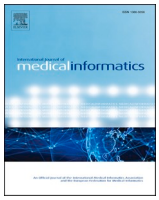
International Journal of Medical Informatics 206 (2026) 106140

Contents lists available at ScienceDirect

International Journal of Medical Informatics

journal homepage: www.elsevier.com/locate/ijmedinf



Ethical oversight of Artificial Intelligence in Nigerian Healthcare: A qualitative analysis of ethics committee members' perspectives on integration and regulation

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ARTICLE INFO

Keywords:
Artificial intelligence
Healthcare ethics
Nigeria
Regulation
Qualitative research

ABSTRACT

Background: The adoption of artificial intelligence (AI) in healthcare has the potential to improve diagnostic accuracy, streamline processes, and address resource shortages, particularly in low- and middle-income countries (LMICs) like Nigeria. However, challenges related to knowledge, ethics, and regulation hinder its implementation.

Aim: This study aimed to explore ethics committee members' perspectives on AI integration in healthcare across public teaching hospitals in southwest Nigeria, examining their knowledge, perceived benefits, challenges, and regulatory considerations surrounding AI adoption in healthcare settings.

Methods: A qualitative study design was used, involving semi-structured interviews with 10 ethics committee members from five public teaching hospitals across southwest Nigeria. Thematic analysis was conducted using NVivo software to identify key themes regarding knowledge, benefits, challenges, risks, and regulatory needs associated with AI in healthcare.

Results: Participants acknowledged AI's potential to improve efficiency and accuracy in healthcare. However, they expressed concerns about limited knowledge and training, financial barriers, and data privacy issues. Ethical concerns included potential AI errors and overreliance on technology. Participants highlighted the need for comprehensive regulatory frameworks and emphasized a collaborative approach to AI regulation, involving multiple stakeholders. Trust in AI was found to be contingent upon demonstrated accuracy and reliability.

Conclusions: While participants recognized the benefits of AI in addressing healthcare challenges, significant knowledge gaps, ethical concerns, and regulatory deficiencies present barriers to AI's successful implementation. Addressing these challenges through training, investment, and multi-stakeholder regulatory efforts could facilitate the responsible and effective integration of AI into Nigeria's healthcare sector.

1. Introduction

The rapid advancements in artificial intelligence (AI) have begun to transform multiple sectors, including healthcare, where AI applications promise to improve diagnostics, treatment planning, and operational efficiencies [1]. AI's ability to analyze vast amounts of data, identify patterns, and assist in decision-making has positioned it as a transformative tool for healthcare systems worldwide, especially in resource-constrained environments. AI applications, ranging from machine learning algorithms for diagnostic imaging to robotic-assisted surgery and predictive analytics, have shown significant potential to enhance the accuracy and speed of medical services [2–4]. For instance, AI-enabled diagnostic tools have been shown to match or even surpass human expertise in identifying diseases from medical images, thus

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https://doi.org/10.1016/j.ijmedinf.2025.106140
Received 16 August 2025; Received in revised form 30 September 2025; Accepted 7 October 2025
Available online 9 October 2025

supporting faster and more accurate diagnostics [5,6]. Additionally, AI applications can streamline administrative tasks, allowing healthcare workers to focus on direct patient care. By automating repetitive tasks like data entry, AI has the potential to address human resource challenges, reducing physician burnout and enhancing operational efficiency [7]. These developments are particularly relevant in low- and middle-income countries (LMICs) like Nigeria, where healthcare systems often face critical challenges, including high patient loads, limited healthcare personnel, and inadequate infrastructure [8,9]. As AI continues to evolve, its potential benefits for LMICs are becoming increasingly evident.

However, despite these potential benefits, significant barriers exist to the adoption and effective implementation of AI in healthcare, particularly in LMICs. A major concern is the knowledge and skill gap among healthcare professionals regarding AI technologies [9,10]. Studies indicate that many healthcare providers lack the foundational knowledge and confidence needed to use AI tools effectively, which can impact their willingness to adopt new technologies [11]. In Nigeria, as in many other LMICs, a shortage of training programs on AI in healthcare further exacerbates this issue, limiting healthcare professionals' ability to understand, trust, and utilize AI effectively [8,12]. For example, a study among 312 health professionals in Northwestern Ethiopia reported that barely 40 % had good telemedicine knowledge, highlighting the existence of a wide training gap [13]. Additionally, ethical and regulatory concerns regarding patient data privacy, algorithmic bias, and accountability present considerable challenges [14–16]. A recent study that evaluated the regulatory landscape of AI across 12 African countries reported that none had a sui generis/independent regulation [17]. AI systems, which rely on large volumes of data, are vulnerable to biases that could perpetuate health disparities if not carefully regulated [18]. Furthermore, there is a need for policies that address the ethical implications of AI in healthcare, such as ensuring transparency in AI decision-making processes and maintaining patient autonomy [19].

The successful integration of AI in healthcare critically depends on robust regulatory frameworks, which are well-established in developed nations but remain nascent in many LMICs. High-income countries have implemented comprehensive guidelines: the United States regulates AI in healthcare through the Software as a Medical Device (SaMD) framework, the United Kingdom employs the Standards Framework for Digital Health Technologies, and the European Union operates under the European Medical Device Regulation [20,21]. Similar frameworks are being developed or implemented in other countries, including Australia, China, Brazil, and Singapore [20]. However, Nigeria, like many developing nations, lacks these foundational regulatory structures, creating significant gaps in governance related to data security, informed consent, and AI implementation in healthcare settings [17]. This regulatory vacuum not only creates uncertainty among stakeholders but also potentially compromises patient safety and trust in AI-enabled healthcare services.

In this context, empirical research focusing on key stakeholders' perspectives becomes crucial for developing context-appropriate regulatory frameworks. Ethics committee members occupy a particularly strategic position in this discourse, as they serve as institutional gatekeepers responsible for evaluating and overseeing the implementation of new technologies and ensuring their ethical deployment in healthcare settings. Their unique role at the intersection of healthcare innovation and ethical oversight makes their perspectives invaluable for understanding the opportunities, challenges, and regulatory considerations surrounding AI adoption in healthcare.

What distinguishes this study is its focus on ethics committee members in Nigeria, a perspective not previously documented in the literature. Unlike studies examining general healthcare workers' views on AI adoption, this research captures the perspectives of those specifically tasked with ethical oversight and regulatory decision-making in Nigerian teaching hospitals. This unique positioning offers insights into how AI integration will be evaluated and governed at the institutional level, which is critical for successful implementation. This qualitative study, conducted across public teaching hospitals in southwest Nigeria, aims to address critical knowledge gaps by examining ethics committee members' perspectives on AI integration in healthcare. The findings will contribute to the growing body of evidence needed to develop appropriate regulatory frameworks and implementation strategies that align with local contexts and needs, ultimately supporting the responsible integration of AI in Nigeria's healthcare sector.

2. Method

2.1. Study design

This study employed a qualitative research design to explore participants' perspectives on the use of AI in healthcare, with a particular focus on their knowledge, perceived benefits, challenges, and concerns. Semi-structured interviews were conducted with participants involved in healthcare ethics committees, providing rich, in-depth data on their views and experiences.

2.2. Participants

The study was conducted with 10 participants who are members of the ethics committees across five public teaching hospitals located in five states (Lagos, Oyo, Osun, Ondo, and Ekiti) in southwest Nigeria. The sociodemographic details of each participant, including qualifications, years of experience, age range, religion, marital status, and the presence of children within a specified age range were documented to gain insight into how their backgrounds might influence their perspectives on AI in healthcare.

2.3. Selection criteria

Participants were eligible for inclusion in the study if they were professionals currently serving on the ethics review committee in one of the selected public teaching hospitals in southwest Nigeria, with a minimum of 3 years of experience in the ethics review committee of the hospitals. Additionally, they needed to have direct experience or familiarity with ethical considerations and decision-making processes in healthcare, relevant to the review and potential implementation of AI applications.

Exclusion criteria applied to individuals with less than 3 years of professional experience in an ethics review committee role, those not currently serving in an ethics review position in one of the selected teaching hospitals in southwest Nigeria, or those without experience in ethics review processes related to healthcare technology, research approvals, or AI applications. These criteria ensured that participants possessed adequate experience and a relevant professional background to provide informed insights into the implications, benefits, and challenges of AI in healthcare within their respective institutions.

2.4. Data collection

Data were collected through semi-structured interviews, allowing participants to freely discuss their experiences and opinions regarding AI in healthcare. Each interview was audio-recorded, transcribed verbatim, and anonymized to ensure confidentiality. The interview guide included open-ended questions covering topics such as participants' understanding of AI, perceived benefits and risks, ethical considerations, and the readiness of their institutions to adopt AI technologies.

2.5. Data analysis

Thematic analysis was used to identify key themes and patterns within the data, facilitated by NVivo software to ensure an organized and systematic approach. The analysis involved the following steps:

(I) **Data Familiarization**: The transcribed interviews were imported into NVivo. Each transcript was read several times to familiarize the researchers with the data and to identify initial codes relevant to the study objectives.

(II) **Coding**: Initial codes were generated and applied to segments of the data within NVivo. Coding was both deductive, based on existing knowledge of AI in healthcare, and inductive, allowing new insights to emerge from the data. Codes included categories such as *Knowledge and Awareness of AI*, *Perceived Benefits of AI*, *Challenges and Concerns*, *Risks Associated with AI*, *Opportunities for AI*, *Trust and Regulation*, and *AI Regulation Responsibility*.

(III) **Development of Themes**: Codes were reviewed and grouped into broader themes within NVivo. These themes represented shared experiences and unique viewpoints on AI's role in healthcare among participants (Fig. 1). For instance, *Perceived Benefits of AI* included subthemes such as *improved efficiency* and *enhanced accuracy*, while *Challenges and Concerns* encompassed *financial constraints* and *data privacy issues*.

(IV) **Review and Refinement of Themes**: Themes were reviewed to ensure they accurately captured the data and were sufficiently distinct from one another. NVivo's visualization tools, such as coding stripes and matrix queries, were used to cross-check themes against participant quotes and maintain consistency in interpretation.

(V) **Analysis of Patterns and Relationships**: NVivo's query functions facilitated deeper analysis of relationships between themes, allowing for exploration of potential connections between participants' sociodemographic backgrounds and their views on AI in healthcare. For example, the intersection between *trust in AI* and *regulatory bodies* was explored to understand how participants' perceptions of regulation influenced their trust in AI.

(VI) **Reporting of Findings**: Final themes were supported by direct quotes from participants, providing a nuanced understanding of their perspectives. These quotes were extracted and organized within NVivo to ensure accurate representation of the data in the reporting phase.

2.6. Ethical approval

Ethical approval for this study was granted by the Bowen University Teaching Hospital Ethics Committee, with the approval number BUTH/REC-1134. Before data collection commenced, participants were fully briefed on the study's purpose, procedures, and their rights as participants. Written informed consent was obtained from each individual, affirming their voluntary involvement and the confidentiality of their responses. Participants were assured of their anonymity, and it was emphasized that all data collected would be used exclusively for research purposes.

3. Results

The sociodemographic profile of participants (Table 1) reveals a diverse group of ethics committee members across southwest Nigeria's teaching hospitals. The cohort comprised six males (60 %) and four females (40 %), with ages ranging from 25 to 55 years. Educational qualifications varied: four participants held bachelor's degrees (40 %), five held master's degrees in various fields including Bioethics, Public Health, or related disciplines (50 %), and one held a medical fellowship (10 %). Professional experience on ethics committees ranged from 3 to 15 years, with a median of 5 years. Most participants (80 %) were married, whilst two (20 %) were single. Geographic representation was balanced across five southwestern Nigerian states: Lagos (2 participants), Oyo (2 participants), Osun (2 participants), Ekiti (2 participants), and Ondo (2 participants), providing comprehensive regional

Table 1
Aggregate Sociodemographic Characteristics of Ethics Committee Members (N = 10).

Characteristic	Summary Statistics
Gender	Male: 6 (60 %) Female: 4 (40 %)
Age Range	25–35 years: 3 (30 %) 36–45 years: 5 (50 %) 46–55 years: 2 (20 %)
Highest Qualification	Bachelor's degree: 4 (40 %) Master's degree (MSc, MPH, Bioethics): 5 (50 %) Medical Fellowship: 1 (10 %)
Years of Experience on Ethics Committee	Range: 3–15 years Median: 5 years 3–5 years: 6 (60 %) 6–10 years: 3 (30 %) 10–15 years: 1 (10 %)
Marital Status	Married: 8 (80 %) Single: 2 (20 %)
Geographic Location (State)	Lagos: 2 (20 %) Oyo: 2 (20 %) Osun: 2 (20 %) Ekiti: 2 (20 %) Ondo: 2 (20 %)

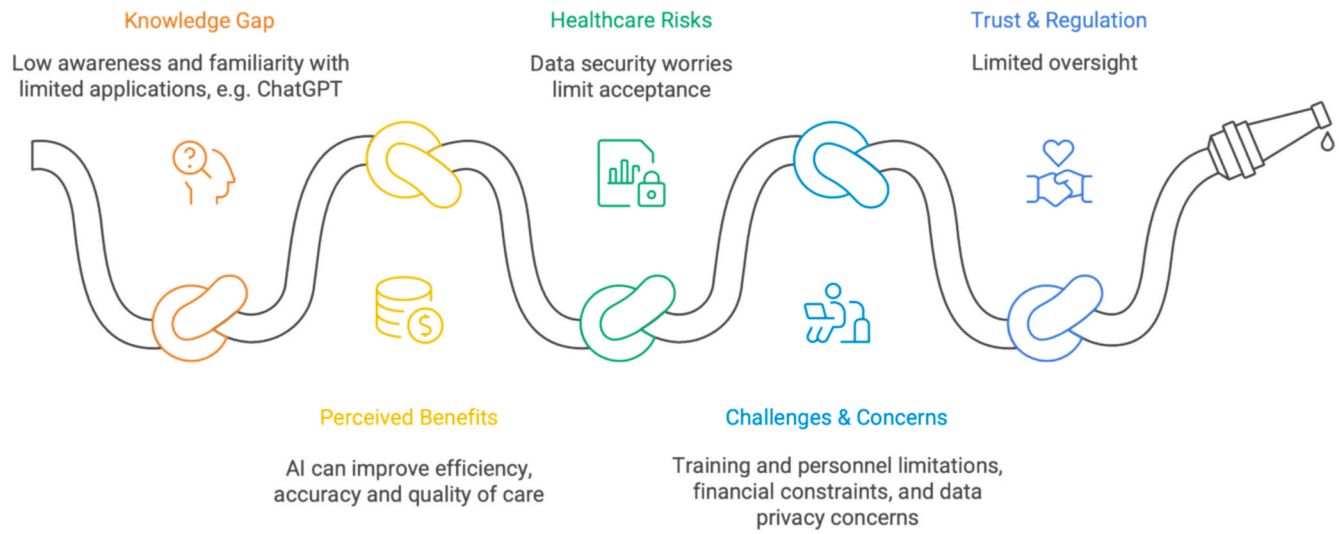

Fig. 1. Major themes developed from qualitative data obtained.

perspectives on AI integration in healthcare ethics oversight.

3.1. Knowledge and awareness of AI in healthcare

The interviews revealed significant knowledge gaps regarding AI applications in healthcare amongst ethics committee members. Most participants acknowledged their limited understanding of AI technologies and their healthcare applications.

3.1.1. Low awareness and limited knowledge

The majority of participants indicated minimal familiarity with AI systems. Several participants were candid about their knowledge limitations:

"I'd say in my team, we have little to no knowledge about AI… we are trying to know more about it, and there is no application of it." (Participant 3)
"I know we use many online resources for other things like learning, communication, and virtual meetings, but… the secretariat does not use AI either to access proposals or do their things." (Participant 4)
"In terms of using AI that's artificial intelligence, we don't do much with AI to be honest." (Participant 2)

Interestingly, participants with longer experience on ethics committees (10 + years) and advanced qualifications (Master's in Bioethics) demonstrated slightly broader conceptual understanding of AI, though they similarly reported limited practical exposure to AI applications in their institutional settings.

3.1.2. Existing familiarity with Certain AI applications

Despite limited overall knowledge, some participants demonstrated awareness of specific AI-enabled tools, particularly those used in diagnostics and data analysis:

"We are familiar with scanner machines, BP machines with audio recordings." (Participant 3)
"I remember Chat GPT, it is easy to access… I downloaded Paperpal and had a webinar on how to use it." (Participant 9)

However, such usage remained isolated rather than integrated into regular institutional workflows. Some participants showed broader understanding of AI's potential applications:

"AI can be used in research… it is also advantageous in the use of robotics, surgery diagnosis, and so on." (Participant 6)

3.2. Perceived benefits of AI in healthcare

Despite limited knowledge, participants recognised AI's significant potential for transforming healthcare delivery, particularly in addressing resource constraints common in their settings.

3.2.1. Improved efficiency and time management

Efficiency emerged as the most frequently cited benefit, with participants recognising AI's potential to streamline healthcare processes:

"It will save time, then it will improve accuracy, then it will improve decision-making." (Participant 1)
"AI has the opportunity to do quite a lot within a short period of time, which reduces the effects on human capital or resources." (Participant 5)

The time-saving potential particularly resonated given the overwhelming workloads faced by healthcare workers:

"What you could have taken two weeks can be done in seconds." (Participant 7)

3.2.2. Enhanced accuracy and quality of care

Diagnostic accuracy was viewed as a crucial benefit, particularly important for improving patient outcomes:

"It is helping in accurate diagnosis, and very accurate diagnosis is important in treatment." (Participant 2)
"Use of AI also brings about accuracy." (Participant 3)

Participants particularly valued AI's potential when managing high patient volumes:

"If there is no AI recruitments, we might end up losing some patients, especially if they are emergencies." (Participant 3)

3.3. Challenges and concerns with AI implementation

Participants identified several substantial barriers that would need addressing before successful AI implementation in their healthcare settings.

3.3.1. Lack of knowledge and training

The knowledge gap emerged as a primary implementation challenge. Participants expressed concerns about unknown AI capabilities and the need for comprehensive education:

"There might be like a lot of other things that AI can do that we're not even aware of." (Participant 8)
"Primarily, I think people have to learn and understand what AI is about, what is the usefulness of AI in research." (Participant 4)

The institutional knowledge gap was evident across ethics committees:

"I might not be able to talk about everybody… since I became a member of the committee, we have not been discussing the use of AI or its adoption." (Participant 5)

3.3.2. Financial constraints

Financial limitations presented significant obstacles to AI adoption. Whilst this concern was explicitly articulated by one participant, it was implicitly referenced by several others when discussing resource constraints, infrastructure inadequacies, and the need for substantial investment in AI systems:

"The hospital may not have money to finance all these AI equipment." (Participant 3)
Additional participants alluded to financial barriers when discussing: "…limited healthcare personnel, and inadequate infrastructure" (Participant 5)
"We don't have the resources… to maintain such systems" (Participant 7)

These perspectives collectively underscore that financial constraints extend beyond initial equipment acquisition to encompass ongoing maintenance, training programmes, and infrastructure upgrades necessary for sustainable AI integration. Participants from hospitals in less urbanised states (Ekiti, Ondo) were particularly emphatic about budgetary limitations, whilst those from Lagos and Oyo acknowledged that even well-funded institutions face resource allocation challenges when considering AI adoption.

3.3.3. Data privacy and security concerns

Data protection concerns were recurring themes, particularly regarding sensitive patient information and consent processes:

"Consent… are the patients aware that this information about them is being shared with third parties?" (Participant 2)
"Before we allow people to get such information on life subjects… we ensure the information collected is used for healthcare purposes." (Participant 7)

3.4. Risks associated with AI in healthcare

Participants demonstrated thoughtful consideration of potential risks that could compromise patient safety and healthcare quality.

3.4.1. Potential for errors and Misdiagnoses

Concerns about AI-generated errors and their consequences featured prominently in discussions:

"If you are not knowledgeable about AI equipment, you will use it the other way round or wrongly, and that can lead to death." (Participant 9)
"Things could go wrong, especially when you are dealing with human life… for example, during surgery, a machine could be near an artery, and something happens, the machine punctures the artery." (Participant 5)

3.4.2. Ethical and trust issues

Beyond technical concerns, participants identified ethical challenges around appropriate AI use and potential misuse:

"People don't take time to review what AI has generated for them, they just copy it like that… Some people may think this is unfair to the people doing the real work." (Participant 4)

Trust in AI systems was conditional on demonstrated reliability:

"If we can see… that it is being correct and that it would be like somebody did it, then that's something we could rely on." (Participant 10)

3.5. Opportunities for AI in healthcare

Despite identified challenges, participants recognised significant opportunities for AI to address critical healthcare needs in their settings.

3.5.1. Potential to improve diagnostic accuracy

Participants viewed AI's diagnostic capabilities as particularly valuable, especially in resource-limited environments:

"There can be accurate diagnosis, that's a potential opportunity." (Participant 2)
"With AI, they are able to do some microscopic surgical interventions." (Participant 8)

3.5.2. Support for Overburdened staff

AI was recognised as potentially alleviating healthcare worker burden and improving resource efficiency:

"If there is use of AI, it will make our work faster." (Participant 1)
"The use of AI in these interventions is quite cost-effective because it reduces the effects on human capital or resources." (Participant 5)

3.6. Trust and regulation of AI in healthcare

Trust emerged as a critical factor in AI adoption, closely linked to demonstrated performance and appropriate regulatory oversight.

3.6.1. Current trust levels and Conditions

Trust levels appeared cautiously optimistic but remained contingent on proven accuracy and reliability:

"60 %" (Participant 2, when asked about current trust levels)

Trust could potentially increase if participants could:

"see… that there is no error." (Participant 2)

Participants detailed necessary precautions for maintaining trust:

"Before we allow people to get such information on life subjects… we'd ask further questions… to make sure that the confidentiality and privacy of the subjects are protected." (Participant 6)

3.6.2. Factors Influencing trust

Trust was intrinsically linked to transparency, accuracy, and responsible data handling practices. Qualified personnel were seen as crucial for building confidence:

"if the person coming for such information has the pedigree, requisite qualification, and experience." (Participant 9)

Error reduction emerged as fundamental to trust-building:

"Ensuring that there's little to no error can influence our level of trust in AI solutions." (Participant 2)

3.7. Responsibility for AI regulation in healthcare

Participants recognised the need for robust governance frameworks whilst acknowledging current regulatory uncertainties and gaps.

3.7.1. Perceived regulatory bodies and gaps

Responsibility for AI regulation was associated with various government entities, though participants expressed uncertainty about current arrangements:

"There will be data scientists in that." (Participant 1)
"We have the Ministry for Information Technology, Communications and Technology and then the Federal Ministry of Health." (Participant 4)
"There is the National Research Committee… and the Ministry of Health and Social Welfare." (Participant 7)

However, uncertainty about current regulatory arrangements was evident:

"If there is any agency charged with that at the moment, I am not so sure." (Participant 7)

3.7.2. The need for collaborative oversight

Multiple participants emphasised that effective AI regulation would require coordinated multi-stakeholder approaches:

"Collaborative effort from all the bodies involved." (Participant 10)
"NCC will also be interested in making sure that accurate healthcare communication is upheld." (Participant 5)

4. Discussion

To contextualize our findings, we developed a SWOT framework (Fig. 2) that synthesizes the promises, barriers, oversight mechanisms, and risks associated with AI integration in Nigerian healthcare. This analysis highlights AI's potential strengths and opportunities, such as improved diagnostics, administrative efficiency, and public health applications, while also underscoring weaknesses including limited knowledge, financial constraints, and ethical challenges. Ethical oversight and regulatory structures emerge as critical mediators, determining whether AI adoption leads to positive outcomes or exacerbates risks such as misdiagnosis, data misuse, and breaches of patient trust.

The thematic analysis revealed several important findings that highlight both optimism and caution toward AI's adoption in the healthcare sector, providing valuable insights for healthcare administrators, policymakers, and AI developers. The participants generally reported limited knowledge of AI technologies, with familiarity mostly confined to specific tools for data analysis and diagnostics. This knowledge gap aligns with broader trends observed across African healthcare systems. For instance, Birku and Abetu (2023) found that

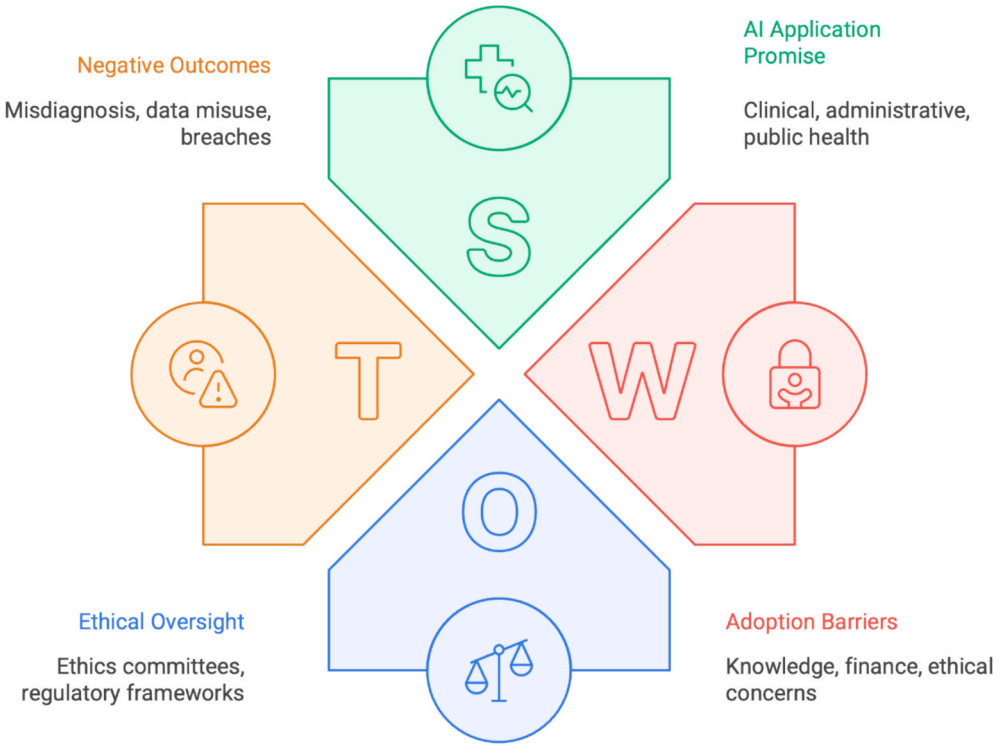

Fig. 2. SWOT framework of AI integration and oversight in Nigerian healthcare.

only 37.6 % of healthcare professionals in Northwest Ethiopia demonstrated good knowledge of telemedicine technologies, despite most showing positive attitudes toward digital health innovations [13]. Similarly, a comprehensive study of radiographers across Africa by Antwi *et al.* (2020) revealed significant concerns about AI implementation, particularly regarding equipment maintenance and limited awareness, despite recognizing AI's potential benefits for clinical quality improvement and diagnostic accuracy [22].

The limited understanding among ethics committee members in our study primarily centred around basic data analysis tools and diagnostic machines, reflecting patterns observed in other African contexts. Alboraie *et al.* (2021) found that in Egypt, healthcare professionals' exposure to digital health technologies was largely confined to basic applications such as laboratory result follow-ups and video consultations, with more advanced applications remaining largely unexplored [23]. This pattern of limited exposure to advanced applications is further corroborated by Aldhafeeri's (2024) recent study, which found that 44.8 % of radiographers were unfamiliar with AI integration in their field, and 32.9 % expressed uncertainty about fundamental aspects of AI systems such as transparency and explanatory capabilities [24]. This consistent pattern of limited knowledge across different African healthcare settings suggests a systemic gap in AI education and training, which could potentially hinder broader AI adoption and effective oversight [17,18]. As ethics committee members play a crucial role in evaluating and approving new technologies, their limited exposure to AI applications may impact their ability to make informed decisions about AI integration in healthcare settings. Therefore, targeted educational initiatives focusing on AI in healthcare appear crucial, not only for general healthcare professionals but particularly for ethics committee members who serve as institutional gatekeepers for new technology adoption.

The perceived benefits of AI in healthcare were widely acknowledged by participants, particularly regarding improvements in efficiency, accuracy, and decision-making. They emphasized AI's potential to alleviate the strain on healthcare systems, improve diagnostic precision, and expedite administrative tasks, benefits that are especially critical in resource-limited settings. Recent implementations in Nigeria have demonstrated these advantages. A notable example is the ADVISER (AI-driven Vaccination Intervention Optimiser) system deployed in Oyo State, Nigeria. This pioneering AI framework optimizes the allocation of health interventions in resource-constrained settings through an integer linear program that maximizes the probability of successful vaccination. The system's successful deployment to over 13,000 families represent the first large-scale implementation of AI-enabled healthcare optimization in Nigeria, demonstrating the practical feasibility of AI integration in Nigerian healthcare settings [25]. Another practical example of AI application in Nigerian healthcare logistics comes from a maternity kit distribution system study, where AI was implemented to predict delivery dates and manage distribution [26]. However, this implementation revealed significant technical challenges, the facial recognition system struggled with accuracy among people of African descent, particularly family members with similar features, and the reliance on free versions of APIs limited the system's functionality [26]. These practical implementation challenges highlight the need for contextually appropriate AI solutions and adequate investment in robust systems.

While participants highlighted financial constraints as a significant barrier to acquiring and maintaining AI systems, recent studies have identified specific applications that could justify such investments through their potential return on investment. For instance, in addressing antibiotic resistance, a major driver of healthcare costs in Nigeria, AI systems could significantly reduce expenses related to prolonged hospital stays and additional medications by improving prescribing accuracy and providing real-time clinical support [27]. Similarly, AI-enabled telemedicine could optimize resource allocation by extending healthcare access to rural areas through remote training and decision support for local healthcare providers, potentially reducing the burden on urban healthcare facilities [28]. These applications demonstrate how strategic AI investments, despite initial financial barriers, could address critical healthcare challenges while potentially generating long-term cost savings. However, as noted in a comprehensive analysis of technology adoption in African healthcare, while information technology presents substantial opportunities for improving healthcare delivery, widespread

implementation continues to be hindered by financial limitations and policy gaps [29]. These financial barriers not only affect initial acquisition but also impact the maintenance and sustainability of AI systems, a concern that particularly resonates in resource-constrained settings like Nigeria's public teaching hospitals.

Participants expressed significant concerns about data privacy and security, particularly regarding the use of patient information in AI-driven research. These privacy concerns align with earlier findings from Egypt, where 21.9 % of healthcare professionals worried about patient privacy in digital health systems [23]. The need for robust data protection measures appears even more critical in the Nigerian context, where participants emphasized that without rigorous data governance frameworks, AI applications could expose sensitive patient information to unauthorized access or misuse. This concern is particularly relevant given the increasing integration of AI systems that require large volumes of patient data, as highlighted in the deployment of the ADVISER system [25].

Participants also expressed concerns about potential AI-related errors stemming from bias, intellectual laziness, and overreliance, particularly in critical areas such as diagnosis and surgery. These concerns are supported by empirical evidence. A retrospective study in Japan examining an AI-driven automated medical history-taking system found that diagnostic errors occurred in 11 % of cases, with higher error rates when the AI system failed to include the final diagnosis in its differential diagnosis list [30]. This underscores participants' concerns about over-reliance on AI systems, particularly in critical diagnostic decisions. The challenge of reproducibility and accuracy across different clinical contexts is further complicated by the rapid pace of technological change and the diversity of AI techniques [31]. However, research suggests that these risks can be mitigated through proper implementation strategies. A three-year panel study across multiple hospital wards demonstrated that combining automation with quality management training for staff significantly reduced interpretative medical errors [32]. This finding aligns with participants' suggestions that comprehensive training and clear protocols for AI use could help prevent overreliance while maximizing benefits. The study's recommendation for an optimal implementation path that combines automated error prevention with staff training provides a potential framework for addressing participants' concerns about maintaining human oversight and judgment in AI-assisted healthcare delivery.

4.1. Practical pathways for AI implementation in Nigerian healthcare

Based on our findings and existing evidence, we propose a phased implementation framework for AI integration in Nigerian healthcare settings. This framework addresses the key barriers identified by participants, knowledge gaps, financial constraints, and trust concerns, whilst building upon the existing regulatory infrastructure and stakeholder engagement that participants emphasised as crucial for successful implementation.

The first phase, Foundation Building (Months 1–12), focuses on establishing the necessary groundwork for AI adoption. This begins with comprehensive AI literacy programmes specifically designed for ethics committee members and healthcare administrators, covering fundamental AI concepts, healthcare applications, ethical considerations, and regulatory requirements. Concurrently, institutions should develop AI readiness assessment tools to evaluate their infrastructure, technical capacity, and staff preparedness. A critical component of this phase involves creating multi-stakeholder AI governance committees that bring together clinicians, ethicists, IT specialists, and patient representatives to ensure diverse perspectives inform AI integration decisions. During this foundational period, institutions should also pilot small-scale AI applications with proven track records in similar resource-constrained settings, such as AI-assisted diagnostic imaging for tuberculosis or malaria detection, allowing stakeholders to gain practical experience with manageable risk.

The second phase, Controlled Implementation (Months 13–24), transitions from preparation to active deployment whilst maintaining rigorous oversight. AI systems should be deployed in controlled clinical environments with robust human oversight mechanisms to ensure patient safety and build user confidence. Institutions must implement continuous monitoring systems to track AI performance, error rates, and user confidence levels, providing real-time feedback for adjustments and improvements. This phase also requires establishing clear standard operating procedures (SOPs) for AI-human collaboration, emphasising that AI serves as a decision-support tool rather than a replacement for clinical judgement, thereby addressing participants' concerns about overreliance. Additionally, context-specific data governance frameworks must be developed to address the privacy, consent, and security concerns identified by participants, ensuring patient data is protected throughout AI integration.

The final phase, Scaling and Sustainability (Months 25–36), focuses on expanding successful implementations and ensuring long-term viability. Successful AI applications should be expanded to additional departments and institutions based on demonstrated evidence of improved outcomes and user acceptance, rather than rapid scaling without evaluation. To address the financial constraints repeatedly highlighted by participants, sustainable financing models must be created, potentially including public–private partnerships and phased procurement strategies that distribute costs over time. Regular training refresher programmes should be established to prevent knowledge decay and ensure staff remain updated on evolving AI capabilities, maintaining the competence that participants identified as essential for safe AI use. Finally, institutions should prioritise developing localised AI solutions that account for the technical challenges identified in previous Nigerian implementations, such as ensuring algorithms perform accurately across diverse patient populations, thereby avoiding the pitfalls experienced in earlier AI deployments in African healthcare settings.

5. Study limitations

This study has several limitations that should be considered when interpreting the findings. First, the sample size of 10 participants, whilst appropriate for qualitative inquiry and sufficient to achieve thematic saturation on key topics, inherently limits the generalisability of findings. The perspectives captured represent those of ethics committee members specifically and may not reflect the views of frontline healthcare workers (nurses, physicians, laboratory technicians), hospital administrators, or patients, all of whom are critical stakeholders in AI implementation. Frontline providers may have different priorities regarding workflow integration and practical usability, whilst patients may emphasise different ethical concerns around consent and data privacy. Future research should explicitly examine these diverse stakeholder perspectives to develop a comprehensive understanding of AI implementation readiness across all levels of the healthcare system.

Second, geographic constraints further limit generalisability. Whilst the study included five teaching hospitals across southwest Nigeria, providing reasonable regional coverage, it does not capture perspectives from Nigeria's other geopolitical zones (North Central, North East, North West, South East, South South), which may face distinct infrastructural, cultural, and resource challenges. Teaching hospitals, as tertiary institutions with relatively advanced infrastructure and educated staff, may also present a more optimistic picture than secondary or primary healthcare facilities where resource constraints are typically more severe. Therefore, findings should be interpreted as representing the perspectives of ethics committee members in well-resourced teaching hospitals in southwest Nigeria rather than the Nigerian healthcare system as a whole.

Also, participants were members of ethics committees, whose views may not represent those of other stakeholders involved in the practical implementation and use of AI technologies. Whilst their perspectives are crucial for understanding ethical considerations and regulatory needs,

the insights of frontline clinicians who would directly interact with AI systems, IT specialists who would manage technical infrastructure, and hospital administrators who would make procurement and resource allocation decisions could reveal additional challenges and opportunities for AI implementation that were not captured in this study.

Furthermore, data collection relied on self-reported knowledge and opinions through semi-structured interviews, which may be subject to recall bias or social desirability bias, as participants might have been inclined to give responses they perceived as favourable. Observing or analysing actual practices and interactions with AI technologies, if available, could complement these findings with a more objective view of AI awareness and usage in healthcare. Lastly, the study focused on general perceptions of AI rather than specific AI tools or applications. This broad approach was valuable for identifying overarching themes, but a more targeted exploration of particular AI systems (e.g., diagnostic tools, robotic-assisted surgery, or patient data management applications) could provide more nuanced insights. Future research could address these limitations by including a wider range of participants, expanding the geographic scope, and focusing on specific AI applications in healthcare.

6. Conclusion

This study provides critical insights into the perspectives of ethics committee members across public teaching hospitals in southwest Nigeria regarding AI integration in healthcare. While participants recognized AI's potential to transform healthcare delivery, particularly in resource-constrained settings, their views reflect both the promise and challenges of AI adoption in developing healthcare systems. The findings highlight three critical areas requiring immediate attention. First, there is a pressing need to address the knowledge gap among healthcare professionals, particularly those in oversight roles. This aligns with broader patterns observed across African healthcare settings, where limited understanding of advanced digital health technologies persists despite positive attitudes toward innovation. Second, while financial constraints present significant barriers to AI adoption, our analysis suggests that strategic investments in specific applications, such as AI-enabled telemedicine for rural healthcare access and automated diagnostic support systems, could generate substantial returns through improved resource allocation and reduced healthcare costs. Third, concerns about AI-related errors and privacy risks necessitate the development of robust governance frameworks, supported by empirical evidence showing that proper implementation strategies and staff training can significantly reduce error rates.

Looking ahead, several key recommendations emerge:

Development of contextually appropriate AI solutions that address specific challenges in Nigerian healthcare while considering local technical and resource constraints
Implementation of comprehensive training programs that combine technical knowledge with quality management principles to prevent over-reliance on AI systems
Establishment of clear regulatory frameworks that protect patient privacy while facilitating beneficial AI applications
Adoption of phased implementation approaches that build institutional capacity progressively, beginning with pilot programmes in controlled environments and scaling based on demonstrated success and stakeholder confidence
Investment in pilot programmes that can demonstrate the feasibility and impact of AI integration in Nigerian healthcare settings

This study contributes to the growing body of evidence guiding the responsible integration of AI in healthcare systems of developing nations. By addressing the identified challenges through a systematic, evidence-based approach, Nigeria can work toward realizing AI's potential to improve healthcare delivery while maintaining high ethical standards and patient safety.

CRediT authorship contribution statement

David B. Olawade: Conceptualization, Formal analysis, Project Management, Writing – review & editing, Writing – original draft, Methodology, Investigation, Supervision. **Aanuoluwapo Clement David-Olawade:** Writing – review & editing, Writing – original draft, Methodology, Investigation. **Nicholas Aderinto:** Writing – review & editing, Writing – original draft, Methodology, Investigation. **Ojima Z. Wada:** Writing – review & editing, Writing – original draft, Visualization, Methodology, Investigation.

Funding

This study did not receive any funding.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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