



## The Effect of Health Information Systems Management on Healthcare Delivery in Northern Nigerian Tertiary Hospitals



Muhammad M. Adam<sup>1\*</sup>, Sulaiman Salisu<sup>2</sup> & Haruna Hahaya<sup>3</sup>

<sup>1,2,3</sup>Department of Health Information Management. Federal Polytechnic Daura

\*Corresponding Author Email: [muhammadmadam1989@gmail.com](mailto:muhammadmadam1989@gmail.com)

### ABSTRACT

This study investigated the influence of Health Information Systems (HIS) management on healthcare delivery within tertiary hospitals in Northern Nigeria. The research specifically examined how HIS management—conceptualized through data quality, system reliability, and staff competence—affects service efficiency, clinical decision-making, and overall quality of care. Adopting a descriptive cross-sectional survey design, primary data were elicited from a sample of 300 healthcare professionals, yielding 284 valid responses for analysis. Data were analyzed using descriptive statistics, Pearson Product-Moment Correlation, and Multiple Regression analysis. Findings revealed a strong significant positive relationship between HIS management and healthcare delivery ( $r = 0.68$ ,  $p < 0.05$ ). Regression results further indicated that HIS management is a significant predictor of service quality improvements, accounting for 54% of the variance ( $R^2 = 0.54$ ). Despite these benefits, the study identified critical bottlenecks, including dilapidated ICT infrastructure, erratic power supply, chronic underfunding, and specialized training gaps. The study concludes that robust HIS management is a non-negotiable catalyst for optimizing healthcare outcomes in Northern Nigeria. It recommends targeted investment in resilient power solutions and continuous professional ICT development for medical personnel.

### Keywords:

Healthcare Delivery,  
Health Information  
Systems (HIS),  
Northern Nigeria,  
Service Efficiency,  
Tertiary Hospitals.

### INTRODUCTION

This study is anchored on the Technology Acceptance Model (TAM) and Socio-Technical Systems Theory. The Technology Acceptance Model, developed by Fred Davis, posits that perceived usefulness and perceived ease of use influence individuals' acceptance and utilization of information systems. In the context of tertiary hospitals, health professionals are more likely to effectively use Health Information Systems (HIS) when they perceive them as beneficial and user-friendly. This directly affects service efficiency and clinical decision-making.

Socio-Technical Systems Theory further emphasizes that the performance of an information system depends on the interaction between technological infrastructure and human or organizational factors. Effective HIS management therefore requires alignment between system design, staff competence, institutional policies, and infrastructural support. These theories collectively provide a framework for understanding how HIS management practices influence health care delivery outcomes.

In an ideal healthcare setting, the integration of Health Information Systems (HIS) is expected to act as a backbone for seamless data retrieval, accurate clinical decision-making, and high-speed service delivery. However, in many tertiary hospitals across Northern Nigeria, this ideal remains elusive. Despite the global shift toward digitalization, healthcare delivery in the region is still plagued by fragmented data management and a heavy reliance on manual processes that are prone to human error.

The core of the problem lies in the disconnect between the deployment of HIS and the actual management of its components—specifically data quality, system reliability, and staff competence. While some hospitals have acquired basic hardware, the lack of consistent system reliability and poor data integrity has led to delayed diagnoses and administrative bottlenecks. Furthermore, there is a visible gap in staff technical proficiency, which often leads to "technology rejection" or underutilization of existing systems.

Previous studies have focused on the general adoption of ICT in Nigeria,

but there is a dearth of empirical evidence specifically linking HIS management dimensions to service efficiency in the unique socio-economic and infrastructural context of Northern Nigerian tertiary hospitals. If these management challenges—compounded by erratic power supply and underfunding—are not addressed, the healthcare system in the region risks total collapse in efficiency, leading to increased mortality rates and diminished patient trust. This study, therefore, seeks to fill this gap by evaluating how effective HIS management can be leveraged to optimize healthcare. Empirical studies have demonstrated the positive relationship between HIS and health care delivery outcomes. For instance, Ojo and Popoola (2015) found that effective electronic health information systems significantly improved operational efficiency in Nigerian teaching hospitals. Similarly, Nwankwo and Sambo (2018) reported that training of health workers enhanced data management practices and improved reporting accuracy. More recently, Olukorode et al. (2024) observed that electronic medical record systems contributed to better clinical documentation and reduced medical errors in Nigerian hospitals.

However, most of these studies focused primarily on system adoption and infrastructure rather than examining how specific dimensions of HIS management influence measurable health care delivery outcomes, particularly in Northern Nigerian tertiary hospitals.

#### Research Gap

Although previous studies have examined Health Information Systems implementation in Nigeria, limited empirical research has specifically investigated how distinct HIS management dimensions—such as data quality, system reliability, and staff competence—directly affect health care delivery outcomes in Northern Nigerian tertiary hospitals. Existing research largely emphasizes adoption levels and infrastructural challenges without clearly linking management practices to service efficiency and quality of care indicators. This study seeks to fill this gap by providing empirical evidence on the relationship between HIS management and health care delivery performance within the Northern Nigerian tertiary hospital context.

#### Justification for Variable Selection

The selection of data quality, system reliability, and staff competence as dimensions of HIS management is informed by both theory and prior empirical findings. Data quality is fundamental because accurate and timely information supports effective clinical decisions and administrative planning. System reliability is essential to ensure consistent access to patient records and minimize service disruption. Staff competence is critical since the effectiveness of any information system depends largely on users' skills and capacity to utilize it properly. Together, these variables represent key managerial components that determine the success of HIS and their

impact on health care delivery outcomes such as service efficiency, clinical accuracy, and patient satisfaction.

Health Information Systems (HIS) play a pivotal role in modern healthcare delivery by ensuring that accurate, timely, and relevant information flows through the healthcare chain to guide clinical practice and administrative decision-making. HIS compass electronic medical records, patient registration systems, data analysis platforms, reporting tools, and other digital mechanisms used for capturing, storing, retrieving, and transmitting health data. These systems are essential for effective planning, monitoring, evaluation, and resource allocation within health institutions.

Across the globe, well-managed health information systems have helped improve patient outcomes, reduce clinical errors, streamline administrative workflows, and strengthen public health responses. In many developed countries, HIS are integrated into routine hospital functions and are widely acknowledged as a drivers of improved quality care. However, in developing regions like Northern Nigeria, tertiary hospitals continue to grapple with several challenges related to HIS performance — including infrastructure deficits, inconsistent data quality, limited technical capacity, and poor system maintenance.

Northern Nigerian tertiary hospitals serve as referral centers for specialized medical care and handle large patient volumes. These hospitals are expected to deliver high standards of healthcare, but effective service delivery is often hindered by weak information management practices that disrupt communication among departments, delay clinical decisions, and lead to sub-optimal utilization of limited resources. For example, inaccurate or incomplete health records can affect diagnoses and treatment plans, while irregular reporting systems may compromise planning and policy formulation at administrative levels.

Understanding how HIS management influences healthcare delivery in Northern Nigerian tertiary hospitals is crucial for identifying bottlenecks and opportunities for improvement. It is equally important for stakeholders at institutional and governmental levels to recognize how strengthening HIS can enhance evidence-based practice, improve patient satisfaction, and support overall health system performance.

Despite ongoing efforts to digitize and strengthen health information systems in Nigeria, tertiary hospitals in the northern region continue to report challenges that undermine the effectiveness of healthcare delivery. Some of these challenges include inconsistent data capture, frequent system downtime, poor health record accuracy, and inadequate staff training on HIS use. These issues often lead to delays in clinical decision-making, limited access to patient histories, reduced ability to monitor treatment outcomes, and inefficient allocation of scarce healthcare resources.

While previous studies have explored HIS implementation in various regions, there remains limited empirical evidence on the specific effects of HIS management on healthcare outcomes in Northern Nigerian tertiary hospitals. Without such evidence, hospital administrators and policy makers lack clear guidance on the key areas where interventions will have the greatest impact. This research seeks to fill that gap by examining how health information system management — including data quality, system reliability, and user competence — affects healthcare delivery outcomes in tertiary hospital settings.

**MATERIALS AND METHODS**

**Research Design and Study Area**

This study adopted a **descriptive cross-sectional survey design**. The study area was Northern Nigeria, specifically targeting tertiary hospitals with established HIS infrastructure. The target population consisted of Doctors, Nurses, Health Records Officers, and IT Staff.

**Sample and Instrumentation**

A sample size of 300 participants was determined using the Taro Yamane formula. A **purposive sampling technique** was utilized, resulting in **284 valid responses** (94.7% rate). The primary tool was the "HIS Management and Healthcare Delivery Questionnaire (HISMHDQ)," using a 4-point Likert Scale.

**Validity, Reliability, and Analysis**

Face and content validity were ensured via expert peer review. Reliability was established through a pilot study using **Cronbach’s Alpha** (coefficient of 0.79). Data were analyzed using **IBM SPSS Version 26.0** using both descriptive statistics and inferential tools (PPMC and Multiple Regression).

**RESULTS AND DISCUSSION**

Frontline workers, primarily Nurses (34.5%) and Doctors (25.4%), formed the bulk of respondents. Most (55.6%) use Electronic Health Records (EHR).

- **Hypothesis 1:** A significant positive relationship was found between HIS management and service efficiency ( $r = 0.68, p < 0.05$ ).
- **Hypothesis 2:** Regression analysis revealed that HIS management significantly predicts quality of care ( $R^2 = 0.54, F = 72.31, p = 0.000$ ).

Data are presented using tables, frequencies, percentages, mean scores, and inferential statistical results in line with the research objectives and hypotheses.

**Demographic Characteristics of Respondents**

Table 1. Distribution by Professional Category

Profession	Frequency	Percentage (%)
Medical Doctors	72	25.4
Nurses	98	34.5
Health Information Managers	54	19.0
ICT Personnel	28	9.9
Hospital Administrators	32	11.3
<b>Total</b>	<b>284</b>	<b>100</b>

**Interpretation:**

The table shows that nurses constituted the largest proportion of respondents (34.5%), followed by medical doctors (25.4%). This indicates that frontline healthcare workers formed a significant part of the study, providing relevant insights into healthcare delivery processes.

Table 2. Distribution by Years of Work Experience

Years of Experience	Frequency	Percentage (%)
1–5 years	64	22.5
6–10 years	91	32.0
11–15 years	73	25.7
Above 15 years	56	19.8
<b>Total</b>	<b>284</b>	<b>100</b>

**Interpretation:**

Most respondents (32.0%) had 6–10 years of experience, indicating adequate exposure to hospital information systems and service delivery processes.

**Availability and Structure of Health Information Systems**

Table 3. Availability of Functional HIS in the Hospital

Response	Frequency	Percentage (%)
Yes	246	86.6
No	38	13.4
<b>Total</b>	<b>284</b>	<b>100</b>

**Interpretation:**

A large majority (86.6%) confirmed the availability of functional Health Information Systems (HIS) in their hospitals, indicating that tertiary institutions in Northern Nigeria have largely adopted formal information management structures.

Table 4. type of Health Information System Used

Type of System	Frequency	Percentage (%)
Manual (Paper-based)	41	14.4
Electronic Health Records (EHR)	158	55.6
Hybrid (Manual + Electronic)	85	29.9
<b>Total</b>	<b>284</b>	<b>100</b>

**Interpretation:**

More than half of the respondents (55.6%) indicated that their hospitals primarily use Electronic Health Records (HER) while 29.9% reported a hybrid system. This suggests ongoing digital transformation in tertiary hospitals.

Effect of HIS Management on Healthcare Delivery

Respondents were asked to rate statements on a 5-point Likert scale. Mean scores above 3.0 were interpreted as agreement.

Table 5. HIS and Service Efficiency

Statement	Mean	Std. Dev.
HIS reduces patient waiting time	3.89	0.94
HIS improves appointment scheduling	4.02	0.88
HIS enhances coordination between departments	3.76	1.01

**Interpretation:**

All mean scores exceed 3.0, indicating that effective HIS management positively influences service efficiency, especially appointment scheduling (Mean = 4.02).

Table 6. HIS and Clinical Decision-Making

Statement	Mean	Std. Dev.
HIS improves access to patient history	4.21	0.79
HIS supports accurate diagnosis	3.95	0.91
HIS reduces medical errors	3.83	0.97

**Interpretation:**

Respondents agreed that HIS significantly enhances clinical decision-making. The highest mean (4.21) was recorded for improved access to patient history, suggesting strong impact on clinical continuity.

Table 7. HIS and Quality of Care

Statement	Mean	Std. Dev.
HIS improves overall quality of care	4.05	0.86
HIS increases patient satisfaction	3.74	0.93
HIS enhances data accuracy	4.18	0.82

**Interpretation:**

The findings indicate that proper HIS management contributes to improved quality of care, particularly in enhancing data accuracy (Mean = 4.18).

Challenges Affecting Effective HIS Management

Table 8. Major Challenges

Challenge	Mean	Interpretation
Inadequate ICT infrastructure	4.22	Major Challenge
Poor staff training	3.88	Moderate Challenge
Power supply instability	4.31	Major Challenge
Resistance to change	3.41	Moderate Challenge
Insufficient funding	4.15	Major Challenge

**Interpretation:**

Power supply instability (Mean = 4.31) emerged as the most critical challenge, followed by inadequate ICT infrastructure and insufficient funding. This reflects infrastructural and financial constraints affecting effective HIS utilization.

Hypothesis One

**H<sub>01</sub>:** There is no significant relationship between HIS management and healthcare service efficiency.

Using Pearson Correlation analysis:

- $r = 0.68$
- $p\text{-value} = 0.000$

Since  $p < 0.05$ , the null hypothesis is rejected.

**Conclusion:** There is a significant positive relationship between HIS management and healthcare service efficiency.

Hypothesis Two

**H<sub>02</sub>:** HIS management does not significantly influence quality of healthcare delivery.

Using Multiple Regression analysis:

- $R^2 = 0.54$
- $F = 72.31$
- $p = 0.000$

Since  $p < 0.05$ , the null hypothesis is rejected.

**Conclusion:** HIS management significantly predicts and influences quality of healthcare delivery. Approximately 54% of variations in healthcare delivery quality are explained by HIS management variables.

The findings indicate that effective management of Health Information Systems significantly improves healthcare delivery in Northern Nigerian tertiary hospitals.

Key outcomes include:

- Improved service efficiency and reduced waiting time
- Enhanced clinical decision-making through better access to patient data
- Increased data accuracy and improved quality of care
- Significant positive statistical relationship between HIS management and healthcare performance

However, infrastructural challenges such as unstable power supply, limited funding, and inadequate ICT facilities hinder optimal performance.

Overall, the study demonstrates that while HIS adoption is progressing in Northern Nigerian tertiary hospitals, strengthening infrastructure, funding, and staff capacity is necessary to maximize benefits.

## CONCLUSION

This study investigated the effect of Health Information Systems (HIS) management on health care delivery in Northern Nigerian tertiary hospitals. The conclusions below are explicitly linked to the research objectives and hypotheses:

1. **Availability and Structure of HIS (Objective 1 / Hypothesis 1):** Most tertiary hospitals in Northern Nigeria have functional HIS, with electronic and hybrid systems predominating. The study confirms that effective HIS management significantly improves service

efficiency, supporting Hypothesis One ( $r = 0.68$ ,  $p < 0.001$ ).

2. **Effect on Service Efficiency (Objective 2 / Hypothesis 1):** HIS management positively influences patient waiting time, appointment scheduling, and departmental coordination. This demonstrates that management of data quality, system reliability, and staff competence enhances operational efficiency.
3. **Effect on Clinical Decision-Making and Quality of Care (Objective 3 / Hypothesis 2):** Regression results indicate that HIS management significantly predicts health care delivery quality ( $R^2 = 0.54$ ,  $p < 0.001$ ). Improved access to patient records, reduction of medical errors, and higher data accuracy were observed, confirming Hypothesis Two.
4. **Challenges to Effective HIS Implementation (Objective 4):** Infrastructural and human resource constraints, including unstable power supply, inadequate ICT infrastructure, insufficient funding, and limited staff training, continue to limit HIS performance.

## Key Contributions:

This study provides empirical evidence linking HIS management dimensions—data quality, system reliability, and staff competence—to health care delivery outcomes in Northern Nigerian tertiary hospitals. It extends existing literature by moving beyond system adoption to evaluate **management practices as determinants of service efficiency, clinical decision-making, and quality of care.**

## Policy and Practical Implications:

- Hospital administrators should invest in ICT infrastructure and ensure reliable power supply to optimize HIS performance.
- Continuous staff training programs are essential to improve competence and data management skills.
- Policymakers should develop clear guidelines and standard operating procedures for HIS implementation, monitoring, and evaluation to strengthen health service delivery.

Future research could be carryout on the following:

- Conduct longitudinal studies to assess long-term effects of HIS management on health care outcomes

- Compare HIS management effectiveness between Northern and Southern Nigerian tertiary hospitals

Examine patient perspectives and cybersecurity/data protection practices in HIS implementation

#### REFERENCE

Adebayo, T. T., & Orimoloye, E. S. (2018). Health information management – A tool for effective health care delivery in Nigeria: The Mother and Child Hospital experience. *Journal of Information Science*, 25, 283–294.

Ajobiwe, D. N., Ojo, A. I., & Olukorode, O. (2022). Utilization of health information system to enhance health-care delivery in Nigeria. *International Journal of Computer Science and Mobile Applications*.

Eniojukan, J. F. (2024). Information technology in health care delivery: An overview. *West African Journal of Pharmacy*, 35(1).

Hanifah, A. (2022). *Health information systems (HIS) adoption success factors in Nigeria* (Master's thesis). International Islamic University Malaysia.

Nwankwo, B., & Sambo, M. N. (2018). Can training of health care workers improve data management practice in health management information systems: A case study of primary health care facilities in Kaduna state, Nigeria. *Pan African Medical Journal*, 30, 289. <https://doi.org/10.11604/pamj.2018.30.289.15802>

Odunlade, R. O., & Ojo, J. O. (2019). Information systems in health care delivery services: A case study of selected academic medical centres in Lagos State, Nigeria. *Unilag Journal of Humanities*, 3(1), 34–46.

Ojo, A. I., & Popoola, S. O. (2015). Some correlates of electronic health information management system success in Nigerian teaching hospitals. *BioMed Central Information Technology for Development*, 7(1), 1–9. <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4426943/>

Olukorode, O., Ajobiwe, D. N., & Ojo, A. I. (2024). Impact of electronic medical records on healthcare delivery in Nigeria: A review. *PMC*, 39269927