

# The State of Radiology Subspecialty Training in the West African Subregion: The Residents' Perspective

Omolola Mojisola Atalabi, Ademola Joseph Adekanmi, Eniola Adetola Bamgboye<sup>1</sup>

Department of Radiology, College of Medicine, University of Ibadan / University College Hospital, <sup>1</sup>Department of Community Medicine, University College Hospital, Ibadan, Nigeria

**Correspondence:** Dr. Omolola M Atalabi, Department of Radiology, College of Medicine/University College Hospital, Ibadan, Nigeria.  
E-mail: omatalabi@yahoo.co.uk

## ABSTRACT

**Background/Aim:** Radiology residency was initiated nearly 30 years ago in the West African subregion, but accompanying formal subspecialty training has been developed within the 30 year time span. In contrast, subspecialization has evolved over the past 25 years in developed countries. The aim of this study was to determine residents' perspective about radiology subspecialization training in West Africa. **Materials and Methods:** Semi-structured, self-administered electronic questionnaires were sent to residents at different levels of training via E-mail and during update courses. Data analysis was performed using SPSS version 15.0 (IBM) package. Quantitative variables were expressed using summary statistics including means and medians. Descriptive analysis was performed for the qualitative variables using frequencies, proportions, and charts. Statistical significance was set at the 5% level using two tailed *P* values. **Results:** There were 117 respondents 85 (72.6%) males and 32 (27.4%) females. A total of 110 (94%) were aware of the various subspecialties in radiology with neuroradiology being identified by all as separate subspecialty. Interventional radiology topped the choice of subspecialty with 61 (52.1%) respondents, and 67 (57.3%) would prefer that subspecialties be introduced in phases. Ultrasound, basic X-ray, mamography equipment, and computed tomography scanners are available in many of the training centers. 116 (99.1%) of the residents believed that there is a need for subspecialization in the subregion. **Conclusion:** Our study demonstrates the need for subspecialization in West Africa. To achieve this goal, collaboration and support from well-established radiology residency and fellowship training programs based in developed countries is necessary.

**Key words:** Radiology; subspecialization; residents; West Africa

## Introduction

The tremendous revolution and the significant advances in technology in the field of imaging with increasing complexity of imaging procedures has placed increased demands on the radiologist, who must understand the anatomy, imaging modality technology, and clinical issues, as well as medical and surgical options for all conditions or disease processes. It is no longer possible for any individual radiologist to master and maintain the expertise and depth of knowledge, required to provide the highest quality interpretation across all modalities and all body parts.

This therefore requires that radiologists must narrow their scope of practice to the modality and body part so as to acquire the necessary experience in the selected field or subspecialty. Prior to the 1960s, there was no subspecialization in radiology world-wide and radiologists were trained as general radiologists due to lack of the subspecialist role models and funding for fellowships.<sup>[1,2]</sup> In 1959, Taveras<sup>[3]</sup> organized the first neuroradiology subspecialty training known as fellowship at Columbia University. Consequently, this has led to the training of a large number of subspecialists in radiology sustained increase in the number of radiologist in various subspecialties in the developed nations of the World.<sup>[2-6]</sup>

Training program has now been designed, in the developed countries, in such a way that graduate residents take a fellowship in a particular subspecialty of interest immediately after residency training.<sup>[7]</sup> There has been vision and suggestions for the training of radiologist in subspecialties in the West African subregion at about the same time when the subspecialization was evolving in the developed countries;<sup>[3]</sup> however, the training of radiologists has been static at the

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general radiology level. The subregion is yet to put in place any structured subspecialist training. The curriculum is designed to produce general radiologists despite the tremendous advances in imaging technology and the growing need for subspecialists. Apart from Nigeria with 14 teaching hospitals offering residency program in radiology and two teaching hospitals in Ghana, the other 14 countries in West Africa are currently not running any radiology residency training program.

Subspecialties in radiology among others now include; neuroradiology, genitourinary, pediatric, musculoskeletal, breast imaging, gastrointestinal, emergency radiology, nuclear medicine, radiation oncology, Vascular and interventional, and teleradiology.

Overtime there has been training of many general radiologists, although clustered in Nigeria and Ghana that are now acquiring cutting edge medical equipment, in a bid to promote health care delivery and reduce the staggering morbidity and mortality rate among her 300 million populations.

There are no previous studies on radiology subspecialty training in West Africa subregion. The objective of this study therefore is to find out radiology residents' level of awareness and knowledge of radiology subspecialties and to determine radiology residents preferred subspecialty as well as residents views about the need for subspecialization in radiology in the West African subregion.

## Materials and Methods

The base line data of radiologists and radiology residents in the West African subregion was updated after which self-administered semi-structured questionnaire was sent to the residents using the individual E-mails through "Survey monkey" online questionnaire administration. The same questionnaires were administered to those who did not have access to internet facilities or who were not familiar with on-line based questionnaires were targeted at the update/revision courses. The update/revisions courses were organized by the Faculty of radiology of the West African college of surgeons and National post-graduate medical college of Nigeria for residents with participants from different training centers in Ghana and Nigeria, The purpose of the study was fully explained to the participants and verbal consent obtained. All those who had submitted their responses through survey monkey were exempted to avoid duplication.

The questionnaire contained items on demographic details of the respondents, year of graduation as a medical doctor and year in residency training in radiology. Other items in the questionnaire include awareness of subspecialties in radiology; imaging modalities available at their centers, opinion about the need for subspecialty in radiology,

availability of necessary equipment and manpower to sustain radiology subspecialization in the West Africa sub region.

Items from the returned questionnaires were computed and analyzed using SPSS version 15 (SPSS, Chicago, IL, USA).

Descriptive analysis was performed majorly for the qualitative variables by generating frequencies, proportions, and charts while summary statistics including means and the median was done for quantitative variables. Statistical significance was set at 5% level using two tailed P values.

## Results

A total of 140 questionnaires were administered out of which 117 were returned giving a response rate of 83.7%. There were 85 (72.6%) males and 32 (27.4%) females with the age range of 28-53 years with a mean of 35.24 and standard deviation of 5.3 [Table 1].

### Awareness of radiology subspecialty

Majority of the respondents 110 (94%) were aware of the various subspecialties in radiology. All the listed subspecialties were identified as separate subspecialty with neuroradiology being identified by 112 (95.7%) followed by interventional radiology (IR), pediatric radiology and breast imaging with 107 (91.5%), 105 (89.7%), and 98 (83.8%) respectively. The other listed subspecialties were each identified by over 70% of the respondents [Figure 1] and all but one respondent 116 (99.1%) agreed that there was a need for subspecialization in the West Africa subregion.

### Choice of radiology subspecialty

IR was the leading choice among the subspecialties with 61 (52.1%) respondents while neuroradiology and breast imaging were the choices of 46 (39.3%) and 23 (19.7%) respondents respectively. Seventeen (14.5%) respondents choose pediatric radiology. Chest radiology and emergency radiology recorded 15 (12.8%) each. Thirteen (11.1%) residents choose musculoskeletal and head and neck radiology while residents' choice of gastrointestinal radiology and genitourinary radiology were 12 (10.3%) and 11 (9.4%) respectively [Figure 2].

Out of the 61 respondents that chose IR as their area of interest for subspecialization, 46 (75.4%) were males and

**Table 1: Age and gender distribution of the respondents**

	Gender		Total N (%)
	Male N (%)	Female N (%)	
Age (years)			
25-34	36 (42.4)	23 (71.9)	59 (50.4)
35-44	41 (48.2)	7 (21.9)	48 (41.0)
>45	8 (9.4)	2 (6.3)	10 (8.5)
Total	85 (100.0)	32 (100.0)	117 (100.0)

15 (24.6%) females. However, when compared with the overall ratio of male to female respondents in the study there was no statistical significance of preference for IR by both sexes.  $P=0.4845$  [Table 2].

**Commencement of subspecialty radiology training in phases**

More than half of the respondents, 67 (57.3%) would prefer that the subspecialties be introduced in phases based on the available radiological facilities [Table 2]. Breast Imaging and Neuroradiology recorded almost the same number of responses as the preferred subspecialties to be introduced first with 58 (49.6%) and 57 (48.7%) respectively while radionuclide imaging had the least number of respondents of 16 (13.7%) [Figure 3].

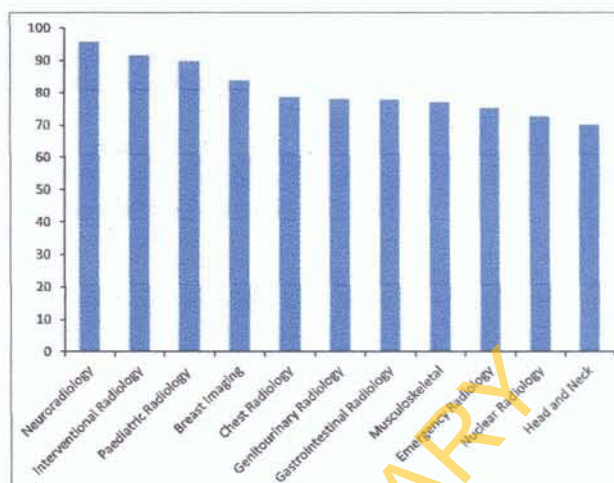
**Availability of radiological equipment**

On availability of required equipment for subspecialty training, 87 (74.4%) respondents felt that the subregion does not have enough equipment in all the training centers for the training of subspecialists, and the same number of respondents felt that subspecialization should be limited to accredited training centers with the necessary radiological equipment and facilities [Table 2].

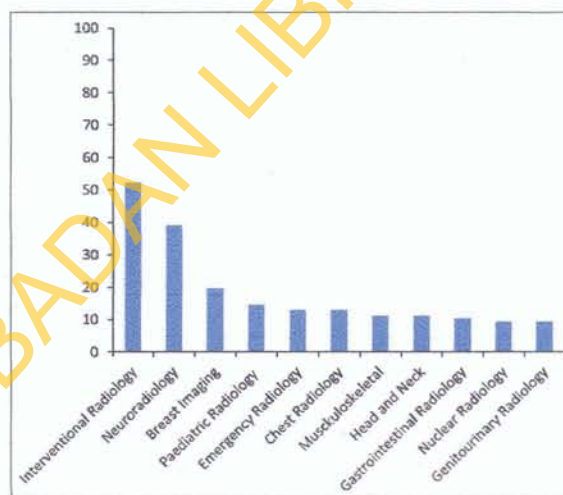
All respondents, 117 (100%) had ultrasound machines at their training centers. One hundred and thirteen (96.6%) had basic X-ray unit, 112 (95.7%) of the respondents had mamography and computerized tomography (CT) equipment at their training centers. 82 (70.1%) respondents had magnetic resonance imaging (MRI) scanners while 76 (65%) had Fluoroscopy

**Table 2: Attitude of respondents toward the introduction of subspecialties**

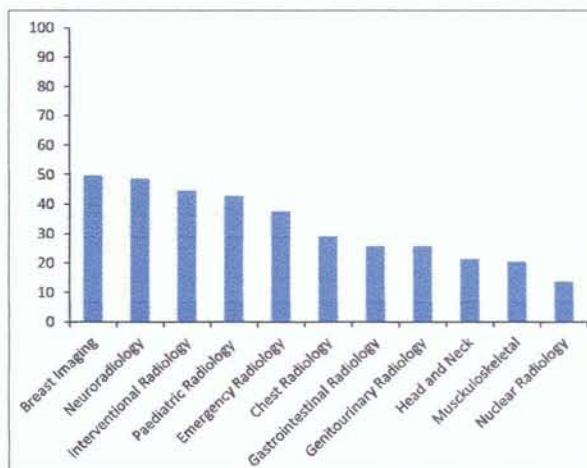
Characteristics	FREQ	%
Should all subspecialty be introduced at the same time?		
Yes	50	42.7
No	67	57.3
Total	117	100.0
Should all subspecialties be in all training centers?		
Yes	50	42.7
No	67	57.3
Total	117	100.0
Should subspecialty be limited to some centers with facilities?		
Yes	87	74.4
No	30	25.6
Total	117	100.0
Should some part of the subspecialty training be done overseas?		
Yes	111	94.9
No	6	5.1
Total	117	100.0



**Figure 1: Knowledge of the respondents about the existence of different subspecialties in radiology**



**Figure 2: Possible area of subspecialization preferred by the respondents**



**Figure 3: Preferred subspecialty to be introduced first by the respondents**

units in their centers. However, only 15 (12.8%) of the study population had Conventional angiographic equipment.

### Training opportunities

Sixty two (50%) of the respondents were of the opinion that there are enough trainers (qualified radiologists) to commence subspecialization training. Majority of the respondents 111 (94.9%) felt that part of the training should be done overseas [Table 2], with 89 (76.1%) respondents preferring 1 year overseas attachment while the rest opted for between 3 months and 6 months overseas clinical attachment.

### Discussion

The over-whelming responses on various issues of this study are a pointer to the long overdue and desired commencement of radiology subspecialty training. The gender ratio of respondents in radiology in this study of 2.67: 1 is in accordance with the works of Baker *et al.*<sup>[8]</sup> in America and Adeyekun<sup>[9]</sup> in Nigeria where this difference have been attributed to unfounded fear that ionizing radiation causes adverse effect on women reproductive life. In addition, the gender inequality in education as regards education of the girl child in Africa may be a contributory factor. The huge awareness of the various subspecialties in radiology and the consensus of the need for radiology subspecialization in the West Africa subregion reflect the high level of desire and readiness of respondents to have subspecialty training.

The Residents' choice of radiology subspecialties showed IR as the leading choice, followed by neuroradiology and breast imaging. This is in contrast to the work of Baker *et al.* in America<sup>[8]</sup>, that reported body imaging as the choice of 29% of the residents, 28% for IR, 27% pediatric radiology, 16% neuroradiology while nuclear medicine, women's imaging, musculoskeletal imaging, and MRI accounted for 3-4% per category. The difference in the choice of subspecialty, in our opinion might be due to the relatively new and rapidly evolving subspecialty of IR and the status symbol of being in a subspecialty where not only diagnostic examinations, but therapeutic procedures are also carried out. The financial gain might also be another reason for the high number of residents choosing IR. The choice of neuroradiology as a leading subspecialty choice may be associated with the availability of CT and MRI in many of the training centers. The increase in advocacy groups in breast cancer awareness programs in the subregion and research funding opportunities might be why the subspecialty is also favored as this will enhance carrier development.

This study also shows that gender appeared not to play any role in the choice of IR as area of subspecialization by the respondents. Nuclear Medicine was the least favored and this might be due to the fact that this facility is available only in one training center.

The high number of respondents that agreed that the subregion does not have enough radiological equipment in all the training centers is a reflection of low priority given to health issues by the government and corporate organizations in the subregion. Other reasons might be attributed to economic challenges, regional instability, and lack of visionary leadership as regards health-care in West Africa as a whole.

This may be responsible for the respondent's view that subspecialties be introduced in phases in accordance with availability of radiological equipment needed for subspecialization at the various accredited training centers. Sonography equipment is widely available at all respondents center and this may be due to the fact that this equipment is not expensive when compared with other radiological equipments, and its relative portability and ease of installation with its wide application and ionizing radiation free. It is not surprising that a majority of the respondents felt that part of the training should be done as overseas attachment in order to gain more experience. This can be attributed to the lack of certified subspecialists in different subspecialties to adequately train the residents in the subregion, and in addition to enable the mastery of the state of the art equipment available for training. The choice of 1 year duration by a majority of the respondents for overseas training must have been informed by the same length of time needed for most subspecialty training in radiology needed for adequate exposure competence acquisition and board certification in the developed countries. A practicable choice in our opinion is a 6 months mid training overseas exposure so that the 3 months before and after will allow for the trainees to practice in their local environments. However, the long term approach is to eventually train subspecialist in the subregion for the subregion in order to take care of the peculiar regional imaging needs, a view supported by Rabinowitz and Pretorius<sup>[10]</sup> and Roberfroid *et al.*<sup>[11]</sup>

In conclusion, this study has shown that there is overwhelming awareness and preparedness for subspecialty training in radiology among residents in training. Hence, the need for the curricular development and implementation with training focus that will allow for broad based learning in order to keep pace with the new development in modern imaging. The training program should emphasize training and experience in various radiology subspecialties tailored to the need of the respective teaching hospitals and availability of necessary radiological equipments while simultaneously strengthening conventional radiology. There should also be collaboration with well-established training bodies and organizations in the developed world. All hands must be on deck to move radiology training from the general radiology practice to the next level of training subspecialists that is much needed in the West African subregion.

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How to cite this article: ???

Source of Support: Nil, Conflict of Interest: None declared.

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