Evidence Based Journal of Information Science
Volume 1, Issue 2, December, 2025
ISSN: 1595-6148
https://journals.kasu.edu.ng/index.php/lib

UTILIZATION OF AI TOOLS FOR ENHANCING HEALTHCARE SERVICES IN UNIVERSITY OF ILORIN TEACHING HOSPITAL (UITH) KWARA STATE, NIGERIA

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Abstract

This study examines the utilization of AI tools in enhancing healthcare services in the University of Ilorin Teaching Hospital (UITH), Kwara State, Nigeria. The objectives of this study were to: identify the perceived benefits associated with the use of AI tools in enhancing healthcare services *at the University of Ilorin Teaching Hospital, Kwara State, Nigeria; and identify the perceived challenges faced in the use of AI tools in enhancing* healthcare services *at the University of Ilorin Teaching Hospital, Kwara State, Nigeria. The methodology adopted for this study was a descriptive survey research design approach, utilizing a structured questionnaire to collect data from a wide range of healthcare professionals within the hospital. The population for this study comprised 198 healthcare professionals from five departments at UITH, Kwara State, Nigeria. A stratified sampling technique was employed to ensure fair representation from the diverse professional categories across departments. The departments include Hematology, Chemical Pathology, Radiology, Medical Microbiology Laboratory, and the Intensive Care Unit (ICU). A total sample size of 132 healthcare workers was selected across five departments/units. Findings revealed a high level of perceived benefits of AI tools were recognised such as AI's potential to improve diagnosis, reduce manual errors, and speed up laboratory processes among others, however, respondents identified a number of challenges hindering the optimal use of AI tools such as unstable electricity, poor internet connectivity, outdated infrastructure, limited training, and the absence of clear institutional or national policies. In conclusion, the adoption of AI would significantly improve healthcare delivery at UITH and contribute substantially to broader digital health advancements in Nigeria. It was recommended that medical practitioners and other ad hoc staff across departments within the hospital environment need to be trained on the effective use of AI tools.*

Keywords*:* *Artificial intelligence, Delivery, Extent of use, Health care, Services,*

Received: October 15, 2025. Accepted: December 16, 2025

Introduction

Globally, healthcare systems are increasingly embracing Artificial Intelligence (AI) tools to enhance service delivery, improve decision-making, and address complex medical challenges (Lee et al., 2025). AI, a specialized field of computer science, is designed to simulate human intelligence processes, including learning, reasoning, and self-correction, allowing machines to analyze vast datasets, predict health outcomes, and optimize clinical workflows with a high degree of accuracy (Russell & Norvig, 2016). This advanced capability enables AI systems to process and interpret complex medical data that would otherwise be difficult for human practitioners to analyze in a timely manner. The application of AI in healthcare has grown significantly, with tools such as machine learning, natural language processing, and predictive analytics transforming various aspects of medical care. For instance, AI-powered diagnostic tools are now being used to detect diseases such as cancer, cardiovascular diseases, and diabetic retinopathy, achieving remarkable accuracy that rivals or even surpasses traditional diagnostic methods (Rajpurkar et al., 2018).

Moreover, the potential benefits of AI tools in managing healthcare services lie in their capacity to improve operational efficiency, enhance diagnostic accuracy, and personalize patient care, making them an indispensable tool in tackling contemporary healthcare challenges. In spite of these benefits, the integration of AI tools in enhancing healthcare delivery in most Public health institutions in Nigeria is rather slow, perhaps due to some factors such as high cost of implementing AI technology for health, unreliable electricity supply, limited access to advanced technologies, insufficient digital infrastructure, shortage of skilled professionals capable of implementing and managing AI systems effectively among others. (Olatunji, 2021; Adetiba et al., 2020). There is, therefore, an urgent need to assess the perception of health workers on the utilization of AI tools in enhancing healthcare services due to their slow adoption in the Nigerian environment.

Received: October 15, 2025. Accepted: December 16, 2025

In light of the above, this study examined the perception of health workers in the utilization of AI tools in enhancing healthcare services at the University of Ilorin Teaching Hospital (UITH), Kwara State, Nigeria.

Research Objectives

This study seeks to achieve the following objectives:

i.To identify the perceived benefits associated with the use of AI tools in enhancing healthcare services at the University of Ilorin Teaching Hospital, Kwara State, Nigeria; and

ii. To identify the perceived challenges faced in the use of AI tools in enhancing healthcare services at the University of Ilorin Teaching Hospital, Kwara State, Nigeria.

Literature Review

Concept of Artificial Intelligence

The term "Artificial Intelligence" (AI) was coined by John McCarthy in 1956 during the Dartmouth Conference, which is widely regarded as the founding event of AI as a field of study (McCarthy et al., 1955). The conference, organized by John McCarthy and others, explored ways to simulate human intelligence using machines (Russell & Norvig, 2021).

Artificial Intelligence (AI) refers to the simulation of human intelligence in machines programmed to think, learn, and act like humans. AI encompasses various technologies, including machine learning, natural language processing, and robotics, which allow systems to process information, identify patterns, and make decisions with minimal human intervention (Russell & Norvig, 2021).

Received: October 15, 2025. Accepted: December 16, 2025

The transformative impact of AI is driven by the availability of large-scale datasets, advancements in computational power, and continuous innovation in algorithm development (Topol, 2019).

Application Areas of AI in Healthcare Globally and in Nigeria

The diverse application areas of AI in healthcare delivery are discussed briefly below:

i.Healthcare Administration and Operations: AI tools are also used in healthcare administration to streamline hospital operations and reduce costs. AI algorithms help hospitals predict patient admission rates, optimize staffing schedules, manage resources, and improve patient flow. By analyzing historical data, AI can forecast peak demand periods, allowing hospitals to better allocate resources and plan for capacity (Vaishya et al., 2020).

ii. Medical Imaging: AI has revolutionized medical imaging by enabling precise analysis of diagnostic images, such as X-rays, CT scans, and MRIs. Advanced algorithms, particularly convolutional neural networks (CNNs), detect abnormalities like fractures, tumors, and neurological disorders with high accuracy. This technology supports radiologists in making faster and more consistent diagnoses, reducing the likelihood of missed early-stage diseases. AI has been particularly effective in detecting early signs of conditions like lung cancer and Alzheimer's, which can be overlooked during manual evaluations (Krittanawong et al., 2018).

iii. Pathology: AI-powered systems have improved the accuracy of pathology by identifying subtle patterns in tissue and cell samples. These systems assist in diagnosing conditions such as cancer, infectious diseases, and genetic abnormalities, significantly reducing subjectivity in manual analysis. For example, AI-enabled platforms can distinguish between benign and malignant cells, allowing early detection of cancers (Litjens et al., 2017).

Received: October 15, 2025. Accepted: December 16, 2025

iv. Laboratory Automation: AI is transforming laboratory services by automating tasks such as sample collection, sorting, and testing. Robotic systems equipped with AI process samples with remarkable precision, reducing human error and turnaround time. Real-time analysis by machine learning algorithms flags anomalies for further investigation. Automated blood analyzers integrated with AI have been shown to enhance the speed and accuracy of diagnostics, particularly in emergency care settings (Topol, 2019).

v. Predictive Analytics: AI tools in predictive analytics use historical patient data to anticipate disease progression, enabling early intervention and better patient care. By analyzing genetic, lifestyle, and historical data, these tools predict the risk of chronic diseases like diabetes, cardiovascular diseases, and kidney failure. Additionally, predictive analytics supports resource allocation by forecasting patient admission rates and optimizing hospital staffing (Shickel et al., 2018).

vi. Genomic Analysis: AI has greatly advanced genomics by analyzing genetic data to identify biomarkers and mutations linked to various diseases. This allows healthcare providers to design personalized treatment plans based on an individual's genetic profile. AI also supports large-scale genomic studies by processing vast datasets quickly and accurately. Such applications are critical in cancer treatment, where identifying genetic drivers can guide the development of targeted therapies (Levine et al., 2019).

vii. Disease Outbreak Monitoring: AI is instrumental in tracking and predicting disease outbreaks by analyzing data from public health systems, laboratories, and patient records. During the COVID-19 pandemic, AI was deployed to monitor infection rates and predict hospital resource needs, enabling quicker response and preparedness (Vaishya et al., 2020).

Received: October 15, 2025. Accepted: December 16, 2025

viii. Drug Discovery and Development: AI accelerates drug discovery by analyzing molecular and clinical data to identify promising drug candidates and optimize clinical trials. These AI applications significantly reduce the time and cost associated with traditional drug development methods, paving the way for more efficient pharmaceutical innovation (Zhou et al., 2020).

ix. Robotics in Surgery: AI-powered robotics are increasingly used in surgical procedures to enhance precision and minimize risks. Surgical robots, such as the Da Vinci system, assist surgeons by providing real-time feedback, reducing variability, and enabling minimally invasive procedures. These advancements have led to faster recovery times and improved patient outcomes (Atallah et al., 2018).

x. Virtual Health Assistants: AI-based virtual assistants, such as chatbots and voice recognition tools, provide personalized health advice and reminders for medication adherence. These tools improve patient engagement and are particularly useful for managing chronic conditions, providing education, and addressing minor health concerns (Topol, 2019).

xi. Health Monitoring and Wearables: Wearable devices integrated with AI provide real-time health monitoring, tracking vital signs like heart rate, blood pressure, and oxygen levels. These tools are invaluable in chronic disease management, alerting users and healthcare providers to potential health issues before they escalate (Vaishya et al., 2020).

These application areas of AI in healthcare are transforming patient care and operational efficiency globally, particularly in health institutions in Nigeria that recognize the role of AI in enhancing diagnosis accuracy, enabling early intervention, and supporting personalized treatment plans.

Challenges to AI Adoption in Healthcare Delivery in Nigeria

Received: October 15, 2025. Accepted: December 16, 2025

The adoption of AI in Nigeria's healthcare sector faces several significant barriers that limit its effectiveness and integration. Past studies (E.g, Okuneye et al., 2023; Olatunji, 2021; Adetiba et al., 2020) have identified some key challenges, which include a shortage of AI-trained healthcare professionals, inadequate access to high-tech diagnostic tools, unreliable internet connectivity, and poor electricity infrastructure. Additionally, cultural resistance among healthcare providers, who remain skeptical about relying on AI for critical medical decisions, further hinders widespread adoption.

i. Infrastructural Deficiencies: Limited access to reliable electricity, stable internet connectivity, and advanced computing systems significantly hampers the implementation of AI technologies in Nigerian healthcare facilities (Okuneye et al., 2023; Olatunji, 2021; Adetiba et al., 2020).

ii. High Implementation Costs: The high costs associated with acquiring, deploying, and maintaining AI technologies often exceed the financial capacity of public healthcare institutions, making widespread adoption difficult (Okuneye et al., 2023).

iii. Lack of Skilled Personnel: A critical shortage of healthcare professionals and IT experts trained in AI technologies restricts the ability to adopt and effectively use AI tools (Olatunji, 2021; Adetiba et al., 2020)

iv. Algorithmic Bias: Many AI tools are developed using datasets primarily sourced from high-income countries, making them less effective and applicable to Nigeria's unique healthcare needs (Olatunji, 2021; Adetiba et al., 2020)

v. Regulatory and Ethical Concerns: Challenges such as data privacy, security, and the ethical use of AI in healthcare remain unresolved, with no clear regulatory framework to guide its adoption (Olatunji, 2021; Adetiba et al., 2020).

Received: October 15, 2025. Accepted: December 16, 2025

Related Studies on Perception of AI Tools among Health Workers Globally and in Nigeria

The growing integration of AI in healthcare has led to significant advancements in diagnostics, predictive analytics, and patient management. Various studies have explored the perception of healthcare workers on the adoption, impact, and challenges of AI tools in different healthcare systems worldwide. For instance, Rajkomar *et al*. (2023) analyzed AI-driven diagnostics in European hospitals. The result revealed that AI models significantly improved early disease detection rates, particularly for conditions like diabetic retinopathy and lung cancer. However, the study also highlighted concerns regarding data privacy regulations under the General Data Protection Regulation (GDPR), which imposed strict limitations on how patient data can be used for AI model training.

In the same vein, Lee *et al*. (2023) focused on AI-driven telemedicine adoption in South Korea and Japan. The research found that AI-powered chatbots and remote diagnostic tools significantly reduced patient wait times and improved access to healthcare in rural areas. However, the study also reported that cultural skepticism toward AI in medicine, coupled with regulatory hurdles, posed challenges to full-scale implementation. This study is a pointer to the fact that health institutions in Nigeria can explore the utilization of AI tools by rural dwellers.

Okuneye *et al.* (2023) explored medical students' and faculty members' perceptions of AI across Ten Nigerian Universities. The study found that while AI awareness among students was relatively high, practical knowledge of AI tools remained low. Limited access to AI-driven healthcare solutions and inadequate infrastructure were identified as major obstacles to AI adoption in Nigerian medical institutions. This current study focused on the perception of health workers on the utilization of AI tools in UITH, considering their perceived benefits and challenges.

Received: October 15, 2025. Accepted: December 16, 2025

On the whole, these reviewed studies above have shown that there are relatively varying perceptions on the utilization of AI tools among personnel in the medical-related field across countries globally. In view of this, this study assessed the perception of health workers on the utilization of AI tools in UITH, Kwara State, Nigeria.

Theoretical Framework

The most applicable theory in this study is the Technology Acceptance Model (TAM). TAM is a framework proposed by Davis (1989) to understand and predict how users accept and use new technology. It seeks to explain the psychological factors that influence an individual's decision to adopt or reject technology and has become one of the most influential theories in the field of Information Systems (IS) and Technology Adoption. The primary goal of TAM is to predict the behavior of users in relation to technology adoption. It helps explain how external factors (such as system features and design) influence users' cognitive perceptions (ease of use and perceived usefulness), which in turn affect their attitudes and behaviors toward using technology.

TAM is based on two key factors that drive technology acceptance:

Perceived Usefulness (PU): This refers to the degree to which a person believes that using a particular technology will improve their job performance. For example, if a healthcare worker believes that an AI tool will help them deliver better patient care or make more accurate diagnoses, they will be more likely to adopt that technology. For AI tools to be adopted by healthcare professionals, they need to perceive them as useful in improving their job performance, which, in this case, refers to providing better patient care and more accurate diagnoses.

Perceived Ease of Use (PEOU): This refers to the degree to which a person believes that using a technology will be free of effort. In other words, if a technology is perceived as easy to use, without

Received: October 15, 2025. Accepted: December 16, 2025

requiring extensive training or complex steps, the user is more likely to adopt it. In the case of AI adoptions, perceived ease of use is critical to their acceptance. For instance, if healthcare workers find AI tools complex or difficult to integrate into their existing workflows, they may be hesitant to use them.

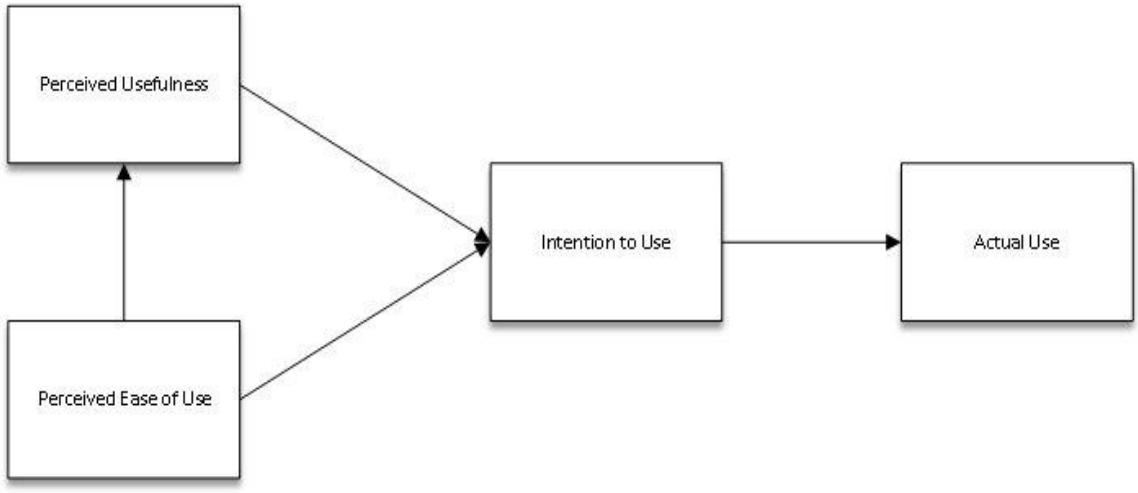

Figure 1: TAM Mode**l: Davis, F.D (1989)**

Methodology

A survey research design approach was adopted with the aid of a structured questionnaire to collect data from a wide range of healthcare professionals within the hospital. The population for this study comprised 198 healthcare professionals from five departments at UITH, Kwara State, Nigeria. A stratified sampling technique was employed to ensure fair representation from the diverse professional categories across departments. The departments include Hematology, Chemical Pathology, Radiology, Medical Microbiology Laboratory, and the Intensive Care Unit (ICU). These departments were chosen due to their technical engagement with Artificial Intelligence (AI) tools, either in diagnostics, imaging, or laboratory processes. Yamane's (1967) sample size determination table was used to determine the appropriate sample size for this study.

Received: October 15, 2025. Accepted: December 16, 2025

This gave a total of 132 respondents for this study. Copies of the questionnaire were distributed by hand, covering the selected departments. Out of the 132 copies distributed, 114 were returned as valid and analyzed. This gave a rate of return of 86%.

Data Presentation and Discussion

Research Objective One: To identify the perceived benefits associated with the use of AI tools in healthcare delivery at the University of Ilorin Teaching Hospital (UITH), Kwara State.

Table 4.1.1: Perceived Benefits of Artificial Intelligence in Enhancing Healthcare Delivery among Health Workers at the UITH, Kwara State, Nigeria

Perceived Benefit of AI Tools among Health Professionals	**SA F(%)**	**A F(%)**	**D F(%)**	**SD F(%)**	**MEAN**	**Std. Dev.**
AI improves emergency response and critical care decisions.	68 (59.6%)	37 (32.5%)	7 (6.1 %)	2 (1.8%)	3.64	0.55
AI reduces healthcare costs by automating repetitive tasks, improving efficiency, and minimizing diagnostic errors.	60 (52.6%)	41 (36.0%)	9 (7.9%)	4 (3.5%)	3.58	0.60
AI integration in healthcare systems improves workflow by enhancing collaboration among medical professionals.	56 (49.1%)	40 (35.1%)	13 (11.4%)	5 (4.4%)	3.52	0.64
AI enhances mental health support by powering chatbots and tools that offer real-time emotional assistance and therapy guidance.	48 (42.1%)	34 (29.8%)	22 (19.3%)	10 (8.8%)	3.40	0.72
AI improves diagnostic accuracy and early disease detection.	75 (65.8%)	34 (29.8%)	5 (4.4%)	0 (0.0%)	3.72	0.49
AI speeds up laboratory tests and reduces errors.	70 (61.4%)	32 (28.1%)	9 (7.9%)	3 (2.6%)	3.72	0.58

Received: October 15, 2025. Accepted: December 16, 2025

AI makes healthcare more patient-friendly and effective.	59 (51.8%)	38 (33.3%)	12 (10.5%)	5 (4.4%)	3.57	0.63
Grand Mean					**3.59**	

Table 4.1.1 shows a high level of perceived benefits of AI tools in healthcare delivery among health workers at UITH, with a grand mean of 3.59. The responses revealed a generally high level of agreement with the benefits of AI integration in hospital operations. For instance, the majority, 109(95.6%) of the respondents agreed that AI improves diagnostic accuracy and supports early disease detection, while 105(92.1%) agreed that AI helps to enhance emergency response and critical care, and 101 (88.6%) equally agreed that AI assists in reducing healthcare costs by automating repetitive tasks. Likewise, 102(89.5%) agreed that AI speeds up laboratory tests and reduces errors. This result aligns with past findings on the perceived benefits of AI tools among health workers across countries globally and in Nigeria (Akinyemi, 2021; Topol, 2019).

Research Objective Two: To identify the perceived challenges faced in adopting AI tools for healthcare services at UITH, Kwara State, Nigeria.

Table 4.1.2: Challenges Faced in Adopting AI tools for Healthcare Services at UITH, Kwara State, Nigeria

Challenges of AI Adoption in Healthcare	**SA F(%)**	**A F(%)**	**D F(%)**	**SD F (%)**	**MEAN**	**Std. Dev.**
Limited access to reliable electricity and internet connectivity makes AI adoption difficult in Teaching Hospitals.	63 (55.3)	40 (35.1)	7 (6.1)	4 (3.5)	3.60	0.65
The high cost of implementing AI technology is a major barrier to its adoption Teaching Hospitals.	58 (50.9)	42 (36.8)	9 (7.9)	5 (4.4)	3.52	0.68

Received: October 15, 2025. Accepted: December 16, 2025

Lack of government policies and regulations affects the smooth implementation of AI in hospitals.	55 (48.2)	41 (36.0)	12 (10.5)	6 (5.3)	3.49	0.74
AI adoption in healthcare requires more investment in staff training and capacity building.	72 (63.2)	33 (28.9)	7 (6.1)	2 (1.8)	3.70	0.51
Teaching hospitals lack the necessary digital infrastructure to fully integrate AI solutions.	68 (59.6)	35 (30.7)	8 (7.0)	3 (2.6)	3.61	0.58
Concerns about data privacy, security, and ethics slow down AI adoption in healthcare.	50 (43.9)	39 (34.2)	18 (15.8)	7 (6.1)	3.44	0.69
There is a shortage of healthcare professionals and IT experts trained to use AI in hospitals.	67 (58.8)	36 (31.6)	8 7.0)	3 (2.6)	3.66	0.60
Grand Mean					**3.48**	

Table 4.1.2 shows a high level of challenges affecting AI adoption in UITH, with a grand mean score of 3.48. For instance, 105(92.1%) reported that the major challenge is that AI requires investment in staff training and capacity building, followed by 103(90.3%) shortage of health professionals and IT experts who are trained to use AI. 103(90.3%) identified poor digital infrastructure to fully integrate AI solutions, among others. This result supports past studies on varying challenges hindering successful AI integration in delivering healthcare services (Okuneye *et al.*, 2023; Ewurum, 2020).

Emerging Themes from Open-Ended Responses

4.2.1 Need for AI Training among Healthcare professionals at UITH, Kwara, Nigeria

Response	**Frequency**	**Percentage (%)**
Yes	102	89.5%
No	12	10.5%

Received: October 15, 2025. Accepted: December 16, 2025

Total	114	100.0%

Table 4.2.1 shows that a significant majority of respondents, 102 (89.5%), indicated a clear need for training on AI tools. This strong response suggests that while healthcare professionals at UITH indicated the need for AI training.

Table 4.2.2: Reasons for the Need for AI Training among Health Professionals in the University of Ilorin

Theme	**Frequency**	**Percentage (%)**	**Sample Quote**
No prior training on AI	32	31.4%	"We have not been trained at all on AI tools."
Improve job efficiency	25	24.5%	"I want to work smarter with these technologies."
Fear of misuse	22	21.6%	"Without proper knowledge, we might make mistakes."
General curiosity/interest	18	17.6%	"I want to understand how these AI systems work."

Table 4.2.2 shows the diverse reasons for the need for AI training among the health professionals in the study area. For instance, 32(31.4%) reported a lack of prior training, 25(24.5%) improved job efficiency, 22(21.6%) helped them avoid misuse of AI tools, while 18(17.6%) simply expressed general curiosity and interest. These responses show that healthcare professionals are willing to learn, but need proper support and training.

Received: October 15, 2025. Accepted: December 16, 2025

Table 4.2.3: Staff Support for AI Investment At UITH

Response	Frequency	Percentage (%)
Yes	107	93.9%
No	7	6.1%
Total	114	100.0%

Table 4.2.3 shows that the majority of the respondents, 107(93.9%), expressed strong support for further investment in AI tools at UITH. This suggests that staff are not only aware of AI's potential but are also eager to integrate it into their daily tasks and hospital operations at large. This reflects a clear readiness among health professionals to embrace this new technology.

Table 4. 2.4: Suggestions on Ways to Improve AI Integration

Theme	Frequency	Percentage (%)	Sample Quote
Regular staff training	45	39.5%	"All departments need periodic workshops on AI use."
Infrastructure upgrade and Government Funding	33	28.9%	"We need reliable power and internet first."
Management support/policy	22	19.3%	"Let the hospital management support AI officially."
Tool availability	14	12.3%	"AI tools should be made accessible to every department."
Total	114	100.0%	

Table 4.2.4 shows that the majority of respondents, 45(39.5%), emphasized the need for regular staff training, while 33(28.9%) highlighted the importance of improving infrastructure and securing government funding. Others 22(19.3%) mentioned management support and clear

Received: October 15, 2025. Accepted: December 16, 2025

policies, while 14 (12.3%) called for better availability of AI tools across departments. These results suggest possible ways for effective AI integration in the hospital.

Conclusion

The findings of this study have clearly demonstrated that the role of AI in healthcare delivery is recognized among health professionals at UITH, Kwara State, Nigeria. However, despite this positive outlook, the actual use of AI tools remains relatively low. This is largely due to systemic problems hindering the full-blown adoption of AI tools among health workers in public health institutions, such as inadequate infrastructure, lack of formal training, limited tool availability, and the absence of strong institutional policies and support.

Recommendations

Based on the findings of this study, there is an urgent need to integrate the use of AI tools to improve diagnosis, streamline workflows, and enhance patient care at the University of Ilorin Teaching Hospital. Kwara State, Nigeria. Therefore, the following recommendations are hereby made to improve AI adoption in healthcare in UITH:

i. Health care workers and other ad hoc staff across departments within the hospital environment of UITH need to be trained on the effective use of AI tools.

ii. Hospital management of UITH should ensure that there is reliable infrastructural support, such as electricity, strong internet, and updated digital systems are essential to drive AI usage across departments in the hospital.

Received: October 15, 2025. Accepted: December 16, 2025

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Received: October 15, 2025. Accepted: December 16, 2025