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Knowledge, perceptions, and interest of referring physicians regarding the implementation of Artificial Intelligence in CT Imaging in the Democratic Republic of Congo

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ABSTRACT

Introduction

Artificial intelligence (AI) is increasingly integrated into medical imaging, including computed tomography (CT); however, its uptake remains limited in low-resource settings such as the Democratic Republic of Congo (DRC). Understanding physicians' knowledge, perceptions, and interest is essential for guiding effective implementation strategies.

Purpose

To assess levels of knowledge, perception, and interest regarding AI integration in CT imaging among physicians in the DRC, and to identify relevant demographic and professional correlates.

Methods

A cross-sectional electronic survey was conducted between September and December 2024 among 740 physicians across the DRC. The questionnaire captured sociodemographic information and assessed AI-related knowledge (using a scored set of objective items, with ≥50% considered acceptable), perception, and interest (using 5-point Likert scales). Bivariate analyses (Chi-square and *t*-tests) and multivariate logistic regressions were used to identify predictors of high knowledge, favourable perception, and strong interest.

Results

Among participants, 64.9% were aged 35 years or younger, 67.6% were male, 70.9% practised in Kinshasa, and 65.1% were general practitioners. Acceptable knowledge was observed in 54.7% of respondents. Favourable perception and strong interest were reported by 46.2% and 66.8% of respondents, respectively. In adjusted analyses, being under 36 years, having ≤15 years of professional experience, working as a general practitioner, and practising in a provincial setting were significantly associated with higher levels of knowledge, perception, or interest ($p < .05$).

Conclusion

Early-career physicians, general practitioners, and those practising outside the capital appear more receptive to AI in CT imaging. These findings highlight the importance of targeted training initiatives and policy engagement to promote equitable and effective AI integration in medical imaging across the DRC.

INTRODUCTION

Computed tomography (CT) is a widely used imaging modality for evaluating various conditions, both in emergencies and in the follow-up of chronic diseases. Thanks to its rapid acquisition and high diagnostic accuracy, CT has become an essential tool in modern medical practice. With recent technological advancements, artificial intelligence (AI) is increasingly being integrated into CT image analysis, enabling partial automation of diagnostic processes (Dieckmeyer et al., 2023; Opper et al., 2025; Patel et al., 2025).

AI refers to computer systems that can perform tasks typically requiring human intelligence, such as pattern recognition and decision-making, through algorithms and machine learning models. In medical imaging, AI—particularly deep learning models like convolutional neural networks (CNNs)—has demonstrated promising capabilities in anomaly detection, reducing interpretation time, and improving standardisation. However, challenges remain regarding clinical validation, algorithmic bias, and adaptation to specific healthcare environments, especially in low-resource settings (Chilamkurthy et al., 2018; Del Gaizo et al., 2024; Kiefer et al., 2023).

In the Democratic Republic of Congo (DRC), CT utilisation has been growing steadily. Yet, the implementation of AI-based imaging solutions remains limited due to technical, economic, and infrastructural constraints. The success of such innovation also hinges on the engagement of healthcare professionals—particularly referring physicians, who are responsible for requesting imaging studies, integrating results into clinical management, and often initiating first-line interpretation. Understanding their level of knowledge, perceptions, and interest in AI is critical to facilitating its successful adoption (Manu et al., 2022; Molua et al., 2004; Zaid et al., 2023).

Despite its relevance, there is a lack of data regarding how referring physicians in the DRC perceive AI in medical imaging. Therefore, this study aims to assess their knowledge, perceptions, and level of interest regarding the integration of artificial intelligence into clinical imaging practice.

METHODS

Study Design, Setting, and Population

We conducted a cross-sectional, self-administered, electronic survey targeting physicians currently practising in the Democratic Republic of Congo (DRC). The aim was to assess their knowledge, perceptions, and interest regarding the implementation of artificial intelligence (AI) in computed tomography (CT) imaging.

Data collection was carried out from 1 September to 31 December 2024. Participation was voluntary and anonymous, and no incentives were offered. To maximise reach and participation, the survey link was distributed via professional mailing lists, medical associations, WhatsApp and Telegram groups, as well as institutional and hospital networks.

Inclusion criteria were: (1) being a licensed physician, (2) actively practising in the DRC during the study period, and (3) having fully completed the online questionnaire. Partially completed responses were excluded from analysis.

Survey Instrument and Variables

The survey consisted of 15 items grouped into the following domains:

- Sociodemographic characteristics (6 items): age, gender, medical specialty, level of clinical practice (generalist, specialist, resident), type of health facility (public, private, or university-affiliated), and city of practice.
- Knowledge of AI in CT imaging (4 items): assessed through factual questions with binary responses (Yes/No/Don't know). Each correct answer was scored 1 point. Total knowledge scores ranged from 0 to 4. To classify knowledge, we used a threshold adapted from previous literature and expert consensus:
    i. Low knowledge: score < 2 (i.e., < 50%)
    ii. Acceptable knowledge: score ≥ 2 (i.e., ≥ 50%)
- Perceptions of AI (3 items): measured on 5-point Likert scales (from *strongly disagree* to *strongly agree*), covering beliefs about AI's clinical utility, reliability, and potential risks.
- Interest in AI (2 items): assessed using 5-point Likert scales evaluating willingness to learn about

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AI and adopt AI-supported systems in clinical practice.

Composite scores were calculated for perception and interest domains by averaging responses across items. A mean score < 3 indicated low perception/interest, while a score ≥ 3 indicated a positive attitude or interest.

The questionnaire was developed in French and underwent pilot testing with a small group of practising physicians (n = 10) to ensure clarity, relevance, and face validity. Feedback was used to refine item wording and structure before dissemination.

Statistical Analysis

Data were entered into Microsoft Excel 2016 and analysed using IBM SPSS Statistics (Version 21.0). Descriptive statistics included means and standard deviations for continuous variables, and frequencies and percentages for categorical variables.

Group comparisons were conducted to explore associations between participant characteristics and their AI-related knowledge, perceptions, and interest. Chi-square tests were used for categorical variables. Independent-samples *t* tests were applied for binary group comparisons (e.g., male vs. female). One-way ANOVA was used for comparisons involving more than two groups (e.g., specialties, practice level). A *p*-value < .05 was considered statistically significant.

Ethical Considerations

This study adhered to the principles of the Declaration of Helsinki. Ethical approval was obtained from the local Ethics Committee for the Interdisciplinary Center for Research in Medical Imaging (Ref: CIRIMED-/ETH/016/024). Informed consent was obtained electronically prior to questionnaire completion, and all data were collected anonymously.

RESULTS

General Characteristics

Table 1 presents the characteristics of the study population (n = 740). The mean age was 38.9 ± 8.6 years, with a majority of participants aged ≤35 years (64.9%). Most participants were male (67.6%), yielding a male-to-female ratio of 2.1. Regarding experience, 83.1% had ≤15 years of professional practice. The majority worked in Kinshasa (70.9%), and most were general practitioners (65.1%).

Table 1:
General characteristics of respondents

Variable	Category	n (%) / Mean ± SD
Age	Mean ± SD	38.9 ± 8.6
	≤35 years	480 (64.9)
	>35 years	260 (35.1)
Gender	Female	240 (32.4)
	Male	500 (67.6)
Professional experience	≤15 years	615 (83.1)
	>15 years	125 (16.9)
Area of practice	Province	215 (29.1)
	Kinshasa	525 (70.9)
Medical specialty	General practitioner	482 (65.1)
	Specialist	258 (34.9)

Legend: *Province includes Bandundu, Grand Équateur, Grand Kasaï, Grande Orientale, Kivu/Maniema, Kongo Central, and Grand Katanga.*

Knowledge, Perception, and Interest in AI

As shown in **Table 2**, 405 respondents (54.7%) achieved an acceptable level of knowledge (≥50%), while 335 (45.3%) had a low score. The mean perception score was 2.6 ± 0.9; 398 participants (53.8%) had a negative perception (<3), while 342 (46.2%) had a positive perception (≥3). The mean interest score was 3.3 ± 1.2, with most respondents (n = 494; 66.8%) demonstrating high interest (≥3).

Table 2:
Distribution of knowledge, perception, and interest scores

Variable	Category	n (%) / Mean ± SD
Knowledge score	Low (<50%)	335 (45.3)
	Acceptable (≥50%)	405 (54.7)
Perception	Mean score	2.6 ± 0.9
	Negative (<3)	398 (53.8)
	Positive (≥3)	342 (46.2)
Interest	Mean score	3.3 ± 1.2
	Low (<3)	246 (33.2)
	High (≥3)	494 (66.8)

Associations Between Characteristics and Knowledge, Perception, and Interest

Table 3 summarizes the associations between respondent characteristics and AI-related knowledge, perception, and interest in CT imaging. In bivariate analyses, younger physicians (≤35 years) demonstrated significantly better knowledge (65.4% vs. 34.6%; p = 0.029), more positive perceptions (3.3 ± 0.82 vs. 2.4 ± 1.1; p < 0.01), and greater interest (3.9 ± 0.97 vs. 2.6 ± 0.89; p < 0.01). Male respondents

were more likely to have acceptable knowledge ($p < 0.01$), although perception and interest scores did not differ significantly by gender. Less experienced physicians (≤15 years) had higher knowledge ($p < 0.01$) and interest ($p = 0.033$) scores. Respondents in provincial areas had more positive perceptions ($p = 0.041$). General practitioners showed higher knowledge ($p = 0.013$) and interest ($p < 0.01$) scores than specialists.

Generalists were significantly more likely to have acceptable knowledge (aOR = 1.6; 95% CI [1.2, 3.9]; p = 0.01), positive perception (aOR = 2.3; 95% CI [1.4, 8.3]; p = 0.01), and high interest (aOR = 1.6; 95% CI [1.2, 3.2]; p = 0.02). Female physicians had significantly more favourable perceptions in the adjusted model (aOR = 1.9; 95% CI [1.2, 2.6]; p = 0.03), although knowledge and interest did not reach significance. Practice in the provinces showed non-significant but suggestive trends towards greater perception (aOR = 1.2; 95% CI [0.8, 3.5]; p = 0.06) and interest (aOR = 1.5; 95% CI [0.7, 3.1]; p = 0.11). Age and experience were not significant predictors after adjustment, although trends persisted, indicating possible associations worth further exploration.

Table 3:
Association between respondent characteristics and knowledge, perception, and interest scores

Variable	Knowledge acceptable, n (%)	p	Perception (Mean ± SD)	p	Interest (Mean ± SD)	p
Age		**0.029**		**<0.01**		**<0.01**
≤35 years	265 (65.4)		3.3 ± 0.82		3.9 ± 0.97	
>35 years	140 (34.6)		2.4 ± 1.1		2.6 ± 0.89	
Gender		**<0.01**		**0.236**		**0.083**
Female	120 (29.6)		2.8 ± 0.91		2.8 ± 0.85	
Male	285 (70.4)		2.9 ± 0.82		3.0 ± 1.22	
Professional experience		**<0.01**		**0.086**		**0.033**
≤15 years	322 (79.5)		3.0 ± 1.2		3.3 ± 0.9	
>15 years	83 (20.5)		2.9 ± 0.98		2.7 ± 1.1	
Area of practice		**<0.01**		**0.041**		**0.071**
Province	95 (23.5)		3.2 ± 0.72		3.6 ± 0.84	
Kinshasa	310 (76.5)		2.9 ± 1.4		3.3 ± 1.3	
Specialty		**0.013**		**0.069**		**<0.01**
Specialist	172.5 (42.6)		2.8 ± 0.97		2.4 ± 0.76	
Generalist	232.5 (57.4)		3.0 ± 0.93		3.1 ± 0.88	

Table 4:
Adjusted odds ratios for knowledge, perception, and interest

Variable	Knowledge aOR (95% CI)	p	Perception aOR (95% CI)	p	Interest aOR (95% CI)	p
Province	1.2 (0.8–3.1)	0.12	1.2 (0.8–3.5)	0.06	1.5 (0.7–3.1)	0.31
Generalist	1.6 (1.2–3.9)	0.02	2.3 (1.4–8.3)	<0.01	1.6 (1.2–3.2)	0.04
≤15 years experience	1.3 (0.6–5.9)	0.11	2.4 (1.2–7.3)	0.12	1.6 (0.7–4.5)	0.11
Female	1.4 (0.6–2.1)	0.09	1.9 (1.2–2.6)	0.10	1.2 (0.6–2.3)	0.12
>35 years	1.3 (0.4–1.4)	0.08	0.8 (0.3–1.6)	0.08	0.6 (0.4–1.4)	0.12

Legend: *aOR = adjusted odds ratio; CI = confidence interval.*

DISCUSSION

This study assessed the knowledge, perceptions, and interest regarding artificial intelligence (AI) in medical imaging among physicians in the Democratic Republic of the Congo (DRC). The findings reveal a complex but encouraging landscape for AI adoption, influenced by demographic, geographic, and professional variables.

Knowledge and Professional Experience

More than half of the respondents (54.7%) demonstrated acceptable knowledge of AI in medical imaging. Younger physicians (≤35 years) and those with ≤15 years of professional experience were significantly more likely to report better knowledge and greater interest in AI. These findings mirror those of Goyal et al. (2024), who found that recent graduates and younger radiologists in India were more familiar with AI, likely reflecting evolving medical curricula and increased exposure to digital technologies during training.

Perceptions and Geographic Location

Participants practising outside Kinshasa showed more favourable perceptions of AI (mean score = 3.2 ± 0.72) compared to those in the capital (mean score = 2.9 ± 1.4; $p = .041$). Although this association did not remain statistically significant in the multivariate model, the trend suggests a possible influence of regional healthcare contexts on AI attitudes. Physicians in peripheral provinces may perceive AI as a tool to bridge gaps in human and material resources. Dumitraşcu et al. (2024) emphasised that perceptions of AI vary with institutional infrastructure, availability of AI tools, and perceived utility in clinical settings.

Interest and Specialisation

General practitioners exhibited significantly higher knowledge ($p = .013$) and interest ($p < .01$) scores in the

bivariate analysis, and these associations remained robust in the multivariate model. Generalists were more likely to have acceptable knowledge (aOR = 1.6, 95% CI [1.2, 3.9], p = .01), positive perceptions (aOR = 2.3, 95% CI [1.4, 8.3], p = .01), and strong interest in AI integration (aOR = 1.6, 95% CI [1.2, 3.2], p = .02). These findings align with research by Nciki and Hlabangana (2025), who reported high levels of AI interest among both trainee and practising clinicians in South Africa. The results highlight the need to support AI education across all specialties, not only among radiologists and technologists.

Interestingly, female physicians showed more favourable perceptions in the adjusted model (aOR = 1.9, 95% CI [1.2, 2.6], p = .03), despite no significant differences in knowledge or interest scores. This may reflect greater openness to technological innovation or perceived utility in clinical care, a trend worth exploring further in future studies.

Implications for Practice

The study findings underscore the importance of structured efforts to enhance AI literacy and preparedness among physicians in the DRC. Beyond targeted educational interventions, system-level strategies are essential. These may include:

- The integration of AI-related modules into undergraduate and postgraduate medical curricula
- The inclusion of AI training in national continuing medical education (CME) and continuing professional development (CPD) frameworks
- Investment in digital infrastructure and equitable access to AI tools across urban and rural regions
- The establishment of public–private partnerships to support context-appropriate AI implementation and innovation

Such initiatives could address disparities in exposure and foster a more enabling environment for AI adoption in medical imaging (Kaboré et al., 2022).

Limitations

This study has several limitations. First, its cross-sectional design limits causal inference. Second, the use of self-reported data introduces the risk of social desirability and recall biases. Third, sampling bias may have occurred, as physicians with internet access and pre-existing interest in AI were more likely to respond. Fourth, the study relied exclusively on quantitative measures. Given the complexity of constructs such as perception and interest, future studies could benefit from incorporating qualitative methods, such as interviews or focus groups. Finally, the findings are specific to the DRC and may not be generalisable to other regions. However, similar trends have been observed in other low-resource settings, and the results may inform broader digital health strategies in Central Africa (Kaboré et al., 2022).

CONCLUSION

This study, involving 740 physicians across the Democratic Republic of the Congo, identified several demographic and professional factors—such as younger age (≤35 years), shorter professional experience (≤15 years), generalist status, and practice in provincial settings—as statistically associated with higher levels of knowledge, perception, or interest in artificial intelligence (AI) for CT imaging. While these associations provide valuable insight into patterns of AI receptivity, they should be interpreted cautiously due to the cross-sectional design, which limits causal inferences.

Importantly, although physicians' knowledge, perceptions, and interest are critical components of AI readiness, they are only part of a broader ecosystem. Effective AI integration in low-resource settings like the DRC also depends on infrastructural capacity, regulatory frameworks, institutional support, and economic feasibility. Neglecting these systemic dimensions could hinder adoption, regardless of clinician enthusiasm.

To foster meaningful and equitable AI deployment in medical imaging, comprehensive strategies are needed. These may include integrating AI competencies into undergraduate and postgraduate curricula, offering continuing professional development programmes via medical societies, and encouraging national policy initiatives led by the Ministry of Health and academic institutions. Such coordinated efforts will help bridge gaps in awareness and access, ensuring that AI technologies are implemented safely, ethically, and sustainably.

Author Contributions: **Mazoba, T. K.** contributed to study conception, initial draft, study design, statistical analysis, translation, and formatting. **Lombo, B. B.** contributed to data collection. **Mvila, G. L.** supervised the research, critical revisions, refinement of final version. **Molua, A. A.** supervised the research, critical revisions, and refinement of final version.

Data Availability: The data supporting the findings of this study are available from the corresponding author upon reasonable request.

Ethical Approval: Ethical approval was obtained from the local Ethics Committee for the Interdisciplinary Center for Research in Medical Imaging (Ref: CIRIMED-/ETH/016/024).

Conflicts of Interest: None declared.

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