Radiographers' Perceptions of Artificial Intelligence and Theranostics: Implications for Job Security and Professional Adaptation

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Abstract

Background: Artificial Intelligence (AI) and theranostics are transforming radiographic practice by enhancing diagnostic precision and enabling personalized treatment. However, these innovations raise concerns about professional adaptation and job security.

Objectives: To investigate Nigerian radiographers' awareness, perceptions, and adaptability regarding these technologies, with a focus on job security and professional relevance.

Method: A cross-sectional survey of 349 Nigerian radiographers assessed awareness, perceptions, and adaptability regarding AI and theranostics. Data were analyzed using descriptive statistics (SPSS v25).

Results: Awareness was higher for AI than theranostics: 31.2% were moderately familiar and 28.7% very familiar with AI, whereas 34.4% were not familiar with theranostics. Most respondents (64.5%) had not attended training or seminars. Regarding possible role displacement through automation, 107 respondents (30.7%) agreed and 35 (10.0%) strongly agreed. Further education or certification attracted agreement from 179 respondents (51.3%) and strong agreement from 79 (22.6%). Adoption as an opportunity for career growth attracted agreement from 168 respondents (48.1%) and strong agreement from 93 (26.6%). Key adaptation factors included mentorship (50.7% in the agree category), financial support (45.6% in the agree category), and curriculum integration (41.5% in the agree category).

Conclusion: Nigerian radiographers demonstrate moderate familiarity with AI but limited understanding of theranostics. While job security concerns persist, willingness to upskill is strong. Structured training, mentorship, and curriculum reform are essential to support professional adaptation and safeguard radiographers' relevance in the era of AI and theranostics.

Contribution: This study highlights the need for radiography professional bodies and policymakers to prioritize structured training pathways, financial incentives, and cross-disciplinary collaborations to ensure radiographers remain central to technological transitions.

Keywords: Artificial Intelligence; Theranostics; Radiography; Job Security; Professional Adaptation; Nigeria

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Introduction

Artificial intelligence (AI) and theranostics are rapidly transforming healthcare, particularly within medical imaging and radiographic practice, some of which include workflow optimization, image acquisition, diagnostic interpretation, and treatment planning [1].

Recent advances in deep learning and neural networks have accelerated the integration of AI into clinical imaging, offering greater efficiency, improved accuracy, and enhanced patient safety [2]. In parallel, theranostics — an approach that combines diagnostic imaging with targeted therapy — has gained increasing importance in nuclear medicine and precision oncology [3]. By enabling clinicians to both detect and treat specific pathologies, theranostics exemplifies the move toward personalized medicine.

Globally, radiographers' perceptions of these innovations have been mixed. While many acknowledge AI's capacity to reduce errors, optimize workflows, and advance radio-graphic practice, others express concerns about automation leading to job displacement [4,5]. A study in Zimbabwe found that radiographers anticipated reduced roles and altered professional practices with AI adoption [6].

Similarly, Saudi Arabian radiographers largely agreed that AI would play a significant role in imaging, but cited barriers such as cost, lack of expertise, and machine reliability [7]. Badera et al. [8] reported generally favorable attitudes toward AI among radiographers and radiologists but highlighted mentorship gaps as a key obstacle to adoption. These findings illustrate the global tension between optimism about technological progress and apprehension about professional security.

Despite these developments, the Nigerian context remains underexplored. Although AI and theranostics are increasingly discussed in international literature, limited research has examined how Nigerian radiographers perceive these technologies or how prepared they are to adapt. Considering Nigeria's evolving healthcare infrastructure, absence of theranostics training in most radiography curricula, and limited access to mentorship and continuing education, this knowledge gap is particularly significant. Without understanding local awareness and readiness, the professional practice in Nigeria risks falling behind in adapting to global technological shifts.

This study therefore investigates Nigerian radiographers' awareness, perceptions, and adaptability regarding AI and theranostics. Specifically, it examines their concerns about job security, willingness to upskill, and the structural and educational supports necessary for effective professional adaptation.

Materials and Methods

This study employed a prospective cross-sectional survey design, conducted between October 2024 and January 2025 across private and federal government hospitals in Nigeria. Ethical clearance was obtained from an institutions review board (NHREC/05/01/2008B-FWA00002458-1RB00002323). The study population consisted of licensed radiographers registered with the Radiographers Registration Board of Nigeria (RRBN). Only practicing radiographers who consented to participate were included, while other healthcare workers, academic radiographers, industrial radiographers, and radiographers unwilling to participate were excluded.

A convenience sampling technique was used and data were collected using a structured, self-administered questionnaire designed in Google Forms. The instrument consisted of three sections: Section I covered demographic characteristics such as age, gender, years of practice, specialty, and geopolitical zone of practice; Section II assessed awareness and understanding of AI and theranostics; while Section III focused on perceptions of job security, willingness to adapt, and factors influencing adaptation.

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Materials and Methods (continued)

The questionnaire was pretested on 15 radiographers at a university teaching hospital to assess internal consistency using Cronbach's alpha, and this yielded a coefficient of 0.79, indicating acceptable reliability. Content validity was ensured through expert review by radiography lecturers and clinical practitioners. The questionnaire link was distributed via professional WhatsApp groups, LinkedIn, email lists, and direct contacts of practicing radiographers. Participation was voluntary, and informed consent was obtained prior to completing the survey.

Responses were analyzed using descriptive statistics in IBM SPSS version 25. Frequencies and percentages were used to summarize respondent characteristics, awareness, perceptions and willingness to adapt. Results are presented in tables. Anonymity was maintained by ensuring that no personal identifiers were collected, and data were stored securely for academic purposes only.

Results

Demographic Characteristics

Of the 349 radiographers who participated in the study, majority were male (56.7%) and within the 25–34 years age group (46.1%). Most respondents had practiced for fewer than five years (61.6%), reflecting a predominantly early-career workforce. The South-East geopolitical zone contributed the highest proportion of respondents (39.5%), while diagnostic radiography was the most common specialty (79.7%) (Table 1).

Awareness and Understanding of AI and Theranostics

From Table 2, familiarity with AI was generally higher than with theranostics. About 31.2% reported being moderately familiar with AI and 28.7% very familiar, while only 7.4% were not familiar at all. In contrast, awareness of theranostics was low, with 34.4% reporting no familiarity and only 7.7% describing themselves as extremely familiar. Knowledge sufficiency was also limited, as 42.7% either disagreed or strongly disagreed that their current knowledge of AI and theranostics was adequate to meet future professional demands. Furthermore, 64.5% of respondents had never attended training or seminars on either technology.

Perceptions of Job Security

Regarding possible role displacement through automation, 107 respondents (30.7%) agreed and 35 (10.0%) strongly agreed. The need to acquire new skills attracted agreement from 150 respondents (43.0%) and strong agreement from 110 (31.5%) (Table 3).

Willingness to Adapt

Further education or certification attracted agreement from 179 respondents (51.3%) and strong agreement from 79 (22.6%). Adoption as an opportunity for career growth attracted agreement from 168 respondents (48.1%) and strong agreement from 93 (26.6%). Responses concerning peer resistance are presented separately in Table 4.

Factors Influencing Adaptation

In Table 5, 177 respondents (50.7%) selected agree and 87 (24.9%) selected strongly agree regarding structured mentorship programs. Financial support or incentives attracted agreement from 159 respondents (45.6%) and strong agreement from 84 (24.1%). Curriculum integration attracted agreement from 145 respondents (41.5%) and strong agreement from 111 (31.8%). Collaboration with other healthcare professionals attracted agreement from 155 respondents (44.4%) and strong agreement from 94 (26.9%). For workplace technological infrastructure, 91 respondents (26.1%) agreed and 49 (14.0%) strongly agreed that it supported AI and theranostics.

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Respondent Characteristics

Table 1. Demographic Characteristics of Respondents (n = 349)

Variable	Frequency (n)	Percentage (%)
Gender		
Male	198	56.7
Female	151	43.3
Age Range (Years)		
Below 25	109	31.2
25–34	161	46.1
35–44	55	15.8
45–54	15	4.3
Above 55	9	2.6
Years of Practice		
Less than 5	215	61.6
5–10	83	23.8
11–20	40	11.5
Above 20	11	3.2
Geopolitical Zone of Practice		
North Central	37	10.6
North East	30	8.6
North West	27	7.7
South East	138	39.5
South-South	50	14.3
South West	67	19.2
Area of Specialty		
Diagnostic Radiography	278	79.7
Nuclear Medicine	17	4.9
Therapeutic Radiography	54	15.5

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Awareness and Job Security

Table 2. Awareness and Understanding of AI and Theranostics (n = 349)

Variable	Not familiar	Somewhat familiar	Moderately familiar	Very familiar	Extremely familiar
How familiar are you with the concept of Artificial Intelligence (AI) in medical imaging?	26 (7.4)	80 (22.9)	109 (31.2)	100 (28.7)	34 (9.7)
How familiar are you with theranostics as a field in radiography?	120 (34.4)	77 (22.1)	84 (24.1)	41 (11.7)	27 (7.7)

Table 2 (continued)

Variable	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
My current knowledge of AI and theranostics is sufficient to meet future demands in radiography	44 (12.6)	105 (30.1)	117 (33.5)	65 (18.6)	18 (5.2)
There are sufficient resources available to educate radiographers about AI and theranostics	49 (14.0)	111 (31.8)	101 (28.9)	66 (18.9)	22 (6.3)

Table 2 (continued)

Variable	No	Yes
I have attended training or seminars on AI and theranostics	225 (64.5)	124 (35.5)

Values are frequency (percentage).

Table 3. Perception of Impact of AI and Theranostics on Job Security (n = 349)

Variable	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
Automation through AI might lead to role displacement for radiographers	30 (8.6)	83 (23.8)	94 (26.9)	107 (30.7)	35 (10.0)
The integration of AI and theranostics will require radiographers to acquire new skills to remain relevant	13 (3.7)	18 (5.2)	58 (16.6)	150 (43.0)	110 (31.5)

Values are frequency (percentage).

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Willingness and Factors Influencing Adaptation

Table 4. Radiographers' Willingness to Adapt to AI and Theranostic Technologies (n = 349)

Variable	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
I am interested in pursuing further education or certifications in AI and theranostics	7 (2.0)	17 (4.9)	67 (19.2)	179 (51.3)	79 (22.6)
I see the adoption of AI and theranostics as an opportunity for personal growth in my career	13 (3.7)	14 (4.0)	61 (17.5)	168 (48.1)	93 (26.6)
Resistance from peers could influence my decision to adopt new technologies in radiography	47 (13.5)	82 (23.5)	110 (31.5)	84 (24.1)	26 (7.4)

Values are frequency (percentage).

Table 5. Factors Influencing Radiographers' Adaptation (n = 349)

Variable	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
Access to structured mentorship programs would facilitate my adaptation to AI and theranostics	10 (2.9)	15 (4.3)	60 (17.2)	177 (50.7)	87 (24.9)
Financial support or incentives from employers is necessary for adopting these technologies	14 (4.0)	21 (6.0)	71 (20.3)	159 (45.6)	84 (24.1)
AI and theranostics training should be included in the curriculum of undergraduate radiography programs	8 (2.3)	10 (2.9)	75 (21.5)	145 (41.5)	111 (31.8)
Radiographers from specific geopolitical zones may face unique challenges in adapting to AI and theranostics	9 (2.6)	29 (8.3)	94 (26.9)	131 (37.5)	86 (24.6)
Technological infrastructure in my current workplace supports the use of AI and theranostics	46 (13.2)	79 (22.6)	84 (24.1)	91 (26.1)	49 (14.0)
Collaboration with other healthcare professionals will play a key role in adapting to AI and theranostics	7 (2.0)	13 (3.7)	80 (22.9)	155 (44.4)	94 (26.9)

Values are frequency (percentage).

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Discussion

Radiographers in this study demonstrated higher familiarity with artificial intelligence (AI) than with theranostics, a pattern that reflects the relative availability of these technologies in Nigeria. While AI is beginning to attract interest in some private institutions, it has not yet been integrated into routine clinical practice or healthcare policy [9,10,11,12].

By contrast, theranostics remains entirely theoretical in developing countries, with no established facilities nationwide [13,14]. The limited awareness observed among respondents is therefore an expected outcome rather than a professional deficiency, and it underscores the need for anticipatory training as these technologies evolve globally.

Concerns about job security were evident: 107 respondents (30.7%) agreed and 35 (10.0%) strongly agreed that automation through AI might lead to role displacement.

These anxieties ranged from fears of redundancy—particularly in modalities such as CT, MRI, and mammography—to expectations of shifts in responsibility. Some respondents even extended these fears to conventional radiography, where automation might reduce the importance of patient positioning. Such perceptions echo findings from Saudi Arabia and Zambia [6,7], where radiographers expressed unease about being sidelined by automation. Similar concerns has earlier been expressed in other climes and related professions [15,16,17,18,19]. These results points to a possible global tension between technological progress and professional stability.

Despite these concerns, willingness to adapt was strong. Further education or certification attracted agreement from 179 respondents (51.3%) and strong agreement from 79 (22.6%). Adoption as an opportunity for career growth attracted agreement from 168 respondents (48.1%) and strong agreement from 93 (26.6%). This optimism is reinforced by the demographic profile of the study population: 61.6% had fewer than five years of professional experience. A predominantly young workforce may be more open to technological change and flexible in adapting to new systems compared to older counterparts, [20] an advantage that Nigeria can leverage in shaping its future radiography workforce. Similar studies in other regions also point to optimism where structured training and institutional support are available [21,22].

Barriers to adaptation, however, are significant, with mentorship emerging as a key challenge. An instance is younger radiographers perceiving senior colleagues as disengaged from training responsibilities and more preoccupied with personal advancement [23]. Financial barriers were also prominent, and this may be because few employers provide sponsorship for training or certifications [24]. Infrastructure represents a further limitation: AI-enabled picture archiving and communication systems (PACS) are not widely available, and theranostics facilities are entirely absent [13]. These barriers reflect systemic issues rather than shortcomings in professional willingness. Without addressing these gaps, the enthusiasm of younger radiographers may not translate into practical adaptation.

Taken together, the findings position Nigeria at an early but promising stage in the integration of AI and theranostics. AI has already been incorporated into the Core Curriculum Minimum Academic Standards (CCMAS) for radiography, but theranostics has yet to be introduced [25]. This curricular reform is timely, but its effectiveness will depend on parallel investments in faculty development, mentorship programs, and infrastructural support. Radiography professional bodies and policymakers should therefore prioritize structured training pathways, financial incentives, and cross-disciplinary collaborations to ensure radiographers remain central to technological transitions.

Conclusion

Nigerian radiographers are cautiously optimistic about the integration of AI and theranostics into clinical practice. While concerns about job displacement persist, the willingness to adapt is encouraging, particularly given the predominantly young workforce. The limited awareness of theranostics reflects its absence from the Nigerian healthcare landscape, highlighting the need for proactive educational reforms. To safeguard professional relevance and enhance patient care, stakeholders must address systemic barriers through curriculum reform, mentorship, financial support, and infrastructural development. With these supports in place, Nigerian radiographers are well-positioned to embrace emerging technologies and lead their integration into clinical practice.

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Declarations

Consent for publication: The author clarifies that written informed consent was obtained and the anonymity of the patient was ensured. This study submitted to Swiss J. Rad. Nucl. Med. has been conducted in accordance with the Declaration of Helsinki and according to requirements of all applicable local and international standards.

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