
KNOWLEDGE AND ATTITUDE OF HEALTH INFORMATION MANAGEMENT PROFESSIONALS TOWARDS HEALTH DATA UTILIZATION IN TERTIARY HEALTHCARE INSTITUTIONS IN ONDO STATE, NIGERIA

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ABSTRACT

Background: Health data utilization is fundamental to evidence-based healthcare delivery, planning, and policy formulation. Despite growing investment in health information systems in Nigeria, routine utilization of health data remains suboptimal. This study assessed the knowledge, attitude, and organizational factors influencing health data utilization among Health Information Management (HIM) professionals in three tertiary healthcare institutions in Ondo State, Nigeria.

Methods: A descriptive cross-sectional survey was conducted among HIM professionals at Federal Medical Centre, Owo; University of Medical Sciences Teaching Hospital, Ondo; and Federal University of Technology Akure Teaching Hospital. From an accessible population of 160, a minimum sample of 115 was calculated using the Yamane formula and inflated by 10% for non-response, yielding a target of 127, proportionately allocated and selected by stratified random sampling. A structured, validated, self-administered questionnaire (Cronbach's alpha 0.866–0.923) captured socio-demographic characteristics, knowledge, attitude, organizational factors, and health data utilization. Of 127 questionnaires distributed, 106 were retrieved complete (response rate 83.5%) and analysed in R (version 4.5.0) using descriptive statistics, Pearson's correlation, and multiple linear regression ($\alpha=0.05$).

Results: Respondents demonstrated good knowledge (99.1%; mean=4.46±0.36), positive attitude (99.1%; mean=4.65±0.37), and good utilization practices (99.1%; mean=4.51±0.39) within a broadly supportive organizational environment (mean=4.53±0.41). All inter-variable

correlations were positive and significant ($p < 0.001$), including knowledge–utilization ($r = 0.662$) and attitude–utilization ($r = 0.740$). Knowledge, attitude, and organizational factors jointly and significantly predicted utilization ($F(3,102) = 46.95$, $p < 0.001$; $R^2 = 0.580$); attitude ($\beta = 0.487$, $p < 0.001$) and organizational factors ($\beta = 0.182$, $p = 0.031$) were significant independent predictors, while knowledge was not independently significant after adjustment ($\beta = 0.202$, $p = 0.097$).

Conclusion: HIM professionals in these institutions possess adequate knowledge and favourable attitudes, but attitude and organizational support — not knowledge alone — independently drive routine health data utilization. Strengthening continuous professional development, digital infrastructure, and management support is recommended.

KEYWORDS: Health Information Management; Health Data Utilization; Knowledge; Attitude; Tertiary Healthcare Institutions; Nigeria.

1. INTRODUCTION

Reliable health information underpins clinical care, healthcare management, policy formulation, and public health surveillance, and is recognised by the World Health Organization as one of six essential building blocks of a functioning health system [1]. Globally, advances in electronic health records, hospital information systems, and clinical decision-support tools have improved the accessibility and quality of health information, reducing medical errors and promoting evidence-based practice [2]. However, the availability of health data does not by itself guarantee improved outcomes: data become valuable only when systematically analysed and applied to decision-making, a process termed health data utilization [1].

Across sub-Saharan Africa, and in Nigeria specifically, substantial investment has been directed at strengthening national health information systems — including the National Health Management Information System and the District Health Information Software (DHIS2), coordinated by the Federal Ministry of Health and Social Welfare [3]. Despite these reforms, evidence suggests that much of the health data routinely collected in Nigerian healthcare institutions serves primarily to satisfy statutory reporting obligations rather than to guide institutional decision-making, so that opportunities to improve healthcare quality and organizational efficiency are frequently missed.

The effectiveness of any health information system depends not only on technological infrastructure but on the competence and disposition of the Health Information Management

(HIM) professionals responsible for managing that information. Knowledge — understanding of health information systems, data quality, and evidence-based practice — and attitude — professionals' beliefs and willingness to apply that knowledge — are widely recognised as central, interrelated determinants of whether available data are actually utilised, alongside organizational factors such as ICT infrastructure, electricity supply, and management support [4].

In Ondo State, South-West Nigeria, the Federal Medical Centre, Owo; the University of Medical Sciences Teaching Hospital, Ondo; and the Federal University of Technology Akure Teaching Hospital occupy strategic positions as major referral and teaching institutions generating substantial health information daily. Although these institutions have progressively adopted digital health technologies, relatively few Nigerian studies have specifically examined HIM professionals' own knowledge and attitude — as distinct from health workers in general or technological infrastructure alone — as determinants of health data utilization within this specific institutional context. This study addressed that gap by assessing the knowledge, attitude, and organizational factors influencing health data utilization among HIM professionals in the three selected institutions.

2. Statement of the Problem

Nigerian tertiary healthcare institutions generate large volumes of clinical and administrative health data daily, yet routine utilization of this information for decision-making, quality improvement, and planning remains inconsistent. Where health data are utilised, this tends to be concentrated on statutory reporting and clinical purposes, with comparatively weaker application to internal operational problem-solving and management decision-making — a pattern that limits the return on investment in health information system infrastructure and constrains evidence-based institutional governance.

Existing Nigerian literature has predominantly examined either the technological determinants of health information system adoption (e.g., ICT infrastructure, electronic health record functionality) or the knowledge and attitudes of health workers in general, without isolating the specific contribution of Health Information Management professionals — the cadre formally trained and mandated to manage health information — nor examining how their knowledge, attitude, and perceived organizational environment jointly and independently predict actual utilization behaviour. Without this evidence, institutional and professional-regulatory interventions risk being misdirected — for instance, prioritising knowledge-focused training where attitude or organizational barriers are in fact the binding

constraint. This study therefore investigated the knowledge, attitude, and organizational factors associated with health data utilization among HIM professionals in three tertiary healthcare institutions in Ondo State, to generate institution-specific, actionable evidence for this gap.

Objectives of the Study

The specific objectives were to: (i) determine the level of knowledge of HIM professionals regarding health data utilization; (ii) examine their attitude toward health data utilization; (iii) identify organizational factors influencing health data utilization; (iv) determine the relationship between knowledge and health data utilization; (v) determine the relationship between attitude and health data utilization; and (vi) determine whether knowledge, attitude, and organizational factors jointly and independently predict health data utilization.

Research Hypotheses

The following null hypotheses were tested at the 5% level of significance:

H01: There is no statistically significant relationship between the knowledge of HIM professionals and health data utilization.

H02: There is no statistically significant relationship between the attitude of HIM professionals and health data utilization.

H03: Knowledge, attitude, and organizational factors do not jointly and independently predict health data utilization among HIM professionals.

3. Theoretical Framework

This study was guided by four complementary theories. The Technology Acceptance Model (TAM) proposes that behavioural intention to use a technology is shaped by perceived usefulness and perceived ease of use [5]; a healthcare-specific review confirmed perceived usefulness as a consistent predictor of health information technology use, moderated by organizational and workflow factors [6]. The Knowledge–Attitude–Practice (KAP) model proposes that knowledge shapes attitude, which in turn shapes practice, though methodological reviews caution this sequence is rarely as linear as assumed, since organizational context also shapes whether knowledge translates into behaviour [7]. The DeLone and McLean Information Systems Success Model holds that system quality, information quality, and service quality jointly shape user satisfaction and system use [8,9], directing attention to information-system characteristics alongside individual knowledge and attitude. The Health Belief Model proposes that behaviour is influenced by perceived

susceptibility, severity, benefits, barriers, cues to action, and self-efficacy [10,11], helping explain why professionals with similar knowledge might differ in data-use behaviour depending on perceived risk, benefit, and confidence. Together, these theories informed a conceptual framework in which knowledge and attitude are treated as independent variables and health data utilization as the dependent variable, moderated by organizational factors.

4. METHODS

4.1 Study Design and Setting

A descriptive cross-sectional survey design was adopted [12], conducted at three tertiary healthcare institutions in Ondo State: Federal Medical Centre (FMC), Owo; University of Medical Sciences Teaching Hospital (UNIMEDTH), Ondo; and Federal University of Technology Akure Teaching Hospital (FUTATH), Akure, each maintaining a functional HIM department.

4.2 Population and Sample Size

The accessible population comprised 160 HIM professionals: FMC Owo (70), UNIMEDTH (50), and FUTATH (40) (Table 1). The minimum sample size was determined using the Yamane [13] formula, $n = N / (1 + N(e)^2)$, with $N = 160$ and $e = 0.05$, giving $n = 114.28$, rounded to 115; a further 10% (12) was added for non-response, yielding a target of 127, proportionately allocated by institution (Table 2) and selected by stratified random sampling.

Table 1: Accessible Study Population by Institution.

Institution	Population
Federal Medical Centre, Owo	70
University of Medical Sciences Teaching Hospital, Ondo	50
Federal University of Technology Akure Teaching Hospital	40
Total	160

Table 2: Proportionate Allocation of the Target Sample. (n=127)

Institution	Population	%	Sample
FMC Owo	70	43.75	55
UNIMEDTH Ondo	50	31.25	40
FUTATH Akure	40	25.00	32
Total	160	100.00	127

4.3 Eligibility, Instrument, and Data Collection

Eligible participants were qualified HIM professionals employed for at least six months and directly involved in health information management; interns, staff on leave, and non-HIM professionals were excluded. Data were collected using a structured, self-administered

questionnaire with five sections: socio-demographic characteristics; knowledge (15 items, correct=1/incorrect=0); attitude (15 items, five-point Likert); organizational factors (10 items, five-point Likert); and health data utilization (15 items, five-point Likert). Content validity was established by expert review; internal consistency (Cronbach's alpha) ranged from 0.866 to 0.923 (Table 9) [14,15]. Following ethical approval, questionnaires were administered in person after written informed consent; of 127 distributed, 106 were retrieved complete and analysed, a response rate of 83.5%.

4.4 Data Analysis

Data were analysed in R (version 4.5.0). Likert responses were coded 1–5 (negatively worded items reverse-coded) and summed into composite scores for knowledge, attitude, organizational factors, and utilization. Descriptive statistics summarised socio-demographic characteristics and composite variables; distributional assumptions were assessed via skewness and kurtosis. Pearson's correlation examined bivariate relationships, and multiple linear regression identified independent predictors of utilization, adjusting simultaneously for knowledge, attitude, and organizational factors. Significance was set at $p < 0.05$.

4.5 Ethical Considerations

Ethical approval was obtained from the appropriate Health Research Ethics Committee, with administrative permission from each institution's management. Participation was voluntary with written informed consent; no personal identifiers were collected, and the study complied with the Declaration of Helsinki [16].

5. RESULTS

5.1 Socio-demographic Characteristics

Of 106 respondents (83.5% response rate), most were female, married, aged 30–49 years, held at least a bachelor's degree, occupied the HIM/Senior HIM Officer cadre, and had 5–10 years' experience (Table 3).

Table 3: Socio-demographic Characteristics of Respondents. (N=106)

Variable	Category	n	%
Gender	Female	86	81.1
	Male	20	18.9
Age (years)	20–29	13	12.3
	30–39	48	45.3
	40–49	42	39.6
	50–59	3	2.8
	60–69	0	0.0
Marital status	Married	89	84.0
	Single	15	14.2

	Divorced	1	0.9
	Widowed	1	0.9
Education	B.Sc./B.Tech.	54	50.9
	Diploma	32	30.2
	HND	11	10.4
	Master's	8	7.5
	PhD	1	0.9
Cadre	HIM Officer	50	47.2
	Senior HIM Officer	23	21.7
	Chief HIM Officer	10	9.4
	Assistant HIM Officer	9	8.5
	Assistant Director	7	6.6
	Principal HIM Officer	6	5.7
	Deputy Director	1	0.9
Experience	<5 years	24	22.6
	5–10 years	55	51.9
	11–15 years	7	6.6
	16–20 years	17	16.0
	>20 years	3	2.8

5.2 Knowledge, Attitude, Utilization, and Organizational Factors

Table 4 summarises the classification and descriptive statistics of the four composite study variables. Nearly all respondents demonstrated good knowledge (99.1%), positive attitude (99.1%), and good utilization (99.1%), within organizational environments universally (100%) perceived as supportive. Attitude recorded the highest mean (4.65 ± 0.37), followed by organizational factors (4.53 ± 0.41), utilization (4.51 ± 0.39), and knowledge (4.46 ± 0.36). Skewness (-0.47 to -1.25) and kurtosis (-0.57 to 1.33) indicated a ceiling effect — responses concentrated toward the higher end of each scale — without substantial departure from approximate normality, supporting the use of Pearson's correlation and linear regression.

Table 4: Classification and Descriptive Statistics of Composite Study Variables. (N=106)

Variable	Good/Positive %	Mean	SD	Min–Max	Skewness	Kurtosis
Knowledge	99.1	4.46	0.36	3.43–5.00	–0.96	0.24
Attitude	99.1	4.65	0.37	3.13–5.00	–1.25	1.33
Health Data Utilization	99.1	4.51	0.39	3.27–5.00	–0.47	–0.57
Organizational Factors	100.0	4.53	0.41	3.20–5.00	–0.57	–0.54

Item-level detail is presented in Tables 5–8. For knowledge (Table 5), the highest-rated items concerned confidentiality (mean=4.72) and the importance of health data for clinical decision-making (mean=4.71); no respondent disagreed on any item.

Table 5: Knowledge of Health Data Utilization — Selected Items. (N=106)

Knowledge Statement	SA+A %	Mean
Health data are important for clinical decision-making.	100.0	4.71
Confidentiality is essential in Health Information Management.	100.0	4.72
Health data are useful for monitoring and evaluation.	100.0	4.70
Health information systems improve healthcare delivery.	100.0	4.68
Proper documentation improves health service delivery.	100.0	4.68
Accurate health data improve patient care.	100.0	4.67
Health data utilization enhances healthcare quality.	100.0	4.67
Timely health data support evidence-based decision-making.	100.0	4.66
Data quality is essential for effective health information management.	100.0	4.66
Health data support disease surveillance activities.	100.0	4.65
Electronic health records improve service delivery.	100.0	4.65
Health data are useful for healthcare planning.	100.0	4.64
Health information is essential for policy formulation.	100.0	4.64
Health data support programme evaluation.	100.0	4.63
Health data are useful for research purposes.	100.0	4.69

Key: SA = Strongly Agree; A = Agree. Full item-level frequency distributions (SA/A/U/D/SD) are available from the corresponding author on reasonable request.

Table 6 (attitude) shows the highest ratings for willingness to attend further training (mean=4.74) and commitment to accurate documentation (mean=4.74); poor internet connectivity as a discouraging factor recorded the lowest mean (4.47), though still an agreement majority.

Table 6: Attitude toward Health Data Utilization — Selected Items. (N=106)

Attitude Statement	SA+A %	Mean
I am willing to attend training on health data utilization.	100.0	4.74
I always ensure accurate documentation.	99.1	4.74
Health data utilization should be encouraged in all hospitals.	99.1	4.73
Regular training improves health data utilization.	98.1	4.73
Electronic health information systems make my work easier.	99.1	4.69
Health data should guide management decisions.	100.0	4.69
I believe health data improve patient care.	100.0	4.66
I support the digitalization of health records.	98.1	4.64
I am willing to adopt new health information technologies.	99.1	4.62
I enjoy using health information for decision-making.	100.0	4.62
I feel motivated to use health data in my daily work.	99.1	4.62
Health data utilization should be mandatory for HIM professionals.	98.1	4.61
Overall, I have a positive attitude toward health data utilization.	99.1	4.56
Management supports effective use of health information.	99.1	4.54
Poor internet discourages health data utilization.	96.2	4.47

Table 7 (utilization) shows the strongest reported practices for disease surveillance (mean=4.67) and improving patient care (mean=4.66); using data to solve departmental operational problems was weakest (mean=4.19).

Table 7: Health Data Utilization Practices — Selected Items. (N=106)

Utilization Practice	SA+A %	Mean
Health data are used for disease surveillance.	100.0	4.67
Health data are used to improve patient care.	100.0	4.66
Health statistics are generated regularly.	99.1	4.63
Health data are used for hospital planning.	99.1	4.61
Electronic systems improve health data utilization.	100.0	4.56
Research activities utilize hospital health data.	99.1	4.58
I use health data during decision-making.	97.2	4.53
Health data are used in monitoring and evaluation.	99.1	4.54
I regularly use health data for reporting.	97.2	4.47
Routine health data are analyzed regularly.	98.1	4.46
Health data are used to evaluate staff performance.	96.2	4.42
Management relies on health data for policy decisions.	97.2	4.42
Data quality checks are conducted regularly.	97.2	4.40
Overall, health data are effectively utilized in my institution.	96.2	4.38
My department uses health data to solve operational problems.	91.5	4.19

Table 8 (organizational factors) shows availability of modern ICT equipment (mean=4.72) and continuous professional development (mean=4.64) rated most positively; heavy workload was rated lowest (mean=4.26).

Table 8: Organizational Factors Influencing Health Data Utilization — Selected Items. (N=106)

Organizational Factor	SA+A %	Mean
Availability of modern ICT equipment improves utilization.	100.0	4.72
Continuous professional development enhances utilization.	100.0	4.64
Poor electricity supply affects electronic systems.	100.0	4.61
Inadequate training affects health data utilization.	100.0	4.60
Limited internet access affects health data utilization.	99.1	4.57
Insufficient funding affects HIM activities.	98.1	4.57
Regular supervision improves health data utilization.	97.2	4.55
Poor ICT infrastructure limits health data utilization.	96.2	4.54
Lack of management support affects data utilization.	96.2	4.53
Heavy workload affects proper use of health data.	92.5	4.26

5.3 Reliability of the Research Instrument

Table 9: Reliability Analysis of the Research Instrument.

Construct	Items	Cronbach's α	Interpretation
Knowledge	15	0.910	Excellent
Attitude	15	0.923	Excellent
Health Data Utilization	15	0.901	Excellent
Organizational Factors	10	0.866	Good

5.4 Test of Hypotheses

H01: Knowledge and Health Data Utilization

Table 10: Pearson's Correlation Matrix among Study Variables. (N=106)

Variable	Knowledge	Attitude	Utilization	Organizational Factors
Knowledge	1.000	0.804***	0.662***	0.550***
Attitude	0.804***	1.000	0.740***	0.665***
Utilization	0.662***	0.740***	1.000	0.600***
Organizational Factors	0.550***	0.665***	0.600***	1.000

*** $p < 0.001$ (two-tailed).

Knowledge was significantly and positively correlated with utilization ($r=0.662$, $p<0.001$).

H01 was rejected: knowledge is significantly associated with health data utilization.

H02: Attitude and Health Data Utilization

Attitude showed the strongest bivariate correlation with utilization ($r=0.740$, $p<0.001$; Table 10). H02 was rejected: attitude is significantly associated with health data utilization.

H03: Joint and Independent Prediction of Health Data Utilization

Table 11: Multiple Linear Regression Predicting Health Data Utilization. (N=106)

Predictor	β	SE	t	p-value
Constant	0.469	0.356	1.319	0.190
Knowledge	0.202	0.121	1.674	0.097
Attitude	0.487	0.125	3.903	<0.001
Organizational Factors	0.182	0.083	2.186	0.031

Overall model: $F(3,102)=46.95$, $p<0.001$; $R^2=0.580$ (adjusted $R^2=0.568$).

The overall regression model was statistically significant ($F(3,102)=46.95$, $p<0.001$), jointly explaining 58.0% of the variance in health data utilization ($R^2=0.580$). H03 was therefore rejected: knowledge, attitude, and organizational factors jointly predicted health data utilization. Examining independent contributions, attitude was the strongest predictor ($\beta=0.487$, $p<0.001$), followed by organizational factors ($\beta=0.182$, $p=0.031$); knowledge did not contribute independently once attitude and organizational factors were held constant

($\beta=0.202$, $p=0.097$), indicating that its bivariate association with utilization (Table 10) operates substantially through its strong correlation with attitude ($r=0.804$) rather than as an independent driver of utilization behaviour.

6. DISCUSSION

Respondents demonstrated high knowledge (99.1% good; mean=4.46) and highly positive attitudes (99.1%; mean=4.65) toward health data utilization, consistent with a study of HIM professionals at Ahmadu Bello University Teaching Hospital, which similarly reported a high level of knowledge of digital health records, particularly regarding data security, interoperability, and confidentiality [17], and with evidence from a Federal Medical Centre where healthcare workers demonstrated high awareness of electronic health records, though awareness alone did not guarantee optimal utilization because of organizational and technical barriers [18]. This last observation anticipates the present study's central finding: in multivariable regression, knowledge did not remain an independent predictor of utilization once attitude and organizational factors were accounted for, indicating that knowledge is a necessary professional foundation but not, by itself, sufficient to drive routine data use.

Attitude was the strongest independent predictor of utilization ($\beta=0.487$, $p<0.001$), consistent with the Technology Acceptance Model's proposition that favourable attitudes increase behavioural intention and actual use [5,6], and with evidence from healthcare workers at a Federal Medical Centre who demonstrated overwhelmingly positive attitudes toward electronic medical records following implementation, notwithstanding ongoing training and technical-support needs [19]. A systematic review of public and patient attitudes toward health data sharing similarly identified trust and perceived usefulness as strong drivers of data-related behaviour, although that review examined public rather than professional attitudes specifically [21]; a Nigerian scoping review of digital health utilization likewise found that recognised usefulness alone was insufficient without adequate organizational and infrastructural capacity [20], directly foreshadowing this study's finding that organizational factors were also a significant independent predictor of utilization ($\beta=0.182$, $p=0.031$).

Utilization was strongest for statutory and clinical purposes (disease surveillance, patient care) but weakest for internal operational problem-solving (mean=4.19), echoing the PRISM framework's observation that routine health data are frequently collected to satisfy reporting obligations without being fully analysed for local decision-making [4], and a facility-level assessment in Ondo and Ekiti States that found considerable variation in whether quality-improvement teams actually used available data for decisions [22]. The finding that

knowledge, attitude, and organizational factors are strongly inter-correlated (e.g., knowledge–attitude $r=0.804$) but that only attitude and organizational factors remain independently predictive is consistent with methodological cautions that the linear Knowledge–Attitude–Practice sequence is rarely as clean in practice as commonly assumed [7], with the DeLone and McLean model's proposition that even knowledgeable users may under-use technically unreliable or poorly supported systems [8,9], and with comparable evidence from Ghana [23], Ethiopia [24,25], Kenya [26], and South Africa [27] that organizational support, supervision, and feedback — not awareness alone — determine whether routine health information is actually used for decisions.

7. CONCLUSION

This study found that HIM professionals in three tertiary healthcare institutions in Ondo State possess high knowledge and favourable attitudes toward health data utilization and report good utilization practices within organizational environments generally perceived as supportive. All study variables were significantly inter-correlated, but multivariable analysis showed that attitude and organizational factors, rather than knowledge alone, independently predicted routine health data utilization, jointly explaining 58.0% of its variance. Strengthening HIM professionals' technical knowledge alone is therefore unlikely to be sufficient to improve routine health data utilization in these institutions; sustained improvement will require parallel investment in fostering positive professional attitudes and strengthening the organizational and infrastructural environment within which HIM professionals operate.

8. Recommendations

1. Hospital management and HIM Department heads at the three institutions should institutionalise regular, applied continuous professional development in health informatics and digital health technologies, given that knowledge alone did not independently predict utilization.
2. The Federal Ministry of Health and Social Welfare and hospital management boards should prioritise investment in ICT infrastructure, electricity, and internet connectivity, given that organizational factors were a significant independent predictor ($\beta=0.182$, $p=0.031$).
3. Hospital Chief Medical Directors and HIM heads should integrate routine health information into management meetings and departmental performance reviews, given that data were least utilised for internal operational problem-solving (mean=4.19).

4. The Health Records Officers Registration Board of Nigeria and the Association of Health Information Management Practitioners of Nigeria should strengthen continuing education requirements that explicitly build positive professional attitudes, given attitude was the strongest independent predictor ($\beta=0.487$, $p<0.001$).

5. The Ondo State Ministry of Health should establish routine data-quality audits and utilization feedback mechanisms across the three institutions to sustain and track improvements over time.

9. Implications of the Study

Policy: institutional and regulatory policy should target attitude formation and organizational readiness as distinct levers, not assume knowledge-focused training alone suffices. Practice: HIM managers should incorporate data-use expectations into performance management rather than relying on staff knowledge alone. Research: future studies should extend this cross-sectional design longitudinally and formally test the influence of socio-demographic characteristics on knowledge and attitude (see Limitations).

10. Contributions to Knowledge

This study provides among the first empirical evidence specifically on HIM professionals' — as distinct from health workers generally — knowledge and attitude toward health data utilization in Ondo State tertiary institutions [17,22]; demonstrates through multivariable regression that attitude and organizational factors, not knowledge alone, independently predict utilization, qualifying the linear Knowledge–Attitude–Practice sequence commonly assumed in training design [7]; integrates the Technology Acceptance Model, KAP model, DeLone and McLean model, and Health Belief Model within a single analytic framework; and provides institution-specific baseline evidence directly usable for continuous professional development and infrastructure planning at the three participating institutions.

11. Limitations of the Study

The cross-sectional design permits association but not causal inference. Self-reported data may be subject to social desirability bias, particularly given near-ceiling classification rates (99.1–100.0%) across all variables. Findings are restricted to three tertiary institutions in one state and may not generalise to primary/secondary facilities or other states. The original protocol proposed hypotheses on socio-demographic influences on knowledge and attitude; these were not carried through to formal inferential testing here and are recommended for secondary analysis of this dataset. Organizational factors were examined as a composite score

rather than disaggregated into constituent dimensions. Complementary qualitative methods would provide deeper contextual insight into the mechanisms underlying the associations reported.

Declarations

Ethics approval and consent to participate

The study questionnaire was administered electronically using a Google Form, which was shared through the respective departmental WhatsApp groups of the participating institutions. Participants were informed about the purpose of the study and their participation was voluntary. Informed consent was obtained electronically from all participants before they proceeded to complete the questionnaire. Confidentiality and anonymity of participants' responses were maintained throughout the study, in accordance with the ethical principles of research involving human participants and the Declaration of Helsinki [16].

Consent for publication

Not applicable.

Availability of data and materials

The datasets generated and/or analysed during the current study are available from the corresponding author on reasonable request.

Competing interests

The authors declare that they have no competing interests.

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Authors' contributions

IEA: Conceptualisation, methodology, data curation, formal analysis, investigation, writing – original draft, writing – review and editing. AMB: Supervision, conceptualisation, methodology, validation, writing – review and editing. JSA: Co-supervision, validation, writing – review and editing. All authors read and approved the final manuscript.

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