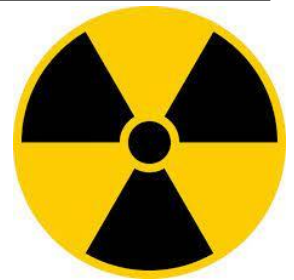


JOURNAL OF RADIOGRAPHY AND RADIATION SCIENCES



KNOWLEDGE AND PERCEPTIONS OF RADIOGRAPHY AMONG UNDERGRADUATE HEALTH PROFESSIONAL STUDENTS: IMPLICATIONS FOR INTERPROFESSIONAL EDUCATION IN NIGERIA

¹Yali Alhaji Ali , ²Mustapha Alhaji Barde , ³Ibrahim Bashir Umar* , ⁴Samaila Aliyu Baba
^{1,3}Department of Radiography and Radiation Sciences, Federal University of Health Sciences, Azare, Nigeria
^{2,4}Department of Medical Radiography, Bayero University Kano, Nigeria

*Corresponding author: ibrahim.bashirumar@fuhsa.edu.ng | Phone: +2347065100601

<https://doi.org/10.82547/jrrs/2026/CPFK6532>

Article info

First Submission
23rd Jun 2026

Revised
5th Aug 2026

Accepted
27th Sept 2026

ABSTRACT

Background: Radiography is a health profession that employs ionising and non-ionising radiations for diagnostic and therapeutic purposes. Students from other health professional courses share institutional and clinical environments with radiography students throughout their training, making mutual understanding of the profession professionally important. No study had previously assessed this relationship at Bayero University Kano.

Objective: To assess the knowledge and perception of students from other health professional courses in Bayero University Kano with respect to radiography profession.

Methods: A prospective, cross-sectional study was conducted among other health professional departments. Stratified random sampling with proportionate allocation was used to select 322 respondents. Data were analysed using SPSS version 22, applying descriptive statistics, Pearson correlation, and paired-samples t-tests.

Results: Of 322 questionnaires distributed, 306 (95.0%) were returned and fully completed (response rate of 95%). Medical Laboratory Sciences students recorded the highest knowledge score (87.5%) while Physiotherapy students recorded the lowest (48.1%). Optometry students held the most favourable perception of the profession (96.2%) while Physiotherapy students were the least favourable (66.7%). Strong positive correlations between knowledge and perception were found in MBBS ($r = 0.737$, $p < 0.001$), Physiotherapy ($r = 0.681$, $p < 0.001$), and Dentistry students ($r = 0.658$, $p < 0.001$).

Conclusion: With the exception of Physiotherapy students, participants from other health professional courses at Bayero University Kano demonstrated satisfactory knowledge and generally favourable perception of radiography. Interprofessional educational initiatives are recommended to address the gaps identified.

Keywords: Knowledge; Perception; Students; Health professionals; Radiography

Introduction

Radiography is the art and science concerned with the use of both ionising and non-ionising radiations on humans or animals, with the purpose of promoting health, treating disease, and producing various diagnostic images^{1,2}. In Nigeria, radiography is offered as a five-year undergraduate programme leading to the Bachelor of Medical Radiography degree at accredited Nigerian universities including Bayero University Kano³. Graduates undertake a one-year internship at an accredited health facility, followed by a compulsory

year of the National Youth Service Corps scheme, after which they are registered and licensed by the Radiographers Registration Board of Nigeria (RRBN), the statutory body established under Decree 42 of 1987, now Cap R1 LFN 2004³.

The profession encompasses three broad branches: diagnostic radiography, therapeutic radiography, and industrial radiography². Diagnostic radiographers work across multiple imaging modalities including conventional X-ray, computed tomography (CT), magnetic resonance imaging (MRI), ultrasound,

fluoroscopy, angiography, and interventional radiology, reflecting the expanding scope of modern imaging practice in healthcare delivery^{4,5}. Advances in medical imaging and workforce development have further expanded radiographer roles into cross-sectional imaging and reporting practices, particularly in CT and MRI, where radiographers increasingly participate in image interpretation and clinical decision support^{5,6}.

Despite radiography's recognized importance in clinical diagnosis and treatment, the profession has faced persistent challenges related to public image and recognition. Studies have consistently reported that it is perceived as a boring and routine career involving high workloads and receiving little acknowledgment from the general public or from allied health peers⁷. In a cross-sectional study of health professionals in a Nigerian teaching hospital, Chiegwu et al.⁸ found that while respondents rated radiographers highly on educational and technical skills, average scores on other professional attributes such as integrity, morality, prestige, and altruism ranged from approximately 55-64%, which the investigators considered inadequate for a professional occupation. A study on Nigerian school children found that the awareness level of respondents with respect to radiography profession was below 76.6%, and that attitudes towards the profession were only moderately positive even among those who had received career guidance⁹. Among secondary school students in Bauchi, 70.7% had no knowledge of radiography as a distinct profession, despite 84.8% being aware of x-rays¹⁰. A qualitative study in Sweden found that while technological developments and opportunities for career advancement had a positive influence on radiography's standing, persistent staff shortages constrained the profession's growth and limited engagement in advancement activities¹¹. These findings collectively describe a profession whose scope is routinely underestimated across audiences, including within healthcare.

Within university settings, students from different health professional programmes frequently interact through shared lectures, clinical postings, and institutional spaces. The quality of these interprofessional encounters is shaped in part by how each group understands and regards the others' professions. Health professional students who graduate with limited or inaccurate knowledge of radiography carry those gaps into clinical practice, where they are likely to become future colleagues and referring practitioners. Their perception of the profession

therefore has direct implications for interprofessional collaboration. While studies of this nature have been conducted at other Nigerian institutions⁸, none had been carried out at Bayero University Kano at the time of this study. This study was aimed to fill that gap by assessing the level of knowledge of radiography among students from other health professional courses at the institution, measuring their perception of the profession, comparing knowledge and perception scores across departments, and determining the nature and strength of the relationship between knowledge and perception within each department.

Methods

Study Design and Setting: This was a prospective, cross-sectional study carried out across two campuses of Bayero University Kano, Nigeria: The College of Health Sciences, located within the Aminu Kano Teaching Hospital premises along Zaria road, Kano metropolis, and the College of Natural and Pharmaceutical Sciences at the old campus along Gwarzo road, Kano metropolis.

Study Population and Eligibility Criteria: The study population comprised students enrolled in health professional courses at Bayero University Kano. Eligible departments included Medicine and Surgery (MBBS), Dentistry (BDS), Nursing Science (BNSc), Physiotherapy (BPT), Medical Laboratory Sciences (BMLS), Optometry (OD), and Pharmacy. Students from the Department of Medical Radiography were excluded to avoid response bias, and students from the Faculty of Basic Medical Sciences were excluded because their training does not lead directly to a clinical health profession within the scope of this study.

Sample Size and Sampling Method: The total population of eligible students across the seven departments was 2,204. Sample size was estimated using the Taro Yamane formula:

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

where N is the known population size and e is the margin of error set at 0.05, yielding a required minimum sample of 322 respondents. Stratified random sampling with proportionate allocation was then applied, with each of the seven departments serving as a stratum, and respondents selected from each department in proportion to its size relative to the total eligible population.

Instrument of Data Collection: A structured, self-administered questionnaire was developed by the researcher for this study, with items generated to cover the core scope-of-practice and regulatory characteristics of the radiography profession described in the literature^{2,3}, rather than adapted wholesale from a previously validated instrument. Content validity was assessed by academic staff of the Department of Medical Radiography, who reviewed the items for relevance, clarity, and coverage of the intended domains; a formal content validity index was not computed, and this is acknowledged as a limitation of the instrument development process. Reliability was assessed through a pilot study conducted prior to the main data collection, yielding a Cronbach alpha coefficient of 0.71, which indicates acceptable internal consistency.

It comprised three sections. Section A contained 8 socio-demographic items covering age, gender, course of study, and marital status. Section B contained 14 items assessing knowledge of radiography, including questions on its use of ionising and non-ionising radiation, clinical modalities, professional regulation by the RRBN, areas of specialisation, and industrial application, with Yes, No, and Not Sure as response options. Section C contained 8 items assessing perception of the profession, covering its integrity, social prestige, relationship with non-radiographers, altruism, professional ethics, educational and technical competence, overall professional interest, and willingness to recommend it to relatives, with Good, Bad, and Not Sure as response options. For knowledge items, each response aligned with the correct answer was assigned a score of one, and the total was expressed as a percentage of the 14 items. Participants scoring 50 percent or above were classified as having adequate knowledge, while those below 50 percent were classified as having poor knowledge. Perception responses were scored and expressed as a percentage of the eight items, with higher percentages indicating more favorable perception.

Ethical Consideration: Ethical clearance was obtained from the Health Research Ethics Committee (HREC) of the Kano State Ministry of Health before data collection commenced (Reference: MOH/Off/797/T.1/2170). Written informed consent was obtained from each participant. Participants were briefed on the purpose and voluntary nature of the study, assured of the confidentiality of their responses, and informed that withdrawal at any point carried no

penalty. The researchers personally administered and retrieved all questionnaires from January 2021 to May 2021.

Data Analysis: Data were analysed using the Statistical Package for Social Sciences (SPSS) version 22. Descriptive statistics were used to summarise socio-demographic characteristics and to present knowledge and perception scores for each department. Pearson's correlation coefficient was computed to examine the relationship between knowledge and perception scores within each department. Paired-samples t-tests were used to compare knowledge and perception score means within each department. The threshold for statistical significance was set at $p < 0.05$ for all tests.

Results

Of the 322 questionnaires distributed, 306 were returned and fully completed, yielding a response rate of 95.0%, and all were usable for analysis. The socio-demographic profile of respondents is presented in Table 1. The majority were aged 21 to 25 years (62.7%), male (58.5%), and single (83.0%). MBBS students constituted the largest departmental group (20.3%), while Physiotherapy students formed the smallest (8.8%). Figure 1 presents the distribution of knowledge scores across departments. Medical Laboratory Sciences students recorded the highest score (87.5%), followed by Pharmacy (82.5%), Dentistry (76.5%), Optometry (75.5%), MBBS (69.4%), and Nursing Science (66.7%). Physiotherapy students recorded the lowest score (48.1%), the only group to fall below the 50 percent threshold.

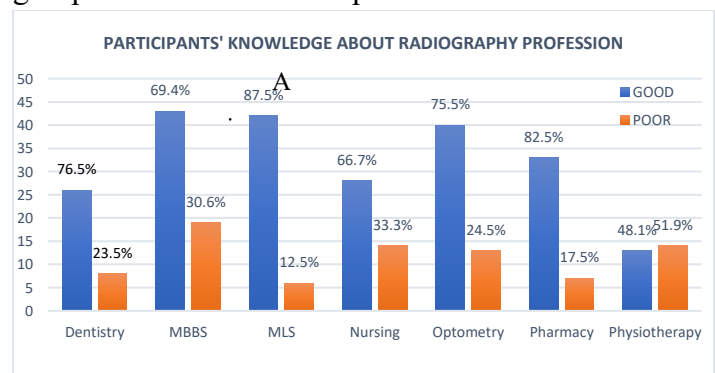


Figure 1. Knowledge scores of participants with respect to radiography profession, by department (n = 306).

Figure 2 presents the perception scores across departments. Optometry students were the most favourably disposed towards radiography (96.2%),

followed by Pharmacy and Medical Laboratory Sciences students, both above 90 percent. MBBS and Dentistry students scored in the 80 to 85 percent range. Nursing Science students scored above 70 percent. Physiotherapy students recorded the lowest perception score (66.7%).

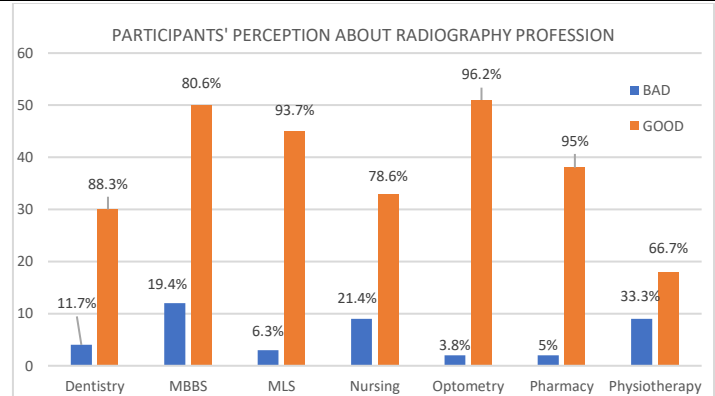


Figure 2. Perception scores of participants with respect to radiography profession, by department (n = 306). Higher scores indicate more favorable perception.

Table 1. Distribution of socio-demographic variables of respondents (n = 306).

S/N	Variable	Category	Frequency (n = 306)	Percentage (%)
1	Age (years)	16 to 20	31	10.1
		21 to 25	192	62.7
		26 to 30	77	25.2
		31 and above	6	2.0
2	Gender	Male	179	58.5
		Female	127	41.5
3	Department	Medicine and Surgery (MBBS)	62	20.3
		Dentistry (BDS)	34	11.1
		Nursing Science (BNSc)	42	13.7
		Physiotherapy (BPT)	27	8.8
		Medical Laboratory Sciences (BMLS)	48	15.7
		Optometry (OD)	53	17.3
		Pharmacy	40	13.1
4	Marital Status	Single	254	83.0
		Married	47	15.4
		Divorced	3	1.0
		Widowed	2	0.7

Table 2. Pearson correlation between knowledge and perception scores by department.

Department	Correlation Coefficient (r)	Significance Level (p)	Interpretation
Medicine and Surgery (MBBS)	0.737	<0.001	Strong positive
Physiotherapy (BPT)	0.681	<0.001	Strong positive
Dentistry (BDS)	0.658	<0.001	Strong positive
Pharmacy	0.498	0.001	Moderate positive
Nursing Science (BNSc)	-0.369	0.016	Moderate negative
Optometry (OD)	-0.113	0.421	Weak negative (NS)
Medical Laboratory Sciences (BMLS)	-0.098	0.509	Weak negative (NS)

Table 3. Comparison of knowledge and perception scores by department using paired-samples t-test.

Department	t value	Significance Level (p)	Difference
Medicine and Surgery (MBBS)	2.786	0.007	Significant
Dentistry (BDS)	2.098	0.044	Significant
Optometry (OD)	3.055	0.004	Significant
Physiotherapy (BPT)	2.431	0.022	Significant
Pharmacy	2.360	0.022	Significant
Medical Laboratory Sciences (BMLS)	1.000	0.322	Not significant
Nursing Science (BNSc)	1.044	0.303	Not significant

Discussion

This study assessed the knowledge and perception of students from seven health professional departments at Bayero University Kano with respect to radiography. A total of 306 participants provided usable data, and the demographic distribution was broadly consistent with enrollment patterns at the institution. A commendable response rate of 95% was obtained. The higher proportion of male respondents (58.5%) is consistent with admission trends in Nigerian health science programmes, where male enrollment tends to outnumber female enrollment, a pattern also reported in similar studies involving Nigerian students⁹. The age distribution, with 62.7 % of respondents in the 21 to 25-year range, reflects the typical demographic of undergraduates in their mid-programme years.

Six of the seven departments demonstrated knowledge scores above 60%, which is a broadly encouraging finding. This study measured knowledge and perception scores rather than their underlying causes, so the departmental comparisons below are factual findings, while the curricular and professional explanations offered for them are interpretive hypotheses that were not directly tested and should be read accordingly. Medical Laboratory Sciences students performed best at 87.5%. One possible explanation is a perceived overlap between their training and radiography in diagnostic science and laboratory-clinical workflow; however, this study did not directly assess curriculum content or clinical exposure, so this interpretation is offered as a plausible hypothesis rather than a confirmed reason and would need to be tested against curriculum data in future work. Pharmacy students also performed well at 82.5%. The reason for this is not established by the present data. Routine undergraduate pharmacy training does not typically involve substantial exposure to radiography, and this study did not directly assess curriculum content or clinical exposure for Pharmacy students, so a curriculum-based explanation cannot be confirmed and is not proposed here; the factors underlying this finding warrant direct investigation in future research. Dentistry and Optometry students, whose curricula incorporate radiology and imaging components directly relevant to their clinical scope, both recorded scores above 75%. It is notable, however, that while Dentistry students at Bayero University Kano demonstrated adequate knowledge of radiography as a profession, a concurrent study at the same institution found significant deficits in their

technical radiation protection knowledge and near-complete absence of awareness of radiation protection regulatory bodies, suggesting that discipline-specific knowledge does not automatically translate to competence across all radiography-related domains. 12 MBBS and Nursing Science students scored in the 66 to 70% range, suggesting that while these groups have contact with radiology departments during clinical postings, their formal knowledge of radiography as a distinct profession remains incomplete. The poor performance of Physiotherapy students at 48.1% is consistent with findings by Chiegwu et al.⁸, who similarly documented limited familiarity with radiography among physiotherapy practitioners in Nigeria. A possible explanation, offered as a hypothesis rather than a confirmed reason, is that the Physiotherapy curriculum at Bayero University Kano involves less structured exposure to radiology postings or cross-disciplinary lectures on radiographic science than MBBS or Dentistry programmes. As this study did not directly measure curriculum content or students' level of exposure to radiography, this explanation would need to be verified against actual curriculum data in future work.

Perception findings were generally positive across most departments. Optometry students were the most favourably disposed at 96.2%, which may reflect the close diagnostic relationship between optometry and imaging sciences, particularly in ocular and orbital imaging. The high perception scores recorded by Pharmacy and Medical Laboratory Sciences students, both above 90%, are consistent with their strong knowledge scores and suggest that in these groups, familiarity with the profession translates into appreciation of it. Physiotherapy students recorded the lowest perception score at 66.7%, consistent with their low knowledge scores and with the broad expectation that limited familiarity with a profession contributes to a less positive view of it.

A noteworthy finding within the Physiotherapy results deserves specific attention. Although Physiotherapy students recorded the lowest scores in both knowledge (48.1%) and perception (66.7%), they showed the second strongest positive correlation between the two variables ($r = 0.681$, $p < 0.001$). The coexistence of low absolute scores and a strong positive correlation is not contradictory. It means that within the Physiotherapy group, those students who knew more about radiography also tended to hold more favourable views of it, and this relationship was consistent and

proportionate. The entire group sits at a low knowledge baseline, but the direction and strength of the knowledge-perception link within the group is clear. This pattern carries an encouraging practical implication: because knowledge and perception move together strongly in this department, targeted efforts to raise knowledge of radiography among physiotherapy students are likely to produce corresponding improvements in perception, making knowledge-based interventions a particularly promising approach for this group.

However, the correlation analysis presents a more complex picture for other departments. Nursing Science showed a statistically significant moderate negative correlation ($r = -0.369$, $p = 0.016$), indicating that among nursing students, higher knowledge scores were paradoxically associated with less favourable perception of radiography. One possible explanation is that greater familiarity with radiography sharpens nursing students' awareness of professional role boundaries and perceived clinical hierarchies, which may generate rather than reduce interprofessional tension. This may not be unique to this setting. The interprofessional education literature has noted that increased professional knowledge can, in some contexts, heighten awareness of professional distinctiveness in ways that reinforce competition rather than cooperation between health disciplines¹³. MLS and Optometry also showed negative correlations, though neither reached statistical significance ($r = -0.098$, $p = 0.509$ and $r = -0.113$, $p = 0.421$ respectively), suggesting this pattern may have broader relevance in departments with high existing familiarity.

The t-test comparisons showed that five of the seven departments had statistically significant differences between their knowledge and perception scores: MBBS, Dentistry, Optometry, Physiotherapy, and Pharmacy. This means that for these groups, the level of factual knowledge a respondent demonstrated did not proportionately predict how favourably they rated the profession. Medical Laboratory Sciences and Nursing Science showed no significant difference between their knowledge and perception score means, indicating greater alignment between knowing and perceiving in those groups. These contrasting patterns point to the need for interprofessional education approaches that go beyond knowledge transfer alone, since knowing about a profession and valuing it are distinct cognitive processes that do not always move together.

The findings carry practical implications. The deficits observed among Physiotherapy students argue for structured interprofessional learning activities that bring radiography and physiotherapy students together in both classroom and clinical settings, through joint seminars, shared case-based learning sessions, or facilitated clinical exchanges. Wider dissemination of information about the full scope of radiography, encompassing its therapeutic, industrial, and specialist diagnostic branches, could address gaps in awareness identified across several departments. The need for targeted curriculum reinforcement at Bayero University Kano is further underscored by findings from a concurrent study at the same institution, which identified significant deficits in radiation protection knowledge among clinical dental students and recommended earlier integration of radiation safety content and specialist-led practical workshops.¹² These recommendations are consistent with those proposed by Coombs et al.⁷, who noted that targeted professional outreach is an effective strategy for improving radiography's visibility and professional image within healthcare institutions.

Several limitations of this study deserve acknowledgment. The single-institution design limits generalizability to other universities, regions, or health systems with different curricular structures. The cross-sectional design means that no causal direction can be established between knowledge and perception. The questionnaire relies on self-reported data, which cannot fully capture the depth or nuance of participants' actual understanding or attitudes. This study measured knowledge and perception scores but did not directly assess curriculum content, clinical exposure, or the specific reasons underlying departmental differences; the curricular and professional explanations offered in the Discussion are therefore interpretive hypotheses rather than tested findings and should be confirmed with curriculum review or qualitative data in future research. The questionnaire's content validity was established through expert review rather than a formally documented content validity index, and this less rigorous validation process should be considered when interpreting the results. Future work would benefit from multicentre designs and mixed-methods approaches incorporating qualitative interviews.

Conclusion

All respondents from other health professional courses at Bayero University Kano demonstrated adequate knowledge with the exception of Physiotherapy

students, and a generally favourable perception of radiography. The statistically significant differences between knowledge and perception scores in five of seven departments, and the negative correlations observed in MLS, Optometry, and Nursing Science, indicate that knowledge alone does not guarantee favourable professional perception. The strong positive correlation found within the Physiotherapy group, despite its low knowledge baseline, suggests that knowledge-based interprofessional interventions are likely to be particularly effective for that department. Interprofessional educational initiatives targeting knowledge gaps in Physiotherapy and the perception dynamics in Nursing Science are specifically recommended. Similar studies at other Nigerian institutions would help to determine whether these patterns are generalisable and to guide the design of interprofessional curricula at a national level.

Conflict of Interest

The authors declare no conflict of interest.

Funding

This research received no external funding.

Data Availability Statement

The data collected and analysed during the current study are available from the corresponding author on reasonable request.

Declaration of Generative AI Use

No generative artificial intelligence tools were used in the preparation, editing, analysis, or figure generation for this manuscript.

Acknowledgements

The authors acknowledge the support of the heads of participating departments and all students who voluntarily consented to participate in the study.

References

1. Ehrlich RA, Daly JA. Patient care in radiography: With an introduction to medical imaging. 7th ed. St. Louis: Mosby Elsevier; 2009.
2. Okeji MC, Ugwuanyi DC, Adejoh T. Radiographers' willingness to work in rural and underserved areas in Nigeria: A survey of final year radiography students. *J Assoc Radiogr Niger*. 2014;28(1):6–10.
3. Adejoh T. An inquest into the quests and conquests of the radiography profession in Nigeria. *J Radiogr Radiat Sci*. 2019;33(1):1–38. <https://doi.org/10.48153/jrrs/RUBH5255>
4. Hardy M, Harvey H. Artificial intelligence in diagnostic imaging: Impact on the radiography profession. *Br J Radiol*. 2020;93(1108):20190840. <https://doi.org/10.1259/bjr.20190840>
5. Brage K, Pedersen MRV, Lauridsen CA, Paulo C, Hansen P, Precht H, et al. Reporting radiographers in CT and MRI: A literature review with a systematic approach. *Radiography (Lond)*. 2025;31(2):102901. <https://doi.org/10.1016/j.radi.2025.102901>
6. Hardy M, Johnson L, Sharples R, Boynes S, Irving D. Does radiography advanced practice improve patient outcomes and health service quality? A systematic review. *Br J Radiol*. 2016;89(1062):20151066. <https://doi.org/10.1259/bjr.20151066>
7. Coombs CR, Park JR, Loan-Clarke J, Arnold J, Preston D, Wilkinson AJ. Perceptions of radiography and the National Health Service: A qualitative study. *Radiography*. 2003;9(2):109–122. [https://doi.org/10.1016/S1078-8174\(03\)00044-0](https://doi.org/10.1016/S1078-8174(03)00044-0)
8. Chiegwu HU, Nwokeocha NL, Obi OL, Uzuegbunam CU, Okonkwo CC. Perception of sister health professionals about radiography profession in Nigeria. *J Radiogr Radiat Sci*. 2019;33(1):13–16.
9. Ohagwu CC, Nwankwo UC, Eze CU. Perception and attitude of Nigerian school children towards radiography profession. *Niger J Med Imaging Radiat Ther*. 2012;1(3):30–42.
10. Haruna IS, Njitti M, Zira DJ, Richard I, Obetta C. Knowledge and awareness of radiography profession among senior science secondary school students in Bauchi metropolis, North Eastern Nigeria. *Int J Adv Res*. 2015;3(11):500–510.
11. Andersson BT, Lundgren SM, Lundén M. Trends that have influenced the Swedish radiography profession over the last four decades. *Radiography*. 2017;23(4):292–297. <https://doi.org/10.1016/j.radi.2017.07.012>
12. Muhammad LU, Umar IB, Barde MA. Assessment of knowledge of radiation protection and biological effects of ionising radiation among clinical dental undergraduate students at Bayero University Kano, Nigeria. *Kanem J Med Sci*. 2026;20(1):93–101. <https://doi.org/10.36020/kjms.2026.2001.013>
13. Goldie J, Dowie A, Cotton P, Morrison J. Teaching professionalism in the early years of a medical curriculum: A qualitative study. *Med Educ*. 2007;41(6):610–617. <https://doi.org/10.1111/j.1365-2923.2007.02772.x>