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

Onwuzu, Sobechukwu W I[1]; Uche-Nwankwo, Adanna Munachimsoaga[1*]; Ozoamalu, Chinemerem Sebastian[1]; Ozohili, Chikaosolu Vanessa[1]; Peter-Adim, Ezinne Stacey[1]; Solomon, Prisca Chinecherem[1]; Sopuluchukwu, Precious Ogechi[1]; Onwunta, Ikechukwu Emmanuel[1]

[1]Department of Medical Radiography and Radiological Sciences, University of Nigeria

Swiss Journal of Radiology and Nuclear Medicine - www.sjoranm.com - Rosenweg 3 in CH-6340 Baar, Switzerland

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 and inferential 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 job security, 41.8% agreed AI and theranostics could reduce the demand for manual radiography skills, and 30.7% agreed automation might cause role displacement. Nevertheless, adaptability was promising: 51.3% expressed interest in further education or certification, and 48.1% viewed adoption as an opportunity for career growth. Key adaptation factors included mentorship (50.7%), financial support (45.6%), and curriculum integration (41.5%).

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

*Corresponding author: Uche-Nwankwo - received: 09.12.2025 - peer reviewed, accepted and published: 31.01.2026

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 radiographic 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.

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.
Completed responses were exported from Google Forms into IBM SPSS version 25 for

analysis. Descriptive statistics such as frequencies, percentages, means, and standard deviations were used to summarize demographic and awareness data, while inferential statistics, including cross-tabulations and mean comparisons, were applied to explore perceptions and adaptability patterns. Results were presented in tables for clarity. 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

Concerns about job security were evident. More than two-fifths of respondents (41.8%) agreed that AI and theranostics could reduce the demand for manual radiography skills, while 30.7% agreed that automation might lead to role displacement.
At the same time, 74.5% acknowledged that integration of these technologies would require radiographers to acquire new skills to remain relevant (Table 3).

Willingness to Adapt

Despite concerns, respondents expressed a strong willingness to adapt.
Over half (51.3%) indicated interest in pursuing further education or certifications in AI and theranostics, while 48.1% agreed that adoption of these technologies represented an opportunity for personal growth. Although peer resistance was reported as a possible barrier, most respondents viewed adaptation positively (Table 4).

Factors Influencing Adaptation

In Table 5, more than half (50.7%) agreed that access to structured mentorship programs would facilitate adaptation, and 45.6% emphasized the need for financial support or incentives from employers. A further 41.5% supported the inclusion of AI and theranostics training in undergraduate curricula, while 44.4% highlighted the importance of collaboration with other healthcare professionals.
However, workplace infrastructure was identified as a barrier, as only 40.1% agreed that their facilities had sufficient technological support.

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

Table 2 - Awareness and understanding of AI and Theranostics (n = 349)

Variable	Not familiar	Somewhat familiar	Moderately familiar	Very familiar	Extremely familiar	Mean ± SD
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)	3.10 ± 1.10
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)	2.36 ± 1.27
	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)	2.74 ± 1.06
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)	2.72 ± 1.06
	No		**Yes**			
I have attended training or seminars on AI and Theranostics	225 (64.5)		124 (35.5)			
Average mean response - 2.73						

Table 3 - Perception of impact of AI and theranostics on job security (n = 349)

Variable	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
AI and theranostics could reduce the demand for manual radiography skills	20 (5.7)	6 (16.0)	87 (24.9)	146 (41.8)	40 (11.9)
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)

Table 4 - Radiographers' willingness to adapt to AI and theranostic technologies (n = 349)

Variable	Strongly disagree	Disagree	Neutral	Agree	Strongly agree	Mean ± SD
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)	3.38 ± 0.88
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)	3.90 ± 0.96
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)	3.11 ± 1.14
Average mean response - 3.46						

Table 5 - Factors influencing radiographers' adaptation (n = 349)

Variable	Strongly disagree	Disagree	Neutral	Agree	Strongly agree	Mean ± SD
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)	3.91 ± 0.91
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)	3.80 ± 1.00
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)	3.98 ± 0.93
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)	3.73 ± 1.00
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)	3.05 ± 1.26
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)	3.91 ± 0.91

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 – 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, with 41.8% of respondents believing that AI and theranostics could reduce the demand for manual radiography and 30.7% fearing outright 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 – 19). These results points to a possible global tension between technological progress and professional stability.

Despite these concerns, willingness to adapt was strong. Over half of the respondents expressed interest in pursuing further education or certification, and nearly half viewed the adoption of AI and theranostics as an opportunity for personal growth. 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.

Correspondence to:
Uche-Nwankwo
Department of Medical Radiography and Radiological Sciences, University of Nigeria
University of Nigeria
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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. All authors contributed to the conception and design of the manuscript, participated in drafting and revising the content critically for important intellectual input, and approved the final version for publication. Each author agrees to be accountable for all aspects of the work, ensuring its accuracy and integrity.
Competing interests: None.
Funding: No funding was required for this study.

Conflict of interest:

The authors declare that there were no conflicts of interest within the meaning of the recommendations of the International Committee of Medical Journal Editors when the article was written.

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