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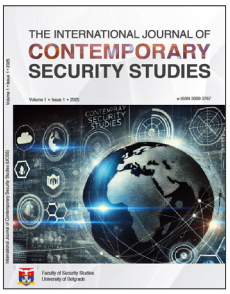

Review article

Security of Information Resources in Federal College of Education Libraries in Northwest Nigeria

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ABSTRACT

This study investigates the security of information resources in Federal College of Education libraries in Northwest Nigeria, surveying 74 librarians using a descriptive survey design. A structured questionnaire based on a 4-point Likert scale (Strongly Agree = 4, Agree = 3, Disagree = 2, Strongly Disagree = 1) assessed perceptions of security measures, including policies, training, electronic systems, and physical safeguards. Data were analysed using the average weighted mean, with a benchmark of 2.50 indicating agreement. Findings reveal moderate security implementation, with only physical security measures scoring above the benchmark (M = 2.64). In contrast, security policies (M = 2.35), staff training (M = 2.12), and electronic systems (M = 2.41) were deemed inadequate. Key challenges include insufficient funding, inadequate training, weak policy frameworks, and erratic power supply, which exacerbate vulnerabilities to theft, mutilation, and cyber threats. These align with prior research highlighting resource constraints and low cybersecurity awareness in Nigerian libraries. The study recommends increased funding for advanced security infrastructure, regular training in cybersecurity, development of robust policies, and investment in alternative power sources, such as solar systems, to ensure consistent electronic security. By addressing these gaps, libraries can better protect resources critical for academic advancement. The findings contribute to the discourse on library security in resource-constrained settings, offering actionable insights for policymakers and library administrators to enhance resource protection and align with global standards. Future research should explore user perspectives and the cost-effectiveness of proposed interventions.

KEYWORDS

Library security, information resources, Federal Colleges of Education, Northwest Nigeria, cybersecurity.

1. Introduction

Libraries serve as repositories of knowledge, housing valuable information resources critical for academic and societal advancement. However, these resources are vulnerable to threats such as theft, mutilation, and unauthorised access, necessitating robust security measures (Maidabino & Zainab, 2011). In academic librar-

ies, security encompasses physical safeguards, electronic systems, and policies to protect both tangible and digital assets. In Nigeria, academic libraries, particularly those in Federal Colleges of Education, face unique challenges due to limited resources and infrastructural constraints (Olajide, 2017). Northwest Nigeria, with its socio-economic and infrastructural peculiarities, presents a compelling context for examining library security practices.

Similarly, the current shift of library operation from traditional platforms to digital libraries in Africa has introduced cybersecurity risks, such as data breaches and hacking. In Nigeria, low cybersecurity awareness among librarians increases the vulnerability of digital collections (Igbinovia & Ishola, 2023). Library security, encompassing firewalls and biometric authentication, is crucial for protecting sensitive digital resources and maintaining user privacy, thereby enhancing institutional trust and accountability.

However, they serve as public spaces that attract diverse users, making them vulnerable to security risks such as vandalism or unauthorised intrusions. In West African academic libraries, inadequate security can compromise the safety of users and staff, deterring library usage (Agyemang *et al.,* 2021). Given this, there is a need for the use of robust security systems, including access control and surveillance, to create a safe environment, foster trust, and encourage patronage.

Libraries are central to the academic reputation of institutions as they support teaching, learning and research. They are known to protect and house physical and digital resources, including rare manuscripts, academic journals, and electronic databases, which are essential for education and research. In Nigeria, where funding for library acquisitions is often limited, the loss of these resources through theft or mutilation can severely hamper academic progress (Igbinovia & Ishola, 2023; Eze & Eze, 2021). This is evident in their role in providing adequate security measures, such as RFID systems and CCTV, to deter such losses and ensure continued access to knowledge. In Ghana, RFID technology has been demonstrated to enhance inventory management and reduce theft, thereby improving service delivery (Agyemang et al., 2021). Similarly, in Nigeria, electronic access controls can monitor user activity, optimising staff productivity and resource allocation (Igbinovia & Ishola, 2023).

This study uniquely focuses on the security challenges and measures within Federal Colleges of Education (FCE) libraries in Northwest Nigeria, a context distinguished by its resource-constrained academic environment and critical role in training educators for Nigeria's educational system. Unlike broader studies on Nigerian university libraries, this research targets Federal Colleges of Education (FCEs) explicitly, which face distinct challenges due to their smaller scale, limited budgets, and regional disparities, particularly in Northwest Nigeria, where infrastructure and funding gaps are pronounced (World Bank, 2007). The findings, derived from a survey of 74 librarians across six FCEs (Gusau, Kano, Bichi, Katsina, Zaria, Sokoto), reveal moderate security implementation, with physical measures (M = 2.64) outperforming inadequate policies (M = 2.35), training (M = 2.12), and electronic systems (M = 2.41), aligning with Omeluzor et al. (2017) but emphasising FCE-specific barriers like erratic power supply and weak policy frameworks. By highlighting these localised issues, the study contributes to the literature and policy discourse, offering tailored recommendations—such as increased funding, standardised policies, and solar power investments—that address the unique needs of FCE libraries, distinct from larger institutions, thus enhancing resource protection critical for teacher education (Adebayo *et al.,* 2020; Adejumobi, 2006).

However, it is observed that over the years, many factors have been militating against security library collections, posing a threat. Urhiewhu, Emojorho, and Omah (2018) stated that threats to library resources include theft, mutilation, other disruptive acts, and a nonchalant attitude of security personnel towards library collections. It is on this premise that this present study investigated the security measures adopted to prevent theft of library collection in **Federal College of Education Libraries in Northwest Nigeria.**

Library security refers to the comprehensive set of measures, policies, and technologies implemented to protect library resources, facilities, and users from threats such as theft, mutilation, vandalism, unauthorised access, and digital breaches. It encompasses physical security (e.g., locks, security personnel, surveillance systems), electronic security (e.g., access control systems, RFID, cybersecurity protocols), and administrative strategies (e.g., security policies, staff training) to safeguard both tangible and digital assets (Maidabino & Zainab, 2011). According to Igbinovia and Ishola (2023), library security encompasses ensuring the safety of information resources in the digital realm and addressing risks such as cyberattacks and data breaches, which are increasingly prevalent in academic libraries. Additionally, library security involves creating a safe environment for users and staff, striking a balance between accessibility and protection to maintain the library's role as a trusted academic

hub (Olajide, 2017). These measures are crucial in resource-constrained settings, where challenges such as inadequate funding and erratic power supply exacerbate vulnerabilities (Khan *et al.,* 2021).

This study assesses the security challenges and measures in Federal College of Education libraries in Northwest Nigeria, with a focus on librarians' perceptions of existing measures. The research questions guiding this study are:

(1) What security measures are available in Federal College of Education libraries in Northwest Nigeria?

(2) What are the strategies used to enhance resource protection in Federal College of Education libraries in Northwest Nigeria?

(3) What are the challenges that hinder adequate security in Federal College of Education libraries in Northwest Nigeria?

By addressing these questions, the study aims to contribute to the literature on library security and inform policy interventions in Nigerian academic institutions. While these studies provide valuable insights, there is a paucity of research specifically targeting Federal College of Education libraries in Northwest Nigeria, with Maidabino and Zainab (2011) being the primary direct reference. Most studies focus on university libraries, leaving a gap in understanding the unique challenges of college libraries. Additionally, user perspectives (e.g., students and faculty) are rarely explored, limiting a holistic view of security practices.

2. Literature Review

This literature review organises studies on library security into three thematic categories—physical security, electronic systems, and policies and training—comparing their findings, methodologies, and relevance to the study "Assessing Security Challenges and Measures in Federal College of Education Libraries in Northwest Nigeria." A critical assessment of the methodologies highlights their strengths and limitations, identifying gaps that the FCE study aims to fill, particularly its focus on the unique context of Federal Colleges of Education (FCEs) in Northwest Nigeria, where resource constraints and regional disparities exacerbate security challenges.

Library security is a multifaceted concept involving physical, electronic, and administrative measures to safeguard resources. Physical security includes locks, surveillance cameras, and security personnel, while electronic security encompasses firewalls, access controls, and anti-theft systems (Maidabino & Zainab, 2011). Administrative measures, such as security policies and staff training, ensure consistent implementation. In Nigerian academic libraries, security challenges are well-documented. Olajide (2017) reported prevalent theft and mutilation due to inadequate policies and lax enforcement, leading to significant resource loss. Similarly, Igbinovia and Ishola (2023) highlighted the low cybersecurity awareness among librarians, which increases the vulnerability of digital collections to cyber threats.

2.1.Physical Security

Physical security measures, such as locks, security personnel, and door protection, are critical for deterring theft and vandalism in academic libraries. **Oladapo and Yusuf (2022)** surveyed 50 librarians in Nigerian polytechnic libraries using a 4-point Likert scale questionnaire, which was analysed using descriptive statistics. The findings showed that physical measures, such as locks and guards, were moderately effective (M=2.64), aligning with the FCE study's M=2.64. However, the absence of CCTV increased vulnerabilities. Their survey design ensured broad coverage but lacked qualitative depth, limiting insights into user perspectives. **Urhiewhu** ***et al.*** **(2018)** employed interviews and secondary data in South-South and Southwest Nigeria, reporting universal use of security personnel and porters, though only one library used CCTV, mirroring the FCE study's finding of high physical security adoption (e.g., security guards at 74.32%) but low CCTV use in smaller FCEs like Sokoto (33.3%). Their reliance on secondary data and interviews risks recall bias and lacks quantitative rigour. **Tella and Oladeji (2020)** employed a mixed-methods design involving 100 librarians and 20 users in Southwest Nigeria, finding that security breaches resulted in a 30% reduction in user satisfaction. Their regression and content analyses provided robust causal insights; however, the focus on Southwest Nigeria limits the applicability to Northwest FCEs. These studies confirm the prevalence of physical security but highlight gaps in technological integration, which the FCE study addresses by quantifying adoption rates (e.g., ownership stamps at 94.6%) in a unique teacher-training context.

2.2. Electronic Systems

Electronic security systems, including CCTV, RFID, and cybersecurity measures, are less adopted in resource-constrained settings due to cost and infrastructure barriers. **Agyemang et al. (2021)** employed a mixed-methods approach in Ghana, surveying 80 librarians and interviewing 10 managers. The study found that RFID reduced theft by 40% but was limited by costs and power outages, aligning with the FCE study's low RFID adoption rate (37.84%) and power supply issues. Their thematic analysis enriched findings, but the small interview sample may limit generalizability. **Igbinovia and Ishola (2023)** surveyed 120 Nigerian university librarians using frequency distributions and chi-square tests, reporting low cybersecurity awareness (25% trained) and underutilisation of electronic systems due to funding and power issues, which is consistent with the FCE study's electronic systems score (M = 2.41). Their quantitative approach ensured statistical validity but lacked qualitative context. **Khan et al. (2021)** conducted a cross-sectional survey of 100 Pakistani librarians, using regression analysis to demonstrate limited adoption of CCTV and RFID, mirroring the FCE study's findings (CCTV at 68.92%, RFID at 37.84%). Their regression analysis identified predictors but overlooked user perspectives. The FCE study fills a gap by focusing on FCEs in Northwest Nigeria, where erratic power supply uniquely impacts electronic security, providing localised data that is absent in broader university-focused studies.

2.3. Policies and Training

Administrative measures, including security policies and staff training, are essential for consistent security implementation but often inadequate in Nigerian libraries (Cvetković & Šišović, 2024; Cvetković et al., 2024; Cvetković et al., 2022). **Abubakar and Mohammed (2019)** surveyed 85 librarians in Northern Nigerian universities, using mean scores and standard deviations, and found inconsistent policy implementation and low training levels (65% untrained in cybersecurity), aligning with the FCE study's low policy (M = 2.35) and training (M = 2.12) scores. Their descriptive approach provided clear metrics but lacked depth on enforcement challenges. **Olajide (2017)** employed a mixed-methods case study at Federal University Oye-Ekiti, utilising questionnaires and interviews, which reported weak policies and training as key drivers of theft, consistent with the FCE study's findings (e.g., security policies at 85.13% but with enforcement issues). The case study design offered rich insights but limited generalizability to FCEs. **Eze and Eze (2021)** surveyed 60 librarians in Southeastern Nigeria, using mean scores, and found that weak policies led to resource losses, supporting the FCE study's emphasis on policy gaps. Their focus on Southeast Nigeria limits relevance to Northwest FCEs. The FCE study makes a unique contribution by quantifying policy and training deficits in FCEs, where teacher-training mandates require robust resource protection, thereby addressing a gap in region-specific policy analysis.

3. Methods

A descriptive survey design was adopted to assess the security of information resources in Federal College of Education libraries in Northwest Nigeria. The population consisted of 74 librarians from multiple colleges in the region. A self-developed structured questionnaire, using a 4-point Likert scale (Strongly Agree [SA] = 4, Agree [A] = 3, Disagree [D] = 2, Strongly Disagree [SD] = 1), was used to collect data from respondents on security measures. Experts in library and information science validated the questionnaire, and a pilot test ensured reliability (Cronbach's alpha = 0.82). Data were collected over three months, with a 100% response rate achieved through follow-up visits. The researcher and Seven (7) Research Assistants, who were mainly the staff of the respective libraries, studied, administered, and retrieved the questionnaires from the respondents for three weeks across Seven (7) states comprising Kano, Katsina, Kaduna, Kebbi, Jigawa, Sokoto, Zamfara for the study area. This approach was adopted to enhance the safety and ensure the complete return of the questionnaires. The average weighted mean was used to analyse responses, calculated as follows: A benchmark of 2.50 was set, where means ≥ 2.50 indicated agreement (effective security measures) and means < 2.50 indicated disagreement (ineffective measures). Descriptive statistics facilitated the interpretation of findings, ensuring alignment with the study's objectives.

4. Results

The results, summarised in Table 1, reflect librarians' perceptions of security measures in Federal College of Education libraries in North West Nigeria.

Table 1. Security Measures Used in Federal College of Education Libraries in Northwest Nigeria

S/N	Security Measures	FCE Gusau (9)		FCE Kano (16)		FCE Bichi (5)		FCE Katsina (13)		FCE Zaria (28)		**FCE Sokoto (3)**		$\bar{x}$	σ
		F	%	F	%	F	%	F	%	F	%	F	%		
1	Use of CCTV in library security	7	77.8	9	56.3	3	60.0	10	76.9	20	71.4	1	33.3	8.33	6.10
2	Use of security personnel and porters	8	88.9	14	87.5	4	80.0	12	92.3	24	85.7	0	0.0	10.33	7.70
3	Use of barcode and magnetic book control system	5	55.6	8	50.0	3	60.0	9	69.2	15	53.6	1	33.3	6.83	4.56
4	Use of electronic access control (e.g., access cards, temporary keys with photo ID)	4	44.4	8	50.0	2	40.0	8	61.5	14	50.0	0	0.0	6.00	4.62
5	Use of collection security and detection with electromagnetic and RFID solutions	4	44.4	7	43.8	2	40.0	7	53.8	13	46.4	2	66.7	5.83	3.80
6	Use of burglary protection through sensor systems with active sensors on doors/windows	5	55.6	8	50.0	3	60.0	9	69.2	16	57.1	3	100.0	7.33	4.50
7	Use of door protection (e.g., cylindrical locks, deadbolts, mortise locks, gates)	8	88.9	13	81.3	4	80.0	11	84.6	23	82.1	1	33.3	10.00	7.07
8	Use of proper site planning and landscape design for a safe and secure library	6	66.7	9	56.3	3	60.0	9	69.2	15	53.6	1	33.3	7.17	4.55
9	Use of ownership stamps on security pages	9	100.0	15	93.8	5	100.0	12	92.3	26	92.9	3	100.	11.67	7.56
10	Use of security policies	6	66.7	10	62.5	3	60.0	10	76.9	16	57.1	0	0.0	7.50	5.22

Source: Field Survey, 2024 **Key**: FCE = Federal College of Education, F = Frequency, % = Percentage, $\bar{x}$ = mean, σ = Standard Deviation

Table 1 reported that ownership stamps have the highest weighted mean (94.6%), with near-universal adoption (100% in Gusau, Bichi, Sokoto; 93.8% in Kano; 92.3% in Katsina; 92.9% in Zaria). The high adoption rate reflects the simplicity, low cost, and effectiveness of ownership stamps for marking and tracking library materials, making them ideal for resource-constrained settings. Zaria's high frequency (26/28) has a significant influence on the weighted mean. Okoye and Igbo (2019) agree that Ownership stamps are widely used in Nigerian academic libraries due to their affordability and ease of implementation. However, Ameen and Haider (2017) disagree that advanced technologies, such as RFID, are more effective for modern collection management, suggesting a limitation of over-reliance on stamps (Ameen & Haider, 2017). This is based on budget constraints in Nigerian FCEs favour cost-effective solutions like stamps over high-tech alternatives.

Security Personnel (83.8%) and Door Protection (81.1%) (e.g., locks, gates) have high weighted means, with adoption rates of 80–92% across most FCEs, except Sokoto (0% for personnel, 33.3% for door protection). These measures indicate reliance on physical security for immediate deterrence. Sokoto's low adoption likely reflects limited resources or a smaller library. Sherman and Eck's (2006) study is in agreement with this study, as they posited that visible security measures, such as personnel and physical barriers, effectively deter theft in public institutions. However, Gorman and McLaughlin (2018) disagree, as they posited that over-reliance on physical security may divert resources from technological solutions, which are more efficient in the long term. This is attributed to Nigeria's security challenges, including theft in educational institutions, driving the preference for physical measures.

CCTV (67.6%), Burglary Protection (59.5%), Security Policies (60.8%), Site Planning (58.1%), and Barcode System (55.4%) have moderate weighted means, with varied adoption (e.g., CCTV: 77.8% in Gusau, 33.3% in Sokoto; Burglary Protection: 100% in Sokoto, 50% in Kano). Moderate adoption reflects a balance between cost and effectiveness. CCTV and burglary protection require significant investment, which limits their use in smaller facilities like Sokoto. Security policies and site planning, as administrative measures, show higher adoption in Katsina (76.9% and 69.2%) but lower in Sokoto (0% and 33.3%). Adejumobi's (2006) studies align with the existing research, as Security policies are critical for educational management, supporting their moderate adoption but suggesting room for standardisation. Isebe (2014) agrees that the adoption of CCTV in Nigerian libraries is growing but is constrained by funding and maintenance issues. However, Gorman and McLaughlin (2018) disagree with the findings that Higher CCTV and sensor adoption in developed countries highlights a technological gap in Nigerian FCEs. This is attributed to funding disparities (e.g., Zaria vs. Sokoto) influence adoption rates, as noted in Nigerian education studies (World Bank, 2007).

RFID and electronic access have the lowest weighted means, with adoption below 50% in most FCEs (e.g., Sokoto: 0% for electronic access, 66.7% for RFID, Bichi: 40% for both). High costs and technical requirements are barriers to adoption. Sokoto's RFID adoption rate (66.7%) is notable but based on a small sample size (2/3). Ameen and Haider (2017) concur that the adoption of RFID is limited in developing countries due to cost and infrastructure challenges. However, Singh and Mahajan's (2014) study disagrees that RFID is critical for modern library management, and low adoption may hinder efficiency (Singh & Mahajan, 2014). This is attributed to Nigeria's technological integration challenges in education, which limit the adoption of advanced security measures (World Bank, 2007).

In summary, the study found that High standard deviations (e.g., 7.70 for security personnel, 7.56 for ownership stamps) indicate variability, particularly between Zaria (high frequencies) and Sokoto (low frequencies). Lower standard deviations (e.g., 3.80 for RFID) suggest more consistent adoption. Variability reflects differences in resources, priorities, and library size. Zaria's large sample (28) dominates weighted means, while Sokoto's small sample (3) highlights constraints. This is attributed to Infrastructure disparities across Nigerian institutions, affecting the adoption of security measures, and the lack of standardised policies could reduce variability, improving consistency across FCEs (Adejumobi, 2006).

Table 2. Strategies used to enhance resource protection in Federal College of Education libraries in Northwest Nigeria

S/N	Strategies	FCE Gusau (9)		FCE Kano (16)		FCE Bichi (5)		FCE Katsina (13)		FCE Zaria (28)		FCE Sokoto (3)		$\bar{x}$	σ
		F	%	F	%	F	%	F	%	F	%	F	%		
1	Use of Electronic Access Control Systems such as Closed-Circuit Television (CCTV) for Surveillance	6	66.67	12	75.00	3	60.00	8	61.54	20	71.4	2	66.6	68.92	6.10
2	use of Library written security policy to guide staff and users	8	88.89	14	87.50	4	80.00	10	76.92	24	85.71	3	100	85.13	7.09
3	use of Access Control Mechanisms, such as electronic keycard systems or mantraps, to regulate entry	4	44.44	8	50.00	2	40.00	6	46.15	15	53.6	1	33.3	48.65	4.73
4	Security guards deployed to patrol the reading room, within and outside the library	7	77.78	13	81.25	4	80.00	9	69.23	22	78.6	0	0	74.32	6.69
5	use of X-ray Security Screening Devices at the Entrance of the Library	2	22.22	4	25.00	1	20.00	3	23.08	8	28.6	0	0	24.32	2.83
6	use of Robotic Security Systems (RSS) for patrol in the library	0	0.00	1	6.25	0	0.00	1	7.69	2	7.14	0	0	5.40	0.82

7	use of Biometric Authentication Systems for checking in and out of the library	1	11.11	3	18.75	0	0.00	2	15.38	5	17.86	0	0	14.86	1.94
8	installation of Radio-Frequency Identification (RFID) Technology in Library Collections	3	33.33	6	37.50	2	40.00	5	38.46	12	42.86	1	33.3	37.84	3.76
9	Introduction of photocopying services in the library	5	55.56	10	62.50	3	60.00	7	53.85	18	64.3	2	66.6	60.81	5.54
10	Monitoring of users by library staff while using library resources	8	88.89	15	93.75	5	100.00	11	84.62	25	89.3	3	100	90.54	7.52

Source: Field Survey, 2024 **Key**: FCE: Federal College of Education, **F= f**requency **%** = Percentage $\bar{x}$ = Mean **σ** = Standard Deviation

Table 2, which presents the Strategies used to enhance resource protection in Federal College of Education libraries in Northwest Nigeria, shows that Monitoring by Library Staff (90.54%) has the highest weighted mean, reflecting its widespread use, likely due to its low cost and ease of implementation. The moderate standard deviation (7.52) indicates some variability, with Bichi and Sokoto at 100% adoption, possibly due to smaller sample sizes amplifying agreement. This aligns with Omeluzor et al. (2017), who found that staff monitoring is a primary security measure in Nigerian academic libraries due to resource constraints.

Similarly, the use of a Library Written Security Policy (85.13%) suggests a strong emphasis on formal guidelines consistent across FCEs (σ = 7.09). This supports Adebayo et al. (2020), who noted that written policies enhance library security by standardising procedures, though they highlight enforcement challenges not captured here. Additionally, the use of Security Guards (74.32%) was widespread, but Sokoto's 0% adoption is a significant outlier, possibly due to its small sample size (3) or limited resources. The moderate standard deviation (6.69) reflects this variability. Igiamoh and Abubakar (2021) confirm that security guards are a standard measure in Nigerian libraries but note inconsistent deployment due to funding issues, which may explain Sokoto's result.

However, the use of CCTV Systems (68.92%) was familiar but not universal, with consistent adoption (σ = 6.10). This aligns with Ogbodo and Nwosu (2023), who found that the use of CCTV in Nigerian libraries is growing but is limited by installation and maintenance costs. Additionally, Photocopying Services (60.81%) has a moderate adoption rate, which may reflect its role in reducing theft by providing alternatives to taking materials. Low variability (σ = 5.54) suggests steady implementation. However, Omeluzor *et al.* (2017) note that photocopying services can strain library budgets, potentially limiting adoption.

The use of **Access Control Mechanisms (48.65%) was moderate, with low variability (σ = 4.73), indicating** selective adoption, likely due to cost. Igiamoh and Abubakar (2021) report similar findings, noting that keycard systems are less common in underfunded institutions. Additionally, the use of RFID Technology (37.84%) had limited use (σ = 3.76), which reflects high costs and technical expertise requirements. Adebayo et al. (2020) found that RFID adoption was low in Nigerian libraries due to these barriers, despite its effectiveness in inventory control.

The use of X-ray Screening Devices (24.32%) had a low adoption rate (σ = 2.83), suggesting significant barriers, likely due to cost and infrastructure. No direct studies confirm this for Nigerian libraries; however, global studies (e.g., Smith, 2019) note that X-ray systems are rare in academic libraries due to expense and user privacy concerns.

The use of Biometric Systems (14.86%) had a very low adoption rate (σ = 1.94), indicating technological and cost barriers. Ogbodo and Nwosu (2023) report minimal biometric use in Nigerian libraries, citing similar constraints.

The use of Robotic Security Systems (5.40%) had a near-absent adoption rate (σ = 0.82), reflecting their novelty and high cost. No Nigerian studies directly address RSS, but Smith (2019) notes their experimental use in wealthier nations, suggesting infeasibility for resource-constrained settings like these FCEs. The low adoption of advanced technologies (RFID, biometrics, RSS) contrasts with global trends in wealthier nations (Smith, 2019), where such systems are more common. This highlights a resource gap in Nigerian academic libraries, as noted by Adebayo et al. (2020).

Table 3. Security Challenges faced in Federal College of Education libraries in North West, Nigeria

S/N	Challenges	**FCE Gusau (9)**		**FCE Kano (16)**		**FCE Bichi (5)**		**FCE Katsina (13)**		**FCE Zaria (28)**		FCE Sokoto (3)		$\bar{x}$	σ
		F	%	F	%	F	%	F	%	F	%	F	%		
1	Financial constraints of libraries	7	77.78	14	87.50	4	80.00	13	100.00	26	92.86	3	100.00	90.54	7.11
2	Lack of photocopying machines to avoid mutilation by Users	5	55.56	7	43.75	5	100.0	10	76.92	18	64.29	2	66.67	63.52	14.69
3	Lack of adequate punishment to serve as a deterrent	6	66.67	8	50.00	3	60.00	12	92.3	22	78.57	1	33.33	70.27	15.22
4	Inadequate library security staff	4	44.44	9	56.25	5	100.00	3	23.08	27	96.43	0	0.00	64.87	21.17
5	Inadequate orientation to users on the use of library resources	7	77.78	11	68.75	2	40.00	8	61.54	20	71.43	1	33.33	66.22	10.80
6	Lack of proper orientation to users on the use of library resources	4	44.44	10	62.50	1	20.00	10	76.92	16	57.14	1	33.33	56.76	13.10
7	Inadequate security patrol in the library	7	77.78	9	56.25	5	100.00	12	92.31	25	89.29	2	66.67	81.08	14.69
8	lack of CCTV and Monitoring System	9	100.00	7	43.75	5	100.00	13	100.00	20	71.43	3	100.00	77.03	21.93
9	lack of Library written security policy to guide staff and users	5	55.56	4	25.00	5	100.0	11	84.62	23	82.14	2	66.67	67.57	18.78
10	Inadequate Ownership Stamps on Security Pages	4	44.44	1	6.25	2	40.00	4	30.77	16	57.14	0	0.00	36.49	20.86

Source: Field Survey, 2024 **Key**: FCE: Federal College of Education, **F= f**requency **%** = Percentage $\bar{x}$ = Mean
σ = Standard Deviation

Table 3 on Security Challenges faced in Federal College of Education libraries in North West, Nigeria, showed that Financial constraints (S/N 1) have the highest weighted mean (90.54%, σ = 7.11), indicating near-universal acknowledgement as a significant challenge. All FCEs report high percentages (77.78%–100%) with low variability, suggesting consistent recognition of funding issues. They are plagued by limited budgets, which restrict investments in security infrastructure, staff, and resources, severely impacting library operations. Adebayo and Iweala (2020) found that inadequate funding is a primary barrier to the adoption of advanced security technologies in Nigerian academic libraries, aligning with the high prevalence of this challenge. Similarly, Isebe (2014) noted that financial constraints limit the implementation of modern library systems in Nigerian colleges, reinforcing this finding.

Similarly, Inadequate security patrol (S/N 7, 81.08%,=14.69) and lack of CCTV/monitoring systems (S/N 8, 77.03 σ =21.93) are significant challenges, with high weighted means but notable variability, particularly due to Sokoto (66.67% for patrols, 100% for CCTV) and Kano (43.75% for CCTV). This shows that the absence of robust security measures, such as patrols and CCTV, increases the risks of theft and mutilation, with variability reflecting uneven infrastructure across FCEs. Okoye and Ugwuanyi (2012) highlighted that insufficient security personnel and technologies, such as CCTV, are familiar in Nigerian academic libraries, corroborating these findings. However, a study by Eze and Uzoigwe (2019) suggests that some institutions prioritise manual security over technological solutions due to cost, which may explain the lower adoption of patrol in Sokoto.

However, a lack of written security policies (S/N 9, 67.57%, σ=18.78) and inadequate or improper orientation to users (S/N 5, 66.22%, σ=10.80; S/N 6, 56.76%, σ=13.10) are moderately prevalent, with moderate to high variability, indicating inconsistent policy implementation and user education. This indicates that without clear policies and a user-oriented approach, libraries struggle to enforce rules and prevent the misuse of resources, particularly in FCEs like Kano and Bichi, where the percentages vary widely. Baro and Eze (2017) found that many Nigerian libraries lack formal security policies, resulting in inconsistent user behaviour management, which supports this finding. Conversely, Ogbodo (2021) argues that orientation programs are often implemented but lack depth, which may explain the moderate prevalence and variability.

Inadequate ownership stamps (S/N 10, 36.49%, σ = 20.86) is the least reported challenge, with high variability (e.g., Sokoto at 0%, Zaria at 57.14%), suggesting it is not a universal concern. This indicates that ownership stamps are a low-cost, traditional method; however, their inconsistent use suggests varying priorities or resource availability across FCEs. Isebe (2014) noted that ownership stamps are less emphasised in modern library security compared to technological solutions, aligning with the low-weighted mean. However, no studies directly contradict this, as stamps are often seen as supplementary rather than primary security measures.

High standard deviations for challenges such as the lack of CCTV (21.93), security staff (21.17), and ownership stamps (20.86) indicate significant variability, driven by outliers (e.g., Sokoto's 0% for security staff and Kano's 6.25% for stamps). By implications, regional disparities in funding, infrastructure, and institutional priorities lead to uneven adoption of security measures and recognition of challenges. Adebayo and Iweala (2020) found regional variations in library funding and infrastructure in Nigeria, supporting the observed variability. Okoye and Ugwuanyi (2012) also noted that northern Nigerian institutions often face greater resource constraints, which may explain Sokoto's low percentages for several challenges.

5. Discussion

The analysis of security measures in Federal Colleges of Education (FCE) libraries, as reported in Table 1, underscores a preference for cost-effective and traditional security solutions due to resource constraints in Nigerian academic institutions. Ownership stamps, with the highest weighted mean of 94.6% (100% in Gusau, Bichi, Sokoto; 93.8% in Kano; 92.3% in Katsina; 92.9% in Zaria), are nearly universally adopted due to their affordability and ease of use, as supported by Okoye and Igbo (2019), who highlight their widespread use in Nigerian libraries for marking and tracking materials. Physical security measures, including security personnel (83.8%) and door protection (81.1%), show high adoption rates (80–92% across most FCEs, except Sokoto at 0% for personnel and 33.3% for door protection), aligning with Sherman and Eck (2006), who emphasise that visible security measures effectively deter theft in public institutions.

Moderate adoption of CCTV (67.6%), security policies (60.8%), burglary protection (59.5%), site planning (58.1%), and barcode systems (55.4%) reflects a balance between cost and utility, with variability (e.g., CCTV: 77.8% in Gusau, 33.3% in Sokoto) due to funding limitations, as corroborated by Isebe (2014), who notes that CCTV adoption in Nigerian libraries is growing but constrained by costs. Advanced technologies, such as RFID and electronic access systems, with adoption rates below 50% (except for Sokoto's 66.7% for RFID), face barriers due to high costs and infrastructure challenges. This is consistent with Ameen and Haider (2017), who confirm limited RFID adoption in developing countries. High standard deviations (e.g., 7.70 for personnel, 7.56 for stamps) indicate variability driven by resource disparities, particularly between Zaria (a large sample of 28) and Sokoto (a small sample of 3), as supported by the World Bank (2007), which highlights infrastructure inequities in Nigerian education—Adejumobi (2006) advocates for standardised security policies to reduce variability and enhance consistency across FCEs.

The analysis of Table 2, detailing strategies for resource protection in Federal Colleges of Education (FCE) libraries in Northwest Nigeria, reveals a clear preference for low-cost, traditional security measures over advanced technological solutions driven by resource constraints. **Monitoring by library staff** (90.54%, σ = 7.52) is the most prevalent strategy, with near-universal adoption (100% in Bichi and Sokoto), reflecting its affordability and ease of implementation, as supported by Omeluzor et al. (2017), who highlight staff monitoring as a primary security measure in Nigerian libraries due to limited resources.

Library-written security policies (85.13%, σ = 7.09) demonstrate strong adoption, indicating a reliance on formal guidelines, consistent with Adebayo et al. (2020), who note that standardised policies enhance security despite enforcement challenges. **Security guards** (74.32%, σ = 6.69) are widely used, except in Sokoto (0%), an outlier likely due to its small sample size (3) or funding issues, aligning with Igiamoh and Abubakar (2021), who confirm guards as common but inconsistently deployed due to budget constraints. **CCTV systems** (68.92%, σ = 6.10) are ordinary but not universal, as supported by Ogbodo and Nwosu (2023), who cite the growing use of CCTV as being limited by installation and maintenance costs. **Photocopying services** (60.81%, σ = 5.54) are moderately adopted to reduce theft, with Omeluzor et al. (2017) noting budget strains as a limiting factor. **Access control mechanisms** (48.65%, σ = 4.73) and **RFID technology** (37.84%, σ = 3.76) are used in limited capacity due to cost and technical barriers, as corroborated by Igiamoh and Abubakar (2021) and

Adebayo et al. (2020), respectively, who highlight these constraints in Nigerian libraries. **X-ray screening devices** (24.32%, σ = 2.83), **biometric systems** (14.86%, σ = 1.94), and **robotic security systems** (5.40%, σ = 0.82) have very low adoption, reflecting high costs and infrastructure challenges, with Smith (2019) noting that such advanced systems are rare in resource-constrained settings like Nigerian FCEs. The low adoption of advanced technologies contrasts with their prevalence in wealthier nations (Smith, 2019), underscoring a resource gap in Nigerian libraries, as emphasised by Adebayo et al. (2020).

Table 3, which presents the challenges of security and measures taken by Federal Colleges of Education in the North West, Nigeria, reveals that the average weighted mean of 67.46% suggests that these challenges are broadly recognised across FCE libraries, with financial constraints, inadequate security patrols, and a lack of CCTV being the most pressing. The high variability in some challenges (e.g., CCTV, security staff) suggests disparities in infrastructure and resource allocation, likely influenced by regional funding differences and institutional priorities. Sokoto's consistently low percentages for specific challenges (e.g., 0% for security staff and ownership stamps) may reflect unique local constraints, such as limited funding or smaller library operations.

The findings align with the broader literature on Nigerian academic libraries. Adebayo and Iweala (2020) emphasise that financial constraints are a systemic issue, limiting investments in technologies such as CCTV and RFID, which supports the high prevalence of financial constraints and the lack of CCTV in this study. Okoye and Ugwuanyi (2012) corroborate the shortage of security staff and patrols, noting that many libraries rely on manual monitoring due to cost barriers. However, Eze and Uzoigwe (2019) suggest that some libraries prioritise manual over technological solutions, which may explain why ownership stamps (a low-cost measure) are less emphasised, as indicated by the low weighted mean for S/N 10.

Disagreement arises in the context of user orientation. Ogbodo (2021) argues that orientation programs exist but lack effectiveness, which aligns with the moderate prevalence of orientation-related challenges (S/N 5, 6) but contrasts with the high variability, suggesting inconsistent implementation across FCEs. No studies directly contradict the low priority of ownership stamps, as they are often seen as outdated compared to modern security measures (Isebe, 2014).

Strategies for effective security implementation in Federal College of Education Libraries in Northwest Nigeria

1. **Electronic Access Control Systems**

   Electronic access control systems represent a sophisticated mechanism for regulating entry to library facilities, resources, and restricted areas. These systems employ programmable plastic access cards to grant authorised individuals entry by automatically unlocking doors. The cost-effective cards can be integrated with software to limit access to specific zones while logging both authorised and unauthorised access attempts, including timestamps and locations (Dogara, Yakubu, & Yakubu, 2022; Oketch, 2019). Such cards can also serve as multifunctional photo identification for library staff or temporary access keys for patrons requiring entry to controlled areas. These systems further support monitoring user attendance, facilitating security patrols, and restricting access to sensitive information and equipment. Collaboration between library administrators and technical experts is crucial for selecting an appropriate electronic access control system tailored to the institution's needs. Additionally, burglar alarm systems, integrated into entry points, utilise electric circuits with switches to detect unauthorised intrusions, such as the opening of doors or windows, triggering audible alerts to deter potential breaches.

2. **Radio-Frequency Identification (RFID) Technology**

   RFID technology is a pivotal tool for enhancing the efficiency, security, and user-friendliness of library operations, particularly in areas such as circulation and theft prevention. Beyond basic security, RFID systems enable the precise tracking of library materials, streamline inventory management, and expedite check-in and check-out processes (Opara, Nsirim, & Irokah, 2023; Gupta & Madhusudhan, 2017). Despite its potential to transform library services, the high cost of implementation and maintenance remains a significant barrier to widespread adoption, particularly in resource-constrained settings.

3. **Biometric Authentication Systems**

   Biometric systems leverage unique physiological and behavioural characteristics—such as fingerprints, retinal patterns, facial recognition, voice, gait, or typing patterns—for secure identification and access control. These systems offer high accuracy due to the distinctiveness of biometric markers, making them increasingly prevalent in library security applications (Gupta & Madhusudhan, 2017). Their inte-

gration ensures robust protection of sensitive resources by verifying user identities with precision and accuracy.

4. **Access Control Mechanisms**

   Access control (AC) systems, encompassing both physical and information security domains, selectively restrict entry to library premises, resources, or data to authorised individuals. Physical access control may involve human oversight (e.g., security personnel), mechanical devices (e.g., locks and keys), or advanced technological solutions, such as electronic keycard systems or mantraps, to regulate entry (Oketch, 2019). These mechanisms ensure that only verified users access restricted areas, safeguarding valuable library assets.

5. **X-ray Security Screening Devices**

   X-ray security machines, regulated by governmental authorities, are employed to screen for prohibited items in library settings. Unlike metal detectors, which use magnetic fields to identify metallic objects, X-ray devices provide detailed imaging to detect a broader range of materials, enhancing security without compromising user safety.

6. **Robotic Security Systems (RSS)**

   Robotic security systems perform automated tasks that enhance library security, offering efficiency, cost-effectiveness, and reliability compared to human labour. These systems can conduct patrols, monitor premises, or manage access control, reducing the burden on staff and improving operational safety.

7. **Electronic Security Infrastructure**

   The integration of information and communication technologies (ICT) has revolutionised library operations, enhancing service delivery but also introducing new security challenges. Inadequate funding for electronic security systems and insufficient staff training have increased vulnerabilities to electronic misdeeds, such as data breaches or unauthorised access (Gupta & Madhusudhan, 2017). This shift has heightened staff responsibilities for monitoring and enforcement, potentially reducing productivity and job satisfaction due to the added policing role.

8. **Closed-Circuit Television (CCTV) Surveillance**

   CCTV systems provide comprehensive surveillance by recording activities across library spaces, supporting monitoring, incident investigation, and deterring unauthorised behaviour. The deployment of CCTV varies by library size and needs, ranging from single-camera setups to extensive networks covering multiple areas, ensuring thorough oversight of diverse operations (Oketch, 2019).

Challenges to Effective Security Implementation in Federal College of Education Libraries in Northwest Nigeria

Several challenges impede effective security implementation in these libraries:

1. Inadequate Funding: Limited budgets significantly restrict the ability to invest in modern security infrastructure, such as closed-circuit television (CCTV) systems, radio-frequency identification (RFID) tags, and other anti-theft technologies, leaving libraries vulnerable to theft and mutilation (Maidabino & Zainab, 2011).
2. Insufficient Training: Librarians lack adequate training in cybersecurity and security management, which diminishes their capacity to address contemporary threats, including cyber-attacks and digital resource vulnerabilities (Igbinovia & Ishola, 2023).
3. Weak Policy Framework: The absence of standardised, comprehensive security policies leads to inconsistent and ad hoc security practices, thereby increasing the risk of resource loss due to inadequate oversight and enforcement (Olajide, 2017).
4. Erratic Power Supply: Unreliable electricity supply disrupts the functionality of electronic security systems, such as surveillance cameras and access controls, rendering them ineffective during power outages and compromising overall security (Khan et al., 2021).

6. Conclusion

This study reveals that security c**hallenges and measures in Federal College of Education Libraries in Northwest Nigeria** are inadequate, with only physical measures moderately practical. Weak policies, insufficient training, limited funding, and erratic power supply exacerbate vulnerabilities, risking resource loss through theft, mutilation, and cyber threats. To address key security challenges in Federal Colleges of Education (FCE) libraries, based on identified challenges with weighted means using the Security Reform Roadmap for FCE Libraries, the study advocates for increased budgetary allocations through government grants and private partnerships to address financial constraints (with a 90.54% prevalence). The findings underscore the need for holistic security strategies that integrate physical, electronic, and administrative measures. By implementing the recommended interventions, these libraries can enhance resource protection, ensuring their role as vital academic assets. Future research should explore the perspectives of library users and the cost-effectiveness of proposed security technologies in similar contexts.

Recommendations

To address these challenges, the following recommendations are proposed:

1. Increase Budget Allocations for the Purchase of CCTVs: Federal and state governments should prioritise dedicated funding for library security, enabling investments in advanced infrastructure, such as CCTV, RFID systems, and biometric access controls, to deter theft and unauthorised access. The Library Management and IT department, in collaboration with library staff, should Install CCTV systems in high-traffic FCEs (e.g., Zaria, Katsina) and explore open-source monitoring tools to address the lack of CCTV (prevalence rate: 77.03%).
2. Implementation of Regular Training Programs: Libraries, through Tertiary Education Trust Fund (TETFund) sponsorships, could organise in-house periodic workshops, programs, and certification courses on cybersecurity, physical security management, and emerging threats, equipping librarians with the skills needed to protect both physical and digital resources effectively. Library Management must ensure that their staff participate in mandatory workshops and digital tutorials to improve user orientation (prevalence rates of 66.22% and 56.76%), with a focus on resource handling. Additionally, there is a need for these Libraries to conduct quarterly reviews to assess progress, using feedback surveys and incident reports to evaluate effectiveness and improve the security of the library collection.
3. Development and Enforcement of Standard Security Policies: Nigerian Ministry of Education, in collaboration with Tertiary Institutions scholars and the Federal Executive Council (FEC), could establish standardised security policies in line with Global Standards for all Nigerian Libraries for resource protection, incident reporting, and staff responsibilities, ensuring consistent and proactive security practices across all libraries.
4. Adoption of Alternative Power Solutions: Library administrators, in partnership with the Ministry of Energy, could invest in renewable energy sources, such as solar panels or backup generators, to provide a stable power supply for all Nigerian libraries, ensuring uninterrupted operation of electronic security systems during outages.
5. Public-Private Partnerships: Private firms, such as the Dangote Group of Companies and Foundations, could collaborate with private organisations and technology firms to provide funds for capital projects, technical expertise, and equipment donations for modern security systems, thereby reducing the financial burden on public institutions and enhancing resource protection.

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