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Original Article

Benefits and Challenges of Implementation of Training for Radiologists in Public Tertiary Hospitals in Lagos State

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Abstract

Introduction: The study discusses both the benefits and challenges of training programs for radiologists in Lagos State public tertiary hospitals because of the current shortage of radiologists and their professional development requirements. **Methodology:** We used a descriptive cross-sectional study on sixty radiologists, working at public tertiary hospitals in Lagos State, collecting information from structured surveys. The study compared the experiences of radiologists and trainees to identify the benefits and difficulties they experienced while undergoing training programs. **Result:** The research outcomes depicted that radiologist training led to better diagnostic accuracy, alongside workflow efficiency and patient outcomes. Radiologists appreciated better advanced imaging capabilities combined with greater confidence levels during training. Adequate training was hindered by a lack of funding and staff shortages. Limited radiologist availability put pressure on existing staff resources, which caused additional setbacks to the training schedule. **Conclusion:** Training programs bring tremendous value to radiologists and health delivery in Lagos State, but are beset by the issue of too few radiologists. Adhering to challenges like a lack of funding and time will enhance the benefits of these trainings

Key Words: Radiologist training, Healthcare capacity building, Medical Education, Diagnostic imaging, Nigerian healthcare system.

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Introduction

Radiology is an indispensable component of modern healthcare, playing a critical role in diagnosis and treatment decisions.[1]Continuous professional development is critical for radiologists to keep pace with advancements in imaging technology and maintain high standards of care. Studies globally have shown that structured training programs improve diagnostic accuracy, enhance radiologists' confidence, and workflow efficiency, therefore optimizing patient outcomes.[2,3]

Despite its importance, the global shortage of radiologists continues to undermine healthcare delivery, particularly in Low- and Middle-income countries (LMICs), where healthcare systems often face challenges of limited resources, training, and insufficient workforce capacity.[4]Soroosh et al. reported the ratio of radiologists to the population as low as 1:566,000,[5]while others studies have showed lower ratio such as 1:1,000,000 in other African countries.[6]This shortfall underscores the need for specialized training and involvement of stakeholders to enhance the capacity of radiologists.[7]

A study in United Kingdom showed that continuous professional development programs contributed to a 20% improvement in cancer detection rates.[8]Ohagwu highlighted that specialized training showed greater accuracy and specificity in image interpretation when compared to those without specialized training specificity and accuracy (95.7% vs 88.8%) (96.1% vs 91%), respectively (p<0.0001).[9]

Despite the benefits, several barriers impede the willingness of Nigerian radiologists to attend training programs in Nigeria. These include limited access to modern imaging equipment, insufficient funding for mandatory programs, and redistribution of training centres across the geopolitical zones in Nigeria [7]This study overcomes methodological flaws such as selection bias in previous studies by assessing the opinions of clinicians and trainees' attitudes across different age ranges and genders through structured questionnaires.[10] Additionally, the multi-center design approach offers a wide spectrum of opinions of the benefits and Challenges from Clinicians and trainees from different tertiary health centers, improving the reliance on self-reported data.[11]

In Nigeria, studies have highlighted the need for tailored training frameworks and program specialization that address the specific needs of radiologists while considering the systemic and cultural realities of the healthcare system.[12] However, existing research often focuses on the benefits of training without adequately exploring the barriers that hinder its implementation or the factors that influence its success.[13] This study evaluates the benefits and challenges of implementing radiologist training programs in public tertiary hospitals in Lagos State, Nigeria. By addressing gaps in the existing literature, the research aims to provide actionable insights for policymakers and stakeholders to improve radiological services. The findings are expected to inform strategies for optimizing training programs, addressing systemic barriers, and ultimately improving diagnostic capacity in Lagos State while considering the socio-cultural context.

Materials and Methods

The study focuses on radiologists and their trainees in public tertiary hospitals in Lagos State, Nigeria. The intervention involves analyzing the benefits and challenges of training programs implemented for radiologists. This includes structured workshops, continuous medical education (CME) programs, and international collaborations aimed at skill enhancement and knowledge acquisition. A comparison is made between radiologists who have participated in structured training programs and those who have not. The study also evaluates training outcomes in settings with sufficient resources versus resource-constrained environments. The primary outcomes include improved diagnostic accuracy, increased professional confidence, and enhanced workflow efficiency among radiologists. Secondary outcomes focus on identifying barriers to effective training implementation, such as funding constraints, cultural resistance, and infrastructure limitations.

Study Population and Setting

Data were collected from 60 radiologists and trainees working in public tertiary hospitals in Lagos State. Participants were recruited through purposive sampling to ensure a mix of early-career and experienced radiologists.

Ethical Considerations

Ethical approval was obtained from the University of Lagos Research Ethics Committee. All participants provided electronic informed consent, and confidentiality was maintained throughout the study.

Data Collection and Analysis

Structured research questionnaires were administered and monitored electronically for the collection of data on participants' training experiences, challenges faced, and perceived benefits. Quantitative data were analyzed using the IBM Statistics Package for the Social Sciences (SPSS) software version 27.0.1, while thematic analysis was applied to the qualitative responses.

Results

The study included 60 radiologists from public tertiary hospitals across Lagos State who met the inclusion criteria. The participants were predominantly male (70%, n = 42) compared to female (30%, n = 18). The mean age of participants was 40.2 ± 6.8 years, with males having a slightly higher mean age compared to females. The participants represented a range of ethnic backgrounds, with Yoruba constituting the majority (65%, n = 39), followed by Igbo (20%, n = 12) and others (15%, n = 9) as described in Table 1b.

Inferential Statistics

We conducted a study to evaluate the benefits and obstacles associated with implementing training programs for radiologists in public tertiary hospitals in Lagos State, Nigeria. Most participants, 46(76.7%) radiologists, reported that training programs significantly improved diagnostic accuracy, while 7 (11.7%) radiologists disagreed with the positive impact of training on the diagnostic accuracy of Radiologists as displayed in Table 2a. A large number,49 (81.6%) radiologists noted an improvement in their confidence when interpreting complex imaging results, following radiology training, whereas 4 (6.7%) disagreed with this impact on confidence level. This is illustrated in Figure 3.

However, 44 (73.3%) radiologists cited lack of funding opportunities as a major barrier, while 3 (5.0%) disagreed that lack of funding was not a major barrier to radiology training. This is shown in Figure 4. There were 24 (40%) radiologists who reported the lack of available time for professional development as a critical challenge, with 15 (25%) disapproving of this statement. This is as noted in Figure 5.

Multivariate Analysis

Table 6 highlights the multivariate analysis to assess the factors influencing the perceived benefits of training programs while controlling for potential confounders such as access to funding, gender, and years of professional experience. Results showed that years of experience were the strongest predictor of perceived benefits, with a β coefficient of 0.42 ($p < 0.01$), followed by access to funding (β = 0.36, p <
0.05). Gender showed a minimal relationship with perceived benefits to training, which was not significant (β=0.15, p < 0.12) as shown in Table 6. **Discussion**

The training programs for radiologists in public tertiary hospitals in Lagos State present a complex interplay of benefits and challenges. An in-depth analysis of the existing literature provides valuable insights into these dynamics, highlighting both the strengths and limitations inherent in such initiatives. Locally, structured radiology training programs have been instrumental in enhancing diagnostic accuracy and improving patient care[7] Moreso, radiology training programs have empowered healthcare professionals in emerging nations to deliver exceptional care, even under challenging conditions. However, the applicability of these global findings to low- and middle-income countries (LMICs) like Nigeria is limited.[13] In Nigeria, the shortage of radiologists is a

pressing concern, and the availability and assessment of training programs have been reported. A study highlighted that only 40% of radiologists in Nigeria had access to structured training programs [14] while 60% of radiologists felt unprepared to handle complex imaging cases due to insufficient training. [15]

The study highlights the multiethnicity of radiologists in tertiary health care facilities in Lagos State, with the majority (65%, n = 39), followed by Igbo (20%, n = 12) and others (15%, n = 9) as described in Table 1b. This shows that the majority of Radiologists in the tertiary health care observed in this study are of Yoruba descent, followed by Igbo descent.

This study evaluated the benefits and challenges of radiologist training programs in Lagos State government tertiary hospitals in Nigeria. Among these benefits is enhancing the diagnostic accuracy of radiologists. Our findings indicate that 76.7% of radiologists reported that their diagnostic accuracy improved after training, which supports that radiologists with higher training have significantly greater diagnostic accuracy and experience, as reported by Dinesh et al.[16]

Similarly, in a study conducted by Akpan et al. in Calabar, Nigeria, simulation-based training of radiology residents was effective, with improved performance in interpreting difficult imaging studies.[17]

Further, the radiologist's confidence, particularly when handling complex cases, is improved after radiology training. We noted that 81.6% of the radiologists indicated increased confidence in interpreting complicated images following training. This is consistent with previous studies that indicated short intensive training of radiologists markedly increased the confidence level of radiologists and minimized diagnostic errors.[18]

However, the implementation of training for radiologists poses challenges as described in this study. The lack of funding and time limit the implementation of training for radiologists, as suggested by 73.3% and 40% of radiologists. These findings are consistent with previous reports that the common barriers to implementing training for radiologists were cost, staff shortage, and lack of activities and resources.[19] These infrastructural deficits hinder the effective implementation of training programs and limit the ability of radiologists to perform complex procedures. Cultural and systemic barriers, such as resistance to change and reliance on traditional practices, further complicate efforts to implement effective training [20]

In Nigeria, particularly in Lagos State, the challenges are multifaceted. The radiology sector grapples with issues such as frequent equipment failures, delayed maintenance, inadequate infrastructure, and a shortage of standardized evaluation frameworks for assessing the effectiveness of these programs.[21]Likewise, funding limitations, lack of access to modern imaging equipment and application of Artificial intelligence,[22,23] while under staffing in the health care system and lack of trainers limit their ability to participate in training programs.[24-26]

Additionally, logistics issues, such as scheduling conflicts and the high cost of training materials, further hinder program effectiveness.[2] [7]Despite these challenges, there is a silver lining to these challenges. Postgraduate radiology training centres have been established in Nigeria, with the sole aim of enhancing the proficiency of radiologists.[14]

Conclusion

Despite the benefits of radiology training programs in the Diagnostic Accuracy and Confidence level of radiologists in tertiary public centers in Lagos State, thereby improving the patient's outcome, the implementation of these trainings remains hindered by individual and systemic challenges.

Strengths and Recommendations

The implementation of radiology training programs in tertiary public centers in Lagos State comes with several strengths that provide opportunities for improving diagnostic services. One notable strength is the existence of formal postgraduate radiology education, which offers a solid foundation for developing advanced training modules tailored to address local healthcare needs. However, despite these strengths, several limitations hinder the effective implementation of training programs, like lack of funding, understaffing and lack of available time for radiologists to attend these programs.

Recommendations for addressing the limitations of implementing these trainings include Strategic investments, public-private collaborations, and tailored training frameworks. These opportunities may be critical to these benefits of these programs and enhancing radiological services in Nigeria. These partnerships may foster information and technology advancement while providing the financial support necessary for sustainable training programs.

Conflict of interest

The authors report no conflict of interest.

Table 1a. Demographic Characteristics of Participants

	Frequency (N)	Percent (%)	Cumulative Percent (%)
Valid Female	18	30.0	30.0
Male	42	70.0	100.0
Total	60	100.0	

Table 1b.

	Frequency	Percent (%)	Cumulative Percent (%)
Valid Igbo	12		
		20.0	20.0
Others	9	15.0	35.0
Yoruba	39	65.0	100.0
Total	60	100.0	

Table 2. Impact of training on Diagnostic accuracy

	Frequency	Percent (%)	Cumulative Percent (%)
Valid Agree	39	65.0	65.0
Neutral	7	11.7	76.7
Strongly Agree	7	11.7	88.3
Disagree	4	6.7	95.0
Strongly Disagree	3	5.0	100.0
Total	60	100.0	

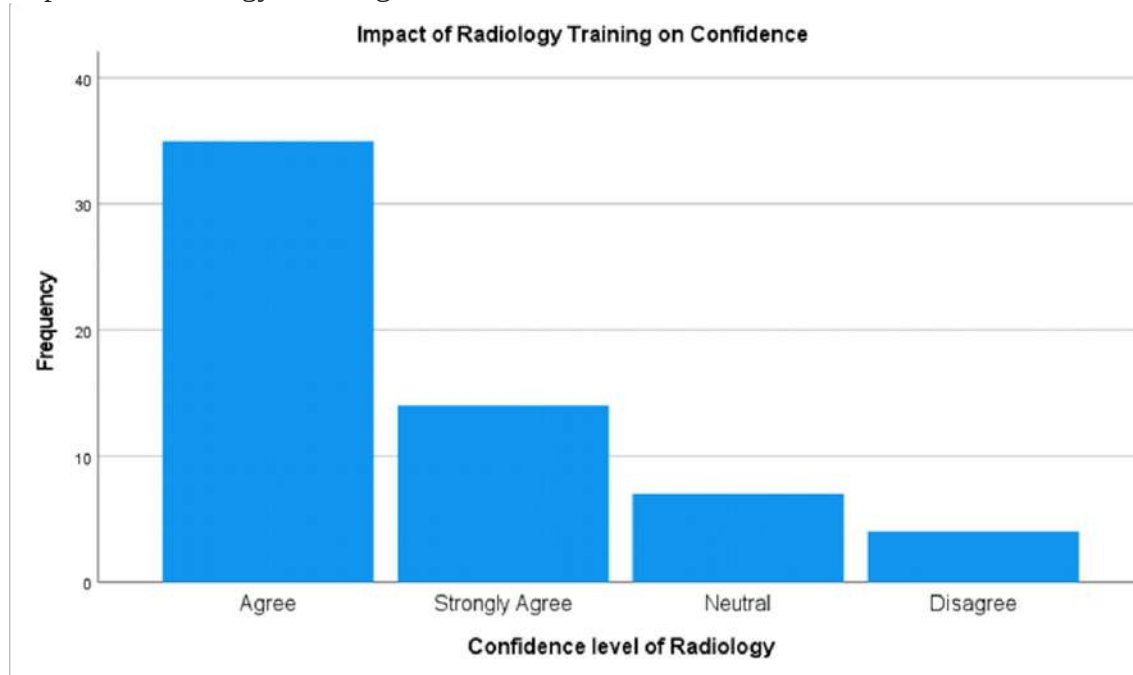Figure 3: Impact of Radiology Training on Confidence Level

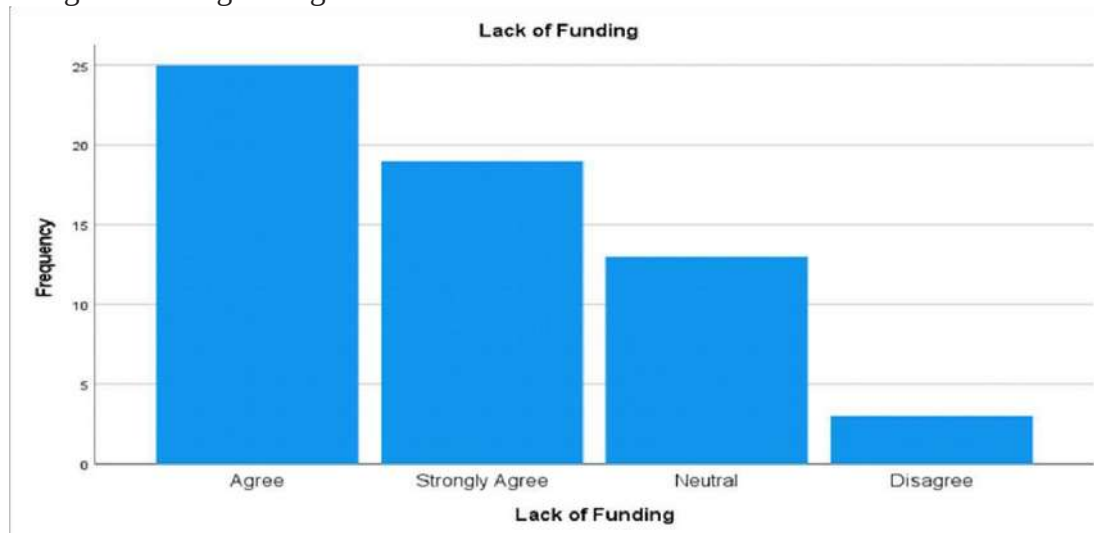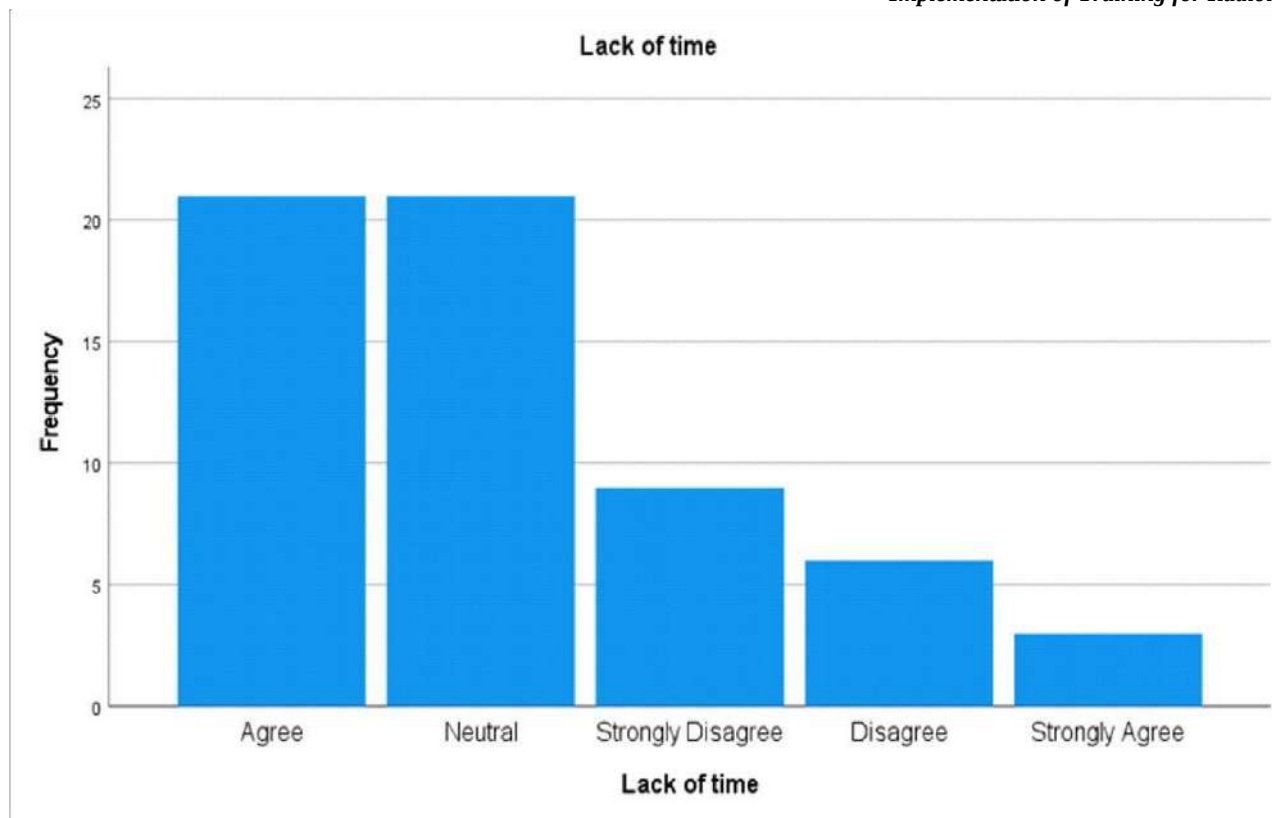Figure 4. Lack of funding for training strategies

Figure 5: Lack of Time for Professional Development

Lack of time

Table 6. Multivariate Regression Analysis

Predictor Variable	β Coefficient	p-value
Years of Experience	0.42	< 0.01
Access to Funding	0.36	< 0.05
Gender	-0.15	0.12

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