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Research article

Perspectives of radiologists in Ghana about the emerging role of artificial intelligence in radiology

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ABSTRACT

Background: The integration of Artificial Intelligence (AI)-based technologies in medicine is advancing rapidly especially in the field of radiology. This however, is at a slow pace in Africa, hence, this study to evaluate the perspectives of Ghanaian radiologists.
Methods: Data for this cross-sectional prospective study was collected between September and November 2021 through an online survey and entered into SPSS for analysis. A Mann–Whitney *U* test assisted in checking for possible gender differences in the mean Likert scale responses on the radiologists' perspectives about AI in radiology. Statistical significance was set at $P \leq 0.05$.
Results: The study comprised 77 radiologists, with more males (71.4%). 97.4% were aware of the concept of AI, with their initial exposure via conferences (42.9%). The majority of the respondents had average awareness (36.4%) and below average expertise (44.2%) in radiological AI usage. Most of the participants (54.5%) stated, they do not use AI in their practices. The respondents disagreed that AI will ultimately replace radiologists in the near future (average Likert score = 3.49, SD = 1.096) and that AI should be an integral part of the training of radiologists (average Likert score = 1.91, SD = 0.830).
Conclusion: Although the radiologists had positive opinions about the capabilities of AI, they exhibited an average awareness of and below average expertise in the usage of AI applications in radiology. They agreed on the potential life changing impact of AI and were of the view that AI will not replace radiologists but serve as a complement. There was inadequate radiological AI infrastructure in Ghana.

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Key points

- Artificial intelligence would not replace the role of radiologists in the foreseeable future.
- Artificial intelligence should be an integral part in the training of radiologists.
- Ghanaian radiologists had average awareness of artificial intelligence in radiology and below average expertise in artificial intelligence usage.
- There was a high willingness to accept and incorporate artificial intelligence into their routine practices.

1. Introduction

Artificial intelligence (AI) is being employed throughout all facets of society in today's world [1]. Generally, the concept of AI refers to the development of computer algorithms with the aim of executing tasks that are normally associated with human intelligence. Although earlier AI methods resulted in applications with subhuman performance, recent AI innovations such as machine learning (ML) and deep learning algorithms perform significantly as well, and may even out-perform humans in specific tasks and applications [2]. This has resulted in applications like natural language processing, self-driving cars, computer vision functions to web searching activities that could previously only be performed by humans [3].

In the medical field, doctors and other medical practitioners have greatly benefited from the applications of AI in a variety of areas; including health data geocoding, health information systems, syndromic and epidemic surveillance, decision assistance, predictive models and medical imaging [4,5]. In medical imaging, ML and deep learning algorithms are becoming more widely used globally, this is clearly depicted in the advanced countries where AI usage has virtually been integrated into the various aspects of the already highly technologically driven medical practices [6].

AI methods excel at identifying complex patterns in imaging data from humans and assess radiographic information quantitatively rather than qualitatively, that can help trained radiologists in image interpretation and decision making resulting in significant gains in the field of radiology [7,8]. For instance, computers and algorithms based on deep learning have achieved the ability to equal or surpass humans in a growing number of simple tasks, such as detecting pneumonia on a chest X-ray or analyzing white matter abnormalities on brain magnetic resonance imaging (MRI) scans among others [9,10]. While a comprehensive inspection by a radiologist is the most accurate way to interpret simple chest X-rays, radiologists make clinically significant errors at a rate of 2–20%. Non-radiologists' interpretation of chest X-rays would almost certainly be more error-prone, resulting in unfavorable consequences for patient care and prognosis. AI thus provides an avenue to not only prevent but also drastically reduce such errors [10,11]. This would be beneficial in places where the radiologist to population ratios are abysmal as observed in many African countries [12].

The adoption of AI in radiology is currently measured in low resourced settings like Ghana, due to challenges obstructing its efficient integration. Nonetheless, AI systems are being steadily adopted and employed, with future projections indicating expansion of utilization [1,13].

Literature has reported that AI may not be able to replace the role of physicians and radiologists, as the practice of medicine is more valuable with human-to-human interaction, expression of emotion and empathy which are key attributes to excellent patient care [14]. This is a key disadvantage of AI. Radiologists are essential players in the integration and roll-out of AI in radiology by performing technical clinical data validation that will enable the use of AI [3]. Therefore, it is crucial to determine the readiness of Ghanaian radiologists for the incorporation of AI technologies in our setting. Hence, the goal of this study is to assess radiologists' perspectives on AI in Ghana, with the following specific objectives;

✓ To determine the level of awareness and usage of AI amongst radiologists in Ghana.
✓ To evaluate the impact of AI on practicing radiologists now and determine future implications of AI on radiologists and their practices.
✓ To assess the existing challenges facing the application of AI in radiology
✓ To determine any possible associations between gender and the radiologists' perspectives on AI.

2. Methods

2.1. Study design, site and sampling

This was a cross-sectional prospective study which employed an online questionnaire to elicit data from Ghanaian radiologists randomly between September and November 2021. There were 96 practicing radiologists registered with the Ghana Association of Radiologists (GAR) as of September 2021, five of which were authors of this article and seven of them who had retired but still practicing. The seven retirees were recruited to pretest the questionnaires. As a result of this 84 of the radiologists in Ghana were eligible to respond to our questionnaire. The Taro Yamane formula established that a sample size of 77 radiologists out of the 96 was representative of the population. This sample size was obtained using the Taro Yamane formula with a precision of 5% and a confidence level of 95%, the sample size was estimated at 77 [15].

$n = N/[1 + N(e)^2]$;

where n = Sample size, N = Population size, and e = Level of precision.

For this study N = 96, $e = 0.05$ given n = 77.

2.2. Research instrument and data collection

We designed an online survey using Google Forms (Google, Mountain View, California). The questionnaire contained sections, each covering various aspects. The first section consisted of questions regarding the participants' demographics, their years of practice and the level of the facility they were practicing at. In the second section, participants were evaluated on whether they were familiar with the concept of AI, their first exposure; encounter or experience with AI in their radiology practices; how beneficial it was and for how long they had encountered or experienced AI. Encounter or experience with AI in this study means any form of encounter or experience including both hands-on and non-hands-on situations. They were also asked to state one practical application of AI in their practices. The third section, required the participants to rate their awareness and expertise in the usage of AI in radiology and as to whether their current knowledge of AI would have influenced their decision to pursue a career in radiology. The participants were given several statements in the fourth section and asked to rate their level of agreement on a five-point Likert scale (Strongly Agree, Agree, Neutral, Disagree, and Strongly Disagree).

The final component sought information on AI applications now accessible in the field of radiology in Ghana, AI applications they would recommend for adoption, challenges faced while applying AI in radiological practices in the country, and possible solutions. On the first page of the questionnaire, the participants were given a brief introduction of the study, outlining the goals, objectives, risks, and advantages of the study, after which they were asked to confirm their willingness to participate (consent) in the survey. Participants were also reminded of the option to withdraw from the study at any point in time. The participants were then advised that they were only allowed to complete and submit one questionnaire response, which was also guaranteed by Google Forms' in-built security protocols. The questionnaires were pretested on retired radiologists who consented to participate after which we thoroughly reviewed for accuracy, clarity, validity, and reliability. After permission was obtained from the GAR executive members, the link for the questionnaire was shared with the radiologists via their WhatsApp and email platforms. The questionnaire was hosted on Google Forms for a period of three month after which it was closed to the respondents upon the attainment of the required sample size.

2.3. Data analysis

The responses were retrieved in an excel format, organized and entered into the SPSS software for Windows (SPSS Inc. Chicago, IL version 26.0). This was done after meticulous screening of the data for errors, verification and validation of the data prior to analysis. Using appropriate tables and charts, the results were presented as frequencies and percentages. A Mann–Whitney *U* test was employed to check for possible gender differences in the mean Likert scale responses in relation to the participants' general career concerns and

Table 1
Distribution of the Sociodemographics of the participants.

Socio-demographics	Count (Percentage)
Gender	
Male	55 (71.4%)
Female	22 (28.6%)
Age	
Minimum	32
Maximum	57
Mean (Standard deviation [SD])	41.62 (6.428)
Mean Age by Gender	
Mean Age for Males (Standard deviation [SD])	42.05 (6.640)
Mean Age for Females (Standard deviation [SD])	40.55 (5.869)
How long have you been practicing as a radiologist?	
Below 1 Year	17 (22.1%)
1–2 Years	0 (0.0%)
3–4 Years	12 (15.6%)
5–6 Years	16 (20.8%)
7–8 Years	8 (10.4%)
Above 8 Years	24 (31.2%)
At which level of health facility do you practice?	
Tertiary Public Facility	50 (54.3%)
Tertiary University Facility	13 (14.1%)
Tertiary Private Facility	9 (9.8%)
Secondary Public Facility	10 (10.9%)
Secondary Private Facility	10 (10.9%)
Research Facility	0 (0.0%)

SD = Standard deviation.

their knowledge level about AI in radiology. Neutrality was defined as having an average Likert scale score of 3.00; an agreement was defined as having an average Likert scale score less than 3.00 and disagreement was defined as having a score above 3.00.

Furthermore, the lower an average Likert scale score below 3.00, the stronger the level of agreement and vice versa. The P-value for statistical significance was 0.05.

2.4. Inclusion criteria

All practicing radiologists in Ghana at the time of this study.

2.5. Exclusion criteria

Retired radiologists and the radiologists who were part of the research team for this article.

2.6. Ethical considerations

The study conformed to the Declaration of Helsinki and was approved by Cape Coast Teaching Hospital Ethical Review Committee with the number CCTHERC/EC/2020/101. All the respondents consented before participation.

3. Results

A total of 77 radiologists responded to the questionnaire which comprised 55 (71.4%) males, the remaining were females. The average age was 41.62 ± 6.428 years, ranging from 32 to 57 years. Females were averagely younger than the males (40.55 ± 5.869 years versus 42.05 ± 6.640 years respectively). Most of the participants had practiced for more than eight years 24 (31.2%), mostly in tertiary public 50 (54.3%), followed by tertiary university 13 (14.1%) facilities. Detailed characteristics of the participants can be found in Table 1.

Almost all the participants (97.4%) were aware of the concept of AI with most of them stating that their initial exposure to AI was

Table 2
Distribution showing respondents' concept and exposure to AI.

Statement	Response	Count (percentage)
Do you know of the concept of artificial intelligence (AI)?	Yes	75 (97.4%)
	No	2 (2.6%)
Where did you first hear, learn and read (exposure) about AI in general?	Traditional media	0 (0.0%)
	Social media	2 (2.6%)
	Internet	26 (33.8%)
	Lectures in School	2 (2.6%)
	Lectures at Conference	33 (42.9%)
	Lectures in Workshop	8 (10.4%)
	Friends/Colleagues/Family	6 (7.8%)
All radiologists use AI in their practices in one way or the other?	Yes	47 (61.0%)
	No	30 (39.0%)
For how long have you encountered or experienced AI in radiology?	Below 1 Year	32 (41.6%)
	1–2 Years	16 (20.8%)
	3–4 Years	16 (20.8%)
	5–6 Years	7 (9.1%)
	7–8 Years	4 (5.2%)
	Above 8 Years	2 (2.6%)
In what ways did you encounter or experience (not necessarily hands-on) AI in your radiological practice?	Through Conferences, CPDs and Exhibitions	20 (26.0%)
	[+]Individual Research	10 (13.0%)
	For radiological services and reporting	37 (48.1%)
	Have not encountered AI as a radiologist	10 (13.0%)
How helpful is AI in your practice?	Extremely helpful	5 (6.5%)
	Very helpful	21 (27.3%)
	Don't Know	24 (31.2%)
	Slightly helpful	10 (13.0%)
	Not at all helpful	17 (22.1%)
State one practical situation in which AI was useful to you in your practice?	[≠]During research	8 (10.4%)
	X-ray/mammography and fluoroscopic examination and Reporting	17 (22.1%)
	CT Reporting	10 (13.0%)
	Don't use AI in my practice	42 (54.5%)

[+]individual research was not limited to only hands-on AI encounter (for instance by observation etc.).
[≠]During research was a hands-on or practical encounter.

via conferences (42.9%), followed by the internet (33.8%). More than half of the participants (61.0%) affirmed to the statement that all radiologists use AI in their practices in one way or the other. Most of the participants (48.1%) indicated they had encountered or experienced (not necessarily hands-on) AI while performing radiological services and reporting, followed by experience or encounter through conferences, Continuous Professional Developments (CPDs) and exhibitions (26.0%). However, the majority (41.6%) indicated that their encounter or experience with it was less than a year, followed by 1–2 Years 16 (20.8%) and 3–4 Years 16 (20.8%) categories respectively. When asked to state a practical hands-on situation in their practices where they made use of AI, more than half (54.5%) however, stated that, they do not use AI in their practices (Table 2).

In rating their awareness of AI in general, most of the participants (44.2%) stated that they had good awareness followed by an average rating (28.6%), however, the reverse of these top two ratings was observed when they were asked to rate their awareness of AI in the field of radiology. The responses further revealed that in terms of rating their expertise in the usage of AI in radiology, the majority (44.2%) had below average expertise followed by an average expertise (33.8%) (Fig. 1).

A review of the responses revealed that the participants were in agreement that 'Machine Learning' and 'Deep Learning' are the subclasses of AI currently being broadly discussed in the medical community (average Likert score = 2.14, SD = 1.009) with males having a stronger agreement level than females. The respondents further agreed that AI enables an automated recognition of diseases/pathologies in the region examined (average Likert score = 1.82, SD = 0.970). The participants also agreed that AI can automatically detect lesions in the anatomical area examined. This response was significantly stronger for the males compared to the females ($p = 0.034$). Even though the majority were in disagreement that they had adequate understanding of AI technologies used in radiology, they however, indicated that AI should be an integral part of the training of radiologists. Other findings are also presented in Table 3.

Table 4 covers respondents' general career concerns about AI. The participants disagreed that AI will ultimately replace radiologists including interventional radiologists in the near future (average Likert score = 3.49, SD = 1.096) even though they agreed that AI will have a significant life changing impact on radiology (average Likert score = 1.69, SD = 0.693). They also disagreed that AI will never improve the practice of radiology (average Likert score = 3.81, SD = 1.124), but they were of the view that applications of AI can have adverse effects on radiological practices and on patients' outcome (average Likert score = 2.58, SD = 1.116).

In terms of AI Applications participants indicated were currently available in Ghana, "recognition of different densities, echogenicities and intensities" was the only application that recorded more than half of responses from the participants. Except AI for interventional procedures, where only 23 radiologists recommended for it to be adopted, the rest of the AI applications were recommended by more than half of the radiologist for their adoption in the radiological space in Ghana (Fig. 2).

Lack of knowledge and expertise on the use of AI (31.2%) and a low availability of AI equipment and infrastructure (20.8%) were the top two most common challenges reported by the participants. The least reported challenge was no lay-down principle on AI roll-out (2.6%) as shown in Fig. 3.

The respondents also proffered the following recommendations as solutions to mitigate challenges faced in applying AI in radiological practices: provision of training on AI to radiology residents and radiologists 33 (42.9%); provision of AI equipment and

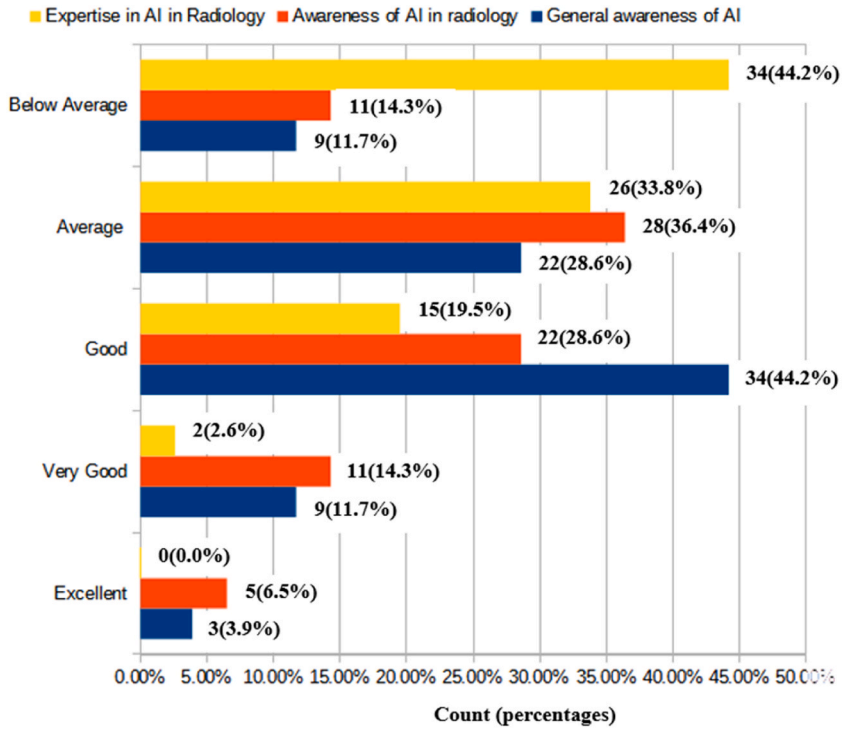

Fig. 1. Participants' ratings of their general awareness of AI, their awareness of and expertise in the usage of AI in radiology.

Table 3
Average Likert scale comparisons of knowledge level of participants about AI in radiology.

Statement	Mean (SD)			
	Total	Gender		P-value
		Male	Female	
I have an adequate understanding of the AI technologies used in radiology.	3.16 (1.136)	3.02 (1.130)	3.50 (1.102)	0.094
'Machine Learning' and 'Deep Learning' are subclasses of AI currently being broadly discussed in the medical community.	2.14 (1.009)	2.04 (0.922)	2.41 (1.182)	0.232
Speech/text recognition, spam-filters, recommendation algorithms are some applications of AI used in daily life.	2.06 (0.864)	1.96 (0.860)	2.32 (0.839)	0.099
AI enables an automated recognition of diseases/pathologies in the region examined radiologically.	1.82 (0.970)	1.75 (0.985)	2.00 (0.926)	0.152
AI can automatically diagnose problems in the anatomical area imaged.	2.31 (1.003)	2.16 (0.898)	2.68 (1.171)	0.034*
AI can offer appropriate suggestions in identifying disease conditions or areas on imaging studies.	1.79 (0.656)	1.75 (0.615)	1.91 (0.750)	0.387
The developments in AI offer prospects that encourage me for the future of radiology.	2.38 (0.844)	2.33 (0.904)	2.50 (0.673)	0.415
Application of AI has mostly positive benefits.	2.45 (0.844)	2.27 (0.1.209)	2.91 (1.065)	0.021*
AI should be an integral part of the training of radiologists.	1.91 (0.830)	1.82 (0.841)	2.14 (0.774)	0.088

*Statistically Significant; SD = Standard deviation.

Table 4
Distribution showing participants' general career concerns about AI.

Statement	Mean (SD)			
	Total	Gender		P-value
		Male	Female	
The emerging developments in AI worries me.	3.26 (1.056)	3.36 (1.128)	3.00 (0.816)	0.159
AI will have a significant life changing impact on radiology.	1.69 (0.693)	1.58 (0.658)	1.95 (0.722)	0.035*
AI will ultimately replace radiologists including interventional radiologists in the near future.	3.49 (1.096)	3.55 (1.102)	3.36 (1.093)	0.398
The emerging developments in AI threatens my job security as a radiologist.	3.17 (1.174)	3.31 (1.230)	2.82 (0.958)	0.065
AI will never replace the role of radiologists in healthcare delivery.	2.12 (1.088)	2.00 (1.106)	2.41 (1.008)	0.070
AI will never improve the practice of radiology.	3.81 (1.124)	3.82 (1.203)	3.77 (0.922)	0.597
Application of AI may have adverse effects on radiological practices and on patients' outcomes.	2.58 (1.116)	2.55 (1.152)	2.68 (1.041)	0.533

*Statistically Significant; SD = Standard deviation.

infrastructure 15 (19.5%); cost subsidization and investment in AI by the government 11 (14.3%); and ensuring a stable internet connectivity with strengthened IT infrastructure 10 (13.0%). Only a few 8 (10.4%) had no idea about how to mitigate the existing AI challenges.

All the respondents stated they would learn AI applications in relation to the field of radiology (Fig. 4A) and asserted that, they would design AI software to perform the duties of radiologists (Fig. 4B). The majority (68.8%) also stated that their choice of radiology as a profession would not have been influenced by their current knowledge of AI (Fig. 4C).

4. Discussion

Seventy-seven GAR members who worked mostly in tertiary public institutions (academic and non-academic) within the age range of 32–57 years completed the survey over the study period (Table 1). This is comparable to the European Society of Radiology (ESR) survey which found their respondents (age range 30–60 years) to be working mostly in academic or non-academic hospitals [16]. The sample size in our study is relatively small as compared to prior surveys on radiologists' perceptions regarding AI, the largest proportion of such surveys, according to Pakdemirli et al. were carried out in the West followed by China [17]. Although we employed a sample size using the Taro Yamen formula, but when we took into account the harsh reality of only 96 existing radiologists serving a population of about 30.8 million as at the time of this survey, we obtained a participation rate of about 80.2% [15,18]. This is commendable as compared to the participation rates of 9.5% and 3.4% from the Italian Society of Medical and Interventional Radiology (SIRM) survey in 2020 and a survey by the ESR in 2019 [16,19]. This demonstrates the respondents' interest in this topic.

Our research showed that almost all of the respondents (97.4%) were conversant with the concept of AI (Table 2). This is paralleled by a study in the United States by Collado-Mesa et al., which indicated that about 89.9% of the participants had heard of AI [20]. Another study conducted in Saudi Arabia by Tajaldeen et al. also reported that, about 76.0% believed they knew about AI [21].

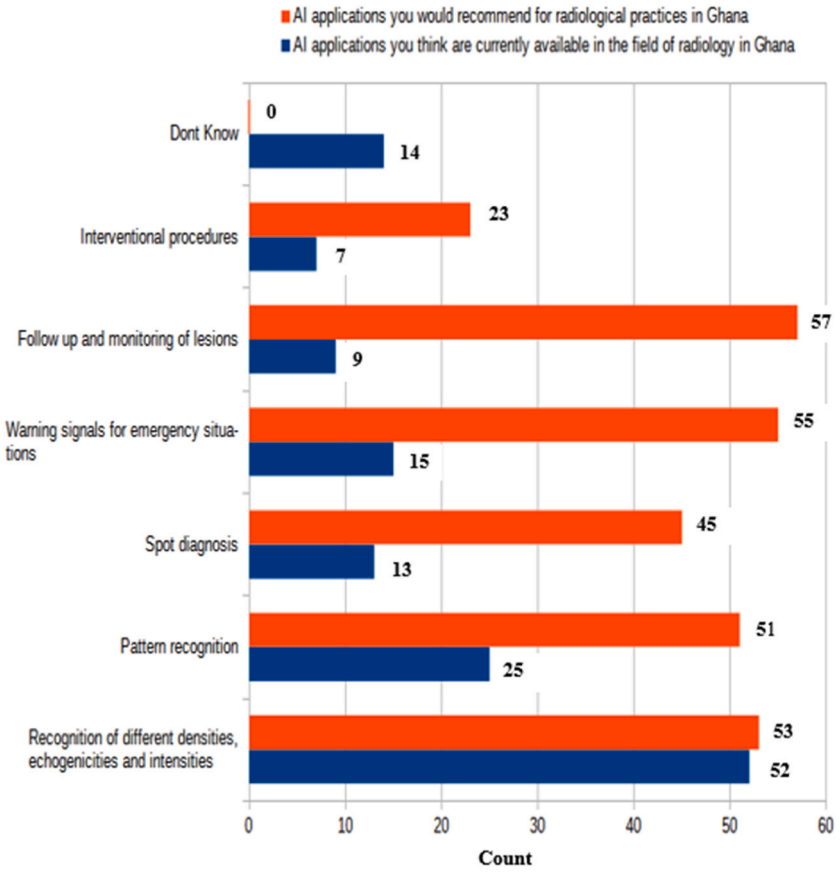

Fig. 2. Available AI radiological applications in Ghana and recommended AI radiological applications by participants.

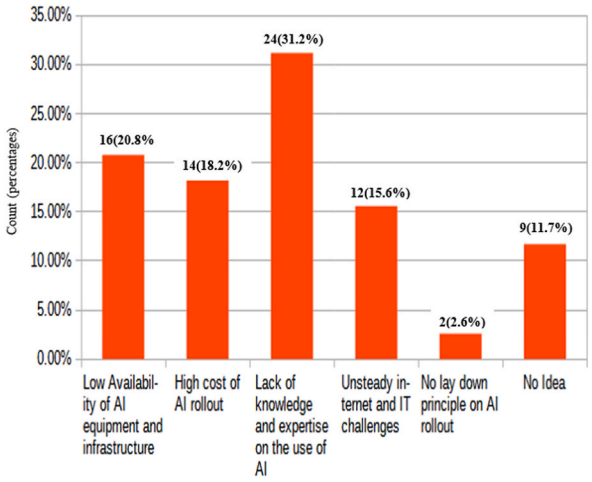

Fig. 3. Challenges encountered in applying AI in radiological practices in Ghana.

However, this level of knowledge in our study and the aforementioned studies were not specific to radiology; rather, it was from a general perspective. This can be corroborated by our finding where majority stated they had a good awareness of the AI concept in general (Fig. 1). The respondents stated that their main source of exposure (heard, learned and read) to AI was via conferences followed by the internet and majority had only been exposed to AI for less than a year (Table 2). This is to be expected, given the recent influx of lectures and articles on AI, as well as the fact that certain radiological associations, including the ESR, the French Radiology Community and Canadian Association of Radiology, have produced white papers on the subject [3,20,21].

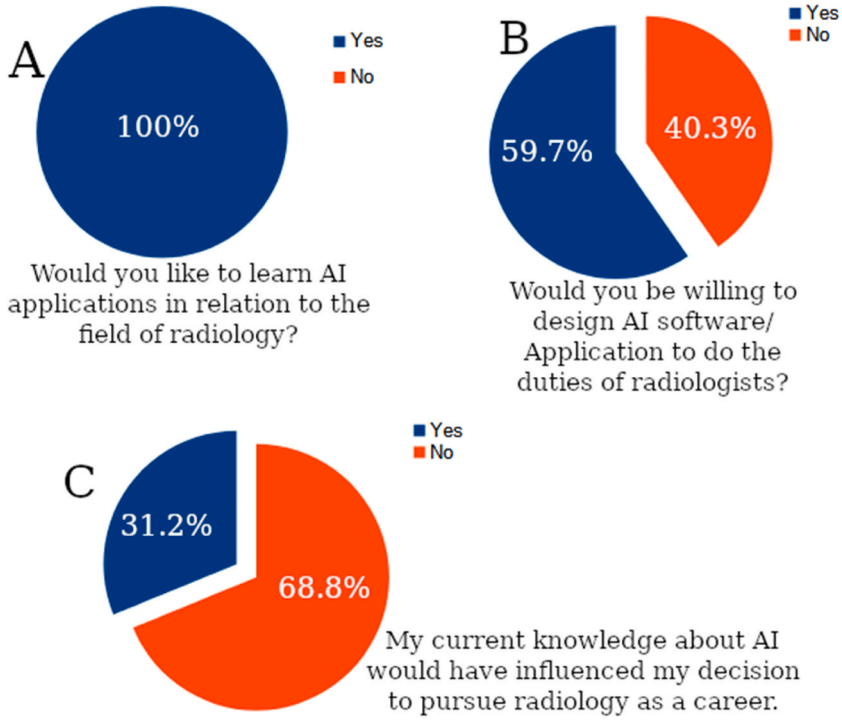

Fig. 4. Distribution showing whether participants' current knowledge about AI would have influenced their career choice, as well as their willingness to learn about or develop AI applications in the field of radiology.

According to our survey, the majority of participants had an average awareness and below average expertise in the use of AI in radiology (Fig. 1). Consistent with our findings, Ooi et al. reported the majority of their respondents (64.8%) perceived themselves as novices in their understanding of AI/ML in radiology [22]. In an international survey of radiologists, Huisman et al. also discovered that majority of their respondents (30.0%) had only basic AI specific knowledge [23]. Numerous factors could account for this low awareness and expertise among radiologists [24]. Ooi et al. also reported that while AI-based scientific literature is growing exponentially, only a few radiologists would take the initiative to either read them or attend courses on data science or ML at the individual level and this may lead to a low level of awareness and expertise [22]. The respondents we surveyed also perceived they did not possess adequate understanding of AI technologies used in radiology which may also reflect in their low level of awareness and expertise (Table 3). Their affirmations to specific AI capabilities in radiology were positive, even though when asked to name a situation in which they had hands-on utilization of AI, the majority stated that they do not use AI (Tables 2 and 3). The findings of low usage by Huisman et al. and Eiroa et al. support this [23,24]. From the responses, the majority of the participants indicated a low availability of radiological AI applications in Ghana and this may also explain the low usage (Fig. 2). In a poll of residents and radiologists, it was found that, those with advanced and intermediate AI-specific knowledge were associated with a proactive and an open attitude towards AI. On the other hand, those with basic knowledge had a less proactive and open attitude towards AI [23]. This therefore highlights the need to expand the awareness and expertise of AI among radiologists.

The incorporation of AI education into radiology courses is a crucial step in the successful introduction and continual benefits from AI. This is a broad sentiment shared by the global radiology community and has been the subject of further probing [22–25]. The majority of respondents (84.8%) in a survey by Ooi et al. agreed that, AI/ML knowledge should be taught during residency [22]. Another study among French radiologists revealed that, medical school curricula should cover the basics of AI [25]. These findings were corroborated in this present study (Table 3). Our checks revealed that, there are no courses currently in the Ghanaian radiology residency program dedicated to AI. This overall situation highlights the importance of incorporating current AI knowledge and skills into the medical school and radiology residency curricula to allow aspiring radiologists to get the most from AI to strengthen their foundation [19,26].

The respondents in this study believed that AI will not replace radiologists (Table 4). This viewpoint is widely shared in the radiology community worldwide [16,19–25,27]. The radiologists did not agree with the assertion that their job security would be threatened by the developments in AI (Table 4). This concurs with an international survey by Huisman et al. [23]. Radiology experts predict that, because of difficulty in integrating AI into regular clinical practice, high AI acquisition, installation and incorporation costs coupled with high cost of training labor and stringent regulatory processes, AI will not replace radiologists [21]. This further supports the assertion that, radiologists in Africa and low-resource countries cannot be replaced by AI any time soon. The sentiment that AI will never replace radiologists in healthcare, suggests the respondents viewed AI as more of a complementary than a de-skilling tool (Table 4). Even though the real impact of AI on radiology is currently uncertain, the respondents posited AI would improve the

practice of radiology, but may have adverse effects on radiological and patients' outcomes (Table 3). From our findings, the perspectives of the radiologists about AI with respect to gender showed stronger positive views for males compared to females in the statistically significant responses (Tables 3 and 4). This finding has been corroborated in a recent study by Rainey et al. in Newtownabbey, United Kingdom [28].

The main issues we identified during our assessment of the challenges in implementing AI in radiological practices in Ghana included lack of knowledge and expertise in AI (31.2%), lack of infrastructure and equipment for AI (20.8%), a high cost of AI roll-out (18.2%), unsteady internet and information technology challenges (15.6%), and lack of laid-out policies for AI roll-out (2.6%) (Fig. 3). In a study on AI in low- and middle-income countries, Mollura et al. reported similar problems. They identified expertise of personnel, data-rights frameworks, local equipment, infrastructure, and public policies as the major obstacles in this environment [29]. Our findings showed a strong willingness of the radiologists to accept and adopt AI in their practices. This is an encouraging trend.

4.1. Limitation of the study

Due to the small number of radiologists in Ghana, a problem seen throughout Africa and in many low-resource settings, our study is limited by the number of participants included. In order to strengthen the reliability of the results and enable better conclusions, we advise further research that may include the entire radiology community on the continent. The ethical and legal ramifications of AI were not thoroughly examined in our survey and were only brought up by a small percentage of respondents. This is an area of tremendous relevance, particularly in our environment where such issues are not given much consideration.

5. Conclusion

There was an average awareness of and below average expertise in the usage of AI applications in radiology. This demonstrates the requirement for better educational frameworks by stakeholders in the training of medical students, residents and healthcare professionals in general. Even though the radiologists agreed with the potential life changing impact of AI, they were nonetheless of the view that AI will not replace radiologists but serve as a complement. Lack of knowledge and expertise on the use of AI and low availability of AI equipment and infrastructure were the top two most common challenges noted in our setting, which could be mitigated by the provision of resources, allowing for the easy adoption of AI in radiology.

Author contribution statement

Emmanuel Kobina Mesi Edzie, Klenam Dzefi-Tettey, Abdul Raman Asemah: Conceived and designed the experiments; Performed the experiments; Analyzed and interpreted the data; Wrote the paper.

Edmund Kwakye Brakohiapa, Samuel Asiamah, Frank Quarshie, Adu Tutu Amankwa: Performed the experiments; Analyzed and interpreted the data; Wrote the paper.

Amrit Raj, Obed Nimo, Evans Boadi, Joshua Mensah Kpobi: Performed the experiments; Contributed reagents, materials, analysis tools or data; Wrote the paper.

Richard Ato Edzie, Bernard Osei, Veronica Turkson, Henry Kusodzi: Analyzed and interpreted the data; Contributed reagents, materials, analysis tools or data; Wrote the paper.

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Availability of data and material

The data used for this paper are available in this article.

Declaration of competing interest

None to declare.

Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.heliyon.2023.e15558.

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