

EVALUATION OF NUCLEAR MEDICINE AWARENESS IN NIGERIA; PERSPECTIVE OF LAGOS STATE RADIOGRAPHERS

¹Sowunmi AC, ²Babatunde EO, ³Popoola A, ³Olatunji T, ⁴Ololade K¹Department of Radiation Biology, Radiotherapy, Radiodiagnosis and Radiography, College of Medicine, University of Lagos²Radio diagnosis department, Lagos University Teaching Hospital Idi-araba, Lagos, Nigeria³Oncology Unit, Department of Radiology, Lagos State University College of Medicine, Ikeja, Lagos, Nigeria⁴Department of Radiation Biology, Radiotherapy, Radiodiagnosis and Radiography, College of Medicine, University of Lagos, Lagos, Nigeria.

Correspondences and Reprint request to: Dr. SOWUNMI ANTHONIA C.
 Department of Radiation Biology, Radiotherapy, Radiodiagnosis and Radiography,
 College of Medicine, University of Lagos, Lagos, Nigeria
 Email: asowumi@unilag.edu.ng/ toniasow@yahoo.com

TEL: +234 8037216723

ABSTRACT

Background: Diagnostic Nuclear Medicine makes use of radioisotopes with the aid of ionizing radiation for the early diagnosis of disease conditions. This study aims to assess the awareness and knowledge of diagnostic nuclear medicine amongst radiographers in Lagos state and its importance in the field of diagnosis. **Methods:** The study is a descriptive, cross-sectional study using questionnaires administered by the researcher without coercion. The questionnaires were administered to 175 participants. Ethical considerations were of paramount importance by eligibility to be part of the category includes being a radiographer that works in Lagos State, under an RRBN certified institution. The questionnaire was divided into socio-demographic section, awareness of nuclear medicine and the knowledge about the specialty. Data collected was tabulated, categorized and analysed with statistical software - IBMSPSS Statistics 21. **Results:** A total of 175 radiographers participated in this study. The age range of the respondents was between 20 – 60 years with a mean age of 34.7 years. 112 (64%) are between the ages of 20 and 35 years, 51 (29.1%) are between 36 and 50, while 12 (6.9%) are 51 years and above. 166 (94.9%) of radiographers admitted to having previous knowledge about nuclear medicine, while 9 (5.1%) said they had no prior knowledge of the medical specialty. 2(1.1%) were the only respondents who had participated in carrying out nuclear medicine procedures. 109 (62.3%) between the ages of 20 and 35 years which represents the youngest age group has the highest rate of awareness about nuclear medicine. 162 (92.6%) of the respondents agreed the urgent need for the establishment of more standardized centres in Nigeria. **Conclusion:** Diagnostic nuclear medicine is a very important diagnostic specialty and highly essential in the medical sector of every country. Despite the level of awareness amongst radiographers, only 1.1% has participated in nuclear medicine procedures and this could be attributed to lack of equipments in Nigeria which also reflects the level of development as a whole.

KEYWORDS: Nuclear medicine, Radiographers, Diagnosis, Medical specialty

Access this article online

Quick Access Code

WEBSITE: www.kjmsmedicaljournal.com

DOI: 10.36020/kjms.2019.1301.003

INTRODUCTION

Diagnostic nuclear medicine refers to the use of gamma radiation for the production of images which help in effective diagnosis of disease. It is a safe, painless and a cost-effective technique.¹ Diagnostic nuclear medicine began more than 50 years ago and has evolved into a major medical

specialty.² It is a discipline in which scientists from various different fields such as physics, medicine, chemistry and engineering have contributed over the decades.²

In Africa, where South Africa is currently the giant of this discipline, nuclear medicine dates back to 1948 marking the first importation of radioisotopes for medical purposes.³ In Nigeria, the first and one of the very few nuclear medicine centres is that of the University College Hospital, Ibadan which was commissioned on April 27, 2006 by the then Minister of Health, Professor Eytayo Lambo.⁴ There also exists that of the National Hospital, Abuja.⁵ Some nuclear medicine facilities are also available at the Radiation Biology and Radiotherapy Department of LUTH, Lagos, and at the department of Internal Medicine of UNTH-Enugu.⁶

In the United States, meanwhile, the number of nuclear medicine procedures has grown from approximately 14 million in 1999 to almost 20 million in 2005.⁷ A study performed in 2007 investigated the worldwide use of nuclear cardiology and it was observed that nuclear cardiology represents more than 50% of the nuclear medicine procedures done in the United States but represents only 14% of those done in Europe.⁸

When compared with our current situation in Nigeria, it is hard to believe that this modality has not gotten to an applicable stage nationwide in over 22 years even with all the numerous benefits the specialty has to offer.⁹

This situation is not peculiar to Nigeria alone, with Togo a neighbouring African country also report that a lack of Nuclear medicine department hampers the management of numerous patients¹⁰ according to an article named "Knowledge and perception of nuclear medicine by Togolese physicians"¹⁰

In 1994 that Nigeria successfully obtained approval for the acquisition of the first nuclear research reactor through a Technical Cooperation Project from the International Atomic Energy Agency (IAEA).¹¹

Diagnostic nuclear medicine differs from x-ray, ultrasound or other diagnostic test because it determines the presence of disease based on biological changes rather than changes in anatomy. The advantages of nuclear medicine imaging are 1. In most cases the whole body is analysed. This is particularly advantageous when lesions are likely to occur in various places, such as in the case of cancer dissemination or when the presence of an infectious lesion is suspected without any indication on where this lesion might be. The functional information provided by nuclear examinations is advantageously combined with morphological information from other imaging modalities.¹²

2. It is detailed and accurate. The significant advantage of using nuclear medicine is the ability to make complex medical procedures simpler and safer for patients. With this technology, physicians and medical professionals are able to examine in great detail the most sensitive areas. All examinations can happen without subjecting patients to possibly dangerous and invasive procedures and surgeries.

3. It offers additional treatment plans.

This medical technology has allowed the advancement of treatment options for patients suffering from serious illnesses, such as cancer, by way of radiation or chemotherapy and these treatments make the difference between life and death.

Radioactive material known as "radiopharmaceuticals" is used to get information about health and disease.¹³ The gamma radiation used in this procedure is derived when small amounts of these radiopharmaceuticals are introduced into the body by injection, swallowing, or inhalation,¹⁴ and they are attracted to specific organs, bones, or tissues. The amount used is carefully selected to provide the least amount of radiation exposure to the patient but ensure an accurate test.¹²

This study evaluates the exact level of awareness of diagnostic nuclear medicine in Nigeria amongst

radiographers, using the commercial capital - Lagos State - as a case study, and to understand the possible reasons why it is at this level.

This study would serve as a significant source of reference as regards the evaluation of diagnostic nuclear medicine awareness in Nigeria as a country and to whosoever may be interested in getting knowledge regarding it. The interest group includes the general public, medical officers, radiographers, radiologists, other radiation workers, local and foreign investors and the government.

MATERIALS AND METHODS

This study was a descriptive cross-sectional study. A self-administered questionnaire was used to acquire information about socio-demographic data such as age, gender, religion, marital status, place of work, duration of practice, ethnicity, and tertiary educational knowledge. Knowledge about the medical specialty of nuclear medicine and their attitude towards its use was also assessed.

Information regarding what the specialty of nuclear medicine entails using the "Likart five-point scale". Following consent, the questionnaire was administered via an interview with no coercion, and all information was treated with utmost confidentiality.

STUDY PARTICIPANTS

This was a multi-centre study comprising of 13 radiological diagnostic centres in Lagos state. Questionnaire survey was distributed to radiographers who currently work in hospitals and diagnostic centres certified by the Radiographers Registration Board of Nigeria (RRBN). The radiographers working in Lagos State stand as a perfect subset of the entire Nigerian population, because the State hosts the greatest population of radiographers and the largest amount of diagnostic centres in the country. The desired sample size estimated were 175 respondents using the Cochran's sample size formula

DATA ANALYSIS

Data was analysed using statistical software SPSS Statistics 21 (IBM, USA) and the results were presented in tables including percentages and frequencies, bar charts and pie charts.

RESULTS

One hundred and seventy five respondents aged between 20 and 65 years participated in this study. The mean age was 34.7 years with majority 99(56.6%) being males and 76(43.4%) being females. 112 (64%) are between the ages of 20 and 35 years, 51 (29.1%) are between 36 and 50 years, while 12 (6.9%) are 51 -65 years. 121 (69.1%) are Christians and 54 (30.9%) practice Islam. 104 (59.4%) are single while 71 (40.6%) are married. 55 (31.4%) of participants work in diagnostic centres, 49 (28%) work in General/Specialist Hospitals, 37 (21.1%) in private hospitals and 34 (19.4%) in Teaching Hospitals. Job experience revealed that 96 (54.9%) have between 0 - 5 years, 58 (33.1%) between 6 - 15 years, while 21 (12%) between 16 - 30 years. Educational status revealed that 155 (88.6%) have BSc in Radiography, 8 (4.6%) have an MSc and the remaining 12 (6.9%) have other degrees in radiography as the maximum. This was shown in table 1.

Considering knowledge of nuclear medicine, 3 of the 112 radiographers between the ages of 20 - 35 had no knowledge while 109 had the knowledge. Amongst the 51 radiographers between 36-50 years old, 6 have no prior knowledge of nuclear medicine while the remaining 45 have knowledge of it. Meanwhile, all the 12 radiographers that are 51-65 years had prior knowledge regarding nuclear medicine. The familiarity with nuclear medicine in relationship to their years of practice also revealed that 5 amongst the 96 radiographers with 0 to 5 years of practice experience have no prior knowledge about nuclear medicine, while the remaining 91 had. Amongst the 58 radiographers with between 6 and 15 years of practice experience, 4 have no prior knowledge of nuclear medicine while 54 have knowledge about the specialty. [Table 2]

Meanwhile, all the 21 radiographers with practice experience of between 16 and 30 years had knowledge about the specialty. Majority 148 (95.5%) radiographers that had BSc degrees knew about the specialty while 7 have no prior knowledge, 10 of the 12 radiographers with other degrees have knowledge about the specialty while the remaining 2 do not. Amongst the 8 radiographers with MSc degrees, all of them have

prior knowledge of nuclear medicine. Table 3 shows the Radiographers' educational status against the familiarity with nuclear medicine. One hundred and sixty six (94.9%) have heard of the specialty, 81 (46.3%) knew where it is performed in Nigeria, for example University College Hospital (UCH) in Ibadan and National Hospital in Abuja. Meanwhile, 85 (48.6%) are not aware. 14 (8%) radiographers have witnessed the procedure, while 152 (86.9%) have not witnessed the procedure. Only 2 (1.1%) radiographers out of the respondents have either carried out or assisted in performing the procedure, 69 (39.4%) of radiographers have come across publications regarding nuclear medicine in Nigeria, 95 (54.3%) of radiographers have been spoken to about nuclear medicine and the source are friends, past lecturers and so on. One hundred and forty nine (85.1%) of radiographers strongly believe that nuclear medicine specialty is not popular in Nigeria, 16 (9.1%) do not have an idea about the situation and preferred to remain neutral, while 1 (0.6%) believe nuclear medicine is popular in the country. [Table 4]

Considering the lack of research about nuclear medicine in Nigeria, 130 (74.3%) of the respondents agree that there is lack of research about this specialty. [FIGURE 1]

Majority of the respondents 145 (82.8%) agree that there is gross inadequate nuclear medicine facilities in Nigeria. [FIGURE 2]

One hundred and sixty (91.5%) of the respondents agree that poor management and compliance of effective radiation protection regulations in the region of establishment will negatively affect the specialty. [FIGURE 3]

Considering the establishment of nuclear medicine facilities by the government, 116 (66.2%) which represents majority are of the view that it should not be the government's responsibility alone. [FIGURE 4]

TABLE 1: Socio-Demographic characteristics of the respondents

Socio-demography	Frequency	Percentage
Age (Years)		
20-35	112	64.0
36-50	51	29.1
51-65	12	6.9
Total	175	100.0

Gender		
Female	76	43.4
Male	99	56.6
Total	175	100.0
Religion		
Christianity	121	69.1
Islam	54	30.9
Total	175	100.0
Marital Status		
Married	71	40.6
Single	104	59.4
Total	175	100.0
Ethnicity		
Hausa	2	1.1
Igbo	59	33.7
Other	40	22.9
Yoruba	74	42.3
Total	175	100.0
Place of work		
Diagnostic Center	55	31.4
General/ Specialist	49	28.0
Private Hospital	37	21.1
Teaching Hospital	19.4	34
Total	175	100.0
Years of Practice		
0-5	96	54.9
16-30	21	12.0
6-15	58	33.1
Total	175	100.0
Maximum educational degree		
MSc	8	4.6
Other	12	6.9
Total	175	100.0

TABLE 2: Radiographers' ages and years of practice against the familiarity with nuclear medicine

Have you heard of the medical specialty known as nuclear medicine?	No	Yes	Total
Age			
20-35	3	109	112
36-50	6	45	51
51-65	0	12	12
Total	9	166	175
0-5	5	91	96
Years of Practice 6-15	4	54	58
16-30	0	21	21
Total	9	166	175

TABLE 3: Radiographers' educational status against the familiarity with nuclear medicine

Have you heard of the medical specialty known as nuclear medicine?	No	Yes	Total
Maximum educational degree			
BSc	7	148	155
MSc	0	8	8
Other	2	10	12
Total	9	166	175

TABLE 4: Nuclear medicine awareness amongst radiographers

Have you ever carried out a nuclear medicine procedure in Nigeria?		
No	164	93.7
Yes	2	1.1
Total	166	100.0
Have you come across any writing (publications, newspapers, journal, adverts e.t.c.) as regards nuclear medicine in Nigeria?		
No	97	55.4
Yes	69	39.4
Total	166	100.0
Has anybody (friend, stranger, colleague etc.) spoken to you about nuclear medicine previously?		
No	71	40.6
Yes	95	54.3
Total	166	100.0

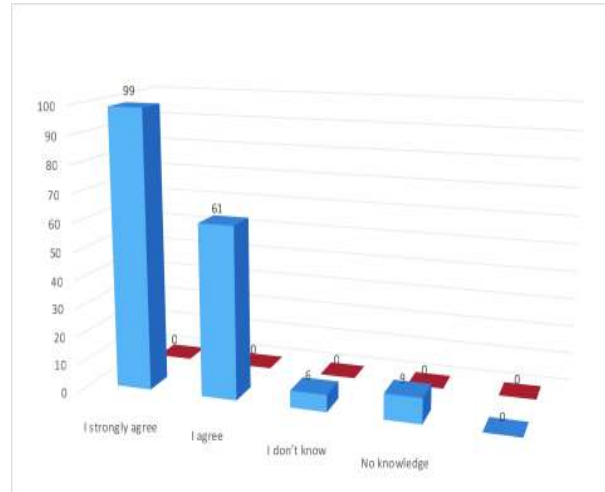


Figure 3: Poor management of radioactivity can negatively affect the specialty

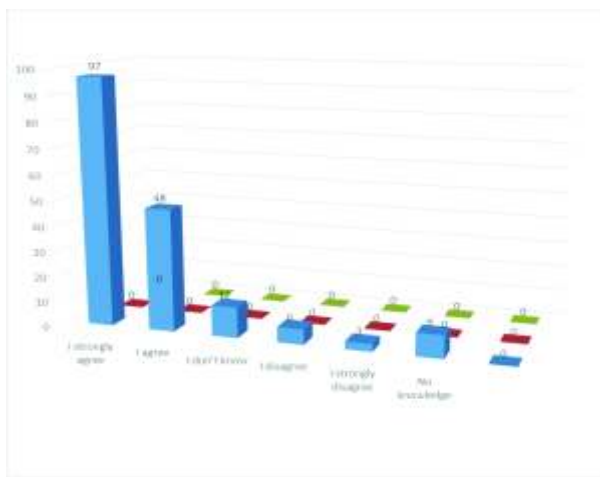


Figure 1: Bar Chart Of Lack Of Research About Nuclear In Nigeria

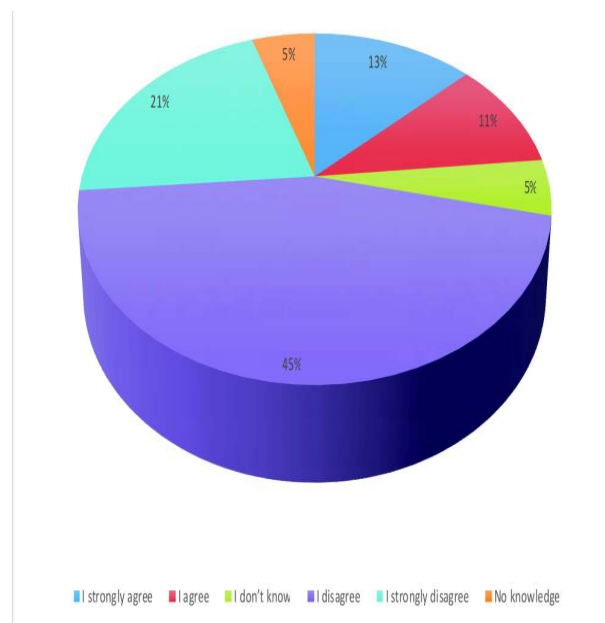


Figure 4: Establishment of Nuclear medicine facilities should solely be a government project

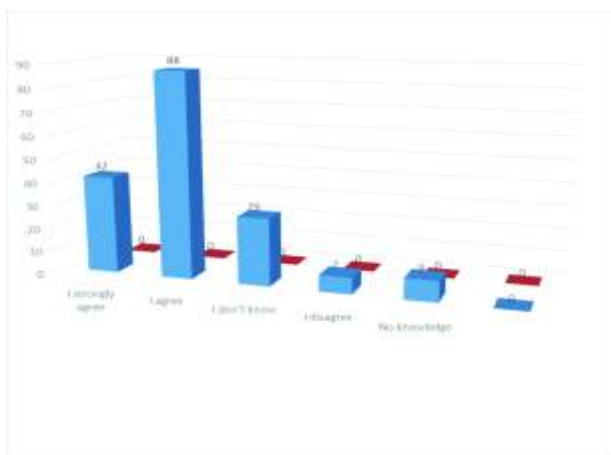


Figure 2: Radiographers' response to the lack of nuclear medicine facilities

DISCUSSION

The importance of the study is to make radiographers and general health personnel become more aware about this diagnostic specialty, and also to improve the nuclear medicine sector in the country, through promoting the establishment of new institutions, as well as the maintenance of existing facilities to prevent extinction.

In this study the socio-demographic characteristics of the radiographers that participated in this survey revealed that majority

were between the ages of 20 and 35 years followed by (29.1%) between 36 and 50 years.

Radiographers with 0 to 5 year experience were aware of nuclear medicine probably due to the introduction of the subject in the school curriculum in recent times.

This study revealed that education has increased awareness which is explainable as radiography in Nigeria has been on a great rise in the last decade, educationally and in the health sector as a whole, thereby producing more of younger people in the profession. It also implies that most of practicing radiographers in Lagos State are BSc holders.

In this study it was revealed that most radiographers have not participated in nuclear medicine procedures because of limited access to equipment in the country. Only two of the eight oncology centers in the country have nuclear medicine equipments but faces challenges of lack of reagent on a regular basis. This also explains why there is dearth of nuclear medicine research publications in the country.

According to Figure 2, 145 (82.9%) participants agree that there is lack of nuclear medicine facilities, while 9 (5.1%) disagree with this notion and 12 (6.9%) remain neutral. There are also some factors which radiographers agree can affect the potential establishment of nuclear medicine in Nigeria such as poor electricity and poor radioactivity management. This is well-supported by the article of Kayode Solomon et al.¹⁴

The study also revealed that poor management of radioactivity can negatively affect the specialty, due to the side effects of absorption of excess radiation, thus the need and emphasis of good radiation protection safety measures is mandatory in facilities offering this service in order to avoid health hazards associated with radiation to both staff and patients which correlates with the study by Kayode Solomon et al.¹⁴. Regular electricity supply is paramount to the efficient functioning of the nuclear centres in preserving the lifespan of the machine which can become faulty due to irregular power supply. It was also deduced from the study that majority of the participant agreed that the government has an important role to play in

establishing Nuclear medicine facilities especially with the increasing incidence of cancer patients in Nigeria (100, 000 new cases of cancer occur every year, with high death rate). This correlates with the study by K Adam bounou et al which states that the lack of the specialty hampers the management of patients with pathologies.¹⁵

It is important to encourage private institutions participation in the practice once the basics, such as effective means of radiation management, have been put in place by the government, while 20 (11.4%) disagree.

CONCLUSION

Establishment of standardized nuclear medicine centers across geographical regions in Nigeria is paramount in increasing awareness and expertise in the specialty both to the populace and medical personnel respectively.

ACKNOWLEDGEMENTS.

We would like to thank all those whose assistance proved to be a milestone in the accomplishment of this manuscript namely Mr S.A Babatunde, Funmilola Lawal, all the management and radiographers of the 13 centers that we distributed our questionnaires which include

- Lagos University Teaching Hospital (LUTH), Idi-Araba.
- Lagos State University Teaching Hospital (LASUTH), Ikeja.
- General Hospital, Marina.
- General Hospital, Isolo.
- Foremost Diagnostics, Surulere.
- Me Cure Healthcare Limited, Oshodi.
- St. Nicholas Hospital, Marina.
- Afriglobal Medicare, Ikeja.
- Lagoon Hospitals, Apapa.
- Lagoon Hospitals, Ikeja.
- Reddington Hospital, Victoria Island.
- Federal Medical Centre, Ebute-Metta.
- National Orthopaedic Hospital, Igbobi, Somolu.

REFERENCES

1. Jeffrey A. Siegel, Charles W. Pennington, Bill Sacks. Subjecting Radiologic Imaging to the Linear No-Threshold Hypothesis: A Non Sequitur of Non-Trivial Proportion. *J Nucl Med* 2017; 58:1-6.
2. Sten Carlson. A Glance At The History Of Nuclear Medicine. *Acta Oncologica* 1995; 34:8,1095-1102.
3. Sathekge, Mike; Warwick, James. Nuclear medicine in South Africa. *South African Med J* 2008; 93(2):88
4. Kayode Solomon Adedapo, Yetunde Ajoke Onimode John Enyi Ekeh, Adewale Oluwaseun Adepoju. Avoidable challenges of a nuclear medicine facility in a developing nation. *Indian J Nucl Med* 2013; 28(4): 195-9.
5. Orunmuyi TA, Sathekge MM, Buscombe RJ. Ensuring effective and sustainable radionuclide delivery and its impact on the development of nuclear medicine in the developing world with special reference to Nigeria. *World J Nucl Med* 2019; 18(1):2-7.
6. N. N. Jibiri, O. S. Bankole. Soil radioactivity and radiation absorbed dose rates at roadsides in high-traffic density areas in Ibadan metropolis, southwestern Nigeria. *Radiat Prot Dosimetry* 2006; 118(4): 453-458.
7. Dominique Delbeke and George M. Segall. Status of and Trends in Nuclear Medicine in the United States. *J Nucl Med* 2011; 52:24S-28S
8. Vitola JV, Shaw LJ, Allam AH, et al. Assessing the need for nuclear cardiology and other advanced cardiac imaging modalities in the developing world. *J Nucl Cardiol.* 2009; 16:956-961.
9. Izenstark, Joseph L, Lafferty, Walter. *Medical Radiological Practice in New Orleans: Estimates and Characteristics of Visits, Examinations, and Genetically Significant Dose.* *Radiology* 90:229, 1968.
10. K Adambounou et al; International Conference on Medical Physics August 03-05, 2015 Birmingham, UK; Knowledge and perception of Nuclear Medicine by Togolese physicians.
11. Nathaniel lowbeer-Lewis. Nigeria and Nuclear Energy; Plans and Prospects. *Nuclear energy future papers* 2010; 11: 1-16.
12. Jeffrey A. Siegel, PhD Chair, Joint Government Relations Committee American College of Nuclear Physicians and Society of Nuclear Medicine. *Guide for Nuclear Medicine – “Nuclear Regulatory Commission” Regulation of nuclear medicine.*
13. Decristoforo C, Penuelas I, Elsinga P et al. Radiopharmaceuticals are special, but is this recognised? The possible impact of the new Clinical Trials Regulation on the preparation of radiopharmaceuticals. *Eur J Nucl Med Mol Imaging* 2014; 41: 20-5.
14. Kayode Solomon Adedolapo et al; Avoidable challenges of a nuclear medicine facility in a developing nation. *Indian J Nucl Med* 2013 Oct-Dec; 28(4); 195-199.
15. K Adambounou et al; International Conference on Medical Physics August 03-05, 2015 Birmingham, UK; Knowledge and perception of Nuclear Medicine by Togolese physicians.