



**AVAILABILITY OF THE TECHNOLOGICAL SUPPORT  
IN STORAGE OF PATIENT HEALTH INFORMATION  
AND ASSOCIATED CHALLENGES AMONG HEALTHCARE  
PROFESSIONALS IN UNIVERSITY OF CALABAR TEACHING  
HOSPITAL, CROSS RIVER STATE, NIGERIA**

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**Abstract:**

The purpose of this study was to explore the availability of technological support in the storage of patient health information and associated challenges among health information professionals in the University of Calabar Teaching Hospital, Cross River State, Nigeria. The study adopted a cross-sectional research design. Data were collected from 229 participants. A structured questionnaire entitled (PHISPAHIP) was the instrument used for data collection. Data were analyzed using frequencies, percentages, means, standard deviations, and chi-square tests. The results of the analysis showed that 61% of respondents primarily used paper-based methods, 57% reported moderate use of digital storage systems, and 63% agreed that compliance with confidentiality and data protection standards was partially observed. Major challenges included inadequate staffing (76%), heavy workload (72%), limited storage space (70%), and insufficient technical support (53%). While 59% of respondents agreed that available digital tools improved efficiency, gaps in staff competence and training hindered optimal utilization. The study concluded that the storage and management of patient health information in the University of Calabar Teaching Hospital are characterized by a continued reliance on

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paper-based methods, with partial adoption of electronic and hybrid systems. Recommendations include phased transition to electronic or hybrid systems, enhanced staff training, strengthened technical support, standardized security and backup protocols, and investment in modern health information infrastructure to improve efficiency, accessibility, and data integrity. The study contributes to knowledge by documenting storage practices, compliance gaps, and the influence of technology and staff competence on health information management in a Nigerian tertiary hospital context.

**Keywords:** technological support, available, patient health information, challenges for professionals, University of Calabar

## 1. Introduction

Over time, technology has transformed significantly in several sectors, including political, economic, socio-technical, and health sectors, influencing the quality of healthcare services (Epizitone *et al.*, 2023). The unification of health-related processes and information systems in the healthcare sector has been realized through Health Information Systems (HIS) (Epizitone *et al.*, 2023). This can be attributed to the advancement of technological deployment, global health priorities and universal health coverage (Evans, 2016; Epizitone *et al.*, 2023).

Health Information System (HIS) is viewed as a structured mechanism for the collection, storage, analysis, dissemination, and utilization of health-related data to support decision-making at all levels of the healthcare system (WHO, 2026). HIS is essential for monitoring and evaluating health sector progress, tracking disease trends, addressing health inequalities, and ensuring efficient resource allocation. It supports evidence-based decision-making, improves service delivery, and enhances overall health system performance (Alotaibi & Federico, 2017; WHO, 2026). Moreover, HIS is designed to assist organizations and all stakeholders within the healthcare arena eradicate disjointed information and modernize health processes by integrating different health functions and departments across the healthcare locations for better healthcare delivery (Epizitone *et al.*, 2022). Studies have observed that the use of modern technology is growing and has recorded a huge success in health care systems, including storing patient health information in centers on Electronic Health Records (EHRs), Picture Archiving and Communication Systems (PACS), and cloud-based or localized Health Information Systems (Evans, 2016; Nobana & Aleke, 2020). It is pivotal to note that despite the efficiency and effectiveness of HIS in boosting data accuracy, timely reporting and accessibility, the health professionals are faced with challenges such as poor IT infrastructure, high implementation costs, cybersecurity risks, and a lack of trained personnel.

In developing countries, including Nigeria, studies have reported that its implementation has achieved little success with low technological Support in the Storage of Patient Health Information, low utilization and associated Challenges (Bowman, 2013; Nobana & Aleke, 2020). Moreover, given the high burden of disease outbreak and the morbidity and mortality among health care professionals including the emerging trends in the nation's healthcare systems and the low number of skilled personnel, HIS is essential as it has been identified to improve health care by strengthening the health system, supporting delivery of care, and improving communication without necessarily face-to-face contact among health care professionals and their clients/patients (Bowman, 2013; Nobana & Aleke, 2020).

Health Information Professionals use these technology tools to support the storage of patient health information through Electronic Health Records (EHRs), digital libraries, and secure cloud networks to streamline data retrieval, enhance interdisciplinary collaboration, and improve care delivery. Nevertheless, Health Information Professionals face significant hurdles, including interoperability issues, high infrastructure costs, and data security risks (Angayarkanni *et al.*, 2023). While hospitals are adopting Electronic Health Records (EHRs), health information professionals often lack the technical training required to manage these systems, leading to compromised data integrity and slower service delivery (Bowman, 2013). The implications have been reported in several studies; thus, the pooled prevalence revealed that 30 out of the 47 countries in the WHO African Region (64%) lacked the capacity to accurately count and register births and deaths (Angayarkanni *et al.*, 2023; WHO, 2026). Additionally, the ability to diagnose the cause of death was nearly absent in most of these countries, including Nigeria (WHO, 2026).

In Nigeria, particularly the University of Calabar Teaching Hospital, anecdotal evidence and preliminary observations suggest that health information professionals face difficulties in maintaining systematic, secure and accessible health records. These challenges include reliance on outdated manual record-keeping systems, inconsistent adherence to storage protocols, insufficient use of digital health information systems and vulnerabilities related to data loss, unauthorized access and poor record retrieval. Such inefficiencies in the storage of patients' health information can have serious implications, including delayed patient care, compromised data integrity, challenges in clinical research and non-compliance with healthcare regulations. Despite the crucial role of health information professionals in ensuring accurate record storage, there is limited empirical research assessing their practices, challenges and the adequacy of existing storage systems within the University of Calabar Teaching Hospital.

Health facilities deal with the lives and health of their patients. Quality medical care relies on well-trained doctors and nurses and on high-quality facilities and equipment. Quality medical care also relies on good record-keeping. Without accurate, comprehensive up-to-date and accessible patient case notes, medical personnel may not offer the best treatment or may in fact misdiagnose a condition, which can have serious consequences owing to the fact that if the health personnel continue treating patient

exclusive of sufficient information about the patients' health conditions the individual could end up rendering poor health care that may be unsafe to patient health and sometimes lead to patient's death (Danquah *et al.*, 2024).

The persistent weaknesses in Nigeria's health information systems continue to undermine the quality of care delivered in hospitals. Although patient information storage is a core component of effective health information management, many facilities still rely on fragmented, incomplete and poorly secured paper records. Studies have noted that inadequate storage systems, weak data protection measures, poor documentation culture and limited digital infrastructure reduce the accuracy, timeliness and availability of patient records (Adewoyinet *et al.*, 2020; Omoleke *et al.*, 2023). When health workers cannot access complete patient histories or previous diagnostic information, the risk of misdiagnosis increases, treatment plans are delayed, and continuity of care is compromised.

In teaching hospitals, where patient volume is high and clinical decisions are often complex, poor record storage creates further strain. Limited storage space, deterioration of paper files, loss of essential information and difficulties in retrieving old records disrupt service delivery and contribute to medical errors (Danquah *et al.*, 2024). Despite the global shift toward electronic health records, institutions such as the University of Calabar Teaching Hospital still struggle with outdated systems, irregular data backup practices, shortages of trained records personnel and insufficient investment in digital record keeping (Asore, 2022).

These persistent gaps raise concerns about the efficiency, safety and accountability of patient care. The problem, therefore, lies in the continuing inadequacies in how patient information is stored, protected and utilized, and how these gaps may be affecting the quality of health information management services in the University of Calabar Teaching Hospital. The mention scenarios have prompted the current studies on assessing the availability of technological Support in the storage of patient health information and associated challenges among health information professionals in the University of Calabar Teaching Hospital, Cross River State, Nigeria. The objectives of the study were to: (a) determine the extent to which available technologies support the storage of patient health information in the University of Calabar Teaching Hospital, and (b) assess the challenges associated with recording and storing patient health information in the University of Calabar Teaching Hospital. The findings of the study will help give the patients confidence about the security of their health information and also promote the quality of care rendered to patients and relatives who access health care institutions. The study will also provide information to the government, researchers, policy makers and the public in order to serve as a supervision tool for improving knowledge to students and for policy makers to address the needed gaps and to promote quality care. Further, the findings of this study will assist stakeholders in designing appropriate measures and interventions that can effectively change the storage of patients' health information in the University of Calabar Teaching Hospital.

### **3. Methodology**

#### **3.1 Research Design**

This study adopted a cross-sectional research design in which self-reported data were collected from sampled participants in order to describe the population based on the variables of interest in the study.

#### **3.2 Study Area**

The area of the study is the University of Calabar Teaching Hospital, located in Calabar, the capital city of Cross River State in southeastern Nigeria. Calabar is known for its rich cultural heritage and historical significance. The city is a bustling urban area with a diverse population. The University of Calabar Teaching Hospital is a major tertiary healthcare institution in the region. It provides a wide range of medical services to the population. The hospital serves as a referral center for various health facilities within the state and neighboring regions. It plays a crucial role in the healthcare delivery system. The hospital offers specialized medical care to patients. It also provides training for healthcare professionals.

The University of Calabar Teaching Hospital conducts medical research. Calabar is a hub for educational institutions, commercial activities, and healthcare services. The city attracts individuals from various socio-economic backgrounds. The hospital caters to a large and varied patient population. Patients come from Calabar and its environs. The hospital also receives patients referred from other parts of Cross River State. Neighboring states also refer patients to the hospital. The University of Calabar Teaching Hospital is a key healthcare provider in the region. It is situated in a dynamic urban environment. The hospital's services are essential for the healthcare needs of the population. The hospital's location makes it accessible to a large population.

The University of Calabar Teaching Hospital is a significant institution in the region's healthcare system. The hospital's role in healthcare delivery, education, and research is vital. Calabar's diverse population is reflected in the patient population served by the hospital. The hospital's services and research activities have a significant impact on the region. The hospital is a major healthcare provider in southeastern Nigeria.

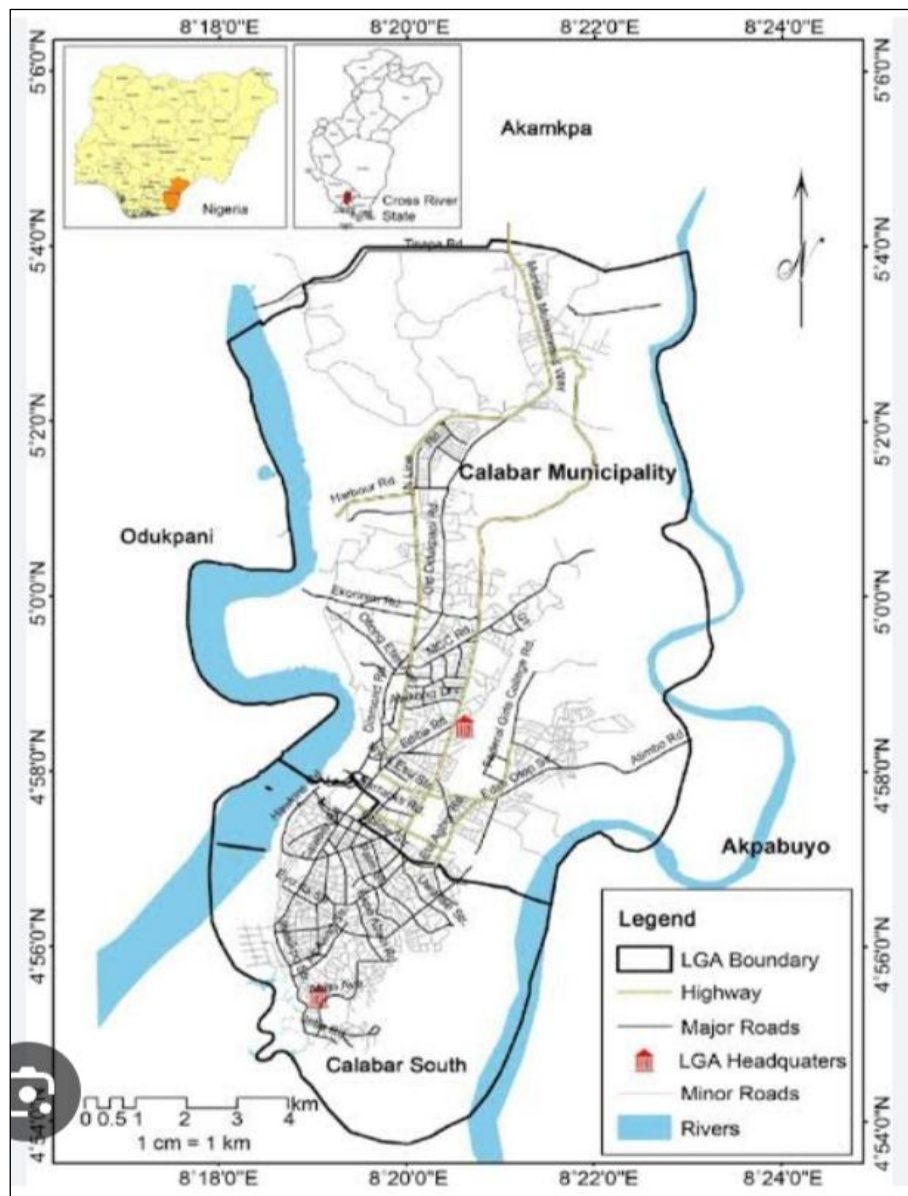


Figure 1: Map of University of Calabar Teaching Hospital, Calabar (Source: Google Map)

### 3.3 Population of the Study

The target population for this study comprises 450 health information management officers currently employed at the University of Calabar Teaching Hospital (UCTH). The breakdown of the population of the study is presented in Table 1.

Table 1: List of all the departments/units and the population of the study population

S/N	Department/Unit	Population
1	Hematology Department	20
2	Obstetrics and Gynecology	35
3	Radiology	18
4	Pediatrics	22
5	Urology	25
6	Histopathology	28

7	Oral and Dental Health	32
8	Community and Family Medicine	40
9	Health Records Department	128
10	Outpatient and Inpatient Department	72
11	Accident and Emergency Department.	30
	<b>Total</b>	<b>450</b>

### 3.3.1 Inclusion Criteria

Adults aged 20 to 50 years, Health Information Management Officers working at the University of Calabar Teaching Hospital (UCTH) who have direct involvement in the management and storage of patient health information. Participants who have completed the questionnaire with a high level of honesty and have provided responses that can be analyzed.

### 3.3.2 Exclusion Criteria

Respondents who are not Health Information Management Officers or do not work at the University of Calabar Teaching Hospital (UCTH) were excluded from the study. Questionnaires with incomplete or inconsistent responses that cannot be analyzed were excluded from the study

### 3.4 Sampling Technique and Sample Size

The multi-stage sampling technique was used in this study. Here, participants were recruited from the various departments/units in the University of Calabar Teaching Hospital using a simple random sampling technique after obtaining informed consent. The sampling technique involved the following stages:

#### A. Stage 1: Selection of departments/units

The 11 departments/units were assigned numbers from 1-11, and a proportionate number of participants were selected from each department/unit based on their population size.

The total sample size of 212 participants was divided proportionally in size based on the population of each department/unit.

Here's the calculation:

1. Hematology Department  $(20/450) \times 212 = 9.4 \approx 9$
2. Obstetrics and Gynecology  $(35/450) \times 212 = 16.5 \approx 17$
3. Radiology  $(18/450) \times 212 = 8.5 \approx 9$
4. Pediatrics  $(22/450) \times 212 = 10.4 \approx 10$
5. Urology  $(25/450) \times 212 = 11.8 \approx 12$
6. Histopathology  $(28/450) \times 212 = 13.2 \approx 13$
7. Oral and Dental Health  $(32/450) \times 212 = 15.1 \approx 15$
8. Community and Family Medicine  $(40/450) \times 212 = 18.9 \approx 19$
9. Health Records Department  $(128/450) \times 212 = 60.3 \approx 60$
10. Outpatient and Inpatient Department  $(72/450) \times 212 = 34 \approx 34$

11. Accident and Emergency Department  $(30/450) \times 212 = 14.1 \approx 14$

**B. Stage II: Simple Random Sampling**, here the participants were then selected randomly from each department/unit using a simple random sampling technique until the required number for each department/unit was reached. This approach ensured that the sample was representative of the population, and every participant had an equal chance of being selected.

The sample size was calculated by using Taro Yamane's formula, which is stated as;

$$n = \frac{N}{1 + N(e^2)}$$

Where:

N = Population size,

E = Level of significance,

N = 450,

E = 0.05.

$$n = \frac{450}{1 + 450(0.5)^2}$$

$$n = \frac{450}{1 + 450(0.0025)}$$

$$n = \frac{450}{2.125}$$

$$n = 211.76$$

$$n = 212 \text{ (approximately)}$$

$$\text{8\% of non-response} = \frac{8 \times 212}{100} = \frac{1696}{100} = 16.96$$

Total sample size  $(n) = 212 + 16.96 = 371.8$ ,  $n = 229$  approximated (minimum sample size). A minimum of 229 participants were employed for this study.

### 3.5 Instrument for Data Collection

A structured questionnaire, titled Patient Health Information Storage Practices Questionnaire (PHIS PQ), was used for data collection. The instrument was developed by the researcher based on the study objectives to ensure it captured relevant information on the storage and management of patient health information in the University of Calabar Teaching Hospital. The questionnaire contained both close-ended items and Likert-scale questions, designed to gather responses from health records officers, nurses, clinicians, and other staff involved in patient information management.

The instrument was organized into six sections. Section A collected demographic information, including respondents' department, designation, years of experience, and level of training in health information management. Section B elicited information on the

methods used for recording patient health information, with items asking respondents to indicate whether paper-based records, electronic health records, hybrid systems, or other methods were used. Section C: focused on the techniques used for storing patient health information, including paper-based filing systems, electronic storage, hybrid systems, and associated backup methods. Section D measured the level of compliance with established health information management standards using a four-point Likert scale, where respondents indicated the extent to which storage practices adhered to organizational and regulatory guidelines. Section E assessed challenges associated with recording and storing patient health information, using statements rated on a five-point Likert scale ranging from “Strongly Disagree” to “Strongly Agree” to capture the severity and frequency of observed challenges. Section F examined the availability and adequacy of technologies supporting patient health information storage and evaluated staff competence in using them, with items measured on a five-point scale indicating the degree of adequacy or proficiency.

### **3.6 Validity of the Instrument**

Two kinds of validity are established for the instrument of this study. These are the face and content validity. Face validity refers to the way the questionnaire items appear to take care of relevant content in the subject area of interest, while the extent to which the instrument represents the content of interest or how well the items on the instrument represent or sample the content to be measured is the content validity. The face and content validity were established by using the supervisor. The supervisor certified that the instrument is face and content valid and could then be used for the study. The face validity was established by giving the items developed to the experts who identified flaws and errors, which were corrected with the assistance of the supervisor, who thereafter certified the face validity of the instruments. It serves as an avenue for the easy development of relevant questions and the removal of irrelevant ones.

### **3.7 Reliability of the Instrument**

A structured interviewer-administered questionnaire was pre-tested in the Health Records Department of the University of Calabar Teaching Hospital using a randomly sampled population. The pre-test was carried out with a sample size of 23, which is approximately 10% of the original sample size of 229 Health Information Management Officers. This pre-test aimed to validate the questionnaire's effectiveness and identify any potential issues before the actual data collection process

### **3.8 Method of Data Collection**

Primary data was used in this research work. The primary data was collected using a self-structured questionnaire that was distributed to the respondents in the University of Calabar Teaching Hospital, Calabar, Cross River State, for this research work. The

questionnaire was distributed to the medical records personnel to fill out and retrieved once they were filled out with the help of two research assistants.

### **3.8.1 Data Entry**

Data collected from the field were calculated and screened for completeness and scored using a standard scoring system (IBM - SPSS) for analysis.

### **3.9 Method of Data Analysis**

The data collected from the Patient Health Information Storage Practice Questionnaire (PHIS PQ) were analyzed using descriptive and inferential statistical tools. Frequency counts and percentages were used to summarize respondents' demographic characteristics and to describe the methods and techniques used for recording and storing patient health information. Mean scores and standard deviations were employed to assess the level of compliance with health information management standards, challenges associated with recording and storing patient health information, and the adequacy of available technologies and staff competence in using them. Chi-square ( $\chi^2$ ) tests were used to determine associations between demographic variables and responses on recording, storage, compliance, challenges, and technology use. All analysis was done using SPSS version 25

### **3.10 Ethical Considerations**

Before the survey, a preliminary visit was made to the Staff of Health Information Management in all the Departments of the University of Calabar Teaching Hospital with a letter of introduction. Ethical clearance was obtained from the head of department public health, Faculty of Basic Medical Sciences, Rivers State University. All proxies to the staff were informed during the consent and introduction process on the purpose and safety of the study, and assurance of the confidentiality of the information obtained from them. Written permission was also sought from the Head of Department of the Health Record Units. The research protocol and consent were sought and approved by the University of Calabar Teaching Hospital. The aim of the study was explained to all potential participants. Permission to include them in the study was sought, and necessary written consent was obtained. The participants were informed of their freedom to withdraw at any time without divergent reasons. A reason not to participate was be highly respected, also confidentiality and privacy were ensured and maintained throughout the study.

#### 4. Results

**Table 2:** Socio-demographic Characteristics of the Respondents

Item	Response Option	Frequency (n=229)	Percentage (%)
Gender	Male	92	40.2
	Female	137	59.8
Age	<21 years	14	6.1
	21–30 years	63	27.5
	31–40 years	96	41.9
	>40 years	56	24.5
Designation	Officer	80	34.9
	Senior Officer	65	28.4
	Technologist	42	18.3
	Technicians	30	13.1
	Other	12	5.3
Years of Experience	1–5 yrs	85	37.1
	6–10 yrs	70	30.6
	11–15 yrs	44	19.2
	Above 15 yrs	30	13.1
Formal Training in HIM	Yes	140	61.1
	No	89	38.9
Level of Education	OND	18	7.9
	HND	55	24.0
	BSc	120	52.4
	MSc	30	13.1
	Other	6	2.6

Data in Table 2 showed the demographic characteristics of the respondents. The result showed that there are more women than men participants in the study. Female respondents constituted almost 60 percent of the sample, suggesting that the workforce involved in patient information handling in the hospital is predominantly female. The age distribution shows that most respondents were between 31 and 40 years, making up roughly 42 percent of the total. This indicates that individuals in their mid-career stage dominate health information handling roles in the hospital. The least represented group was respondents younger than 21 years, reflecting limited entry-level staffing in records-related positions. Regarding designation, most respondents were Officers (34.9%) and Senior Officers (28.4%), reflecting a workforce largely composed of Senior-level professionals, with fewer Technologists (18.3%) and Technicians (13.1%). Years of experience showed that 37.1% of respondents had 1–5 years of experience, 30.6% had 6–10 years, while a smaller proportion had over 10 years of experience. Formal training in health information management was reported by 61.1% of respondents, while 38.9% had no formal training. In terms of education, the majority of respondents have a BSc degree (52.4%), followed by HND holders (24.0%) and MSc holders (13.1%). A smaller proportion had OND or other qualifications.

**Table 3: Availability of Technological Support in the Storage of Patient Health Information**

Item	Statement	SA F (%)	A F (%)	U F (%)	D F (%)	SD F(%)	Mean	SD	Remark
1.	The hospital has adequate digital tools for patient record storage	53 (23.1)	78 (34.1)	54 (23.6)	28 (12.2)	16 (7.0)	3.56	0.94	Agree
2.	Technical support is available for managing digital records	49 (21.4)	77 (33.6)	58 (25.3)	28 (12.2)	17 (7.4)	3.48	0.95	Undecided
3.	Staff are competent in using digital systems for record storage	46 (20.1)	79 (34.5)	60 (26.2)	28 (12.2)	16 (7.0)	3.46	0.94	Undecided
4.	Training is provided on modern health information systems	42 (18.3)	72 (31.4)	61 (26.6)	32 (14.0)	22 (9.6)	3.31	1.01	Undecided
5.	Available technologies improve the efficiency of patient information storage	55 (24.0)	80 (34.9)	53 (23.1)	25 (10.9)	16 (7.0)	3.57	0.93	Agree

Data in Table 3 presented the level of Technology Availability and Staff Competence. The results indicate that respondents generally agreed that the hospital has adequate digital tools for patient record storage, with 23.1% strongly agreeing and 34.1% agreeing. However, the perception of available technical support was more uncertain, with 25.3% undecided, suggesting that staff may not always have reliable access to IT assistance. Staff competence in using digital systems also received a relatively low agreement, with 26.2% undecided, indicating gaps in skills and confidence in managing electronic records. Similarly, training on modern health information systems was reported as inadequate by a notable proportion, with a mean of 3.31, reflecting the need for more structured capacity-building programs. Despite these challenges, respondents agreed that available technologies improve the efficiency of patient information storage (mean = 3.57), demonstrating that when tools are accessible and functional, they contribute positively to workflow efficiency. Overall, the findings suggest that while digital resources exist, staff competence, training, and technical support need strengthening to maximize the benefits of technology in health information management.

**Table 4: Challenges Associated with Recording and Storing Patient Information**

Item	Statement	SA F (%)	A F (%)	U F (%)	D F (%)	SD F (%)	Mean	SD	Remark
1	Inadequate staffing affects the proper recording of patient information	92 (40.2)	81 (35.4)	28 (12.2)	18 (7.9)	10 (4.3)	4.04	0.88	Agree
2	Heavy workload leads to delays in updating patient records	85 (37.1)	79 (34.5)	35 (15.3)	20 (8.7)	10 (4.3)	3.95	0.91	Agree

3	Limited physical storage space affects organization of records	78 (34.1)	82 (35.8)	40 (17.5)	19 (8.3)	10 (4.3)	3.88	0.90	Agree
4	System downtime affects access to electronic patient records	62 (27.1)	79 (34.5)	53 (23.1)	21 (9.2)	14 (6.1)	3.70	0.96	Agree
5	Lack of modern equipment hinders effective record storage	69 (30.1)	77 (33.6)	54 (23.6)	18 (7.9)	11 (4.8)	3.71	0.92	Agree

Data in Table 4 presents the challenges associated with recording and storing patient information. The results indicate that inadequate staffing is a major challenge affecting the proper recording of patient information, with 40.2% of respondents strongly agreeing and 35.4% agreeing. This highlights the impact of human resource constraints on record management. Heavy workload was also reported as a significant factor, contributing to delays in updating patient records (mean = 3.95). Limited physical storage space was identified as another key challenge, affecting the organization and accessibility of records, with a combined 69.9% agreement. System downtime was noted to affect access to electronic records, reflecting technical challenges that disrupt the timely retrieval of information. Additionally, the lack of modern equipment hindered effective record storage, indicating that infrastructural limitations continue to affect both paper-based and electronic systems.

## 5. Discussion

### 5.1 Availability of Technological Support in the Storage of Patient Health Information

The analysis of technology availability revealed that respondents generally agreed that the hospital has some digital tools to support patient record storage, with 57.2% agreeing or strongly agreeing. This indicates that while the infrastructure exists, it is only partially utilized, and digital tools are not yet fully integrated across all departments for routine record management. Technical support for managing digital records was perceived as insufficient by many respondents, with 32.7% undecided and 19.6% disagreeing or strongly disagreeing. This suggests that even where digital tools exist, staff may not consistently receive the guidance or troubleshooting assistance required to ensure optimal use of electronic systems. Limited technical support can result in system errors, delays in record updates, and underutilization of technology. Staff competence in using digital systems was also moderate, with a substantial proportion undecided (26.2%) about their confidence in operating electronic record tools. While some staff were confident, the uncertainty among others points to gaps in digital literacy, familiarity, and hands-on experience with health information systems. This may hinder the efficiency and accuracy of digital record-keeping. Training on modern health information systems was reported as inadequate by respondents, with 26.6% undecided and 23.6% disagreeing or strongly disagreeing. The limited provision of structured training programs restricts staff's ability to adapt to technological innovations, reducing the effectiveness of electronic systems and increasing reliance on traditional paper-based methods.

Respondents agreed that available technologies improve the efficiency of patient information storage, with 58.9% agreeing or strongly agreeing. This shows that when digital tools are operational and staff are competent, they have a positive impact on workflow efficiency, data retrieval, and overall record management. However, these benefits are not fully realized due to gaps in support, training, and competence.

The findings are consistent with Aliyu, Akosa, and Sani (2024), who reported that awareness and access to electronic medical records do not automatically translate into effective usage unless accompanied by technical support and staff training. Similarly, Adebisi *et al.* (2024) found that favorable attitudes toward EMR were insufficient without practical capacity-building measures, highlighting the importance of structured training and support systems. Conversely, studies by Akwaowo *et al.* (2022) showed higher adoption and effective use of EMR systems in multi-state hospitals where dedicated technical support and ongoing staff training were provided. Differences may arise from institutional priorities, availability of funding, and the degree to which management enforces and supports digital transformation initiatives.

The moderate competence and limited technical support observed imply that staff may struggle to fully leverage digital tools, leading to inconsistencies in record-keeping, delays in data entry, and potential inaccuracies. This can compromise timely access to information for clinical and administrative purposes, affecting patient care quality.

The implications of these findings are significant for hospital management. While technology can enhance efficiency, without adequate training, technical support, and structured implementation, the potential benefits remain underutilized. Strengthening these areas is essential to ensure that digital systems contribute effectively to patient information management.

In conclusion, technology availability alone is insufficient to guarantee efficient patient record storage. Ensuring staff competence, providing regular training, and maintaining reliable technical support are critical measures required to maximize the benefits of digital tools and improve the quality, accuracy, and accessibility of patient health information in the University of Calabar Teaching Hospital.

## **5.2 Challenges Associated with Recording and Storing of Patient Health Information in the University of Calabar Teaching Hospital**

The analysis of challenges associated with recording and storing patient health information revealed that inadequate staffing was a major concern, with 75.6% of respondents agreeing or strongly agreeing that it affected proper record management. This indicates that limited human resources significantly hinder the efficiency and reliability of patient information capture and storage, as staff may be overburdened with high workloads. Heavy workload was similarly identified as a critical challenge, with 71.6% agreement or strong agreement among respondents. High patient volumes and administrative demands can delay record updates, compromise data accuracy, and increase the likelihood of errors, reflecting operational pressures that interfere with

effective health information management. Limited physical storage space was also reported as a significant barrier, with 69.9% of respondents agreeing that it affected the organization of records. This underscores the spatial constraints often associated with paper-based filing systems, which can lead to cluttered storage areas, difficulty retrieving records, and potential misplacement of critical information. System downtime was identified as a challenge by 61.6% of respondents, indicating that technical failures disrupt access to electronic patient records. Interruptions in digital systems compromise the timely retrieval of information, impede clinical decision-making, and reduce overall workflow efficiency. Lack of modern equipment further hindered effective record storage, with 63.7% of respondents agreeing or strongly agreeing. Outdated or insufficient technological infrastructure limits the adoption of electronic and hybrid storage systems, constraining the hospital's ability to improve storage efficiency, security, and accessibility. The findings are consistent with Owolabi, Agboola, and Oguiyi (2021), who highlighted that staffing shortages, heavy workloads, and infrastructural limitations were pervasive in Nigerian tertiary hospitals, adversely affecting the quality of record management. Juliansyah *et al.* (2024) also reported similar constraints in resource-limited settings, where system downtime and lack of modern equipment hampered effective implementation of electronic health records. In contrast, Akwaowo *et al.* (2022) observed that in some multi-state Nigerian hospitals, adequate staffing, infrastructure investment, and robust IT support mitigated many of these challenges. Differences in findings could be due to variations in institutional resources, administrative prioritization, and staff training levels, with more resourced facilities better able to adopt and maintain electronic systems.

The implications of the findings are substantial. Staffing inadequacies, heavy workloads, spatial limitations, and technical shortcomings collectively compromise the accuracy, timeliness, and accessibility of patient records. Such challenges can negatively affect clinical decision-making, patient safety, and continuity of care. Possible reasons for these persistent challenges include limited funding for staff recruitment, inadequate allocation of physical space for records, insufficient investment in modern technologies, and a lack of ongoing technical support. Addressing these gaps through strategic resource allocation, infrastructure modernization, and capacity-building initiatives is critical for improving patient health information management.

## 6. Summary/Conclusions

The study highlights that operational, technical, and infrastructural challenges impede efficient recording and storage of patient health information. A multifaceted approach addressing human resources, technology, and organizational processes is necessary to enhance data quality, security, and availability in the University of Calabar Teaching Hospital. The study concluded that the storage and management of patient health information in the University of Calabar Teaching Hospital are characterized by a

continued reliance on paper-based methods, with partial adoption of electronic and hybrid systems. While procedures generally ensure accuracy and adherence to basic standards, gaps in staff training, technical support, and infrastructure limit the efficiency, security, and accessibility of patient records. Compliance with health information management standards is moderate, and operational challenges such as inadequate staffing, heavy workload, and limited storage space hinder optimal record management. The study underscores the need for systematic investment in digital technologies, capacity-building initiatives, and robust backup and security mechanisms to improve the quality, reliability, and timely accessibility of patient health information, thereby supporting better clinical decision-making and overall healthcare delivery.

### 6.1 Recommendations

Based on the findings, the following recommendations were made

- 1) Implement a structured transition from paper-based to electronic or hybrid health information systems, including phased adoption of EHR to enhance efficiency, reduce retrieval delays, and minimize record loss.
- 2) Establish comprehensive training programs for all relevant staff to improve competence in recording and storing patient health information, with regular workshops, hands-on sessions, and refresher courses.
- 3) Strengthen technical support for digital systems by deploying dedicated IT personnel to manage system downtime, troubleshoot issues, and maintain reliable backup mechanisms.
- 4) Standardize and rigorously enforce security and backup protocols, including regular cloud backups, off-site storage for physical records, encryption of digital data, and routine audits to ensure confidentiality, privacy, and compliance with standards.
- 5) Address operational challenges such as inadequate staffing and heavy workload by hiring additional qualified personnel, optimizing workflow, and redistributing responsibilities to improve the accuracy and timeliness of record management.
- 6) Conduct periodic monitoring and evaluation of storage practices to assess compliance with national standards, effectiveness of technological tools, and overall quality of patient information management.
- 7) Prioritize investment in modern health information infrastructure, including updated hardware, software, and filing systems, to support current operations and future scalability, integrating technology with robust administrative policies.

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### **Conflict of Interest Statement**

The authors declare no conflicts of interest.

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