

Awareness, Readiness, and Barriers to Artificial Intelligence Integration in Nigerian Medical Education: A Quantitative Study

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Abstract

Introduction:

Artificial Intelligence (AI) is increasingly reshaping medical education globally, yet evidence on institutional readiness for its integration remains limited in Nigeria. This study assessed the awareness, perceptions, institutional readiness, and adoption of AI among medical students and educators in Nigeria.

Methods

A quantitative cross-sectional survey was conducted among 350 clinical-level medical students and 120 medical educators drawn from 12 accredited institutions across Nigeria's six geopolitical zones, using multistage cluster, stratified, and purposive sampling. Structured questionnaires captured awareness, perceptions, institutional readiness, and barriers to AI integration, and data were analyzed using Chi-square tests, Mann-Whitney U, Kruskal-Wallis H, Spearman's correlation, and binary logistic regression in SPSS, with significance set at $p < 0.05$.

Results

Awareness of AI was high across both groups. About 54.7% of students reported being very familiar with AI, and 90.0% of educators were aware of its applications in medical education, with a similar proportion recognizing its value in clinical training. However, institutional readiness lagged behind this enthusiasm, as half of educators (50.0%) rated AI-related resources as inadequate, citing infrastructure deficits, shortage of trained personnel, ethical concerns, and weak policy frameworks as key barriers. No significant associations emerged between students' gender, age, or year of study and their AI awareness or perceptions. Among educators, however, gender significantly predicted likelihood of AI use, with male educators approximately three times more likely than their female counterparts to adopt AI tools in teaching ($\text{Exp}(\beta) = 3.00$, $p = 0.045$).

Conclusion

These findings point to a readiness gap that must be closed through targeted faculty training, infrastructure investment, and coherent institutional policy to enable equitable AI integration in Nigerian medical education.

1. Introduction

Artificial Intelligence (AI) is increasingly reshaping healthcare and medical education by transforming how future healthcare professionals are trained, assessed, and prepared for clinical practice. AI-powered

technologies, including adaptive learning platforms, intelligent tutoring systems, virtual and augmented reality simulations, predictive analytics, and clinical decision-support tools, have demonstrated considerable potential to enhance teaching effectiveness, personalize learning experiences, strengthen clinical reasoning, and improve diagnostic decision-making [1–3]. As healthcare systems become progressively data-driven, there is growing recognition that medical graduates must possess not only clinical competence but also the knowledge and skills required to work effectively alongside AI-enabled technologies. Consequently, integrating AI into medical education is increasingly viewed as an important component of preparing the future healthcare workforce.

Despite this potential, successful AI integration extends beyond the availability of technological tools. Evidence from both developed and developing countries suggests that implementation is largely determined by institutional readiness, which includes appropriate infrastructure, faculty competence, institutional support, governance structures, and opportunities for capacity building [4, 5]. While advances in AI continue to generate considerable enthusiasm among educators and students, many institutions, particularly in low- and middle-income countries (LMICs), remain constrained by inadequate digital infrastructure, limited faculty training, insufficient investment, and the absence of comprehensive policies to guide responsible implementation [6–8]. As a result, the educational benefits of AI frequently remain aspirational rather than fully realized.

The Nigerian context reflects many of these challenges. Medical education is governed by institutions such as the Medical and Dental Council of Nigeria (MDCN), the National Universities Commission (NUC), the Federal Ministry of Health, and the Federal Ministry of Education, all of which influence curriculum development, accreditation, and quality assurance. Although recent national initiatives, including the National Information Technology Development Agency's (NITDA) AI strategy and broader digital health programmes, demonstrate growing recognition of AI's importance, systematic integration of AI into undergraduate medical education remains limited. Persistent shortages of technological infrastructure, inadequate faculty development opportunities, inconsistent institutional support, and limited policy direction continue to constrain implementation within many Nigerian medical schools [9, 10].

Existing literature consistently demonstrates that AI can enrich medical education through personalized instruction, simulation-based learning, competency-based assessment, and enhanced clinical decision support [11]. However, these educational gains depend heavily on institutional readiness and the preparedness of those expected to implement AI within teaching and learning environments. Faculty members require adequate digital competence, continuous professional development, and institutional support to effectively integrate AI into educational practice, while students require structured opportunities to develop AI-related competencies beyond informal exposure [3]. Likewise, reliable technological infrastructure, access to digital resources, and supportive institutional policies are essential for sustainable implementation. Without these enabling conditions, awareness of AI is unlikely to translate into meaningful educational transformation.

Although studies have examined AI applications in healthcare and digital health within Nigeria, relatively few have investigated the readiness of medical schools to integrate AI into undergraduate medical education. In particular, there remains limited empirical evidence regarding the levels of awareness among students and educators, institutional capacity, perceived barriers, and the demographic and institutional factors associated with AI adoption. This lack of evidence limits the ability of policymakers, educators, and institutional leaders to develop contextually appropriate strategies for curriculum reform, faculty development, and institutional investment. Understanding these dimensions is therefore essential for designing interventions that move Nigerian medical education beyond awareness towards meaningful and equitable AI integration.

Accordingly, this study assessed the awareness, perceptions, institutional readiness, and capacity for Artificial Intelligence integration among medical students and educators in Nigeria. Specifically, the study sought to: (i) assess the level of awareness and perceptions of AI among medical students and educators; (ii) evaluate institutional readiness, perceived barriers, and priority areas for AI integration within Nigerian medical schools; and (iii) examine demographic and institutional factors associated with AI awareness, perceptions, readiness, and adoption.

The study addressed the following research questions:

1. What are the levels of AI awareness and perceptions among medical students and educators in Nigeria?
2. What institutional factors influence readiness for AI integration in Nigerian medical schools?
3. Do demographic and institutional characteristics significantly influence AI awareness, perceptions, and AI adoption among medical students and educators?

To answer these questions, the following null hypotheses were tested:

H₀₁

Institutional factors are not significantly associated with readiness for AI integration in Nigerian medical schools.

H₀₂

Demographic and institutional characteristics do not significantly influence AI awareness, perceptions, or AI adoption among medical students and educators.

2. Methods

2.1 Study design

This study adopted a quantitative cross-sectional survey design to assess institutional readiness, faculty capacity, awareness, perceptions, and factors influencing the integration of Artificial Intelligence (AI) in

Nigerian medical education. Structured questionnaires were administered to medical students and educators to quantify key variables such as awareness levels, attitudes, perceived benefits, institutional readiness, barriers, and preferred areas of AI application. Descriptive and inferential statistical analyses (Chi-square tests, Mann-Whitney U test, Kruskal-Wallis H test, correlation analysis, and binary logistic regression) were performed using the Statistical Package for the Social Sciences (SPSS), with statistical significance set at $p < 0.05$. This design was chosen because it effectively captures a snapshot of current perceptions and associations across stakeholder groups.

2.2 Study Population

The population of this study comprised individuals and organizations directly involved in medical education and healthcare delivery in Nigeria. Specifically, it included clinical-level medical students in Years 4 to 6 who were enrolled in accredited Nigerian medical schools and had some exposure to AI technologies, as well as medical educators who were faculty members actively involved in medical education for at least three years and engaged in curriculum delivery or development. This population was selected to ensure that perspectives from all critical stakeholders in medical education governance were captured, providing a comprehensive understanding of AI integration in the Nigerian context.

Eligibility

1. Medical Students

- **Inclusion:** Clinical-level (4th – 6th year) students in accredited Nigerian medical schools who have had some exposure to AI technologies.
- **Exclusion:** Students in lower years, those from non-teaching hospitals, or those unwilling to participate.

2. Medical Educators

- **Inclusion:** Faculty members actively involved in medical education for at least three years.
- **Exclusion:** Retired educators, non-medical faculty members, or those with no AI-related experience.

2.3 Sample Size

The sample size was determined using Cochran’s formula for proportions (Eq. 1)

$$n = \frac{Z^2 \cdot p \cdot (1 - p)}{e^2}$$

1

The required sample size (n) for the study, based on a 95% confidence level and a 5% margin of error, is approximately 378. However, to enhance the precision of estimates, account for potential non-response, and support stratified analysis across regions and participant subgroups, the study deliberately

oversampled to include 350 medical students and 120 medical educators, for a total of 470 participants. This approach improves the representativeness and reliability of the findings.

2.4 Sampling Techniques

This study employed a multistage sampling approach combining cluster, stratified random, and purposive sampling to ensure broad representation of medical students and educators across Nigeria's six geopolitical zones (North-Central, North-East, North-West, South-East, South-South, and South-West). These zones were selected to capture regional variations in infrastructure, institutional capacity, and educational context.

In the first stage, two accredited medical schools were randomly selected from each zone using cluster sampling, yielding 12 institutions (including federal and state-owned schools and coverage of the Federal Capital Territory). In the second stage, stratified random sampling was used within selected schools, with strata based on academic year (Years 3–6 for students) and faculty roles/experience for educators. Purposive sampling was applied to select participants most relevant to AI integration, particularly educators involved in curriculum development. Within each stratum, simple random sampling was conducted using departmental records and class registers.

A total of 350 medical students and 120 medical educators participated. This multistage strategy minimized selection bias and enhanced the representativeness and generalizability of findings across Nigeria's diverse medical education landscape.

2.5 Methods of Data Collection

Data were collected using structured questionnaires specifically developed for this study to gather empirical evidence on awareness, perceptions, attitudes, readiness, barriers, and preferred areas of AI application in medical education. Separate but parallel instruments were developed for medical students and medical educators. The questionnaires covered demographic information, familiarity with and attitudes towards AI, technological infrastructure, institutional support, challenges, curriculum innovation, and preferred AI applications. The English-language versions of the questionnaires are provided as Supplementary Files 1 and 2.

To ensure validity and reliability, the instruments underwent face and content validation by a panel of five experts comprising medical educators, health informatics specialists, and educational technology researchers. They were subsequently pilot-tested with 15 participants (5 educators and 10 students) who were not included in the main study. Feedback from the pilot testing was used to refine the questionnaires for clarity, comprehensibility, and logical flow. Internal consistency was assessed using Cronbach's alpha, which yielded a value of $\alpha = 0.78$, indicating acceptable reliability.

The questionnaires were administered both physically and electronically, depending on institutional accessibility. All participants provided informed consent before completing the questionnaire.

2.6 Data analysis

Statistical analysis was employed in this study to quantify stakeholders' attitudes, perceptions, readiness, and factors influencing the integration of Artificial Intelligence (AI) in Nigerian medical education.

Descriptive statistics, such as frequencies, percentages, and distributions, were computed to summarize and describe the characteristics of survey responses, including sample demographics, awareness levels, perceptions, institutional readiness, and barriers. Inferential statistical tests were utilized to examine relationships and differences between variables. These included Chi-square tests of association, Mann-Whitney U test, Kruskal-Wallis H test, correlation analysis, and binary logistic regression. All analyses were performed using SPSS statistical software, with statistical significance set at $p < 0.05$.

Statistical analysis was selected because it enables objective quantification of stakeholders' attitudes, perceptions, and readiness while testing hypotheses and examining associations (e.g., between gender, experience, infrastructure, and AI adoption). This approach enhances the reliability and generalizability of the findings and provides empirical support for conclusions and recommendations.

2.7 Ethical Consideration

Ethical approval

for this study was obtained from the National Research Ethics Committee, Federal Ministry of Health, Abuja, prior to the commencement of data collection. The research was conducted in full compliance with the approved protocol and relevant ethical standards. Written informed consent was obtained from all participants prior to completing the questionnaires. Participants were provided with information about the study purpose, procedures, voluntary nature of participation, and their right to withdraw at any time without consequences. Confidentiality was maintained by de-identifying data using coded identifiers. All data were stored securely in password-protected files, with access restricted to authorized research team members only. Results are reported in aggregated form to prevent identification of individual participants.

3. Results

3.1 Sample Characteristics

A total of 470 valid responses were analyzed, comprising 350 medical students and 120 medical educators drawn from multiple institutions across Nigeria. Among medical students (Table 1), the majority were aged 20–24 years (52.9%), followed by those aged 25–29 years (26.0%) and 30 years and above (21.1%). Gender distribution was relatively balanced (52.9% male; 47.1% female). Most respondents were in their clinical years, with 32.3% in Year 4 and 29.7% in Year 3, while Years 5 and 6 each accounted for 19.0%. Geographically, respondents were disproportionately concentrated in southern regions, which accounted for over 65% of the sample, while northern regions each contributed

approximately 11%. This distribution reflects existing disparities in educational access and digital infrastructure across regions.

[Insert Table 1]

Table 1
Socio-demographic characteristics of medical students

Response	Frequency	Percentage
Age		
20–24	185	52.9
25–29	91	26.0
30 and above	74	21.1
Total	350	100.0
Gender		
Male	186	52.9
Female	164	47.1
Total	350	100.0
Years of Study		
Year 3	103	29.7
Year 4	113	32.3
Year 5	67	19.0
Year 6	67	19.0
Total	350	100.0
Location/Region		
Northeast	39	11.14
Northwest	41	11.72
Northcentral	42	12.00
Southeast	78	22.28
Southwest	81	23.14
Southsouth	69	19.72
Total	350	100.0
Awareness of AI		
Very familiar	192	54.7
Source: Authors' survey, (2025)		

Response	Frequency	Percentage
Age		
Somewhat familiar	155	44.4
Not familiar	3	0.9
Total	350	100.0
Source: Authors' survey, (2025)		

Among medical educators (Table 2), nearly half (49.5%) reported 11–20 years of teaching experience, while 25.0% had between 21 and 30 years. This indicates a respondent pool with substantial professional experience and institutional familiarity.

[Insert Table 2]

Table 2
Socio-demographic and professional characteristics of medical educators

Response	Frequency	Percentage (%)
Years of experience as medical educator		
1–10 years	17	14.5
11–20 years	59	49.5
21–30 years	30	25.0
31 years and above	14	11.0
Total	120	100.0
Gender		
Male	86	71.7
Female	34	28.3
Total	120	100.0
Awareness of AI medical education		
Aware	108	90.0
Not aware	12	10.0
Total	120	100.0
AI play integral role in enhancing clinical training		
Strongly Agree	72	60.0
Agree	36	30.0
Neutral	6	5.0
Disagree	4	3.3
Strongly Disagree	2	1.7
Total	120	100.0
Perceived Challenges of Implementing AI in medical education		
Inadequate Infrastructure	44	36.7
Lack of Trained Personnel	38	31.7
Ethical Concern	20	16.7
Source: Authors' survey, (2025)		

Response	Frequency	Percentage (%)
Years of experience as medical educator		
Poor Policy/Regulation	18	15.0
Total	120	100.0
How would you rate AI-related Resources in your institution?		
Very Adequate	6	5.0
Adequate	18	15.0
Fair	36	30.0
Inadequate	60	50.0
Total	120	100.0
Source: Authors' survey, (2025)		

3.2 Awareness and Perception of AI Tools

Awareness of Artificial Intelligence (AI) was high across both students and educators. Among students (Fig. 1), 54.7% reported being very familiar with AI, while 44.4% were somewhat familiar, and less than 1% reported no familiarity.

[Insert Fig. 1]

Similarly, 90.0% of educators indicated awareness of AI applications in medical education as shown in Fig. 2. Perceptions of AI were also largely positive. A combined 90.0% of educators either agreed or strongly agreed that AI plays an integral role in enhancing clinical training. Despite this widespread recognition, variation in intended use was observed across demographic groups. Male educators were significantly more likely to report willingness to adopt AI tools in teaching (90.7%) compared to female educators (76.5%).

[Insert Fig. 2]

3.3 Faculty Capacity and Institutional Readiness

Despite high levels of awareness, institutional readiness for AI integration appears limited as evident in Table 3. Half of the educators (50.0%) rated AI-related resources within their institutions as inadequate, while only 5.0% considered them very adequate. Additionally, 31.7% of respondents identified a lack of trained personnel as a major constraint, indicating significant gaps in faculty capacity.

[Insert Table 3]

Table 3
Educators' preferred priority areas for AI integration in medical education

Preferred Area	Frequency (n)	Percentage (%)
Curriculum Reform	38	31.7
Investment in Infrastructure	32	26.7
Staff Training and Capacity Building	30	25.0
Policy and Ethical Frameworks	20	16.6
Total	120	100.0
Source: Author's survey, (2025)		

Educators emphasized the importance of structural improvements to support AI integration, with key priorities including curriculum reform (31.7%), infrastructure investment (26.7%), and staff training (25.0%). These findings suggest a disconnect between cognitive readiness and institutional capacity.

3.4 Barriers to AI Integration

The primary barriers to AI integration reported by medical educators were inadequate infrastructure (36.7%), shortage of trained personnel (31.7%), ethical concerns (16.7%), and weak policy or regulatory frameworks (15.0%) (Fig. 3).

[Insert Fig. 3]

3.5 Inferential Analysis of Determinants of AI Adoption

Several inferential tests were conducted to examine factors influencing AI awareness, perceptions, and adoption. Among students, no statistically significant associations were found between gender and AI awareness, perceived benefits of AI, or attitudes toward AI across age groups as shown in Table 4. Similarly, AI usage did not differ significantly across years of study.

[Insert Table 4]

Table 4

Chi-square and non-parametric tests of association between demographic variables and AI-related outcomes among medical students and educators.

Variable	Test	Statistic	p-value	Remark
Gender and AI awareness (Students)	Chi-square	6.82	0.078	Not significant
Perceived benefits by gender (Students)	Mann-Whitney U	1024.5	0.320	Not significant
Attitude toward AI by age group (Students)	Kruskal-Wallis H	5.41	0.144	Not significant
AI usage by year of study (Students)	Chi-square	4.35	0.226	Not significant
Years of experience and AI awareness (Educators)	Chi-square	1.92	0.59	Not significant
Infrastructural Reliability and Readiness	Spearman's Correlation	0.14	0.42	Not significant
Institutions offering AI training and perceived availability of training (Educators)	Chi-square	7.2	0.03	Significant
Perceived benefits of AI integration (Educators)	Chi-square	4.1	0.13	Not significant
Source: Authors' survey, (2025)				

Among educators, years of experience showed no significant association with AI awareness. However, gender was significantly associated with perceived likelihood of AI use. Male educators reported a considerably higher likelihood of using AI tools in teaching (90.7%) compared to female educators (76.5%), as shown in Table 5. Logistic regression analysis in Table 6 confirmed this pattern, indicating that male educators were approximately three times more likely to adopt AI tools compared to female educators.

[Insert Table 5]

Table 5
Association between gender and perceived likelihood of AI use among medical educators

Gender	Likely (n)	Likely (%)	Not likely (n)	Not likely (%)	Total
Male	78	90.7	8	9.3	86
Female	26	76.5	8	23.5	34
Total	104	86.7	16	13.3	120
Source: Author's Survey, (2025)					
[Insert Table 6]					

Table 6
Logistic regression analysis of gender effect on AI adoption among medical educators (n = 120).

Variable	Coefficient (β)	Standard Error	Wald	p-value	Exp (β)
Gender (Male vs Female)	1.10	0.55	4.00	0.045*	3.00
Constant	-0.70	0.45	2.78	0.095	
Source: Authors' survey, (2025) *Significant at $p < 0.05$					

No significant correlation was observed between infrastructure reliability and readiness to integrate AI. Institutional provision of AI training was significantly associated with perceived availability of training ($\chi^2 = 7.2$, $p = 0.03$), but not with perceived benefits of AI integration.

4. Discussion

Our findings reveal a situation of high awareness and generally positive perceptions of Artificial Intelligence (AI) among medical students and educators in Nigeria. Nearly all surveyed medical students (over 99%) reported some degree of familiarity with AI, with 54.7% describing themselves as very familiar. Among educators, 90% indicated awareness of AI applications in medical education, and a similar proportion agreed or strongly agreed that AI can play an integral role in enhancing clinical training. These results indicate strong cognitive readiness and enthusiasm among both learners and teachers.

This dominant presence of digitally savvy young trainees aligns with global trends showing that tech-oriented youth are inclined to adopt educational innovations. Chan and Lee (12) similarly noted that the younger generation's inherent familiarity with digital technologies predisposes them to embrace AI in learning environments. Given the worldwide shift toward digitization in medical education, it is not unexpected that Nigerian students exhibit such receptiveness. Their broad awareness and baseline knowledge of AI provide a foundation upon which further development could be built. Among educators too, the high level of awareness (90%) reflects a growing recognition of AI's potential. Our chi-square

analysis found no significant association between educators' years of experience and their awareness of AI ($p = 0.59$), indicating that both junior and senior faculty share comparable levels of AI literacy. This high awareness among faculty signals that Nigerian educators are conceptually on board with the idea of AI in teaching, a positive sign also noted in other developing contexts [13].

Despite the high levels of awareness and positive perceptions, institutional readiness for AI integration appears limited. Half of the educators (50.0%) rated AI-related resources within their institutions as inadequate, while only 5.0% considered them very adequate. The primary barriers reported by educators were inadequate infrastructure (36.7%), shortage of trained personnel (31.7%), ethical concerns (16.7%), and weak policy or regulatory frameworks (15.0%). Educators emphasized curriculum reform (31.7%), infrastructure investment (26.7%), and staff training (25.0%) as the most important strategies to advance integration. These findings point to a clear mismatch between high awareness and low implementation, suggesting that environmental conditions and institutional support systems are not keeping pace with stakeholder interest. This gap between high awareness and low implementation is consistent with observations by Nnaji, Ayanwale (14) and Oguguo, Okeke (15), who identified limited technological infrastructure, inadequate funding, and shortages of skilled personnel as major barriers to widespread adoption of AI-driven interventions in Nigeria. The results also resonate with broader observations in low- and middle-income countries (LMICs), where technical infrastructure alone is often insufficient without complementary investments in faculty development and policy support [3, 5]. The findings suggest that, much as the literature warns, high enthusiasm alone cannot translate into integration without addressing infrastructural and institutional deficits.

Interestingly, no significant correlation was observed between infrastructural reliability and readiness to integrate AI ($p = 0.14$, $p = 0.42$). This suggests that although inadequate infrastructure is widely perceived as a barrier, readiness for AI integration may also depend on broader organisational factors, including institutional culture, leadership support, policy guidance, and the availability of trained personnel. The finding reinforces the view that technological infrastructure alone is insufficient without complementary human and institutional capacity.

Inferential analyses provide further insight into these patterns and reveal important nuances about institutional support, equity, and exposure. Institutional provision of AI training was significantly associated with educators' perceived availability of training opportunities ($\chi^2 = 7.2$, $p = 0.03$), although it was not significantly associated with perceived benefits of AI integration ($\chi^2 = 4.1$, $p = 0.13$). This suggests that belief in AI's educational value is already widespread among educators, whereas practical access to structured training remains a key limiting factor. These findings strengthen the argument that formal institutional training programmes are essential for translating awareness and positive perceptions into meaningful AI adoption [16]. In addition, our sample was drawn from medical schools across Nigeria, and we observed a skew in participation favouring the southern regions. This likely reflects underlying disparities in digital infrastructure and academic resources across the country. Indeed, Adeyemi, Ebisike (17) and Umah, Ezeagwu (18) report that southern Nigerian institutions often benefit from better internet connectivity and more robust ICT support, which can lead to greater

exposure to AI tools. Our finding that more students from southern zones were familiar with AI is consistent with these infrastructure differences and underscores the digital divide within the country. Vesna, Sawale (19) note that uneven access to connectivity and technology exacerbates inequalities in who can benefit from innovations like AI. Thus, Nigeria's current landscape shows pockets of advanced engagement, mostly in better-resourced regions, alongside areas lagging due to infrastructural gaps. Bridging this gap will be critical for equitable AI integration nationwide.

Notably, despite these geographical differences, no statistically significant association was observed between gender and AI awareness among students ($\chi^2 = 6.82, p = 0.078$). This finding suggests comparable levels of AI awareness among male and female students within the study population and contrasts with reports of gender-related differences in AI adoption. For example, Muoka, Ewurum (20) found that gender significantly influenced medical students' perceptions and utilization of artificial intelligence in medical education in Nigeria. In contrast, our findings showed that gender did not significantly influence students' perceived benefits of AI integration ($U = 1024.5, p = 0.320$), indicating comparable attitudes toward the educational value of AI across both genders. This discrepancy may reflect differences in institutional contexts, access to digital resources, or exposure to AI technologies, suggesting that gender disparities in AI perceptions are not universal. Our findings are consistent with evidence that technology adoption among students is driven more by access, exposure, and institutional support than by demographic characteristics alone [21, 22]. The observed parity in AI awareness and perceived benefits may therefore indicate improving gender inclusivity in technology-enhanced medical education in Nigeria. While gender disparities in digital access remain a concern in some settings, increasing availability of digital learning platforms and AI-enabled educational resources may be contributing to a narrowing of these gaps among medical students. These findings provide encouraging evidence for policies aimed at promoting equitable AI integration in medical education.

Nonetheless, one notable quantitative finding revealed that gender predicted actual AI usage among educators. Logistic regression analysis showed that male medical educators were approximately three times more likely to report using AI tools in teaching compared with their female counterparts ($\beta = 1.10, p = 0.045$; $\text{Exp}(\beta) = 3.00$). This suggests that while overall awareness and attitudes toward AI may be broadly positive, disparities in actual technology usage remain among faculty. Such disparities may reflect differences in access to training opportunities, confidence in using emerging technologies, institutional roles, or time available for professional development. This finding contrasts with the relative gender parity observed among students and highlights the need for targeted, gender-responsive faculty development initiatives to ensure equitable participation in AI-enhanced medical education.

Furthermore, we found that a student's year of study did not significantly affect AI awareness or usage ($\chi^2 = 4.35, p = 0.226$), highlighting that formal curriculum content on AI is lacking at all levels. One might expect senior clinical students, who are in their final years and closer to practicing, to have more exposure to advanced technologies. Additionally, our Kruskal-Wallis test of age and attitudes towards AI integration showed no significant difference ($H = 5.41, p = 0.144$), suggesting that positive attitudes toward adopting AI in medical education are shared across student age groups. This points to a broadly

consistent enthusiasm that could be leveraged if formal training is introduced. This suggests that AI learning opportunities are not progressively increasing with academic progression. In contexts where AI is systematically integrated into medical education, students typically demonstrate progressively greater competence as they advance through training, particularly through exposure to AI-supported learning, simulation, and clinical applications [23]. Nigeria's relatively flat learning curve in this regard likely reflects limited structured exposure to AI within the undergraduate medical curriculum.

5. Policy and Practice Implications

The findings of this study have important implications for the future integration of Artificial Intelligence (AI) in Nigerian medical education. The absence of significant differences in AI awareness and usage across students' years of study suggests that exposure to AI is not progressively increasing with academic advancement. This implies that students' engagement with AI is likely driven more by personal initiative, online courses, and informal learning opportunities than by structured medical school training.

From the perspective of Rogers' Diffusion of Innovations (DOI) theory, AI integration in Nigerian medical schools appears to be at an early stage of adoption. Although awareness and positive attitudes toward AI are widespread, the lack of progressively higher engagement among senior students and the limited institutional readiness indicate that AI has not yet been systematically embedded within the medical education system. In this context, AI functions more as an external innovation that is unevenly diffused through individual initiative and varying institutional exposure. Nigerian medical schools may therefore be characterised as late adopters or laggards in relation to AI integration, particularly when compared with early-adopting institutions internationally where advanced students benefit more consistently from AI-assisted learning tools, simulations, and diagnostic applications.

These findings highlight the need for targeted faculty training programmes that equip educators with the knowledge and practical skills required to integrate AI effectively into teaching and clinical training. Since institutional provision of AI training was significantly associated with perceived availability of training opportunities, strengthening faculty development initiatives could help translate awareness and positive perceptions into meaningful adoption.

The results also underscore the importance of institutional investment priorities. Medical schools will need to allocate resources toward reliable digital infrastructure, AI-related educational resources, and ongoing technical support. Such investments should be accompanied by curriculum reform that systematically incorporates AI concepts and applications into undergraduate medical education, rather than leaving exposure to students' independent efforts.

Finally, the findings point to the need for policy standardization at national and institutional levels. Clear guidelines and regulatory frameworks are necessary to ensure ethical, equitable, and sustainable integration of AI into medical education. Standardized policies could also help reduce regional disparities in access to AI resources and provide a coordinated framework for faculty training, curriculum development, and infrastructure investment across Nigerian medical schools.

Overall, bridging the gap between awareness and implementation will require coordinated action across faculty development, institutional investment, and policy reform. Such efforts are essential for moving Nigerian medical education from an aspirational phase of AI awareness toward systematic and equitable adoption.

6. Conclusion

The findings of this study highlight a defining paradox in the current state of medical education in Nigeria. Although awareness of Artificial Intelligence (AI) and recognition of its educational value are high among both medical students and educators, the translation of this awareness into meaningful integration remains limited. The evidence demonstrates that while stakeholders are cognitively prepared to embrace AI, institutional readiness has not kept pace. Persistent gaps in digital infrastructure, faculty capacity, curriculum integration, and policy support continue to constrain the effective adoption of AI within medical education.

Importantly, the findings reveal that awareness and positive perceptions of AI are broadly shared across students regardless of gender, age, or year of study, suggesting that enthusiasm for AI is widespread rather than confined to particular demographic groups. Similarly, educators demonstrated consistently high levels of AI awareness irrespective of years of teaching experience. Nevertheless, significant disparities remain in actual adoption. The observed gender differences among educators and the uneven regional distribution of respondents point to broader inequalities in access, institutional capacity, and opportunities for meaningful engagement with AI. These findings suggest that the current landscape reflects not an absence of interest, but an absence of the enabling conditions necessary for sustained and equitable implementation.

The evidence therefore points to an urgent readiness gap within Nigerian medical education. Awareness alone is insufficient to drive educational transformation without the institutional structures needed to support innovation. Bridging the divide between awareness and implementation will require coordinated investment in faculty development, curriculum reform, digital infrastructure, institutional capacity, and supportive governance frameworks. Equally important is the development of coherent national and institutional policies that promote responsible, ethical, and equitable integration of AI into medical education.

Ultimately, artificial intelligence presents a significant opportunity to reshape medical education in Nigeria by enriching teaching, strengthening clinical training, and preparing future healthcare professionals for an increasingly technology-driven healthcare environment. The willingness of students and educators to embrace AI provides a strong foundation upon which meaningful reform can be built. Realizing this potential, however, will depend on deliberate leadership, sustained investment, and collaborative action across government, regulatory bodies, educational institutions, and the wider health sector. By addressing the readiness gaps identified in this study, Nigeria can move beyond isolated

awareness toward the systematic integration of AI into medical education, positioning its future medical workforce to thrive in an evolving digital healthcare landscape.

Declarations

Ethical Approval and Accordance

Ethical approval for this study was obtained from the National Research Ethics Committee, Federal Ministry of Health, Abuja, prior to the commencement of data collection. The research was conducted in full compliance with the approved protocol and relevant ethical standards.

Consent to Participate

Written and verbal informed consent were obtained from all participants prior to data collection.

Consent for Publication

Not applicable. The manuscript does not contain any individual person's data in any form that could be used to identify them.

Conflict of Interest

No, I declare that the authors have no competing interests as defined by Discover, or other interests that might be perceived to influence the results and/or discussion reported in this paper.

Clinical Trial Number

Not Applicable

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Author Contribution

O.O. conceptualized and designed the study, developed the methodology, conducted data collection, performed data curation and formal analysis, and contributed to the review and editing of the manuscript. O.B.F. conducted data collection, contributed to project administration, prepared the original manuscript, and contributed to its review and editing. B.A. supervised the study and contributed to manuscript review and editing. All authors contributed to the interpretation of the findings, reviewed and

revised the manuscript, approved the final version, and agreed to be accountable for all aspects of the work.

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Data Availability

The datasets generated and/or analysed during the current study are not publicly available due to ethical and participant confidentiality considerations. The data are, however, available from the corresponding author upon reasonable request.

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Figures

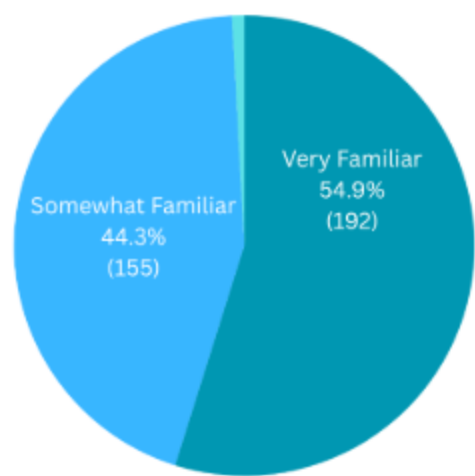


Figure 1

Levels of familiarity with Artificial Intelligence among medical students (n = 350)

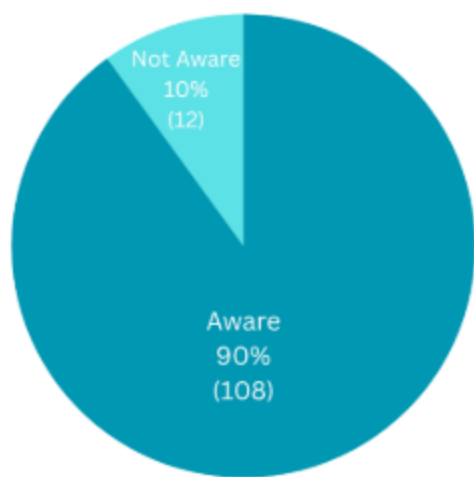


Figure 2

Awareness of AI applications in medical education among medical educators (n = 120)

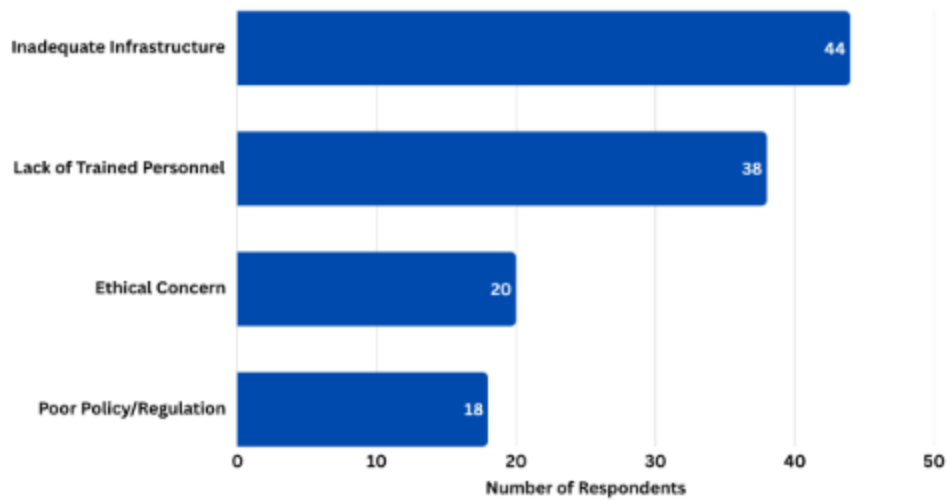


Figure 3

Primary barriers to AI integration in medical education as reported by medical educators (n = 120).

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