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Career Considerations in Radiology: Insights from Ghanaian Clinical Medical Students

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ABSTRACT

The significance of radiology in the current era of evidence-based medicine is undeniable, leading to a rising demand for radiologists. Consequently, it is important to examine whether there will be enough medical students pursuing this specialty to meet the increasing need. Perceptions of Ghanaian Clinical Medical Students Toward a Career in Radiology: A Cross-Sectional Survey. An online survey was administered to 575 clinical medical students from five public medical schools in Ghana between September 2020 and February 2021. Mean comparisons were conducted using Student's t-test and one-way ANOVA. For questions using a Likert scale, variations in responses across different clinical years and between male and female students were analyzed with the Kruskal-Wallis and Mann–Whitney U tests. Logistic regression was applied to identify key factors associated with choosing radiology as a career. Of the 575 participants, 340 (59.1%) were male, and the average age was 24.64 ± 3.08 years. Most students acknowledged the significance of radiology in evidence-based medicine, with a mean Likert score of 4.62 (SD = 0.82); this perception was notably higher among third-year students (p = 0.004). Approximately 30% of respondents reported receiving inadequate radiology instruction, primarily due to a limited number of lectures (89.9%), shortage of teaching staff (9.5%), and difficulty comprehending the material (0.7%). A total of 133 students (23.1%) indicated an interest in specializing in radiology, motivated chiefly by flexible working hours (61.9%) and high earning potential (68.3%), whereas reduced patient contact (8.0%) was the least cited factor. The likelihood of choosing radiology increased by 2.319 times for students valuing flexible working hours (95% CI: 1.413–3.805, P = 0.001). Furthermore, the presence of teleradiology significantly influenced students' decision to pursue a career in the field (p = 0.001). In general, clinical students expressed a range of perspectives but maintained a positive attitude toward radiology as a specialty.

words: Clinical medical students, Career, Radiology, Perception, Ghana

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Introduction

In recent decades, the demand for medical professionals has shifted markedly—from a focus on primary care physicians in the twentieth century to an increasing need for medical specialists [1]. By the late nineteenth century, medical knowledge had advanced to a point where it became impractical for practitioners to master all areas, making it necessary to focus on one or two specialties. Consequently, specialization has become an essential aspect of modern medicine [2]. With a wide array of specialties available, medical students face the challenge of navigating multiple factors when deciding on a career path. Understanding the determinants of specialty choice is critical to meeting workforce demands [3].

Radiology, in particular, has attracted global attention due to its expanding opportunities [4]. While the economic appeal of radiology declined in the past because of an abundant supply of residents and reduced reimbursement for imaging services, its relevance has resurged alongside economic growth and an aging population with increasing healthcare needs [5]. Hospital-based specialists such as radiologists and anesthesiologists, once considered to face higher job insecurity than other physicians, are now in high demand [1].

The role of radiologists has evolved beyond image interpretation to include economic oversight, policy advocacy, public health engagement, patient-centered care, and information technology integration. Through these functions,

radiologists continue to make substantial contributions to healthcare delivery [4]. Exposure to clinical rotations in radiology may spark students' interest in the specialty. Career decisions are heavily influenced by students' perceptions and understanding of a field, highlighting the importance of accurate information for informed choices that benefit both the individual and the specialty [6].

In Ghana, the medical profession is rapidly evolving, with an increasing number of specialists across various fields. However, the number of radiologists remains relatively small, and their distribution is largely concentrated in urban centers. Despite their limited numbers, radiologists provide essential healthcare services. This context raises an important question: will sufficient numbers of medical students choose radiology to meet the growing demand in an era of evidence-based medicine? To address this, the present study explored Ghanaian clinical medical students' perceptions of radiology as a career, with the following objectives:

1. To assess students' knowledge, opinions, and engagement with radiology as a specialty.
2. To examine potential associations between demographic factors, the influence of teleradiology, access to radiology rotations, adequacy of lectures, and the choice of radiology as a career.
3. To identify the key factors influencing students' decisions to pursue radiology as a specialty.

Materials and Methods

Study design and study site

This cross-sectional study utilized a questionnaire to survey clinical medical students from five public medical schools in Ghana—Institution 1, Institution 2, Institution 3, Institution 4, and Institution 5—between September 2020 and February 2021. Participants were students in their clinical years (Levels 400–600), as they are more likely to have had exposure to radiology, a discipline primarily encountered during clinical training.

Questionnaire

The study employed a self-administered questionnaire comprising both open- and closed-ended questions. The instrument was developed following an extensive review of the relevant literature and information pertaining to the research topic. The questionnaire was organized into five sections: (1) socio-demographic characteristics of the students; (2) assessment of knowledge, opinions, and practices regarding radiology as a career; (3) knowledge of teleradiology and the types of radiation utilized in radiology; (4) information on students' initial exposure to radiology and their interest in pursuing it as a career; and (5) factors influencing the decision to specialize in radiology. A five-point Likert scale (1 = strongly disagree, 2 = disagree, 3 = neutral, 4 = agree, 5 = strongly agree) was used to evaluate students' knowledge, opinions, and practices regarding radiology.

To facilitate convenient participation, the questionnaire was converted into an online survey using Google Forms. The study objectives were clearly outlined at the beginning of the survey, after which participants indicated their consent to take part before proceeding to the main sections. Prior to full deployment, the questionnaire was pretested on 15 medical officers and 15 clinical medical students to identify and correct any ambiguities. Revisions were made as needed to enhance clarity, validity, and reliability of the instrument.

Sampling and data collection

Based on records from the participating institutions, the number of clinical students in September 2020 was as follows: Institution 5 (668), Institution 3 (633), Institution 4 (492), Institution 2 (209), and Institution 1 (167), yielding a total population of 2,169 students. According to Mugenda and Mugenda (2003), when the accessible population is less than 10,000, a sample size of 10–30% is considered representative; therefore, 25% was deemed appropriate for this study [7]. This resulted in an initial estimated sample size of 542, which was subsequently adjusted for a 6% non-response rate, giving a final target sample size of 575. After obtaining permission from the respective school authorities, the survey link was distributed to students via class representatives through WhatsApp groups. The lead researcher monitored responses until the target sample size was reached, after which the survey was closed.

Statistical analysis

The collected questionnaire data were compiled, coded, and analyzed using SPSS version 23 and Microsoft Excel, with findings displayed in tables and charts. Comparisons between two continuous variables were performed using Student's t-test, whereas one-way ANOVA was applied for comparisons involving three or more groups. For

Likert-scale items, differences in mean scores across clinical year levels and between genders were assessed with the Kruskal-Wallis and Mann–Whitney U tests. Scores were interpreted as follows: 3.00 represented neutrality, scores above 3.00 indicated agreement, and scores below 3.00 indicated disagreement, with higher deviations from 3.00 reflecting stronger levels of agreement or disagreement.

The Chi-square test was used to examine relationships between students' socio-demographic characteristics, exposure to teleradiology, the presence of radiology rotations, adequacy of lectures or tutorials in radiology, and the decision to pursue radiology as a career. Additionally, binary logistic regression was conducted to identify key predictors associated with choosing radiology as a specialty.

Ethical issues

The study received approval from the relevant institutional review boards, with reference numbers CCTHERC/EC/2020/083 and KBTH-ADM/00224/2021. All procedures were conducted with strict adherence to confidentiality and anonymity for all participants.

Results and Discussion

A total of 575 students took part in the survey, with males representing the majority at 340 (59.1%). The overall mean age of participants was 24.64 ± 3.08 years. Female students were significantly younger than their male counterparts, with mean ages of 24.04 ± 2.59 years and 25.05 ± 3.33 years, respectively ($p < 0.001$). Students from Institutions 2 and 4 comprised the largest portion of the study population, accounting for 64.0% **(Table 1).**

Table 1. Characteristics of participants

Item	Count (%) / Mean ± SD	P-value
Age		
Minimum	19	—
Maximum	44	—
Mean (SD)	24.64 ± 3.08	—
Gender		
Male	340 (59.1%)	—
Female	235 (40.9%)	—
Mean age (Male)	25.05 ± 3.33	<0.001*
Mean age (Female)	24.04 ± 2.59	
Medical School		
Institution 1	11 (1.9%)	—
Institution 2	189 (32.9%)	—
Institution 3	117 (20.3%)	—
Institution 4	179 (31.1%)	—
Institution 5	79 (13.7%)	—
Mean Age by Institution (SD)		
Institution 1	24.00 ± 1.34	<0.001*
Institution 2	23.90 ± 2.59	
Institution 3	24.55 ± 3.16	
Institution 4	25.39 ± 3.83	
Institution 5	24.92 ± 1.62	
Academic Level		
Level 400 (First Clinical Year)	127 (22.1%)	—
Level 500 (Second Clinical Year)	132 (23.0%)	—
Level 600 (Third Clinical Year)	316 (55.0%)	—
Nationality		
Ghanaian	558 (97.0%)	—
Non-Ghanaian	17 (3.0%)	—
Family Member Who is a Physician		
Yes	189 (32.9%)	—
No	386 (67.1%)	—

*Statistically significant.

Students' knowledge, opinions, and practices regarding radiology as a specialty were analyzed by gender and clinical year, revealing variations in some responses. Overall, participants recognized the importance of radiology in the era of evidence-based medicine, with a mean Likert score of 4.62 (SD = 0.82). This perception was particularly pronounced among third-year clinical students (p = 0.004), as presented in **Table 2**.

Table 2. Differences in average Likert responses regarding radiology across genders and clinical year levels.

Item (Scale 1–5 unless noted)	Overall Mean ± SD	Level 400	Level 500	Level 600	P (Year)	Male	Female	P (Gender)
Knowledge of Radiology								
Radiology plays a critical role in evidence-based care	4.62 ± 0.82	4.54 ± 0.85	4.57 ± 0.78	4.68 ± 0.82	0.004*	4.67 ± 0.76	4.55 ± 0.90	0.090
Radiology is a technology-intensive field	4.31 ± 0.76	4.22 ± 0.78	4.29 ± 0.76	4.36 ± 0.75	0.107	4.34 ± 0.73	4.27 ± 0.80	0.351
X-ray, CT, mammography, fluoroscopy, PET, SPECT are radiation-based	4.96 ± 0.25	4.92 ± 0.41	4.99 ± 0.09	4.96 ± 0.21	0.096	4.93 ± 0.32	5.00 ± 0.00	<0.001*
MRI and ultrasound do not use ionizing radiation	5.00 ± 0.06	5.00 ± 0.00	5.00 ± 0.00	4.99 ± 0.08	0.440	4.99 ± 0.08	5.00 ± 0.00	0.239
Perceptions & Opinions								
Radiologists are vital members of the care team	3.50 ± 1.14	3.17 ± 1.02	3.54 ± 1.15	3.62 ± 1.16	0.001*	3.52 ± 1.17	3.47 ± 1.10	0.511
I would consider radiology due to its favorable lifestyle	3.64 ± 1.09	3.67 ± 1.05	3.64 ± 1.08	3.63 ± 1.11	0.976	3.72 ± 1.07	3.52 ± 1.11	0.021*
Radiology offers higher earning potential than most specialties	3.42 ± 0.99	3.72 ± 1.00	3.52 ± 1.05	3.25 ± 0.92	<0.001*	3.38 ± 1.04	3.47 ± 0.91	0.213
Radiology work reduces lifespan compared to other professions	2.87 ± 1.09	3.09 ± 0.96	2.75 ± 0.96	2.83 ± 1.18	0.003*	2.76 ± 1.17	3.02 ± 0.95	0.001*
Practice and Safety Perceptions								
Radiologists typically have limited patient interaction	2.75 ± 1.29	2.95 ± 1.22	2.65 ± 1.27	2.71 ± 1.33	0.115	2.83 ± 1.32	2.64 ± 1.24	0.090
Most clinicians can read images independently without radiologists	2.32 ± 1.00	2.57 ± 1.12	2.31 ± 0.96	2.23 ± 0.95	0.016*	2.44 ± 1.03	2.15 ± 0.94	0.001*
Safe radiology practice carries minimal health risk	3.14 ± 1.18	3.16 ± 1.14	3.24 ± 1.10	3.08 ± 1.22	0.425	3.25 ± 1.19	2.97 ± 1.13	0.004*
Radiation exposure of staff is routinely monitored	3.80 ± 1.30	3.76 ± 0.99	3.89 ± 0.93	3.78 ± 1.53	0.588	3.71 ± 1.07	3.93 ± 1.57	0.090
Protective equipment is consistently used to reduce exposure	3.85 ± 1.11	3.83 ± 1.07	3.81 ± 1.07	3.86 ± 1.15	0.631	3.83 ± 1.14	3.87 ± 1.08	0.851

Statistically significant.

Only 2 (0.3%) had the response to the definition of radiology wrong **(Figure 1).**

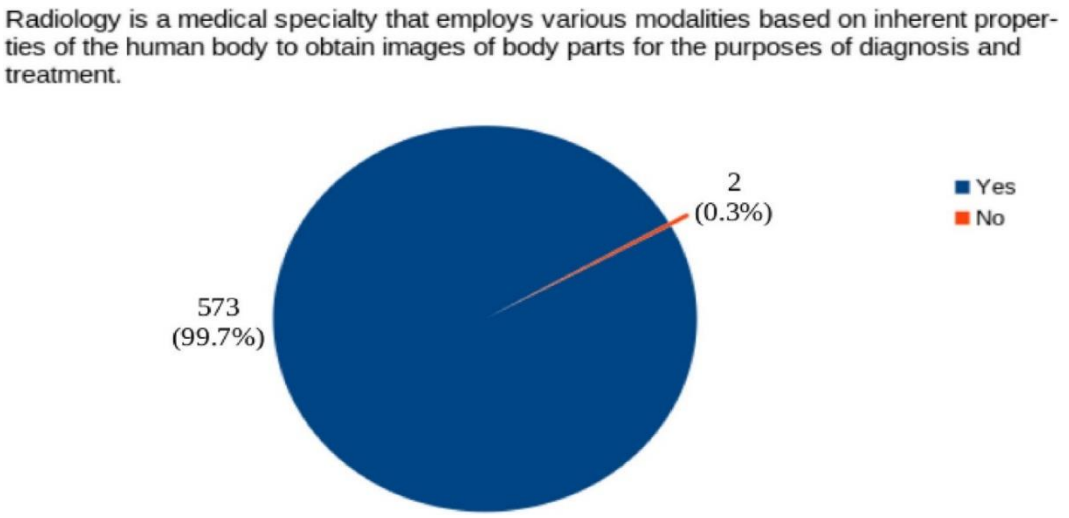

Figure 1. Pie chart illustrating students' knowledge regarding the definition of radiology as a specialty.

Most students, 427 (74.3%), reported receiving sufficient didactic lectures or tutorials in radiology, with the effectiveness of these sessions cited as the primary reason for their response **(Figures 2 and 3).**

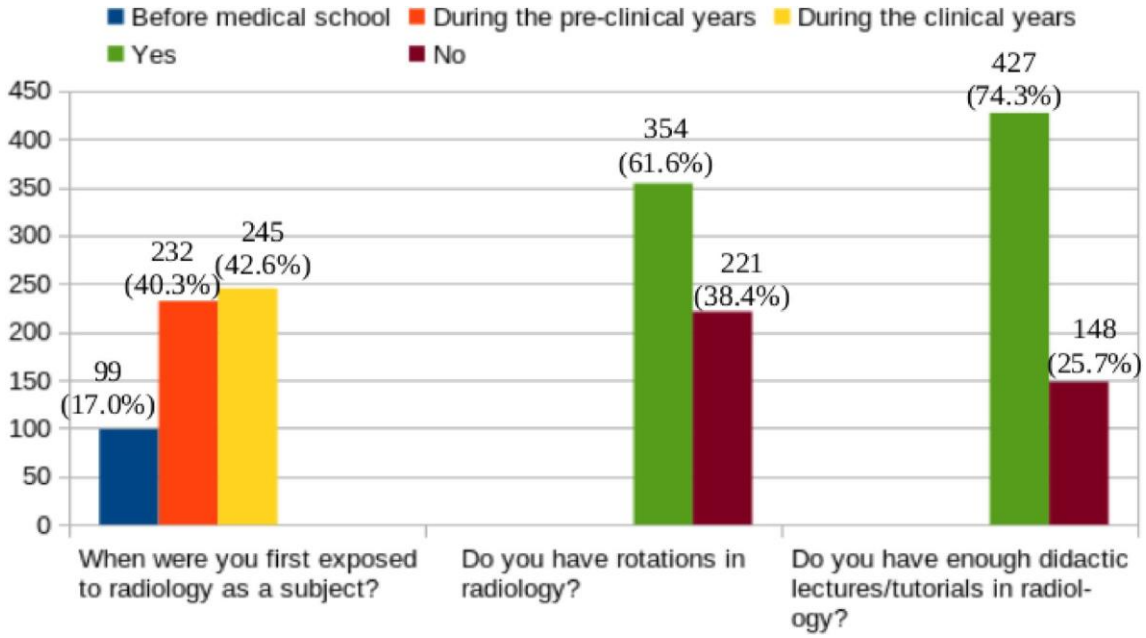

Figure 2. Distribution of students' initial exposure to radiology, the availability of clinical radiology rotations, and the presence of didactic lectures or tutorials in the subject.

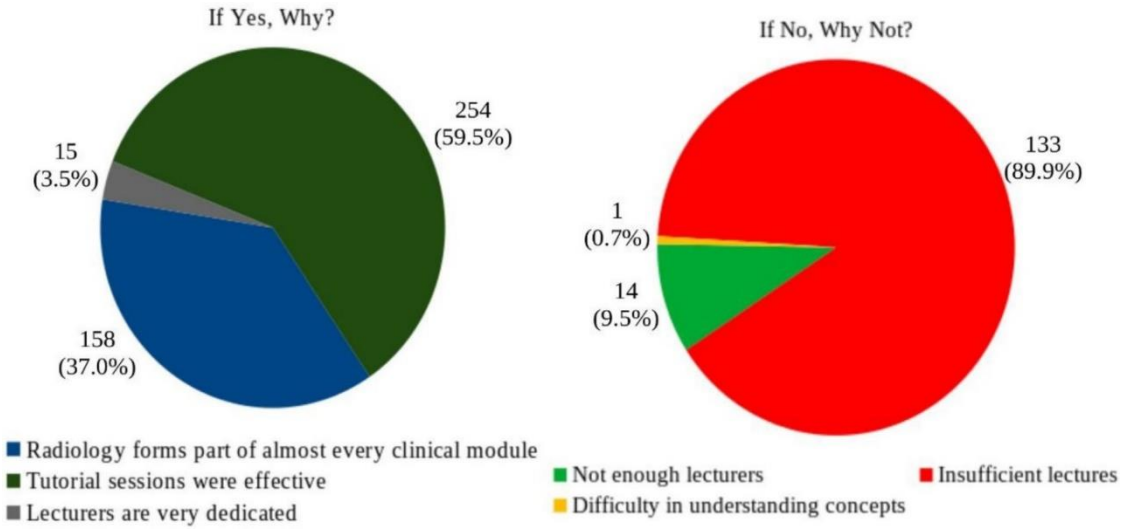

Figure 3. Pie charts depicting the reasons behind students reporting sufficient or insufficient radiology lectures and tutorials.

Figure 4. Representation of teleradiology and its impact on students' decisions to pursue radiology as a specialty.

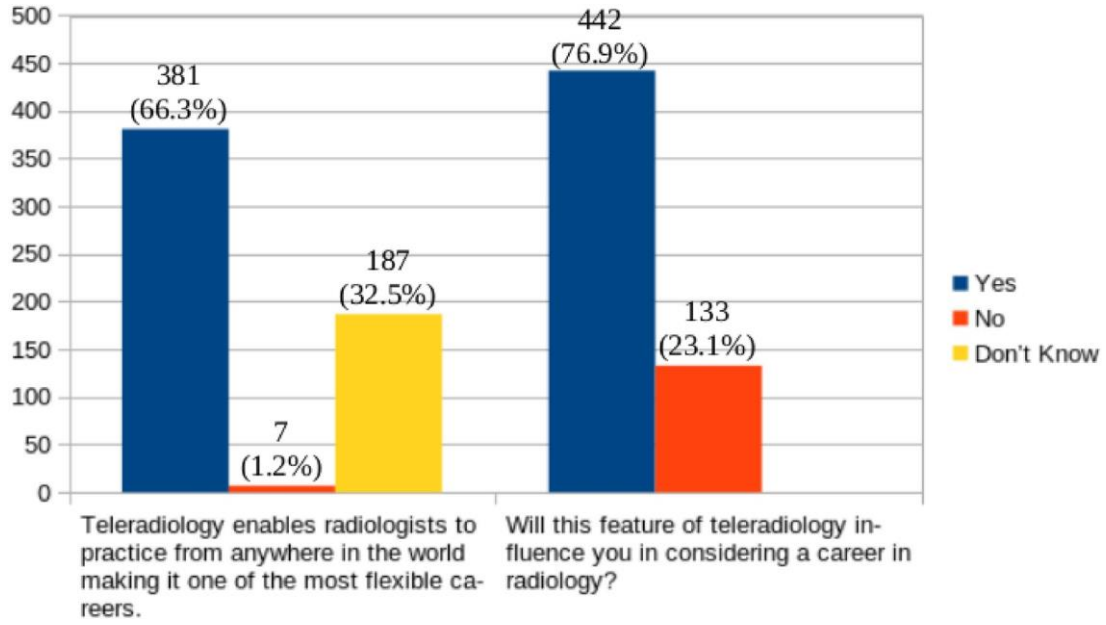

Figure 4. Distribution illustrating the impact of teleradiology on students' decisions to pursue a career in radiology.

Among the 208 students (36.2%) who indicated they were considering radiology as a career, 133 ultimately confirmed that they would choose it as their specialty **(Figure 5).**

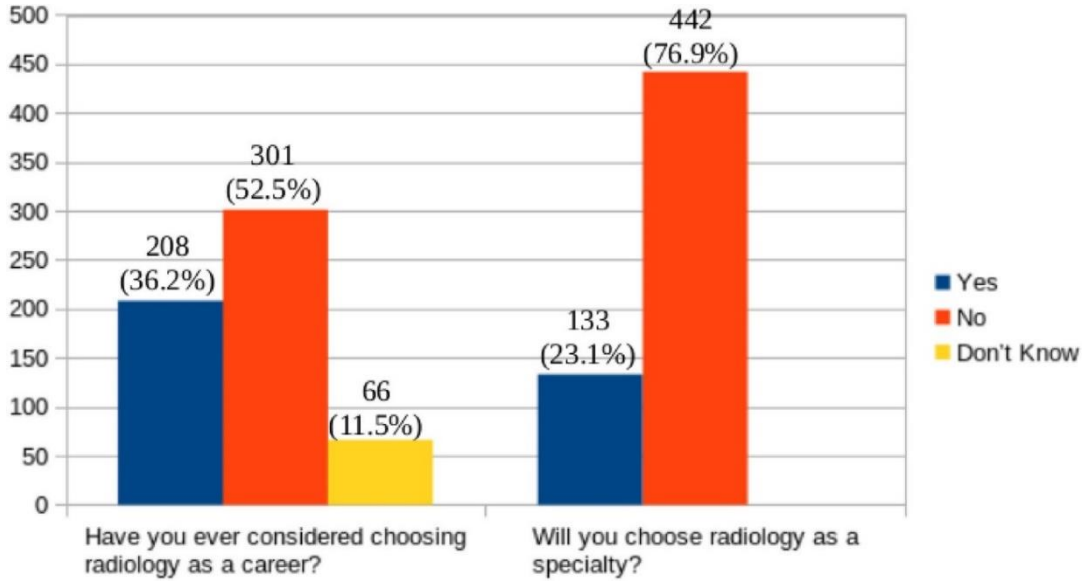

Figure 5. Comparison between students considering radiology as a specialty and those who ultimately intend to pursue it as a career.

The leading factors motivating students to choose radiology were a flexible work schedule (68.3%) and high earning potential (61.9%). Additional factors influencing career choice in radiology are illustrated in **Figure 6.**

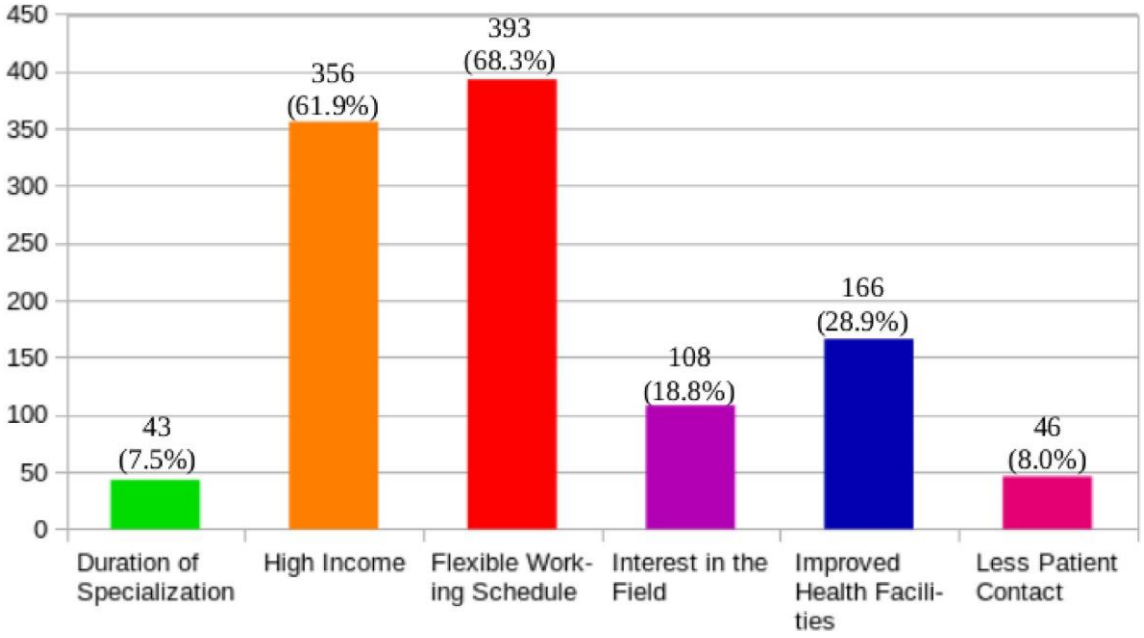

Figure 6. Distribution of the main factors shaping students' decisions to specialize in radiology.

Upon analysis, only a flexible work schedule significantly influenced students' choice to pursue radiology, increasing the likelihood by 2.319 times (95% CI: 1.413–3.805, P = 0.001), as shown in **Table 3.**

Table 3. Analysis using binary logistic regression to identify predictors of choosing radiology as a specialty.

Item (Rated 1–5 unless stated otherwise)	Overall Mean ± SD	Level 400	Level 500	Level 600	P (Across Levels)	Male	Female	P (Gender)
Understanding of Radiology								
Radiology is essential for evidence-based medical care	4.62 ± 0.82	4.54 ± 0.85	4.57 ± 0.78	4.68 ± 0.82	0.004*	4.67 ± 0.76	4.55 ± 0.90	0.090

Radiology depends heavily on technology	4.31 ± 0.76	4.22 ± 0.78	4.29 ± 0.76	4.36 ± 0.75	0.107	4.34 ± 0.73	4.27 ± 0.80	0.351
Modalities such as X-ray, CT, mammography, fluoroscopy, PET, SPECT use radiation	4.96 ± 0.25	4.92 ± 0.41	4.99 ± 0.09	4.96 ± 0.21	0.096	4.93 ± 0.32	5.00 ± 0.00	<0.001*
MRI and ultrasound do not involve ionizing radiation	5.00 ± 0.06	5.00 ± 0.00	5.00 ± 0.00	4.99 ± 0.08	0.440	4.99 ± 0.08	5.00 ± 0.00	0.239
Attitudes and Opinions								
Radiologists are important contributors to patient care	3.50 ± 1.14	3.17 ± 1.02	3.54 ± 1.15	3.62 ± 1.16	0.001*	3.52 ± 1.17	3.47 ± 1.10	0.511
Radiology is appealing due to its balanced lifestyle	3.64 ± 1.09	3.67 ± 1.05	3.64 ± 1.08	3.63 ± 1.11	0.976	3.72 ± 1.07	3.52 ± 1.11	0.021*
Radiology offers relatively high earning potential	3.42 ± 0.99	3.72 ± 1.00	3.52 ± 1.05	3.25 ± 0.92	<0.001*	3.38 ± 1.04	3.47 ± 0.91	0.213
Working in radiology shortens lifespan more than other careers	2.87 ± 1.09	3.09 ± 0.96	2.75 ± 0.96	2.83 ± 1.18	0.003*	2.76 ± 1.17	3.02 ± 0.95	0.001*
Views on Practice and Safety								
Radiologists generally have limited interaction with patients	2.75 ± 1.29	2.95 ± 1.22	2.65 ± 1.27	2.71 ± 1.33	0.115	2.83 ± 1.32	2.64 ± 1.24	0.090
Most physicians can interpret imaging without radiologists	2.32 ± 1.00	2.57 ± 1.12	2.31 ± 0.96	2.23 ± 0.95	0.016*	2.44 ± 1.03	2.15 ± 0.94	0.001*
Practicing radiology safely poses minimal health risk	3.14 ± 1.18	3.16 ± 1.14	3.24 ± 1.10	3.08 ± 1.22	0.425	3.25 ± 1.19	2.97 ± 1.13	0.004*
Staff radiation exposure is routinely tracked	3.80 ± 1.30	3.76 ± 0.99	3.89 ± 0.93	3.78 ± 1.53	0.588	3.71 ± 1.07	3.93 ± 1.57	0.090
Protective gear is used consistently to reduce exposure	3.85 ± 1.11	3.83 ± 1.07	3.81 ± 1.07	3.86 ± 1.15	0.631	3.83 ± 1.14	3.87 ± 1.08	0.851

Statistically significant. Hosmer and Lemeshow: Chi square = 1.054, P = 0.994.

A significantly larger share of students planning to specialize in radiology were male (72.2%, $p < 0.001$). Additionally, the availability of teleradiology was found to have a significant impact on students' career choice in radiology ($p = 0.001$). Other variables did not show statistically significant relationships with the decision to pursue radiology **(Table 4).**

Table 4. Evaluation of how demographics, teleradiology, radiology rotations, and didactic lectures affect specialty choice in radiology.

Variable	Choose Radiology (Yes)	Choose Radiology (No)	P-value
Gender			
Male	96 (72.2%)	244 (55.2%)	<0.001*
Female	37 (27.8%)	198 (44.8%)	
Academic Level			0.569
Level 400	25 (18.8%)	102 (23.1%)	
Level 500	31 (23.3%)	101 (22.9%)	
Level 600	77 (57.9%)	239 (54.1%)	
Family Member Who Is a Physician			0.489
Yes	47 (35.3%)	142 (32.1%)	
No	86 (64.7%)	300 (67.9%)	
Influence of Teleradiology on Career Choice			0.001*
Yes	117 (88.0%)	325 (73.5%)	
No	16 (12.0%)	117 (26.5%)	
Completed a Radiology Rotation			0.667
Yes	84 (63.2%)	270 (61.1%)	

No	49 (36.8%)	172 (38.9%)	
Received Adequate Radiology Lectures/Tutorials			0.236
Yes	104 (78.2%)	323 (73.1%)	
No	29 (21.8%)	119 (26.9%)	

Statistically significant.

Our study found that 52.5% of students considered radiology as a potential career, yet only 23.1% would ultimately choose it as a specialty **(Figure 5).** In contrast, a study in Morocco reported that none of the medical students considered radiology, with most favoring cardiology or general surgery [8]. In Ghana, students' preference for radiology was largely driven by flexible working schedules **(Figure 6),** consistent with findings from Sydney [9]. The importance of lifestyle factors in specialty choice has been well documented and was strongly supported in our study, with binary logistic regression showing a significant effect of schedule flexibility on career choice (OR = 2.319, 95% CI: 1.413–3.805, P = 0.001). Despite this, female representation in radiology in Ghana remains low at 35% [10], and our results indicated that significantly more males than females were willing to choose radiology ($p < 0.001$), **(Table 4).** This contrasts with studies from Canada and Switzerland, where flexible schedules tend to attract more women [11, 12]. Work-life balance and minimal administrative duties have also been reported as key factors influencing female radiologists' career decisions in Australia and Switzerland [13, 14].

Most respondents disagreed with the notion that radiologists have limited patient contact, with only 8.0% considering this as a reason for pursuing radiology **(Table 2 and Figure 6).** This is encouraging, as previous studies have reported that perceived lack of patient interaction can discourage students from entering the field [15, 16]. Many radiology subspecialties, including mammography and interventional radiology, involve significant patient contact [17]. Furthermore, advances in imaging technology have increased radiologists' central role in integrated patient care [18, 19]. In our study, the majority of students were exposed to radiology before their clinical years **(Figure 2),** supporting previous evidence that early exposure to a specialty enhances interest [20].

However, 25.7% of students reported dissatisfaction with didactic lectures and tutorials, and 38.4% lacked clinical rotations in radiology **(Figure 2)**. Radiology is often taught as an adjunct to other courses rather than as a standalone subject [21]. Bransletter *et al*. found that first-year students exposed to a full-year integrated radiology program were more likely to pursue careers in the field [22]. Additionally, the combination of technology and clinical practice, as well as the variety of work, has been cited as a factor driving interest in radiology in other studies [23]. In our study, teleradiology positively influenced students' career decisions **(Figure 4 and Table 4),** reflecting the growing role of technological innovation in the specialty [24].

A limitation of this study is the potential for response bias toward certain medical schools, which may lead to overestimation of students' likelihood to pursue radiology.

Based on our findings, we recommend that clinical radiology rotations be integrated into the medical school curriculum and prioritized to improve student perceptions of the specialty. Mentorship programs and elective internships are also advised to further encourage interest in radiology careers.

Conclusion

Clinical medical students demonstrated generally positive perceptions of radiology as a specialty, with 23.1% expressing willingness to pursue it as a career.

Key findings

- The most frequently cited reason for choosing radiology was a flexible work schedule (68.3%), followed by high income (61.9%). Logistic regression analysis identified flexible scheduling as the only significant predictor, increasing the likelihood of choosing radiology by 2.32 times (95% CI: 1.41–3.81, P = 0.001).
- Teleradiology also had a significant influence on students' career choice in radiology ($p = 0.001$).

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Conflict of Interest: None

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Ethics Statement: None

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