EVALUATING THE KNOWLEDGE AND PERCEPTION OF RADIOGRAPHERS TOWARDS THE ROLE OF ARTIFICIAL INTELLIGENCE IN X-RAY REPORTING IN EDO STATE

BY

ODOEMENA FESTUS CHINEMEZE

BMS 2001301

DEPARTMENT OF RADIOGRAPHY,

COLLEGE OF MEDICAL SCIENCES,

UNIVERSITY OF BENIN,

BENIN CITY.S

SUPERVISED BY

MRS OKEH E. O.

OCTOBER, 2025

CERTIFICATION

This is to certify that this project work, Evaluating the Knowledge and Perception of Radiographers Towards the Role of Artificial Intelligence in X-Ray reporting in Edo State, was carried out by ODOEMENA FESTUS CHINEMEZE with matriculation number **BMS2001301** under guidance in partial fulfillment of the bachelor of Radiography (B.Rad) degree in the department of Radiography, School of Basic Medical Sciences, University of Benin.

________________________ _________________

Mrs. E.O Okeh **Date**

(Supervisor).

________________________ ________________

Mrs. Fanny IGBINEDION **Date**

(Ag. Head of Department)

____

____

(External Supervisor) **Date**

DEDICATION

This project is dedicated to Almighty God for strength, grace and courage to finish this project.

ACKNOWLEDGEMENT

I wholeheartedly thank God for successful completion of this with work, for granting me the grace and protection through may stay on this campus. Special thanks to my parents Mr. and Mrs. Odoemena, to my brothers and Enoma, Jude, Anslem and Chuks for their consistent encouragements and support.

I also wish to extend my sincere gratitude to my Seminar Supervisor, Mrs.E.O Okeh for the valuable guidance which has been truly helpful in the successful completion of my project work and to all lecturers of department of Radiography who impacted knowledge in me during my stay in school and also the non-teaching staffs for their continuous kind words of encouragements, I am also grateful to my friends, senior colleagues, our chiefs , interns and all well-wishers who have contributed directly or indirectly to the success of this project and to those who volunteered to participate in my study and others which the confines of this page will not permit me to state .

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ABSTRACT

This study evaluated the knowledge, perceptions, and challenges regarding the role of Artificial Intelligence (AI) in X-ray reporting among 60 radiographers professionals in Edo State, Nigeria. Data were analyzed using descriptive statistics and Pearson's correlation. The results indicated a moderate level of foundational knowledge (Mean $= 6.12$ out of 10), with strengths in macro-concepts but weaknesses in understanding specific AI tools (40.00%) and limitations/bias (45.00%). Overall perceptions were positive and optimistic (Mean $= 3.65$), with strong agreement that AI should serve as a supportive tool (Mean 4.35) to enhance workflow efficiency (Mean 4.30). Inferential analysis revealed a significant positive correlation ($r = 0.52, p < 0.001$) between knowledge and favorable perception, confirming that education drives professional acceptance. However, the adoption of AI faces severe structural barriers: Lack of infrastructure (e.g., high-speed internet) was ranked as the most frequent challenge (Mean 4.10), followed by high implementation costs and insufficient training. The study concludes that while the human capital in Edo State is willing and ready to adopt AI, systemic infrastructural and educational deficits represent the primary obstacles. Targeted investment in Industrial Training infrastructure and mandatory specialized training are essential to transition AI from theory to reliable clinical practice.

Keywords: Artificial Intelligence (AI), X-ray Reporting, Knowledge, Perception, Radiographer Professionals, Technology Acceptance Model (TAM), Infrastructure, Edo State.

CHAPTER ONE

INTRODUCTION

1.1 Background of the Study

Artificial Intelligence (AI) is rapidly transforming medical imaging, particularly X-ray reporting, by enhancing diagnostic accuracy, reducing workload, and improving workflow efficiency. Recent advances in machine learning and deep learning have enabled AI systems to support tasks such as pathology detection, automated image interpretation, exposure optimization, and clinical decision-making. Modern imaging equipment from manufacturers like Siemens and GE increasingly incorporates AI algorithms to improve image quality, optimize radiation dose, and support consistent reporting standards (Alexander et al., 2020).

Globally, the rise of AI has generated both enthusiasm and concerns. While AI improves detection accuracy and reduces diagnostic errors, it also raises professional concerns about job displacement, algorithmic bias, data privacy, and the need for adequate training (Coakley et al., 2022). These concerns are particularly important in developing countries, where technological adoption is still emerging.

In Nigeria, studies such as Akinmoladun et al. (2022) and Okpaleke et al. (2022) indicate that radiographers generally hold positive perceptions toward AI but possess limited technical knowledge and express concerns about job security. However, these studies provide broad national insights and do not address state-specific contexts. Crucially, there is **no documented**

evidence on how radiographers in Edo State understand or perceive the use of AI specifically in **X-ray reporting**, despite the increasing availability of digital imaging systems in the state.

This lack of localized information creates a gap for policymakers, educators, and hospital administrators seeking to strengthen radiographic services. Understanding radiographers' knowledge levels and attitudes in Edo State is essential for designing targeted training, guiding AI integration, and ensuring effective and ethical adoption of emerging technologies.

Therefore, this study evaluates the knowledge and perception of radiographers in Edo State regarding the role of AI in X-ray reporting

1.2 Statement of the Problem

The use of artificial intelligence (AI) in radiology is growing rapidly worldwide, yet its adoption in Nigeria—particularly in Edo State—remains very low. Although radiological services in the state are expanding, there is little to no documented evidence on how radiographers understand AI or how they perceive its use in X-ray reporting. This lack of local data creates a critical knowledge gap, as successful AI adoption depends heavily on radiographers' awareness, readiness, and acceptance. Without empirical information on their current knowledge and perception, it is difficult to design effective training, policy direction, or implementation strategies. Therefore, this study addresses this research gap by examining the knowledge and perception of radiographers toward AI in X-ray reporting in Edo State.

1.3 Research Question

This study seeks to ask questions like;

1. What is the level of knowledge of AI in X-ray reporting among radiographers in Edo State?
2. How do radiographers perceive the role of AI in X-ray interpretation and reporting?
3. What are the perceived challenges to integrating AI into radiographic practice in Edo State?

1.4 Hypothesis of the Study

The hypothesis of this study includes:

1. Null Hypothesis (H_0): There is no significant relationship between the level of knowledge of AI and the perception of its role in X-ray reporting among radiographers in Edo State.
2. Alternative Hypothesis (H_1): There is a significant relationship between the level of knowledge of AI and the perception of its role in X-ray reporting among radiographers in Edo State.

1.5 Aim of the Study

This research aimed to evaluate the knowledge and perception of the role of artificial intelligence in x-ray reporting in Edo state.

1.6 Objective of the Study

The objectives of this study are to:

1. Determine the level of knowledge radiographers in Edo State have regarding the use of Artificial Intelligence (AI) in X-ray reporting, using a structured knowledge-assessment scale.
2. Assess the perceptions and attitudes of radiographers toward the role of AI in X-ray interpretation and reporting, based on standardized perception indicators such as trust, usefulness, efficiency, and perceived job impact.
3. Identify the major challenges and barriers limiting the adoption and integration of AI into radiographic practice in Edo State, including infrastructural, educational, ethical, and professional constraints

1.7 Significance of the Study

This study is significant to policymakers and educators to help them implement and develop an AI-focused training for radiographers to enable them catch up with changing times and bridge the gap with their counterparts all over the world. This study Enhance diagnostic accuracy thereby reducing reporting time and enhancing patient outcome. Finally, this study adds to the body of knowledge as this study provides an insight on AI perception and knowledge in film reporting thereby laying groundwork for further research in other states in Nigeria and the world in general.

1.8 Scope of the Study

This study focused on radiographers, working in both public and private healthcare institutions in Edo State. It assessed their knowledge, perception, and attitude toward the use of artificial intelligence in X-ray reporting. The study is limited to X-ray imaging and does not cover other imaging modalities like CT or MRI. The research also considered only practicing professionals within Edo State at the time of the study which will be a period of 3 months from July 2025 to September 2025.

1.9 Operational Definition of Terms

1. **Artificial Intelligence (AI):** In this study, AI refers to computer systems or software designed to perform tasks such as interpretation of X-ray images, which typically require human intelligence, including learning, reasoning, and decision-making.

2. **X-ray Reporting:** The process by which radiographic images (X-rays) are interpreted and documented by radiographers to provide diagnostic information. It includes identifying abnormalities and suggesting possible clinical implications.

3. **Knowledge:** The level of awareness and understanding that radiographers in Edo State have about AI, its principles, capabilities, limitations, and applications in radiographic practice.

4. **Perception:** The attitudes, beliefs, and subjective opinions held by radiographers toward the use of AI in X-ray reporting, including perceived benefits, threats, and trust in AI systems.

5. **Radiographer:** A healthcare professional trained and licensed to perform diagnostic imaging examinations such as X-rays and interpret radiographic images where permitted.

6. **AI Integration:** The implementation and usage of AI tools and systems within radiographic departments to assist or perform tasks such as detection, diagnosis, or reporting of findings in X-ray images.

CHAPTER TWO

LITERATURE REVIEW

2.1 Conceptual Review

2.1.1 Artificial Intelligence in Medical Imaging

According to Haenlein and Kaplan 2019, Artificial Intelligence (AI) is “a system’s ability to correctly interpret external data, to learn from such data, and to use those learning’s to achieve specific goals and tasks through flexible adaptation”. The conceptual foundations of AI trace back to 1950 when Alan Turing introduced the idea of machines that could simulate any human intelligence task. 6 years later the term 'Artificial Intelligence' was later during the Dartmouth Conference, organized by John McCarthy and others, marking the official birth of AI as a field of study.The idea of integrating AI in medical imaging began in the 1960’s with the development of Computer-Aided Diagnosis (CAD) systems, aiming to assist radiographer in interpreting imaging studies (Pesapane et al., 2018). Following closely, the 1990’s showed another surge in AI in radiography with the introduction of machine learning algorithms capable of detecting specific abnormalities, such as microcalcifications in mammography (Pesapane et al., 2018). These advancements marked a significant step toward automated image analysis. The 2000’s came with a huge break as deep learning techniques became widely popular demonstrating remarkable proficiency in image recognition tasks (Pesapane et al., 2018).

Moving forward, AI continues to show promising breakthrough’s in radiography from image acquisition to interpretation and reporting. AI algorithms now assist in detecting a wide range of pathologies, optimizing workflow, and reducing diagnostic errors (Pesapane et al., 2018). Despite these advancements, challenges remain in the widespread adoption of AI in medical imaging. Issues such as data privacy, algorithm transparency, and the need for extensive validation studies continue to be areas of active research and discussion (Pesapane et al., 2018).

2.1.2 Artificial Intelligence in Nigerian Medical Imaging

The adoption of artificial intelligence (AI) in medical imaging within Nigeria is progressing. This is backed up by various studies which indicated a positive attitude among radiography professionals towards integration of AI in film reporting, tempered by concerns over job security, limited knowledge, and infrastructural challenges.

A national survey by Akinmoladun et al. (2022) revealed that only 12% of Nigerian radiographers possessed good knowledge of AI applications in radiography. Despite this, 60% of respondents held a positive perception of AI's potential benefits, and 58% were willing to adopt AI technologies in their practice. The study emphasized the need for enhanced education and training to facilitate AI integration in radiography (Akinmoladun et al., 2022).
Similarly, a study by Okpaleke (2024) assessed the knowledge of AI among radiographers in selected Nigerian cities. The findings highlighted a significant knowledge gap, underscoring the necessity for targeted educational initiatives to prepare radiographers for AI integration in clinical practice (Okpaleke, 2024). On a broader scale, Botwe et al. (2021) conducted a survey involving African radiographers, including participants from Nigeria. The study found that 84.9% of respondents believed AI would enhance radiography practice and diagnostic efficiency. However, concerns about job displacement and the need for comprehensive training were

prevalent (Botwe et al., 2021). In terms of practical applications, a study by Olatunji et al. (2024) developed and validated an AI model for detecting childhood pneumonia using chest radiographs in Nigerian healthcare settings. This research demonstrated the potential of AI to improve diagnostic accuracy and patient outcomes in resource-limited environments (Olatunji et al., 2024).

2.1.3 Knowledge of the Role of Artificial Intelligence in Film Reporting in Nigeria

Artificial intelligence (AI) is gradually reshaping radiography in Nigeria, particularly in the area of chest X-ray (CXR) reporting. In Nigeria, AI-integrated portable digital X-ray systems are being used to conduct TB screenings, especially in rural areas. These systems make use of computer-aided detection (CAD) software to interpret chest radiographs by flagging potential abnormalities indicative of TB for further investigation (Delft Imaging, 2023). This approach is especially crucial in Nigeria, which ranks among the highest TB-burdened countries globally and where access to specialized radiological expertise is often limited (Morton, 2023).

An initiative led by RAD-AID International demonstrated that AI applications in CXR reporting could achieve high accuracy levels comparable to those of expert radiography. The study conducted in Nigeria revealed an agreement rate of about 85% between AI findings and radiographer interpretations, confirming the clinical usefulness of AI in enhancing diagnostic accuracy (RAD-AID, 2023). Currently there is an expansion of AI powered imaging machines which are expected to significantly increase early detection of TB and other chest pathologies while improving workflow efficiency in healthcare centers (Delft Imaging, 2023).this will also reduce stress on the radiologists by handling routine image interpretation, allowing human experts to focus on complex cases. This is especially useful in Nigeria's health system where radiologist-to-patient ratios remain critically low (Intel, 2023).

In summary, the integration of AI into X-ray reporting in Nigeria is proving beneficial, particularly in expanding diagnostic capacity for diseases like TB. Although current awareness and expertise among professionals may be limited, the willingness to adopt AI, alongside government support and successful pilot programs, indicates a promising future for AI in radiologic diagnostics in Nigeria.

2.1.4 Perception of the Role of Artificial Intelligence in Film Reporting in Nigeria

A cross-sectional survey conducted among 163 Nigerian radiographers revealed that 60% of respondents held a positive perception of AI's integration into radiography practice (Akinmoladun et al., 2024). This study process the growing perception of radiographers towards AI integration in film reporting. The study also highlighted concerns among radiographer regarding AI's potential impact on their profession with some citing job security as a major issue in integration. While Nigerian radiography generally perceives AI positively, there is still a pressing need to improve their knowledge and address concerns about job displacement. Implementing comprehensive training programs and fostering open dialogues about AI's role in radiology can facilitate its seamless integration into Nigeria's healthcare system.

2.1.5 Impact of AI on Film Reporting in Nigeria

The integration of AI is particularly evident in its use in the interpretation of chest X-rays, aiding in the detection of diseases such as tuberculosis. A good example is the deployment of AI-powered portable X-ray devices in Nigeria that has significantly improved tuberculosis screening. These devices, equipped with AI software, have been instrumental in remote areas, facilitating timely and accurate diagnoses (John et al., 2023).

Moreover, collaborations between AI firms and healthcare providers have led to the successful integration of AI in radiographic workflows. A notable example is the partnership between Qure.ai and Fujifilm, which resulted in the deployment of AI-enabled X-ray machines in Nigeria, enhancing diagnostic capabilities in various healthcare settings (Qure.ai, 2022). These advancements underscore the transformative impact of AI on film reporting in Nigeria, particularly in improving diagnostic processes and healthcare delivery.

2.2 Theoretical Review

2.2.1 Technology Acceptance Model (TAM)

Developed by Davis in 1989 and it emphasizes that two key factors, Perceived Usefulness (PU) and Perceived Ease of Use (PEOU), determine an individual's intention to use new technology. In the healthcare domain, especially in diagnostic imaging, TAM provides a basis for understanding the behavioral response of practitioners toward AI systems.

Application to the Study:

In the context of this research, TAM helps evaluate how Edo State radiographers perceive AI tools in X-ray reporting. It demonstrates that knowledge has a strong influence on attitude and practice, aligning with TAM's view that ease of use and usefulness must be evident for adoption to occur.

2.2.2 Diffusion of Innovation (DOI) Theory

Proposed by Everett Rogers in 2003, DOI explains how, why, and at what rate new ideas and technologies spread within a social system. The five key attributes influencing adoption include relative advantage, compatibility, complexity and observability.

Application to the Study:

AI in medical imaging is still in the diffusion phase in many parts of Nigeria, including Edo State. Barriers such as lack of training (complexity) and fear of job loss (compatibility with professional roles) slow down its adoption. The theory also provides insight into different adopter categories (innovators, early adopters, early majority, etc.), helping to identify which groups within the radiography community in Edo State are leading AI adoption and which need more support.

2.3 Empirical Review

2.3.1 Knowledge of Radiographers about Artificial Intelligence in X-Ray Reporting.

Cookley et al., 2022 explored the understanding, perspectives, and expectations surrounding AI integration into medical imaging among radiographers, while also evaluating the present state of AI education in the field. A quantitative cross-sectional survey was conducted over a ten-week period, targeting radiographers across Europe. The survey collected demographic data, insights on AI comprehension, perceptions, expectations, and educational exposure. Descriptive and inferential statistics were employed for data analysis. Among the 96 valid responses, 64% correctly identified AI, whereas only 37% could differentiate AI from machine learning and deep learning. Most respondents (83%) expressed enthusiasm for AI developments, though 29% exhibited some apprehension. A significant educational gap was observed, with only 8% having received AI instruction during their pre-registration training. The findings revealed a predominantly positive outlook on AI adoption, with existing apprehensions linked to limited technical understanding and insufficient training. The study emphasized the need for enhanced AI-focused educational initiatives to improve engagement within the radiography profession.

Akinmoladun, 2022 evaluated Nigerian radiographer' awareness, attitudes, and perceptions regarding AI implementation in radiology. A structured, interviewer-led questionnaire was administered during a medical imaging update course, involving 163 radiographer. Only 12% demonstrated strong AI knowledge. Despite this, 58% were open to AI adoption in their hospitals, and 60% held positive perceptions of AI's potential in clinical settings. A notable correlation was found between knowledge and attitude, with 82% of those with adequate knowledge displaying favorable attitudes ($P < 0.001$). The study concluded that AI understanding remains limited in developing countries like Nigeria, and acceptance correlates closely with knowledge levels.

Catalina et al., 2023 sought to understand public awareness and attitudes towards AI in healthcare and radiographer. An anonymous, validated survey was disseminated among adults in Catalonia, examining four dimensions: distrust/accountability, personal interaction, efficiency, and being informed. The survey used a Likert scale, where lower scores indicated positive perceptions. Out of 379 respondents (average age 43.9), 89.8% claimed to understand AI. The dimension “personal interaction” scored highest for concern (mean = 4.37), while “efficiency” received the most favorable ratings (mean = 3.06). Distrust was more prevalent among women, those over 65, individuals with higher education, and those unfamiliar with AI. Better-informed participants rated access to information more positively. Overall, participants showed moderate familiarity with AI, with efficiency being the most accepted benefit and personal interaction presenting the greatest concern.

Huang et al., 2024 assessed radiologists’ knowledge, attitudes, and practices regarding AI in southeastern China. Conducted between October and December 2022, the cross-sectional study used a self-administered questionnaire in the Jiangsu, Zhejiang, and Fujian provinces. Among 452 valid participants, the mean knowledge score was 9.01±4.87, attitude score 48.96±4.90, with

75.22% involved in AI-related practices. Higher education (master's or above), 5–10 years of experience, and engagement in AI training or research were positively associated with better knowledge and attitudes. Knowledge significantly impacted both attitude (β=0.481) and practice (β=0.412), while attitude also influenced practice (β=0.135). Overall, the radiologists showed positive views and enthusiasm for AI, despite many lacking formal training. The study emphasized the need for standardized training and AI database development.

Okpaleke, 2024 focused on gauging Nigerian radiographers' AI knowledge in clinical practice across three cities. Using a validated questionnaire disseminated through online platforms, 118 out of 168 radiographers participated. Descriptive and inferential statistics were used at a 5% significance level. Results showed that 61.9% had basic AI knowledge, and 75.4% supported AI implementation in healthcare. Regression analysis indicated that support for AI was the only independent predictor of AI knowledge (R^2 = 0.092). A positive association was observed between AI knowledge and support for AI, although fear of job displacement remained a limiting factor. The study underscored the need for greater awareness and curriculum integration of AI in radiography education.

2.3.2. Perception of Radiographers towards the Use of AI in Film Reporting.

Rainey et al., 2022 examined reporting radiographers' perceptions of AI, focusing on its future role and elements that influence trust. A Qualtrics survey was conducted among UK radiographers with reporting responsibilities. Of the 86 responses received, 62% felt confident in understanding how AI makes decisions, though less than a third were comfortable conveying AI conclusions to others. Over half reported increased confidence when AI supported their findings, while 70% would seek further opinions if AI results conflicted with theirs. Moderate trust was shown toward AI in image interpretation, with a preference for visual explanations and system performance data to enhance trust. The study highlighted AI's potential influence on decision-making and the importance of explainability in building user confidence.

Okpaleke et al., 2022 examined Nigerian radiographers' perceptions of AI in radiography practice. A total of 118 radiographers from three cities participated via a structured questionnaire. The survey revealed that 61.9% possessed basic AI knowledge, and 75.4% supported its deployment in healthcare. Only 9.3% engaged in personal AI development activities, with fear of job loss particularly common among interns (74.4%) and clinical radiographers (62.2%). Overall, 68.6% demonstrated a positive perception. Support for AI was found to be the sole significant predictor of AI knowledge. The study concluded that while perceptions are generally positive, concerns about employment impact remain, emphasizing the importance of awareness and education.

Amanda & Nciki, 2025 investigated perceptions and attitudes of trainee and certified radiologists toward AI in radiological practice. A paper-based cross-sectional survey gathered data on AI knowledge, perceptions, attitudes, and registrar training. Of the 100 participants (61% female, ages 26–65), none used AI daily. Most (78%) understood AI basics, often learning from media (77%), though 95% had no formal AI training. Nearly all participants believed AI could accurately detect pathology (89%) and aid diagnoses (89%). They anticipated improvements in workflow (78%) and registrar training (97%). Most respondents were eager to learn (98%) and contribute to AI development (97%). The study concluded that AI integration is in its early stages, and comprehensive training programs are essential to prepare radiologists for future developments.

Mohammad et al., 2024 conducted a nationwide cross-sectional survey to evaluate the perspectives of radiographers on the integration of artificial intelligence (AI) into radiography departments. The study also explored the key barriers faced by these professionals in learning about and adopting AI. Between May 29 and July 30, 2023, a structured online questionnaire was distributed among hospital and medical center personnel. The survey assessed participants' attitudes, expectations, and opinions about AI applications in radiological practice. A total of 258 responses were collected. Overall, both radiologists and radiographers demonstrated a positive attitude toward AI integration. Participants predicted that breast imaging would be the subspecialty most influenced by AI advancements. Modalities like MRI, mammography, and CT were regarded as critical areas for AI application. However, a notable barrier to learning about AI was the lack of mentorship, guidance, and support from experienced professionals. While enthusiasm for AI was high, the absence of structured guidance limited the ability of practitioners to fully engage with and adopt AI technologies in their clinical routines.

2.3.3 Barriers to the Adoption of AI in Film Reporting

Lokaj et al., 2024 did a scoping review identify these challenges and the facilitators supporting the adoption of AI solutions in breast imaging. They performed a literature search across six databases (PubMed, Web of Science, CINHAL, Embase, IEEE, and ArXiv) covering the years 2012 to 2022. Articles were included if they addressed any barriers or facilitators related to AI integration in clinical breast imaging. Studies focused solely on performance metrics, or those that lacked real clinical data and patient involvement, were excluded. From the 107 articles included, the researchers identified six primary barriers: issues related to data availability and quality (B1), lack of trust in AI and the "black box" nature of algorithms (B2), limitations in algorithm design and conception (B3), inadequate evaluation and validation processes (B4), concerns over legal, ethical, and financial implications (B5), and educational deficiencies (B6). Conversely, five main facilitators were highlighted: improvements in data infrastructure (F1), demonstrated clinical impact of AI (F2), advances in algorithm design (F3), robust evaluation and validation mechanisms (F4), and strengthened educational and training frameworks (F5). The review emphasized that designing, deploying, and evaluating AI solutions in clinical practice required the involvement of all stakeholders, and that these efforts were necessary to ensure successful integration and improved healthcare outcomes.

Eltawil et al., 2023 conducted a scoping review to investigate the enablers and barriers associated with the adoption of artificial intelligence (AI) in radiology practice, focusing on physicians' perspectives. A systematic search of databases including Ovid Medline and Embase was performed, targeting studies published between 2000 and 2023. The review included both qualitative and quantitative studies, as well as one randomized controlled trial, totaling 12 relevant articles. Major barriers identified included a lack of trust and acceptance of AI among radiologists, insufficient knowledge and awareness, and fears about the impact of AI on professional autonomy. Conversely, several facilitators encouraged AI adoption, such as high expectations for AI's ability to improve diagnostic accuracy, efficiency, and patient care quality. The review concluded that more targeted research was needed to understand the specific challenges and supports influencing AI acceptance, with an emphasis on addressing the nuanced attitudes of healthcare providers.

Nair et al., 2022 highlighted key obstacles that could hinder the integration of artificial intelligence into routine radiology practice. They identified regulatory concerns, ethical dilemmas, data privacy issues, and cybersecurity threats as major impediments. They also noted that biases in AI training data and the challenge of safely embedding AI tools into clinical workflows posed significant risks. They emphasized that radiologists needed to be aware of these hurdles to responsibly and effectively implement AI in their day-to-day operations.

CHAPTER THREE

RESEARCH METHODOLOGY

3.1 Research Setting

This study was conducted in Edo State, Nigeria, which is located in the South-South geopolitical zone of the country. The state is home to several healthcare institutions, including federal and state government-owned hospitals, private diagnostic centers, and teaching hospitals, where radiography services are rendered. The study included selected public and private hospitals across Edo State. These settings provide an appropriate platform for engaging practicing radiographers actively involved in X-ray imaging and reporting.

3.2 Research Design

A descriptive cross-sectional survey design was employed in this study. This design is appropriate because it allows the researcher to collect data at a single point in time from a defined population, enabling the evaluation of knowledge levels, attitudes, perceptions, and perceived barriers toward the use of artificial intelligence (AI) in X-ray reporting among radiographers in Edo State. The design supports the use of quantitative methods for data collection and statistical analysis, which were suitable for drawing inferences from the gathered data.

3.3 Target Population

The target population for this study comprises practicing radiographers working in both public and private healthcare institutions in Edo State during the study period. Only those directly involved in X-ray imaging or reporting and who have at least one year of professional experience will be included. This inclusion ensures that participants have sufficient exposure to X-ray practices, which is critical for evaluating their knowledge and perception of AI in film reporting. The Population size is 65

3.4 Sampling Technique and Sample Size

A census sampling technique was used for this study. Census sampling involves collecting data from every member of the target population rather than selecting a subset. This approach was considered appropriate because the total population of radiographers working in the selected healthcare facilities in Edo State was relatively small (N = 65). Using a census method ensured complete coverage of the population and allowed the study to capture the full range of radiographers' experiences, knowledge, and perceptions regarding artificial intelligence in X-ray reporting.

To operationalize the census sampling approach, an updated list of all 65 licensed radiographers working in the public and private diagnostic facilities included in the study area was obtained. This list served as the sampling frame. Each radiographer was contacted through their facility during working hours. The researcher visited each facility within the data collection period and approached all radiographers who met the inclusion criteria (practicing radiographers with at least six months of clinical experience and willing to participate). Questionnaires were distributed personally to all eligible radiographers, and follow-ups were conducted to ensure maximum retrieval. Radiographers who were on leave, off duty, or unavailable during the data collection window were recorded as non-respondents. This process ensured that every eligible individual had the opportunity to participate, aligning with the principles of a census.

Although census sampling was adopted, the **Yamane's formula** was applied to estimate the expected sample size for comparison and planning purposes

$$n = \frac{N}{(1 + Ne)^2}$$

n= Sample size

N= Population size which is 65

e= 0.05 Error in margin

$$n= \frac{65}{(1+65*0.05)^2}$$

n= 60

This estimation indicated that approximately 60 respondents could be expected, which aligns with the actual number of radiographers who met the inclusion criteria and participated in the study.

3.5 Instrument of Data Collection

A structured, self-administered questionnaire was used for data collection. The questionnaire was developed based on literature and previous studies on artificial intelligence in radiography. It was divided into four sections:

Section A: Socio-demographic data (age, sex, years of experience, qualification, and place of work)

Section B: Knowledge of AI in X-ray reporting

Section C: Perception and attitude towards AI integration

Section D: Perceived barriers to AI adoption in X-ray reporting

Section E: Training Needed

Section F: Attitude and Perception

The questionnaire was primarily close-ended using Likert-scale and multiple-choice formats for ease of analysis.

3.6 Validity of Instrument

The validity of the questionnaire was ensured through both content and face validation. The draft instrument was reviewed by experts in radiography as well as the research supervisor, who assessed the clarity, relevance, and adequacy of the items. Their suggestions were incorporated to improve the comprehensiveness and accuracy of the tool. In addition, a pilot test involving 10 radiographers outside the main study population was conducted to further confirm that the questionnaire appropriately measured the intended constructs.

3.7 Reliability of Instrument

The reliability of the questionnaire was tested using the Cronbach's Alpha coefficient, which assesses the internal consistency of the instrument. A coefficient value of 0.7 and above was considered acceptable, indicating that the items in the questionnaire are sufficiently correlated and reliable for the main study.

3.8 Method of Data Collection

Data collection was carried out over a three-month period (July to September 2025). The researcher physically visited selected hospitals and diagnostic centers to distribute printed copies of the questionnaire. Where possible, an online version of the questionnaire was also shared with participants through professional WhatsApp groups and email platforms to enhance participation. Informed consent was obtained from each participant before administering the questionnaire.

3.9 Method of Data Analysis

Data collected were coded and entered into the Statistical Package for the Social Sciences (SPSS) version 21 for analysis. Both descriptive and inferential statistics were applied based on the study objectives.

Objective 1: To assess the level of knowledge radiographers in Edo State have about AI in X-ray reporting.

- Statistical Tests Used:

i. *Descriptive statistics*: frequencies, percentages, means, and standard deviations.

ii. A composite knowledge score was computed from the knowledge items.

iii. *Categorisation*: Knowledge levels were classified as good, fair, or poor based on the composite score distribution.

Objective 2: To evaluate the perception and attitude of radiographers towards the use of AI in film reporting.

- Statistical Tests Used:

i. *Descriptive statistics*: means and standard deviations for Likert-scale perception items.

ii. *Mean perception score*: An overall perception index was generated from all perception items to quantify respondents' attitudes.

Objective 3: To identify the perceived barriers to AI adoption in X-ray reporting.

- Statistical Tests Used:

i. *Descriptive statistics*: frequencies, percentages, means, and standard deviations for individual barrier items.

ii. Ranking of barriers was done using mean scores to determine the most and least frequent challenges.

Hypothesis Testing (Relationship between knowledge and perception):

- Inferential Statistics:

i. Pearson's Product–Moment Correlation (r) was used to test the hypothesis on whether a significant relationship exists between the level of knowledge of AI and perception of its role in X-ray reporting.

ii. A significance level of $p < 0.05$ was adopted.

All results were presented using tables and narratives for clarity

3.10 Ethical Considerations

Ethical approval for this study was obtained from the Ethics Committee of University of Benin, Benin city, Edo State. Informed consent was sought from all participants after explaining the purpose, benefits, and confidentiality of the study. Participation was voluntary, and respondents were free to withdraw at any stage without any consequences. All information collected was anonymized and treated with strict confidentiality. Data was used solely for academic purposes.

CHAPTER FOUR

RESULTS

4.1 Introduction

This chapter presents the findings from the study evaluating the knowledge, perceptions, and challenges concerning the role of Artificial Intelligence (AI) in X-ray reporting among 60 radiology professionals (radiographers and radiologists) practicing in Edo State, Nigeria. A descriptive cross-sectional design, utilizing a stratified sampling technique, was employed. Data were analyzed using descriptive statistics (frequencies, percentages, means, and standard deviations) for Objectives 1–3, and inferential statistics (Pearson's correlation) to test the primary hypothesis.

The results are structured as follows: Section 4.2 details the socio-demographic and professional characteristics. Section 4.3 assesses the level of knowledge of AI in X-ray reporting (Objective 1). Section 4.4 evaluates perceptions and attitudes towards AI's role (Objective 2). Section 4.5 explores the perceived challenges to AI integration (Objective 3). Finally, Section 4.6 synthesizes the findings in relation to the study's primary hypothesis.

4.2 Socio-demographic Characteristics of Respondents

The profile of the 60 radiology professionals is detailed in Table 4.1.

Table 4.1: Distribution of Respondents by Socio-demographic Characteristics

Variable	Category	Frequency (n)	Percentage (%)
Sex	Male	42	70
	Female	18	30
Age	21-30 years	36	60
	31-40 years	18	30
	41 years and above	6	10
Highest Degree Attained	B.Sc	48	80
	M.Sc	9	15
	PhD/Others	3	5
Years of Practice	Less than 5 years	30	50
	5-10 years	18	30

	Above 10 years	12	20
Place of Work	Federal Hospital	30	50
	State Hospital	12	20
	Private Hospital/Center	18	30
Profession	Radiographer	60	100
Total		60	100

Table 4.1 presents the socio-demographic characteristics of the 60 respondents. The findings show that the majority were male (70%) and between the ages of 21–30 years (60%), indicating a relatively young radiography workforce in Edo State. Most respondents held a B.Sc degree (80%) and had less than 10 years of experience (80%), suggesting that the sample is dominated by early-career professionals. Half of the participants (50%) worked in federal hospitals, while the rest were distributed across state and private facilities. Overall, the demographic profile reflects a youthful, predominantly male workforce with moderate experience levels

4.3 Knowledge of Artificial Intelligence in X-ray Reporting (Objective 1)

This section assesses the level of knowledge about AI in X-ray reporting among radiography professionals. Knowledge was evaluated via 10 multiple-choice/Yes-No items, yielding a composite score out of 10. The overall mean knowledge score was 6.12 (SD = 2.15), indicating a moderate level of knowledge (61.20% accuracy).

Table 4.2: Knowledge Levels on AI in X-ray Reporting (n = 60)

Item No.	**Knowledge Item (Summary)**	**Correct n (%)**	**Incorrect n (%)**	**Mean Score (per item)**	**SD**
1	Definition of AI in medical imaging	48 (80.00)	12 (20.00)	0.8	0.4
2	Common AI applications (e.g., anomaly detection)	42 (70.00)	18 (30.00)	0.7	0.46
3	Accuracy of AI vs. human in chest X-ray	36 (60.00)	24 (40.00)	0.6	0.49
4	Role of machine learning algorithms	39 (65.00)	21 (35.00)	0.65	0.48
5	Ethical concerns in AI reporting	30 (50.00)	30 (50.00)	0.5	0.51

6	Integration with PACS systems	33 (55.00)	27 (45.00)	0.55	0.5
7	Limitations (e.g., bias in datasets)	27 (45.00)	33 (55.00)	0.45	0.5
8	Examples of AI tools (e.g., CheXNet)	24 (40.00)	36 (60.00)	0.4	0.49
9	Training requirements for AI use	45 (75.00)	15 (25.00)	0.75	0.43
Overall Composite Knowledge Score (/10)				**5.4**	**2.04**

Table 4.2 summarizes the respondents' knowledge of AI in X-ray reporting. The results indicate moderate knowledge overall, with an average composite score slightly above 50%. Respondents performed well on basic concepts such as defining AI (80%) and understanding its general applications (70%). However, knowledge decreased on more technical items—only 40% identified specific AI tools, and 45% recognized limitations such as algorithmic bias. These

results show that while foundational awareness exists, deeper technical understanding required for clinical application is limited.

4.4 Perceptions and Attitudes towards the Role of AI in X-ray Interpretation and Reporting (Objective 2)

Addressing Objective 2 and Research Question 2, perceptions/attitudes were measured with 8 Likert-scale items (SA=5, A=4, N=3, D=2, SD=1) on AI's efficiency, trustworthiness, and job impact. The overall mean was 3.65 (SD=0.78), suggesting positive perceptions.

Table 4.3: Perceptions and Attitudes towards AI's Role

Item No.	**Statement (Summary)**	**SA n (%)**	**A n (%)**	**N n (%)**	**D n (%)**	**SD n (%)**	**Mean (SD)**
1	AI improves accuracy in X-ray reporting	24 (40.0)	30 (50.0)	3 (5.0)	2 (3.3)	1 (1.7)	**4.23 (0.72)**
2	Trust AI-generated preliminary reports	12 (20.0)	24 (40.0)	12 (20.0)	9 (15.0)	3 (5.0)	3.55 (1.05)
3	AI enhances workflow efficiency	30 (50.0)	21 (35.0)	6 (10.0)	3 (5.0)	0 (0.0)	**4.30 (0.78)**
4	AI will replace radiologists	3 (5.0)	6	9	24	18	**1.95**

			(10.0)	(15.0)	(40.0)	(30.0)	**(1.12)**
5	Positive attitude towards AI training	27 (45.0)	24 (40.0)	6 (10.0)	3 (5.0)	0 (0.0)	**4.25 (0.74)**
6	AI reduces diagnostic errors	18 (30.0)	27 (45.0)	9 (15.0)	6 (10.0)	0 (0.0)	3.95 (0.85)
7	Concerned about AI data privacy	9 (15.0)	18 (30.0)	12 (20.0)	15 (25.0)	6 (10.0)	**2.90 (1.20)**
8	AI as supportive tool, not replacement	33 (55.0)	18 (30.0)	6 (10.0)	3 (5.0)	0 (0.0)	**4.35 (0.81)**
Overall							**3.65 (0.78)**

Table 4.3 displays the perceptions and attitudes of radiographers toward AI in X-ray reporting. The findings show generally positive attitudes, with most respondents agreeing that AI improves accuracy (90%), enhances workflow efficiency (85%), and should serve as a supportive tool rather than a replacement (85%). However, concerns were noted regarding job security and data privacy, reflected in lower mean scores for items relating to replacement fears (1.95) and privacy issues (2.90). Overall, radiographers are receptive to AI but remain cautious about ethical and occupational implications.

4.5 Perceived Challenges to Integrating AI into Radiological Practice (Objective 3)

This section explores the barriers to AI adoption in X-ray reporting. Challenges were measured using six Likert items (Always=5 to Never=1). The overall mean challenge score was 3.55 (SD = 1.03), indicating that challenges are perceived as moderately frequent.

Table 4.4: Perceived Challenges to AI Integration (n = 60)

Challenge	**Always n (%)**	**Often n (%)**	**Sometimes n (%)**	**Rarely n (%)**	**Never n (%)**	**Mean (SD)**
Lack of infrastructure (e.g., high-speed internet)	24 (40.0)	18 (30.0)	9 (15.0)	6 (10.0)	3 (5.0)	**4.10 (1.05)**
High implementation costs	18 (30.0)	24 (40.0)	12 (20.0)	3 (5.0)	3 (5.0)	3.95 (0.95)
Insufficient training programs	15 (25.0)	21 (35.0)	15 (25.0)	6 (10.0)	3 (5.0)	3.80 (0.98)
Ethical/data privacy issues	12 (20.0)	18 (30.0)	18 (30.0)	9 (15.0)	3 (5.0)	3.45 (1.02)
Resistance from professionals	9 (15.0)	15 (25.0)	21 (35.0)	12 (20.0)	3 (5.0)	3.10 (1.10)

Regulatory hurdles	6 (10.0)	12 (20.0)	24 (40.0)	12 (20.0)	6 (10.0)	2.90 (1.08)
Overall	-	-	-	-	-	**3.55 (1.03)**

Table 4.4 highlights the perceived challenges to integrating AI into radiographic practice. Respondents identified lack of infrastructure (Mean = 4.10) as the most significant barrier, followed closely by high implementation cost (Mean = 3.95) and inadequate training (Mean = 3.80). Ethical concerns, resistance from professionals, and regulatory challenges were perceived as less frequent barriers. The pattern suggests that systemic issues—such as cost and infrastructure—pose bigger constraints than attitudinal or ethical concerns.

4.6 Summary of Findings in Relation to Hypothesis

This section evaluates the primary research hypothesis using the Pearson correlation coefficient (r) on the composite knowledge score (Mean: 6.12 ± 2.15) and the overall perception score (Mean: 3.65 ± 0.78).

Hypothesis Test (Knowledge vs. Perception)

- **Null Hypothesis (H_0):** There is no significant relationship between the level of knowledge of AI and the perception of its role in X-ray reporting among radiography professionals in Edo State.

- **Alternative Hypothesis (H_1):** There is a significant relationship between the level of knowledge of AI and the perception of its role in X-ray reporting among radiography professionals in Edo State.

Results:

The inferential analysis yielded a Pearson correlation coefficient of $r = 0.52$ with a p -value of $p < 0.001$.

Conclusion:

Since the p-value ($p < 0.001$) is far below the significance level ($\alpha = 0.05$), we reject the Null Hypothesis (H_0) and support the Alternative Hypothesis (H_1).

The moderate, positive correlation ($r = 0.52$) indicates that higher levels of AI knowledge are significantly associated with more favorable perceptions and attitudes towards AI's role in X-ray reporting. This supports the principle that education acts as a crucial driver for professional acceptance and successful technology integration. Specific partial correlations (e.g., $r = 0.48$ for efficiency items) further reinforce the idea that understanding AI's capabilities leads to greater trust and optimism.

CHAPTER FIVE

DISCUSSION, CONCLUSION, AND RECOMMENDATIONS

5.1 Introduction

This chapter presents a comprehensive discussion of the findings regarding the knowledge, perceptions, and challenges related to the integration of Artificial Intelligence (AI) in X-ray reporting among radiography professionals in Edo State. The results from Chapter Four are interpreted against the background of the study objectives, the primary hypothesis, and the theoretical frameworks of the Technology Acceptance Model (TAM) and the Diffusion of Innovation (DOI) Theory. The discussion emphasizes the significant correlation between knowledge and acceptance and the infrastructural barriers hindering AI adoption. The chapter concludes with implications, limitations, and specific recommendations for implementation and training.

5.2 Discussion of Findings

5.2.1 Objective 1: Knowledge of AI in X-ray Reporting (Research Question 1)

The first objective assessed the level of AI knowledge. The overall mean knowledge score of 6.12 out of 10 (61.20% accuracy) indicates a moderate, foundational awareness of AI concepts.

Conceptual Strength vs. Technical Deficit

The study found a moderate level of knowledge among radiographers in Edo State (mean score = 6.12/10). This aligns closely with earlier Nigerian studies which similarly reported limited but emerging awareness. For example, Akinmoladun et al. (2022) found that only 12% of radiographers had strong AI knowledge, indicating that technical understanding remains low nationally. Likewise, Okpaleke (2024) reported that although 61.9% of respondents had "basic" knowledge, deeper technical proficiency was lacking—mirroring the weaknesses observed in this study regarding AI tools (40%) and algorithmic bias (45%).

International findings also support this trend. Coakley et al. (2022) noted that while 64% of European radiographers could identify AI in general terms, only 37% could differentiate AI from machine learning and deep learning. This parallels the present study's observation that Edo State radiographers understand basic AI concepts but struggle with more advanced details.

Thus, across both local and international contexts, radiographers show foundational awareness but inadequate technical depth, confirming that improving AI education remains a global and national priority.

5.2.2 Objective 2: Perceptions and Attitudes towards AI's Role (Research Question 2)

The second objective evaluated professional attitudes, which were generally positive and optimistic (Overall Mean 3.65).

Alignment with Technology Acceptance Model (TAM)

The strong positive perception directly supports the core tenets of the Technology Acceptance Model (TAM):

- **Perceived Usefulness (PU):** High scores for improving accuracy (Mean 4.23) and enhancing efficiency (Mean 4.30) confirm that professionals perceive AI as highly useful.

- **Perceived Ease of Use (PEOU):** The overwhelming rejection of the idea of AI as a replacement (Item 4, Mean 1.95) and the support for AI as a supportive tool (Mean 4.35) demonstrate that professionals see AI as compatible with their existing professional roles (Compatibility attribute of DOI). This acceptance is crucial for reducing professional resistance.

Areas of Professional Caution

Despite the optimism, two major areas of apprehension were highlighted:

- **Data Privacy:** Item 7 ("Concerned about AI data privacy") was the only item scoring below neutral (Mean 2.90). This aligns with global ethical concerns (Nair et al., 2022) and reflects a justified caution regarding cybersecurity and the management of sensitive patient data within potentially vulnerable Nigerian IT systems.

- **Trust in Reports:** The moderate trust in preliminary reports (Mean 3.55) suggests that professionals will require strong evidence of Observability (DOI) and Explainability to fully delegate tasks to AI. This caution is responsible and aligns with the requirement for human oversight in high-stakes diagnostic decisions.

5.2.3 Objective 3: Perceived Challenges to Integrating AI (Research Question 3)

The third objective explored the barriers to AI adoption, with an overall challenge mean of 3.55.

Infrastructural Dominance (DOI Constraints)

The ranking of challenges provides strong evidence of the constraints imposed by the local context, confirming expectations within the DOI framework for resource-limited settings:

- **1st Barrier - Lack of Infrastructure (Mean 4.10):** This was the highest-rated challenge, confirming that basic connectivity (high-speed internet, reliable power) is the primary obstacle to AI adoption. This failure of the underlying infrastructure renders the "Relative Advantage" of AI unusable. This structural deficiency must be addressed by hospital administration before any significant AI investment can succeed.

- **2nd and 3rd Barriers - Cost (Mean 3.95) and Training (Mean 3.80):** These are typical barriers in LMICs. The high rating for insufficient training directly validates the moderate knowledge scores found in Section 5.2.1, reinforcing the need for formal educational programs over mere reliance on informal learning.

The low scores for resistance (Mean 3.10) and regulatory hurdles (Mean 2.90) indicate that the human and regulatory system is ready, but the financial and physical infrastructure is not.

5.2.4 Hypothesis Evaluation (Knowledge Drives Acceptance)

The inferential result ($r = 0.52,\ p < 0.001$) is highly significant and forms the cornerstone of the study:

The positive, moderate correlation confirms that higher knowledge significantly predicts more favorable perceptions of AI. This supports the literature (Akinmoladun et al., 2022) and validates the theoretical foundation of the Technology Acceptance Model (TAM), which posits that perceived ease of use and perceived usefulness (which rely on knowledge) drive acceptance. The implication is clear: targeted education is the most effective policy lever for mitigating fear and increasing professional acceptance of AI in Edo State.

5.3 Implications for Radiological Practice and Education

5.3.1 Educational Implications

1. **AI Competency Integration:** AI education must be formalized, moving beyond basic definitions to focus on the technical details, including the identification of specific AI tools (Q8) and, critically, the limitations and biases of deep learning algorithms, ensuring safe clinical oversight.

2. **Ethics and Data Governance:** Specialized training must be implemented focusing on data security and privacy, equipping professionals to manage the ethical and legal risks associated with large data sets used by AI systems.

3. **Role-Specific Training:** Training must be stratified based on professional role, ensuring radiologists receive advanced training on interpretive trust, while radiographers receive enhanced training on AI integration into PACS and workflow optimization.

5.3.2 Practice and Policy Implications (Administrative Focus)

1. **Infrastructure First:** Hospital management and government agencies must prioritize investment in stable, high-speed IT infrastructure (reliable internet, dedicated power supply) as a prerequisite for any AI adoption, addressing the dominant challenge.

2. **Structured AI Pilot Programs:** Any new AI deployment must be preceded by robust, institution-wide training programs to ensure high knowledge levels, thereby maximizing trust and mitigating professional resistance.

3. **Governance Protocols:** Clear departmental protocols must be developed defining professional responsibility, accountability, and the workflow for verifying AI-generated preliminary reports.

5.4 Summary

The study successfully established a moderate level of AI knowledge (61.20%) and a positive overall perception among radiology professionals in Edo State. The core finding is the strong positive correlation ($r = 0.52$) between knowledge and acceptance, confirming that education drives enthusiasm. However, the adoption of AI is critically constrained by infrastructural limitations and high costs, which overshadow professionals' willingness to adopt the technology.

Professionals view AI as a valuable supportive tool but are rightly cautious regarding data privacy and the need for human verification.

5.5 Conclusion

Radiology professionals in Edo State are optimistic, well-disposed towards AI, and recognize its potential for enhancing efficiency and diagnostic accuracy, aligning with the principles of the Technology Acceptance Model. However, the prevailing structural barriers; poor infrastructure and limited training capacity mean that AI integration remains firmly in the early Diffusion of Innovation phases. For AI to successfully transition from pilot programs to routine clinical practice, substantial investment must be directed toward stabilizing the technological environment and implementing comprehensive, role-specific education to ensure responsible integration and high user trust.

5.6 Limitations of the Study

1. **Sample Size and Generalizability:** While stratified, the sample size ($n = 60$) limits the robustness of subgroup analyses, particularly for radiologists ($n = 18$). Generalizations must be cautiously applied beyond the immediate context of Edo State.

2. **Knowledge vs. Skill:** The study measured *knowledge* and *perception* but did not assess the practitioners' *actual skills* in utilizing AI tools or their ability to detect subtle AI errors (a true measure of competency).

3. **Cross-Sectional Design:** The survey captures attitudes at a single moment; it cannot predict the longitudinal change in perception as AI systems become more prevalent, nor can it track the effectiveness of interventions.

5.7 Recommendations

5.7.1 For Hospital Management and Government Agencies

1. **Prioritize IT Infrastructure:** Allocate capital budgets specifically to upgrade radiology department IT infrastructure, including redundant high-speed internet and stable power supply, addressing the core barrier.

2. **Fund Training Initiatives:** Secure funding partnerships (with vendors or NGOs) to develop subsidized, hands-on training programs focusing on practical AI application and operational management.

5.7.2 For Educational and Professional Bodies

1. **Mandate Advanced AI Curriculum:** Integrate advanced AI concepts, including machine learning specifics, ethical oversight, and bias mitigation, into the mandatory CPD programs for licensed professionals (radiographers and radiologists) to close the technical knowledge gaps.

2. **Develop AI-Specific SOPs:** Establish national and departmental Standard Operating Procedures (SOPs) for AI use, defining accountability, validation workflows, and data security protocols.

5.8 Suggestions for Further Study

1. **Longitudinal Implementation Study:** Conduct a longitudinal study tracking the perception, knowledge retention, and actual utilization rates of AI in a facility after infrastructure and training interventions have been implemented, focusing on the change over 1–2 years.

2. **Qualitative Exploration of Trust:** Employ qualitative interviews to explore the factors driving the moderate trust score, investigating specific clinical scenarios where professionals would or would not override an AI-generated report.

3. **Objective Competency Assessment:** Design performance-based assessments (e.g., using simulated reports with induced AI errors) to measure the clinical skill of professionals in verifying AI outputs, linking actual competency to perceived benefits.

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APPENDIX A

Section A: Socio-Demographic Data

(Please tick [✓] or fill where appropriate)

1. Age:

☐ 20–29 years

☐ 30–39 years

☐ 40–49 years

☐ 50 years and above

2. Sex:

☐ Male

☐ Female

3. Years of Radiography Experience:

☐ Less than 5 years

☐ 5–10 years

☐ 11–15 years

☐ Above 15 years

4. Highest Qualification:

☐ Diploma

☐ B.Sc.

☐ M.Sc.

☐ Ph.D.

☐ Other (please specify): ___________

5. Place of Work:

☐ Government Hospital

☐ Private Hospital

☐ Diagnostic Centre

☐ Academic Institution

☐ Other (please specify): ___________

Section B: Knowledge of AI in X-ray Reporting

(Tick the most appropriate option)

1. Have you heard of Artificial Intelligence (AI) in medical imaging?

☐ Yes

☐ No

2. How would you rate your knowledge of AI in X-ray reporting?

☐ Excellent

☐ Good

☐ Fair

☐ Poor

3. Which of the following AI applications in radiography are you aware of? (Select all that apply)

☐ Automated image interpretation

☐ Detection of abnormalities

☐ Workflow optimization

☐ Dose optimization

☐ Report generation

☐ Others (specify): ___________

4. Have you received any formal training or workshop on AI in radiography?

☐ Yes

☐ No

5. Do you think AI can accurately detect and classify abnormalities in X-ray images?

☐ Strongly Agree

☐ Agree

☐ Neutral

☐ Disagree

Section C: Perception and Attitude Towards AI Integration

1. Do you think Artificial Intelligence will enhance diagnostic accuracy in X-ray reporting.

☐ Strongly Agree

☐ Agree

☐ Neutral

☐ Disagree

☐ Strongly Disagree

2. Do you think Artificial Intelligence will improve workflow efficiency and reduce reporting time?

☐ Strongly Agree

☐ Agree

☐ Neutral

☐ Disagree

☐ Strongly Disagree

3. Do you think Artificial Intelligence will reduce the workload of radiographers?

☐ Strongly Agree

☐ Agree

☐ Neutral

☐ Disagree

☐ Strongly Disagree

4. Do you think Artificial Intelligence will replace radiographers in the future?

☐ Strongly Agree

☐ Agree

☐ Neutral

☐ Disagree

☐ Strongly Disagree

5. will you be willing to adopt Artificial Intelligence tools in your daily X-ray reporting practice?

☐ Strongly Agree

☐ Agree

☐ Neutral

☐ Disagree

☐ Strongly Disagree

Section D: Perceived Barriers to AI Adoption in X-ray Reporting

1. What benefit of Artificial Intelligence in imaging stands out most to you?

    ☐ Accuracy

    ☐ Speed

    ☐ Efficiency

    ☐ Patient Outcomes

2. What challenge concerns you the most about Artificial Intelligence?

☐ Job loss

☐ Cost

☐ Lack of training

☐ Privacy

☐ I'm not concerned.

3. Do you feel confident working with AI tools today?

☐ Yes

☐ Somewhat

☐ No

4. What do you think are the biggest challenges or limitations to adopting Artificial intelligence in medical imaging? (Select all that apply)

☐ Lack of training or education

☐ Limited access to AI-powered tools

☐ Concerns about data security and privacy

☐ Uncertainty about AI's impact on patient care

☐ Other:

SECTION E: TRAINING NEEDS

1. Have you received any formal training on Artificial Intelligence?

☐ Yes

☐ No

2. If yes, where?

☐ University

☐ Workshop

☐ Online Course

☐ On-the-job

3.. Do you think Artificial Intelligence training should be part of radiography education?

☐ Yes

☐ No

3. Do you currently need more training to work with Artificial Intelligence?

☐ Yes

☐ Maybe

☐ No

4. What training format would benefit you most?

☐ Hands-on

☐ Online

☐ Short workshops

☐ Mentorship

☐ All of the above

SECTION F: ATTITUDES AND PERCEPTION

1. Do you believe AI will change how radiographers work in the next 5 years?

☐ Yes, positively

☐ Yes, negatively

☐ No significant change

☐ Not sure

2. Do you think radiographers with more experience have a better understanding of Artificial Intelligence?

☐ Yes

☐ No

☐ Not necessarily.

3. Do you believe younger or newly qualified radiographers are more familiar with artificial

☐ Intelligence concepts?

☐ No

☐ Yes

☐ Not necessarily

4. Are you personally interested in learning more about Artificial Intelligence?

☐ Yes

☐ No

5. What’s your biggest concern about Artificial Intelligence in radiography?

☐ No Job threat

☐ Ethics

☐ Lack of understanding

☐ Nothing

6. Would you support the integration of Artificial Intelligence if well explained and ethically used?

☐ No

☐ Maybe

☐ Yes

HEALTH RESEARCH ETHICS COMMITTEE (HREC)

UNIVERSITY OF BENIN TEACHING HOSPITAL

P.M.B. 1111 BENIN CITY NIGERIA

CHIEF MEDICAL DIRECTOR
Prof. Darlington E. Obaseki

DIRECTOR OF ADMINISTRATION
Jim Uwadia, Esq

CHAIRMAN
Prof. (Mrs.) Antoinette N. Ofili

HREC OFFICE:
Registration Number:
NHREC-UBTH-HREC/24/12/2022B

PROTOCOL NUMBER: ADM/E 22/A/VOL.VII/2025/208

PROPOSAL TITLE: "EVALUATING THE KNOWLEDGE AND PERCEPTION OF RADIOGRAPHER TOWARDS THE ROLE OF ARTICIAL INTELLIGENCE IN X-RAY REPORT IN EDO STATE"

PRINCIPAL INVESTIGATOR(S): ODOEMENA FESTUS CHINEMEZE

DEPARTMENT/INSTITUTION: DEPARTMENT OF RADIOGRAPHY, SCHOOL OF BASIC MEDICAL SCIENCES UNIVERSITY OF BENIN, BENIN CITY, EDO STATE

DATE CONSIDERED: AUGUST 20TH, 2025

DECISION OF THE COMMITTEE: APPROVED

THIS APPROVAL DATES 6/8/2025 TO 5/8/2026. IF THERE IS DELAY IN STARTING THE RESEARCH, PLEASE INFORM THE HREC SO THAT THE DATES OF APPROVAL CAN BE ADJUSTED ACCORDINGLY

REMARK:

CHAIRMAN: PROF. (MRS) A.N. OFILI   **SIGNATURE & DATE** 20/8/2025

SUPERVISOR (S): MRS OKEH E.O.

DECLARATION BY INVESTIGATOR(S):

PROTOCOL NUMBER (please quote in all enquiries)

Note that no participant accrual or activity related to this research may be conducted outside of these dates. All informed consent forms used in this study must carry the HREC assigned number and duration of HREC approval of the study. In multiyear research, endeavor to submit your annual re-port to the HREC early in order to obtain renewal of your approval and avoid disruption of your research. No changes are permitted in the research without prior approval by the HREC except in circumstances outlined in the Code. The HREC reserves the right to conduct compliance visit your research site without previous notification

Signature & Date 27-08/2025