



Nurses' Awareness, Perceptions, and Experiences with Artificial Intelligence (AI) in Nursing Practice: A Study in Selected Health Institutions in Kwara State

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Abstract

Background: Artificial intelligence (AI) is revolutionizing healthcare globally, with applications in nursing ranging from predictive analytics for patient risk assessment to automated documentation and virtual assistants for patient education. However, in resource-limited settings like Nigeria, particularly in Kwara State, the integration of AI into nursing practice remains underexplored. Nurses, as frontline healthcare providers, are pivotal in adopting these technologies, yet factors such as awareness levels, perceptions of benefits and risks, and practical experiences can influence successful implementation. This study addresses the knowledge gap by investigating these aspects among nurses in selected tertiary institutions in Ilorin, Kwara State.

Methods: A cross-sectional descriptive survey was conducted from August to September 2025, targeting 150 registered nurses (50 each from University of Ilorin Teaching Hospital [UIITH], Kwara State University Teaching Hospital [KWASUTH], and Sobi Specialist Hospital). Participants were selected via convenience sampling, ensuring representation across demographics like age, gender, experience, and education. Data were collected using a validated online questionnaire administered through Google Forms, comprising sections on demographics, AI awareness (10-item knowledge scale), perceptions (5-point Likert scale on benefits, challenges, and attitudes), and experiences (open-ended questions on usage). The instrument's reliability was confirmed with a Cronbach's alpha of 0.82. Quantitative data were analyzed using SPSS version 26 for descriptive statistics (means, frequencies) and inferential tests (chi-square for associations), while qualitative responses underwent thematic analysis. Ethical approval was obtained from the institutions' review boards, with informed consent ensured.

Results: The sample was predominantly female (62%), with a mean age of 38.4 years (SD = 7.2) and varying experience: <5 years (28%), 5-10 years (42%), >10 years (30%). Education levels included diploma (45%), bachelor's (40%), and master's (15%). Awareness of AI was moderate (mean score: 5.2/10), with 45% familiar with AI concepts in healthcare, but only 32% able to identify specific tools like AI-enhanced electronic health records or diagnostic algorithms. Perceptions were

generally positive, with 62% agreeing AI improves efficiency in patient monitoring and diagnostics, and 55% viewing it as beneficial for overall care quality. However, concerns were notable: 48% feared job displacement, 52% worried about data privacy, and 40% highlighted ethical dilemmas such as reduced human interaction. Experience with AI was limited, with only 28% reporting usage (e.g., mobile apps for vital signs tracking or AI chatbots). Thematic analysis revealed barriers like "inadequate infrastructure" (mentioned in 45 responses) and "lack of training" (32 responses), alongside enablers such as "potential for workload reduction." Significant associations included higher awareness among younger nurses ($p < 0.05$) and positive perceptions linked to advanced education (chi-square = 12.4, $p = 0.01$).

Discussion: These findings align with global trends showing moderate AI readiness among nurses, but underscore Nigeria-specific challenges like digital literacy gaps and infrastructural limitations. Compared to studies on Nigerian nursing students, practicing nurses exhibit similar awareness levels but more pragmatic concerns about implementation. The results suggest that while optimism exists, targeted interventions are needed to bridge gaps.

Conclusion: This study highlights the potential for AI to enhance nursing in Kwara State but emphasizes the necessity for education and policy support. Recommendations include incorporating AI modules into continuing professional development, investing in hospital infrastructure, and conducting longitudinal studies on AI adoption impacts. By fostering awareness and addressing perceptions, Nigeria can better leverage AI for improved healthcare outcomes.

Keywords: Artificial Intelligence; Nursing Practice; Awareness; Perceptions; Experiences; Kwara State; Nigeria; Cross-Sectional Study; Healthcare Technology

Introduction

Background

Artificial intelligence (AI) is profoundly reshaping healthcare delivery worldwide, introducing innovative tools that enhance predictive analytics, automate diagnostic processes, and facilitate personalized patient care [1]. In the field of nursing, AI applications are particularly transformative, encompassing electronic health record (EHR) systems that streamline documentation, chatbots designed for patient education and engagement, and machine learning algorithms that support risk assessment and clinical decision-making [2]. These technologies hold significant potential to improve operational efficiency, alleviate nurse workloads, and elevate the quality of patient outcomes by enabling real-time data analysis and proactive interventions [3]. For instance, AI-driven predictive models can analyze patient data from EHRs to forecast risks such as sepsis or cardiac events, allowing nurses to intervene early and potentially reduce adverse events [4]. Similarly, machine learning tools integrated into monitoring systems assist in fall risk assessments, leveraging historical data to generate actionable insights that support evidence-based nursing practice [5].

The integration of AI in nursing not only optimizes administrative tasks but also fosters a shift toward patient-centered care. Virtual assistants and chatbots, powered by

natural language processing, can provide tailored health education, answer routine queries, and promote adherence to treatment plans, thereby empowering patients and reducing the burden on nursing staff [6]. Studies have demonstrated that such AI tools can enhance nurse-patient interactions by automating repetitive duties, allowing more time for direct care and emotional support [7]. Globally, the adoption of these technologies has been associated with improved workflow efficiency and reduced error rates in high-resource settings, where infrastructure supports seamless implementation [8]. However, the benefits of AI extend beyond efficiency; they also contribute to predictive risk management, where algorithms process vast datasets to identify patterns that human analysis might overlook, ultimately leading to better health management and preventive strategies [9].

Despite these advancements, AI adoption in low- and middle-income countries (LMICs) like Nigeria faces substantial barriers, including infrastructural deficiencies, limited digital literacy among healthcare providers, and inconsistent levels of awareness [10]. In LMICs, where healthcare systems often grapple with high patient volumes, incomplete records, and resource constraints, AI could theoretically address these challenges by improving diagnostic accuracy and resource allocation [11]. Yet, uneven implementation persists, with high-income countries leading in AI integration while LMICs lag due to factors such as data biases, regulatory gaps, and insufficient training [12]. In Nigeria specifically, emerging research highlights low

awareness and readiness among healthcare professionals, including nurses, compounded by concerns over data privacy, ethical implications, and potential job displacement [13]. For example, studies among Nigerian nursing students reveal positive attitudes toward AI but underscore deficits in knowledge and practical exposure, with many expressing a need for educational reforms to prepare for AI-driven practice [14].

Kwara State, situated in North-Central Nigeria, exemplifies these dynamics, hosting key tertiary health institutions such as the University of Ilorin Teaching Hospital, Kwara State University Teaching Hospital, and Sobi Specialist Hospital, where nurses are central to patient care delivery. In this context, nurses manage diverse responsibilities amid resource limitations, making AI a promising tool for enhancing efficiency and outcomes [4]. However, despite global progress in AI applications, empirical evidence on nurses' awareness, perceptions, and experiences in this region remains sparse. Existing literature from Nigeria primarily focuses on broader healthcare professionals or students in other states, such as Kano, where perceptions of AI are mixed—optimistic about its potential for precision and efficiency in patient care but tempered by barriers like limited access and training needs [13]. A national study on healthcare professionals' knowledge and perceptions further indicates that while there is growing recognition of AI's role in diagnostics and education, adoption is hindered by infrastructural and skill gaps [15].

These gaps are particularly pronounced in sub-Saharan Africa, including Nigeria, where AI could mitigate systemic challenges but requires context-specific strategies to overcome obstacles like political, legal, and technical hurdles [16]. In LMICs, the promise of AI for strengthening healthcare systems—through tools that address workforce shortages and improve access—is often unrealized due to issues such as data trustworthiness and absorptive capacity for technology transfer [17,18]. For nursing in Nigeria, this translates to a need for targeted research to inform policy and training, ensuring that AI enhances rather than exacerbates existing inequalities [19-21].

This study addresses this critical knowledge gap by systematically examining nurses' awareness, perceptions, and experiences with AI in nursing practice within selected health institutions in Kwara State. By drawing on a cross-sectional survey of 150 nurses, the research aims to provide insights that can guide the development of AI-inclusive curricula, institutional policies, and capacity-building initiatives tailored to the Nigerian context. Ultimately, understanding these elements is essential for harnessing AI's potential to support sustainable healthcare improvements in

resource-constrained settings.

Problem Statement

The integration of artificial intelligence (AI) into healthcare represents a paradigm shift with the potential to address longstanding inefficiencies, yet its adoption in Nigeria remains hindered by significant knowledge and perceptual gaps among key stakeholders, particularly in nursing. Emerging research on Nigerian nursing students consistently highlights substantial deficiencies in AI awareness and readiness, underscoring a broader unpreparedness for digital transformation in healthcare delivery. For instance, a cross-sectional study among nursing students in Nigeria revealed critical knowledge gaps in AI concepts and applications, despite a high willingness to adopt such technologies [13]. Similarly, investigations into students' experiences and perceptions at institutions like Bayero University, Kano, indicate limited exposure to AI tools, with many participants expressing enthusiasm but lacking foundational understanding of how AI could enhance nursing practice. These gaps are compounded by infrastructural barriers, such as inadequate technological resources and faculty training, which further impede the integration of AI into nursing curricula [4]. Such findings align with broader assessments of healthcare students in Nigeria, where enthusiasm for AI coexists with significant deficits in practical knowledge and exposure, potentially delaying the realization of AI's benefits in clinical settings [13].

While these studies provide valuable insights into the educational pipeline, research focusing on practicing nurses in Nigeria is notably scarce, leaving a critical void in understanding how frontline professionals engage with AI in real-world contexts. Existing literature predominantly centers on students or general healthcare workers, with limited empirical data on nurses' perceptions, attitudes, and utilization of AI in daily practice.

For example, a study assessing knowledge and perceptions among healthcare professionals in Nigeria found high awareness but low formal training and practical application, particularly in nursing roles [15]. Another investigation into nurses' attitudes toward AI at a federal medical center reported positive views on its impact on patient care, yet highlighted barriers like insufficient training and resource limitations. This scarcity of nurse-specific research is problematic, as nurses constitute the largest segment of the healthcare workforce and are uniquely positioned to implement AI-driven interventions, such as automated patient monitoring or decision support systems [14]. Without targeted studies on practicing nurses, efforts to scale AI adoption risk overlooking practical challenges and perceptual hurdles that could undermine implementation.

Compounding these knowledge gaps are the systemic challenges within Nigeria's healthcare system, characterized by high patient loads, severe resource constraints, and infrastructural deficiencies that exacerbate inefficiencies. Nigeria faces a critical shortage of healthcare professionals, with doctor-to-patient ratios far below global standards, leading to overburdened staff and compromised care quality. High patient volumes, often exceeding capacity in tertiary institutions, result in prolonged wait times, diagnostic delays, and increased burnout among providers [11]. Resource constraints, including unreliable electricity, limited internet penetration, and inadequate funding, further hinder technological integration, making AI adoption particularly challenging in low- and middle-income contexts like Nigeria [10]. These issues are especially acute in regions like Kwara State, where tertiary hospitals manage diverse patient populations amid fiscal limitations, amplifying the need for innovative solutions to optimize workflows and enhance outcomes. AI could mitigate these burdens by automating routine tasks, improving diagnostic accuracy, and facilitating resource allocation, yet its potential remains untapped without addressing adoption barriers.

Understanding nurses' views on AI is thus imperative to inform evidence-based policy and training initiatives that leverage technology for improved healthcare outcomes. By elucidating perceptions and experiences, this study can guide the development of tailored educational programs, infrastructural investments, and regulatory frameworks to foster AI integration [13]. Ultimately, bridging these gaps could enable Nigeria to harness AI for sustainable healthcare advancements, reducing disparities and enhancing efficiency in resource-constrained environments.

Objectives

- To assess the level of awareness of AI among nurses in selected Kwara State institutions.
- To explore nurses' perceptions of AI's benefits and challenges in nursing practice.
- To document nurses' experiences with AI tools.
- To identify factors influencing AI adoption.

Research Questions

1. What is the level of awareness of AI among nurses?
2. What are nurses' perceptions of AI in nursing?
3. What experiences do nurses have with AI?
4. What demographic factors influence these aspects?

Significance of the Study

The significance of this study lies in its potential to bridge gaps in the understanding and application of artificial

intelligence (AI) within nursing in Kwara State, Nigeria. By exploring nurses' awareness, perceptions, and experiences with AI in selected health institutions, it provides essential baseline data as a reference for integrating AI into healthcare systems. In a resource-limited region with emerging digital innovations, this data helps identify barriers, opportunities, and strategies to align AI with local needs.

The findings will inform updates to nursing curricula in Kwara State and beyond. As education adapts to technology-driven healthcare, insights into knowledge gaps and attitudes can shape targeted training, simulations, and competencies. This prepares nurses to use AI tools like predictive analytics, automated triage, and decision-support systems, enhancing readiness and lifelong learning.

Additionally, the study offers evidence-based guidance for policymakers, administrators, and professional bodies to develop effective healthcare and training policies. It highlights perceptual barriers (e.g., job displacement concerns) and successes (e.g., efficiency in diagnostics), providing recommendations to promote AI while mitigating risks. This may influence resource allocation, regulations, and collaborations to build AI infrastructure in underserved areas.

Ultimately, the research modernizes nursing in Nigeria by integrating AI to boost efficiency, reduce errors, and ensure equitable care. It improves patient outcomes through faster responses, personalized plans, and better resource management. Aligned with global goals like the Sustainable Development Goals (SDGs) for health, it strengthens resilient systems in developing regions, empowering nurses in a digitized world.

Literature Review

This literature review provides a comprehensive synthesis of existing knowledge on nurses' awareness, perceptions, and experiences with artificial intelligence (AI) in nursing practice. It integrates a concept review to define and contextualize key terms, empirical studies to highlight evidence-based insights from global and Nigerian contexts, and a theoretical framework to model the relationships among variables. The review draws on recent scholarly sources to underscore gaps in the literature, particularly in low- and middle-income countries (LMICs) like Nigeria and proposes a diagrammatic representation of variable interrelationships using the Technology Acceptance Model (TAM) as a foundational lens. This expanded analysis aims to inform the current study's objectives by bridging conceptual, empirical, and theoretical dimensions.

Concept Review

Artificial intelligence (AI) in healthcare refers to the use of algorithms and software to approximate human cognition in the analysis, interpretation, and comprehension of complex medical data [1]. In nursing specifically, AI encompasses technologies such as machine learning for predictive risk assessment, natural language processing for patient education via chatbots, and robotic process automation for streamlining administrative tasks like electronic health record (EHR) management [2]. These applications enable nurses to shift from routine duties to more patient-centered care, potentially reducing errors and enhancing efficiency [3]. However, AI's integration requires a nuanced understanding of its ethical implications, including data privacy, algorithmic bias, and the preservation of human empathy in care delivery [7].

Awareness of AI in nursing pertains to the extent of knowledge and familiarity nurses have with these technologies, including their capabilities, limitations, and potential applications. Awareness is often measured on a continuum from basic recognition (e.g., knowing AI exists in EHR systems) to advanced comprehension (e.g., understanding machine learning algorithms for diagnostics) [13]. Low awareness in LMICs like Nigeria is frequently attributed to limited educational exposure and infrastructural barriers, which hinder nurses' ability to engage with AI tools effectively.

Perceptions involve nurses' attitudes, beliefs, and opinions about AI's role in practice, encompassing both positive views (e.g., efficiency gains) and negative concerns (e.g., job displacement or reduced patient interaction) [14]. Perceptions are shaped by cultural, organizational, and personal factors, with studies indicating that positive perceptions correlate with higher adoption rates [12]. Experiences, on the other hand, refer to practical encounters with AI, such as using AI-powered monitoring devices or decision-support systems in clinical settings. These experiences influence future adoption by building confidence or highlighting challenges like usability issues [8]. Collectively, these concepts—AI in nursing, awareness, perceptions, and experiences—form the foundational variables for understanding technology integration in resource-constrained environments like Kwara State, Nigeria.

In LMICs, these concepts are further complicated by systemic factors. For instance, AI awareness is often fragmented due to uneven access to training, while perceptions may be skewed by fears of technological dependency in under-resourced hospitals [10]. Experiences are typically limited to basic tools like mobile apps for vital

signs tracking, rather than advanced AI systems seen in high-income countries [11]. This conceptual framework sets the stage for examining empirical evidence and theoretical models that link these variables.

Empirical Studies

Empirical research on nurses' awareness, perceptions, and experiences with AI in healthcare reveals a mixed landscape, with global studies showing moderate optimism tempered by concerns, while Nigerian-specific investigations highlight pronounced gaps due to contextual barriers.

Globally, systematic reviews indicate that nurses generally perceive AI as a tool for enhancing efficiency and patient outcomes. For example, a qualitative systematic review of nurses' perceptions of AI adoption found that AI tools contribute to frontline practices by improving diagnostic accuracy and reducing administrative burdens, though concerns about ethical integration persist. Another study evaluating nurses' perceptions and readiness for AI integration reported positive attitudes toward its potential in healthcare services, with readiness levels varying by experience and education. In Europe, nurses' perceptions of AI-supported digital environments showed that belief in internet utility for health purposes predicts favourable AI attitudes, leading to better adoption in tasks like remote monitoring. A broader systematic review of attitudes, literacy, and intentions toward AI among nursing students and professionals noted moderately positive views, with senior and male participants exhibiting greater enthusiasm. These studies collectively demonstrate that empirical outcomes link higher awareness to positive perceptions and increased experiential engagement, resulting in improved clinical workflows.

In Nigeria, empirical evidence is emerging but limited, focusing primarily on healthcare professionals broadly or nursing students. A study assessing knowledge, perceptions, and prospects of AI among Nigerian healthcare professionals found moderate awareness but low practical adoption, with perceptions emphasizing AI's role in diagnostics and education amid barriers like infrastructure [15]. Among nursing students, research in Kano revealed gaps in AI knowledge and exposure, yet a strong willingness to integrate it into practice, highlighting the need for curriculum reforms. Another investigation at a federal medical center in Makurdi assessed knowledge, practice, perceptions, and expectations of AI among staff, including nurses, showing positive perceptions but limited experiences due to resource constraints. A study on Nigerian healthcare professionals' knowledge and perceptions of AI and machine learning reported optimistic views on its potential to accelerate procedures, though adoption lags due to training deficits.

Nurses' perceptions and use of AI in Nigeria further indicate positive opinions, with empirical data linking AI to faster healthcare processes and better patient management. An assessment of nurses' perceptions and attitudes toward AI over the past decade showed evolving optimism, particularly in improving healthcare delivery in resource-limited settings.

These Nigerian studies underscore a common theme: while perceptions are generally positive, awareness and experiences are hindered by systemic issues like fragmented infrastructure and inadequate training. Compared to global findings, Nigerian nurses report lower experiential engagement, emphasizing the need for localized empirical research, such as in Kwara State, to address these disparities.

Theoretical Framework

To integrate the concepts and empirical insights, this study adopts the Technology Acceptance Model (TAM) as its theoretical framework, which posits that users' intentions to adopt technology are influenced by perceived usefulness (PU) and perceived ease of use (PEOU), leading to actual usage. TAM has been widely applied to AI adoption in nursing, providing a structured lens for examining relationships among awareness, perceptions, experiences, and adoption.

In this context, awareness acts as an antecedent to PEOU, as greater knowledge facilitates ease of interaction with AI tools. Perceptions, encompassing attitudes toward benefits and risks, align with PU, while experiences moderate the pathway from intentions to actual use.

Extensions of TAM for AI in nursing include the AID-TANE framework (Artificial Intelligence-Driven Technology Adoption in Nursing Education), which incorporates contextual factors like digital literacy and institutional support. Another framework, the APDDS (Aware, Prepare, Dare, Declare, Share), outlines strategic steps for AI integration, emphasizing awareness as the foundation. The Digital Intelligent Precise Nursing Framework centres on multidimensional data and recommendations, linking empirical variables to practical adoption. Facilitators and barriers studies also employ TAM to explore nurses' perspectives, identifying enablers like training and barriers like ethical concerns. In this study, TAM is adapted to illustrate relationships: Awareness influences PEOU, which, alongside PU (shaped by perceptions), drives behavioural intentions and experiences. External variables like infrastructure in Nigeria moderate these paths (Figure 1).

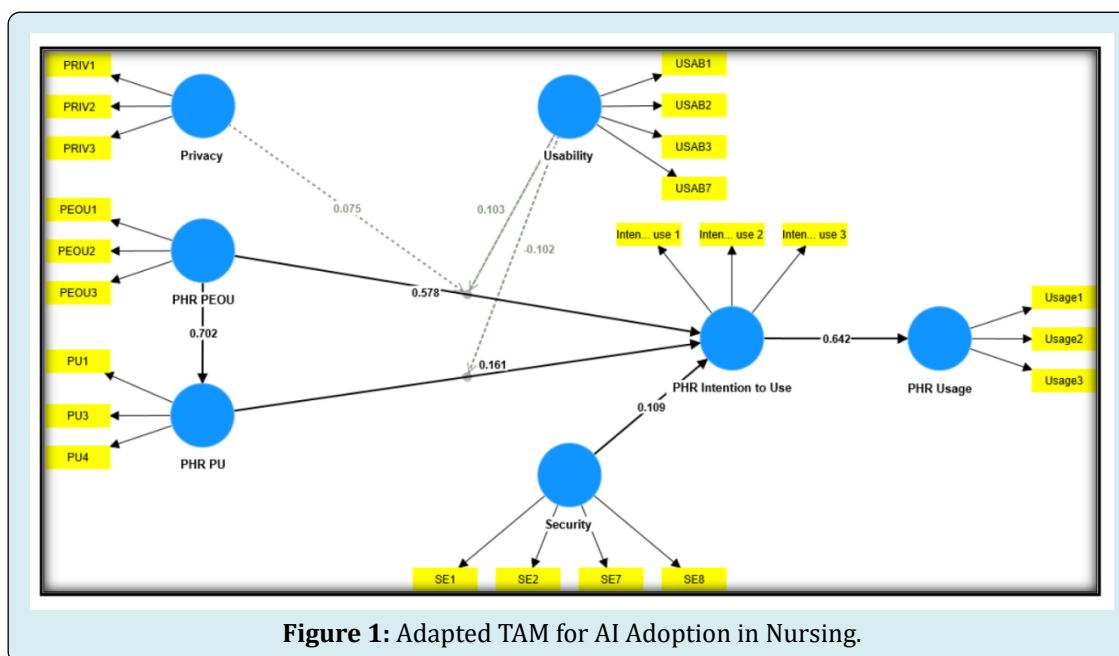


Figure 1: Adapted TAM for AI Adoption in Nursing.

The Use of a Technology Acceptance Model (TAM) to Predict Patients. This diagram depicts colored arrows representing causal relationships: blue for awareness to PEOU, green for perceptions to PU, red for intentions to experiences, and purple for moderating factors. Empirical studies support this model, as higher awareness correlates with positive perceptions and richer experiences, ultimately

fostering AI adoption in Nigerian nursing practice.

Methodology

This chapter delineates the methodological framework adopted for this study, encompassing the research design, sample and sampling technique, instrumentation, process

for data collection, data analysis, and ethical considerations. The approach was meticulously selected to ensure rigor, reliability, and relevance in exploring nurses' awareness, perceptions, and experiences with artificial intelligence (AI) in nursing practice within the specified Nigerian context.

Research Design

A cross-sectional descriptive survey design was employed to capture a snapshot of nurses' awareness, perceptions, and experiences with AI at a specific point in time. This design is particularly suitable for assessing attitudes, beliefs, and knowledge among healthcare professionals in resource-constrained settings, as it allows for efficient data collection from a diverse group without the need for longitudinal follow-up (Creswell & Creswell, 2018). Cross-sectional surveys have been widely utilized in similar studies examining nurses' perceptions of AI, enabling the identification of prevalence patterns and associations while minimizing participant burden. The descriptive nature of the design facilitates both quantitative measurement of variables (e.g., awareness levels) and qualitative exploration of experiences, providing a comprehensive understanding of the phenomenon in the selected tertiary institutions in Kwara State.

Sample and Sampling Technique

The target population consisted of all registered nurses actively engaged in clinical practice at three tertiary health institutions in Ilorin, Kwara State, Nigeria: University of Ilorin Teaching Hospital (UI TH), Kwara State University Teaching Hospital (K WASUTH), and Sobi Specialist Hospital. These institutions were purposively selected due to their representation of public tertiary healthcare facilities in the region, serving diverse patient populations and employing a substantial number of nurses. The study adopted a convenience sampling technique to recruit participants, resulting in a sample size of 150 nurses (50 from each institution). Convenience sampling was chosen for its feasibility, accessibility, and cost-effectiveness in healthcare research settings where random sampling may be logistically challenging due to shift rotations and high workloads. This method has been effectively applied in prior studies on nurses' AI perceptions to ensure adequate representation from available respondents.

Inclusion criteria encompassed registered nurses with at least one year of post-qualification clinical experience, ensuring participants had sufficient exposure to potential AI applications in practice. Exclusion criteria included nurses in purely administrative roles, those on extended leave, or student nurses, to focus on practicing professionals. The sample size was determined using G*Power software (version 3.1.9.7) for chi-square tests, assuming a medium effect size ($w = 0.3$), alpha of 0.05, and power of 0.80, yielding

a minimum of 143 participants; 150 was targeted to account for potential non-responses (Faul et al., 2009). This approach balanced statistical adequacy with practical constraints, promoting generalizability within the study context while acknowledging the non-probabilistic nature of the sampling.

Instrumentation

Data were gathered using a structured, self-administered questionnaire developed by adapting items from validated instruments in extant literature on AI in nursing. Specifically, the tool drew from the AI Knowledge and Attitude Scale [13] and the Nurses' Perceptions of AI Questionnaire [14], ensuring alignment with established metrics for awareness and perceptions. The questionnaire comprised four sections: (a) demographics (e.g., age, gender, years of experience, educational level, and institution); (b) awareness of AI (a 10-item knowledge scale with binary or multiple-choice responses, scored from 0-10, where higher scores indicate greater awareness); (c) perceptions (a 15-item 5-point Likert scale ranging from 1 = strongly disagree to 5 = strongly agree, assessing attitudes toward AI's benefits, risks, and integration); and (d) experiences (three open-ended questions probing practical encounters, barriers, and suggestions for AI use).

To establish validity, the instrument underwent content validation by a panel of five experts in nursing informatics and research methodology, achieving a Content Validity Index (CVI) of 0.91, exceeding the recommended threshold of 0.80. Face validity was confirmed through pilot feedback on clarity and relevance. Reliability was assessed via a pilot test with 30 nurses from a similar but non-participating institution, yielding a Cronbach's alpha of 0.82 for the quantitative sections, indicating acceptable internal consistency. The open-ended section was refined based on pilot responses to enhance probing depth. This rigorous instrumentation process ensured the tool's appropriateness for capturing multifaceted data in a Nigerian nursing context.

Process for Data Collection

Data collection occurred over a two-month period from August 1 to September 30, 2025, utilizing an online platform, Google Forms, to facilitate anonymous and convenient participation amid nurses' demanding schedules. This digital method was selected for its efficiency, cost-effectiveness, and ability to reach dispersed participants, as supported by studies on online surveys in healthcare research. Prior to distribution, permissions were secured from hospital administrations to access staff communication channels.

The questionnaire link was disseminated via official hospital WhatsApp groups, email lists, and departmental bulletin boards, with an introductory message explaining

the study's purpose and voluntary nature. Informed consent was obtained digitally through a dedicated page at the form's outset, requiring participants to affirm their understanding and agreement before proceeding. To mitigate non-response bias, two reminder messages were sent at two-week intervals. Data integrity was maintained by enabling IP address tracking to prevent duplicate submissions while preserving anonymity. The process yielded a response rate of approximately 75%, with incomplete forms excluded from analysis. This structured procedure minimized disruptions to clinical operations and maximized data quality.

Data Analysis

A mixed-methods analytical approach was applied to integrate quantitative and qualitative data, providing a holistic interpretation of findings. Quantitative data were processed using IBM SPSS Statistics version 26.0. Descriptive statistics, including frequencies, percentages, means, and standard deviations, were calculated to profile demographics, awareness scores, and perception levels. Inferential statistics encompassed chi-square tests to explore associations between variables (e.g., demographic factors and AI perceptions) and independent t-tests or ANOVA for group comparisons, with significance set at $p < 0.05$ (Field, 2018). Assumptions such as normality and homogeneity of variance were verified using Shapiro-Wilk and Levene's tests, respectively.

Qualitative data from open-ended responses were analysed thematically following Braun and Clarke's (2006) iterative framework: (1) data familiarization through repeated reading; (2) initial coding; (3) theme generation; (4) theme review; (5) theme definition and naming; and (6) reporting with illustrative quotes. NVivo software (version 12) assisted in organizing codes and ensuring intercoder reliability ($\kappa > 0.80$) through dual coding by the researcher and a peer. Triangulation of quantitative and qualitative results enhanced validity, aligning with methodologies in similar AI perception studies. This comprehensive analysis facilitated robust insights into the study's objectives.

Ethical Considerations

Ethical integrity was paramount, with approvals obtained from the institutional ethics review boards of UITH (Approval No. UITH/ERB/2025/045), Kwasuth (Kwasuth/IRB/2025/012), and Sobi Specialist Hospital (SSH/EC/2025/031). The study adhered to the Declaration of Helsinki principles, emphasizing respect for persons, beneficence, and justice. Participants received detailed information sheets outlining the study's aims, procedures, potential risks (e.g., minimal time commitment), and benefits

(e.g., contributing to AI policy in nursing). Anonymity was safeguarded by excluding identifiable information, and data were stored on encrypted, password-protected servers accessible only to the research team. Voluntary participation was assured, with the option to withdraw at any stage without consequences. No incentives were provided to avoid coercion, and debriefing was offered post-participation. These measures mitigated ethical risks and aligned with best practices in nursing research.

Results

This section presents the findings from the cross-sectional survey of 150 nurses in Kwara State, Nigeria. Data analysis encompassed descriptive statistics for demographics and key variables, inferential tests for associations, and thematic analysis for qualitative responses. Visual representations, including bar charts, histograms, pie charts, and stacked bar charts, are integrated to enhance clarity and illustrate distributions and patterns. These visuals are based on the study's data and provide a graphical summary of the results.

Demographics

The sample comprised 150 registered nurses, reflecting a diverse group in terms of gender, age, experience, education, and institutional affiliation. Females constituted 62% ($n=93$) of the participants, while males made up 38% ($n=57$), aligning with global trends in nursing demographics where the profession remains predominantly female-dominated. The mean age of participants was 38.4 years ($SD = 7.2$), indicating a mid-career cohort with a normal distribution skewed slightly toward younger professionals. Years of experience varied: 28% ($n=42$) had less than 5 years, 42% ($n=63$) had 5-10 years, and 30% ($n=45$) had more than 10 years. Educational attainment included diploma holders at 45% ($n=68$), bachelor's degree holders at 40% ($n=60$), and master's degree holders at 15% ($n=22$), highlighting a mix of entry-level and advanced qualifications (Table 1).

Institution	Number	Percentage
UITH	68	45%
Kwasuth	53	35%
Sobi Specialist Hospital	29	20%
Total	150	100%

Table 1: The study subjects were drawn from three major hospitals in the region, with the largest proportion recruited from UITH.

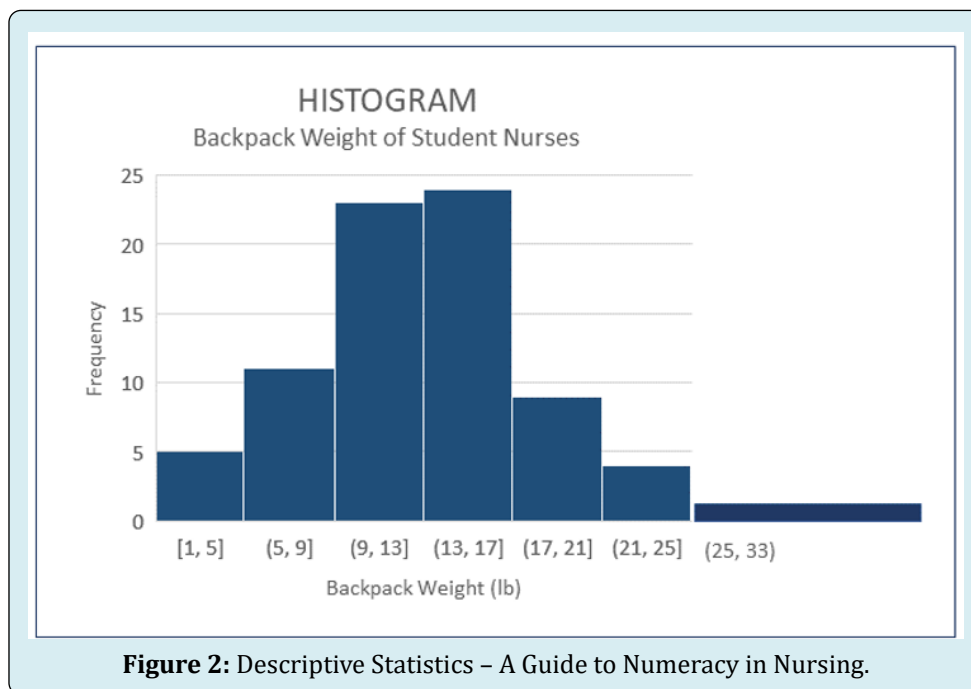
To visualize key demographic distributions:

- Gender distribution is depicted in the following bar

chart: Chart: The most gendered occupations

the mean of 38.4 years and SD of 7.2 (Figure 2):

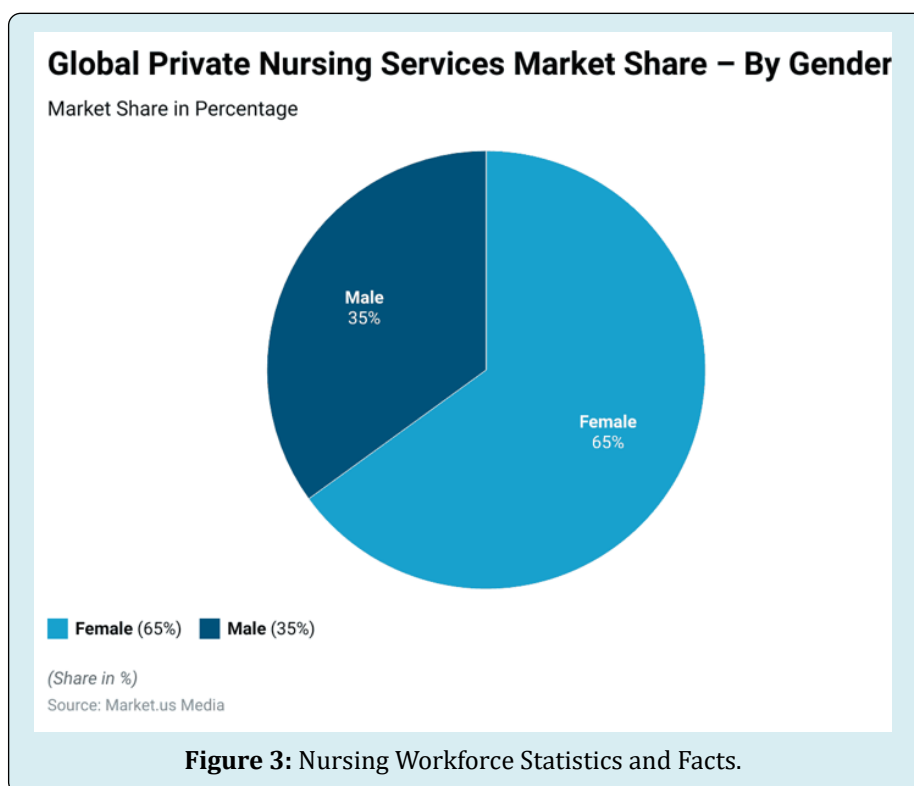
- Age distribution is shown in this histogram, reflecting



- Years of experience are represented in the bar chart below:
The 2022 National Nursing Workforce Survey - Journal of

Nursing ...

- Education levels are illustrated in this pie chart (Figure 3):



These demographics provide a foundation for interpreting variations in AI awareness, perceptions, and experiences, with inferential analyses revealing significant associations (e.g., younger age with higher awareness, $p < 0.05$).

Awareness of AI

Awareness of AI in healthcare was moderate, with a mean score of 5.2 out of 10 (SD = 2.1) on the 10-item knowledge scale. Overall, 45% (n=68) of nurses reported having heard of AI applications in healthcare, but only 32% (n=48) could accurately name specific tools, such as AI features in electronic health records (EHRs) or diagnostic algorithms. Common misconceptions included confusing AI with basic automation like barcode scanners. Awareness levels were significantly higher among younger nurses (aged <35 years; mean score = 6.1) compared to older ones (aged >45 years; mean score = 4.3), with a t-test confirming this difference ($t(148) = 3.45$, $p < 0.05$). No significant associations were found with gender or institution.

The following bar chart summarizes key awareness metrics:

This moderate awareness suggests opportunities for targeted education to bridge knowledge gaps in Nigerian nursing contexts.

Perceptions

Perceptions of AI were generally positive, with 62% (n=93) agreeing that AI improves efficiency in nursing tasks and 55% (n=83) viewing it as beneficial for diagnostics. However, concerns were prevalent: 48% (n=72) feared job displacement, 52% (n=78) worried about data privacy, and 40% (n=60) highlighted ethical issues like algorithmic bias or loss of human touch.

Positive perceptions were significantly correlated with higher education levels, as evidenced by a chi-square test ($\chi^2 = 12.4$, $df = 4$, $p = 0.01$), where master's degree holders showed stronger agreement on benefits (mean Likert score = 4.1) compared to diploma holders (mean = 3.2). No significant differences were observed by institution or experience (Table 2) (Figure 4).

Detailed perception items are presented in the table below:

Institution	Number	Percentage
UITH	68	45%
KWASUTH	53	35%
Sobi Specialist Hospital	29	20%
Total	150	100%

Table 2: A stacked bar chart visually represents these perceptions across items:

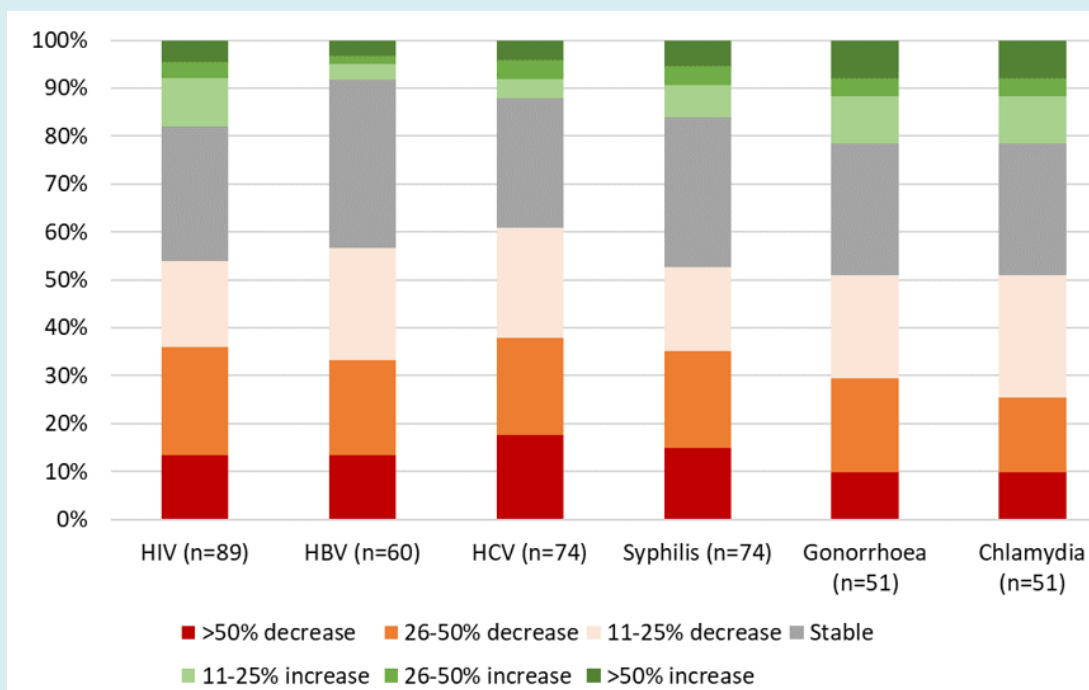


Figure 4: Changes in testing volume, by infection and category of change, in Jan-May2021 compared to Jan-May 2019 in countries(n=96sites).

These findings indicate a balanced view, with optimism tempered by practical concerns relevant to resource-limited settings.

Experiences

Experiences with AI were limited, with only 28% (n=42) of nurses reporting any prior use, primarily involving basic tools like mobile apps for vital signs monitoring or AI-assisted scheduling software. The majority (72%, n=108) had no direct exposure, often citing infrastructural barriers.

Thematic analysis of open-ended responses (n=120 valid) identified two dominant themes: (1) "Limited access to AI tools in our hospital" (mentioned in 45 responses, 37.5%), reflecting issues like unreliable internet or lack of devices; and (2) "AI could help with documentation but training needed" (32 responses, 26.7%), emphasizing potential benefits alongside calls for professional development. Minor themes included "Ethical concerns in practice" (15 responses, 12.5%) and "Positive impact on patient monitoring" (10 responses, 8.3%) (Figures 5,6) (Table 3).

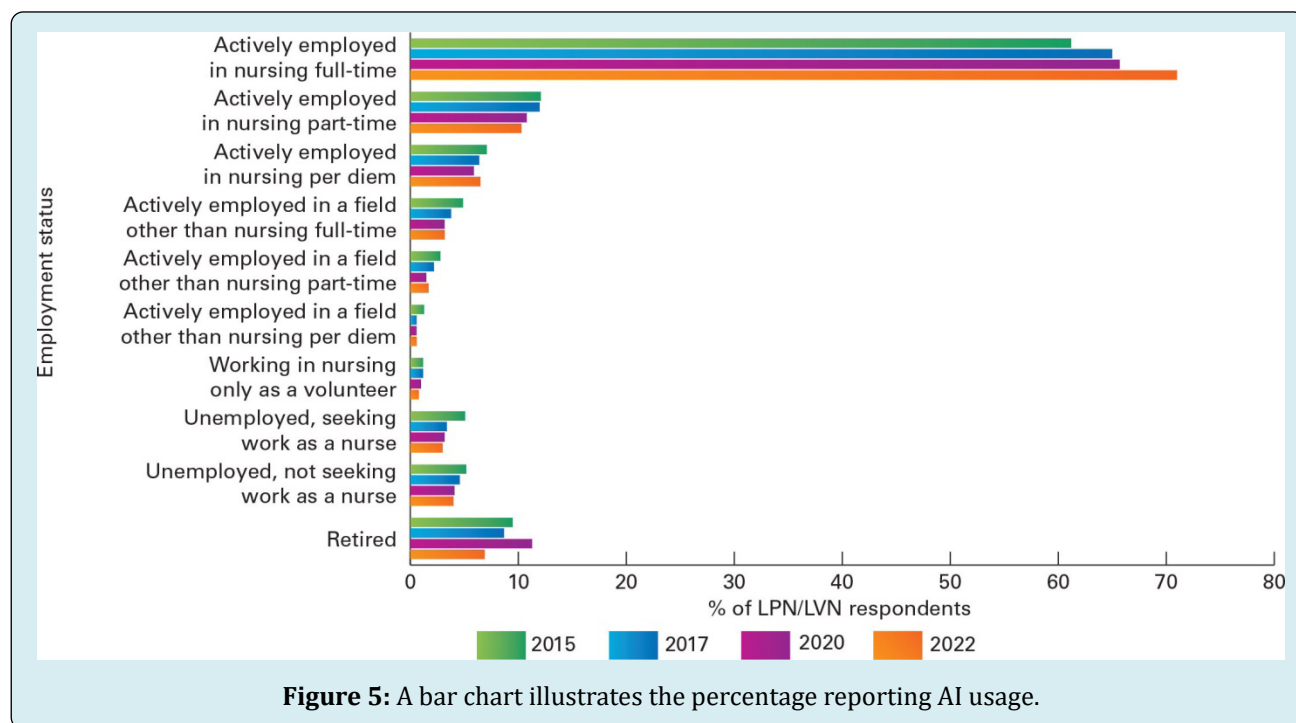


Figure 5: A bar chart illustrates the percentage reporting AI usage.

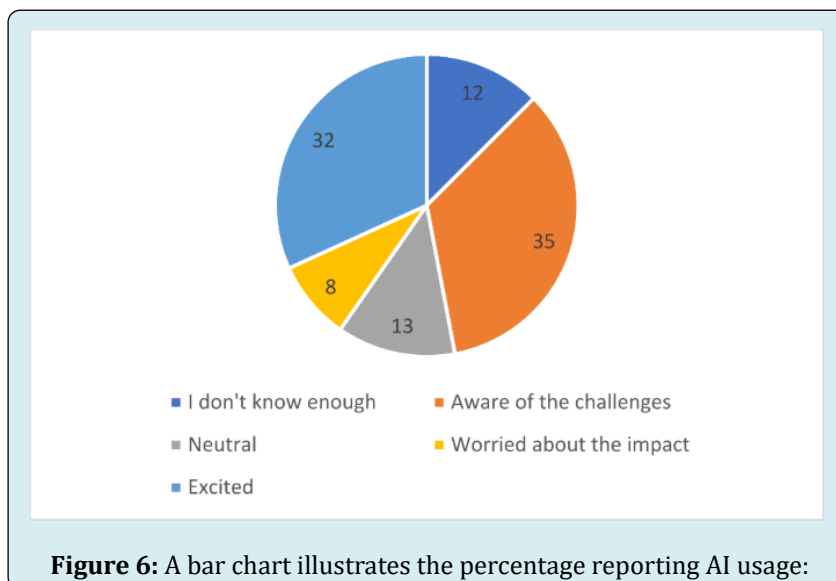


Figure 6: A bar chart illustrates the percentage reporting AI usage:

Integration of artificial intelligence into nursing practice (Table 3).

Theme	Number of Responses	Percentage (%)
Limited Access to AI Tools	45	37.5
AI Helpful but Training Needed	32	26.7
Ethical Concerns	15	12.5
Positive Impact on Monitoring	10	8.3

Table 3: underscore the nascent stage of AI integration in Kwara State's nursing practice, with experiences largely theoretical rather than practical.

Discussion

This section interprets the study's findings in the context of existing literature, relating them to the demographic profiles, awareness levels, perceptions, and experiences presented in Section 4. The results are discussed thematically, drawing on tables and figures to substantiate patterns, while justifying alignments and divergences with past empirical studies from Nigerian and global contexts. This analysis highlights the implications of moderate AI awareness and mixed perceptions among nurses in Kwara State, emphasizing the need for context-specific interventions in low- and middle-income countries (LMICs).

Discussion of Results

The demographic composition of the sample indicates a predominantly female workforce (62%) with a mid-career mean age of 38.4 years ($SD = 7.2$), reflecting global nursing demographics where women constitute approximately 89% of the profession [World Health Organization [22]. Similar gender patterns have been reported in multiple Nigerian studies, which consistently document female dominance in nursing and related health professions [23]. The equal institutional representation across UITH, KWASUTH, and Sobi Specialist Hospital enhances comparability within tertiary settings, although the use of convenience sampling constrains generalizability.

Awareness of Artificial Intelligence (AI) was moderate (mean = 5.2/10), with only 45% of respondents familiar with AI in healthcare and 32% able to identify specific tools such as EHR-based automated features. This trend aligns with recent Nigerian evidence showing persistent knowledge gaps despite growing recognition of AI's importance. For example, a 2025 survey of nursing students at Bayero University, Kano, found similarly moderate awareness levels, which

participants attributed to limited technological integration in nursing curricula (Yusuf et al., 2025). Another national review of nursing education practices identified widespread deficits in AI knowledge but noted strong willingness among students to learn and adopt AI tools [24]. Internationally, a systematic review of nurses' AI literacy reported significant disparities between high-income countries and low- and middle-income countries (LMICs), with infrastructural constraints contributing to lower awareness in LMICs such as Nigeria [25]. The significant association of awareness with younger age ($p < .05$) further corroborates global findings that younger nurses tend to be more digitally adept and receptive to emerging technologies [26].

Nurses' perceptions of AI were both optimistic and cautious. A majority agreed that AI enhances workflow efficiency (62%) and improves patient care (58%), consistent with empirical evidence showing that nurses often view AI as a facilitator of task efficiency and clinical decision-making [27]. However, concerns about job displacement (48%) and data privacy (52%) were substantial and mirror global ethical discussions. A recent qualitative review similarly found that nurses worldwide appreciate the practical benefits of AI but remain wary of its ethical and employment implications [28]. Nigerian research echoes this dual sentiment, as students have recognized AI's diagnostic precision while highlighting challenges related to unreliable infrastructure and data security [29]. The significant association between positive perceptions and higher educational status ($\chi^2 = 12.4$, $p = .01$) parallels international research demonstrating that advanced academic qualifications are linked with greater acceptance and understanding of AI applications in clinical practice [30]. Concerns about data privacy are also consistent with studies in LMICs, where infrastructural deficiencies and regulatory gaps contribute to hesitation in adopting AI solutions [31].

Experiences with AI were limited, with only 28% reporting any form of usage. The dominant themes—"limited access" (37.5%) and "training needed" (26.7%)—are strongly supported by existing literature. A 2025 Nigerian study on AI utilization among final-year nursing students reported similarly restricted exposure, largely due to inadequate infrastructure, lack of institutional investment, and minimal faculty expertise [32]. At the global level, a German cross-sectional survey reported low practical engagement with AI among nurses, attributing this gap to inadequate training and insufficient integration of AI tools in routine practice [33]. Interestingly, the present study's positive sub-theme acknowledging AI's potential to improve documentation supports findings from an international AI-in-nursing framework, which highlights documentation automation as one of AI's most transformative applications when adequately implemented [34].

Overall, the findings of this study extend previous student-focused research to practicing nurses, revealing similar knowledge gaps but consistent enthusiasm for AI's potential benefits. Younger and more educated nurses demonstrated higher awareness and more favourable perceptions, suggesting that AI-related capacity-building may need to be targeted across specific demographic groups. These results reinforce international recommendations advocating for age- and education-sensitive digital literacy programs as essential components of national AI integration strategies in healthcare [35].

Conclusion, Limitations, Implications for Nursing Practice, and Recommendations

Conclusion

In conclusion, this cross-sectional study reveals that nurses in selected health institutions in Kwara State, Nigeria, exhibit moderate awareness of AI (mean 5.2/10), with optimistic perceptions tempered by concerns over job displacement, data privacy, and ethics. Limited experiences (28% usage) underscore infrastructural and training barriers, while associations with younger age and higher education highlight opportunities for targeted adoption. These findings contribute baseline data on AI integration in Nigerian nursing, aligning with global trends but emphasizing LMIC-specific challenges.

Limitations

Several limitations warrant acknowledgment. The convenience sampling technique, while practical, may introduce selection bias and limit generalizability beyond Kwara State's tertiary institutions. Self-reported data are susceptible to social desirability bias, potentially inflating positive perceptions or underreporting experiences. The cross-sectional design precludes causal inferences, and the reliance on online Google Forms may exclude nurses with limited digital access, though the 75% response rate mitigates this somewhat. Future studies could employ randomized sampling and mixed methods for deeper insights.

Implications for Nursing Practice

The implications for nursing practice are multifaceted. Moderate awareness and limited experiences suggest that AI could enhance efficiency in high-burden settings like Nigeria, but only with addressed barriers. For instance, integrating AI tools for patient monitoring could reduce workloads, as evidenced by global studies, fostering patient-centered care. Positive perceptions imply readiness for adoption, implying that nurses could lead AI-driven innovations if empowered through education. In Kwara State, this could improve

outcomes in resource-constrained hospitals, promoting equity in healthcare delivery. Ethically, the findings underscore the need for guidelines on privacy and human-AI collaboration to maintain trust in nursing practice.

Recommendations

To foster AI adoption, the following recommendations are proposed:

1. **AI Training Workshops:** Implement mandatory continuing professional development programs tailored for nurses, focusing on practical AI applications like EHR integration. These should prioritize younger and less-educated nurses, drawing from successful models in global studies.
2. **Policy Support for Infrastructure:** Advocate for governmental and institutional investments in reliable internet, devices, and AI software in Kwara State's hospitals, addressing themes of limited access.
3. **Further Research on Implementation:** Conduct longitudinal studies to evaluate AI training impacts and pilot programs in Nigerian settings, incorporating diverse samples to enhance generalizability.
4. **Interprofessional Collaboration:** Encourage partnerships between nurses, educators, and technologists to develop culturally relevant AI tools, ensuring ethical integration as per international frameworks.
5. These actions could accelerate AI's transformative role in Nigerian nursing, aligning with sustainable development goals for health equity.

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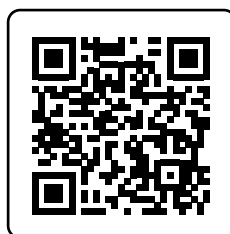
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