.
Nigeria.

Re: RESEARCH ACCEPTANCE/ETHICAL CLEARANCE:

We acknowledge the receipt of your letter dated 17th March, 2026, on your request for approval to conduct an undergraduate research titled, 'Assessment of Electronic Health Record Systems Across Selected Hospitals in Benin City, Edo State'. The hospital Research Ethics/Collaboration Committee has considered your request and you are hereby allowed to carry on with research, as scheduled.

We are sincerely wishing you the best, as you carry out your research.

Yours faithfully

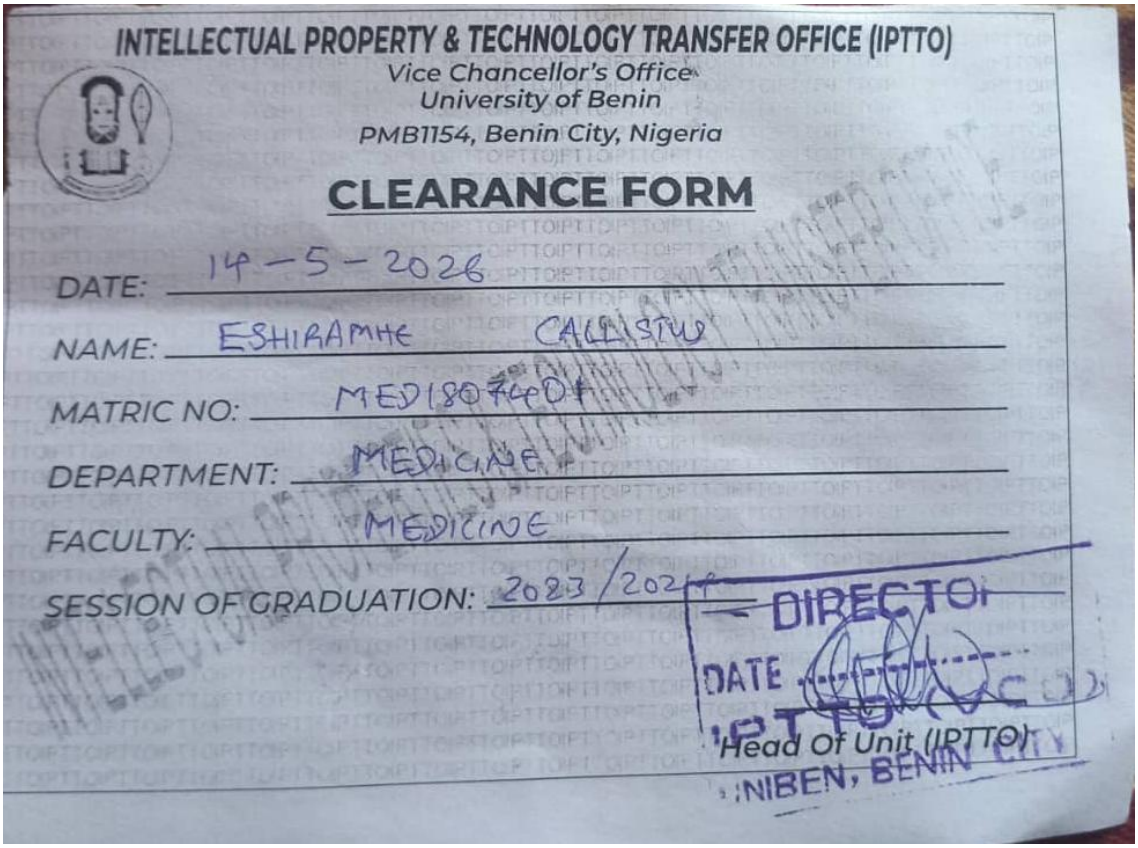
19/3/2026

Dr. Frederick Opia, OSEJI (PharmD; Ph.D.)
Executive Secretary: Research Ethics/Collaboration Committee,
(+2348074324809)

ST. PHILOMENA CATHOLIC HOSPITAL
BOX 2434, BENIN CITY
NIGERIA

APPENDIX III

PLAGIARISM TEST



INTELLECTUAL PROPERTY & TECHNOLOGY TRANSFER OFFICE (IPTTO)

Vice Chancellor's Office
University of Benin
PMB1154, Benin City, Nigeria

CLEARANCE FORM

DATE: 14-5-2026

NAME: ESHIRAMHE CALLISTUS

MATRIC NO: MED/18074/04

DEPARTMENT: MEDICINE

FACULTY: MEDICINE

SESSION OF GRADUATION: 2023/2024

DIRECTOR
DATE
IPTTO
Head Of Unit (IPTTO)
UNIBEN, BENIN CITY