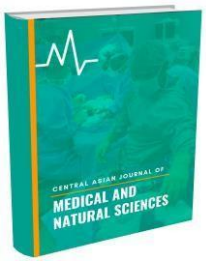

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*Article*

# Career Plans of Final Year Radiography Students of Nnamdi Azikiwe University, Anambra State, Nigeria

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**Abstract:** The rapid increase observed in the population of Nigeria coupled with the development in the radiography profession has resulted to a strong demand for medical radiographers. This is expected to continue as the population ages. This study aimed to investigate the career plans of final year radiography students in Nigeria Universities. A cross-sectional survey study was adopted. Questionnaires were distributed to 160 final year radiography students of Nnamdi Azikiwe University, College of Health Sciences, Okofia Nnewi Nigeria. A total of 150 questionnaires were received. The mean overall age of the students is 21-25 yrs (62.7%). Males composed majority 54% (n=81) of the study population. 117(78%) intends to practice medical radiography after graduation. The choice modality for specialization is ultrasonography with 30.9% (n=34). 35.5% (n=39) think that competition can stand as a barrier to practicing their desired specialty. 17(51.4%) want to venture into sales of radiographic equipment and consumables. 110 (94%) preferred to practice abroad. 13.9% chose radiography to save live/service to humanity. It was concluded that there should be provisions of the various imaging modalities for the students for training. Inclusion of career planning courses to help enhance students' certainty of career plans and seminars relating to sales of radiographic equipment to the curriculum as most students have interest in it. This information can be used by educators to assist in retention strategies of radiography students.

**Keywords:** Career, Radiography Students, Nnamdi Azikiwe University, Imaging Modalities.

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## 1. Introduction

Medical Radiography as a professional career is the study and practice that involves the use of ionizing radiation and other forms of wave in the diagnosis and treatment of diseases. Radiography's origins can be traced to 8 November 1895, when German physics professor Wilhelm Conrad Roentgen discovered X-ray, he referred to the radiation as 'X' to indicate that it was an unknown type of radiation [1]. So many discoveries were made after this breakthrough and X-rays were finally put to diagnostic use early. Radiography has been shown to be the youngest and fastest growing profession in the medical field and this is evident in the rapid technological advancement and diversity [2]. Today medical radiography is a very vast field and every imaging modality in medical radiography has its own vital role in the health sector.

A decree was promulgated by the military government in Nigeria in 1978 to regulate the activities of some professionals in public service that included Radiography. In 1987, decree No. 42 was promulgated which accorded radiography full professional status like

medicine, midwifery, nursing, pharmacy, and law [3]. Hence, radiography is regarded as a professional career. This advancement in radiography has inevitably left students-radiographers with innumerable options in choice of areas of specialization after graduation. Notable diverse areas in Radiography includes; conventional radiography, fluoroscopy, computed tomography, mammography, ultrasonography, radionuclide imaging, magnetic resonance imaging, thermography and radiotherapy [2].

Everybody has always been a student in one way or the other. Once you have learnt something in life, you are said to be a student. A student is therefore a person formally engaged in learning, especially one enrolled in a school or college. Radiography students are students offering radiography as a course in the higher institution. Radiography students undergo both theoretical and practical training [4]. According to [5] the King Khalid University radiography study field also tend to apply the same strategy through exposing the students to both curriculum-based practical in the teaching laboratories and training sessions in hospital at early stages of the program. Radiography has both a practical and theoretical nature and if the students are properly trained on both aspects, there will be a positive effect on the profession as this will improve the students' interest towards practicing radiography.

A career as a radiographer provides the students with a variety of specialization options that they can choose from(www.nextstepu.com). Radiography is a career that gives you purpose and meaning. A study in Nigeria found a different set of basis for choice of specialization. The main reasons influencing specializations were primary interest in the specialty (91%), service to humanity (91%) and job satisfaction (85.7%) [6]. A student's performance in a particular subject is closely linked to interest [7]. The teachings in medical colleges in itself alters and shapes career preferences in the sense that most imaging modalities that are more preferred by students were well taught in school and the interest in those modalities grew more and even more after they experienced it in their clinical postings. Radiographers now have the opportunity to become consultant practitioners, allowing them to reach a more senior level of management, while retaining a high level of clinical practice and working with patients. [8], in a qualitative study to determine the attractiveness of radiography as a career choice indicated that radiography as a career choice although appears to be generally attractive is perceived as boring and routine, involving high workloads and little recognition from the general public. According to [9], there is still a belief by many that it is a profession that involves tremendous exhaustion and high workload with no commensurate remuneration from the appropriate authorities while some believe it is a men's profession. Yet although it is known that women avoid male dominated occupations, there is small increase towards growing number in the profession [10] although others fear their reproductive systems might be tampered with frequent subsequent exposure in future, hence this might dwindle the commitment of those who initially wanted to practice. *Noted that there is loss of quality in Radiography training in Nigeria as the available facilities for quality training may not match with the increasing entrants. This could have a negative effect on the profession as there could be decrease in the workforce available since some of the students that applied for the course may no longer be willing to practice. This could be as a result of inadequate training received, hence lack of interest in the profession.

Career is defined as an occupation or a profession that usually involves special training or formal education [11] and is considered to be a person's life work. Career progression of young radiographers following graduation has been observed in areas of clinical ultrasonography, radiation physics, radiotherapy, computed tomography and others, including a non-clinical but necessary entrepreneurship which encompasses endeavours such as the sale of medical radiography equipment and establishing private radio diagnostic centers; some have even moved into teaching and research, some have also moved into the industrial aspect of radiography. Careers of radiographers in the field of US, CT, MRI, nuclear medicines or radiation therapy is promising. Upon completion of

a bachelor's degree, opportunities exist to continue education and obtain a master's degree.

An insight into the career plans of final year radiography students, what actually made radiography their career of choice, what influenced their choices and the factors that still has an influence on choices yet to be made such as practicing the profession upon graduation and and specializing in any of the modalities available in the profession is important. Such studies can also provide insight into what may be required to bring about a balance in manpower availability among the various imaging modalities. Undoubtedly, the carer plans of radiography students has a great role to play in the future of the radiography profession. A greater proportion of radiography students make their career decisions during the six months SIWES (Students Industrial Work Experience Scheme), along with the factors influencing their specialty choice, our major concern is if they still wish to be medical radiographers in future or if they would want to deviate. To understand final year radiography students' career plans, the researcher carried out this survey.

The career plans of final year radiography students are a subject of considerable interest and significance within the field of healthcare education. As these students transition from academic life to professional practice, it is important to understand their career aspirations, expectations, and preparedness for entering the workforce as radiographers. Existing literature suggests that the career paths and intentions of radiography students may be influenced by various factors such as clinical training experiences, academic curriculum, and the evolving landscape of healthcare delivery. However, there is a need for comprehensive assessment of the career plans of the final year radiography students to gain insights into their career preferences, perceived challenges, and the support mechanisms necessary for successful career transitions. Addressing this gap in knowledge is essential for informing educational institutions, clinical placements sites, and policymakers about the career needs and readiness of upcoming radiography professionals. Consequently, this study aims to investigate the career plans of final year radiography students, with a specific focus on identifying their intended career paths, factors influencing their career decisions, and areas of concern as they prepare to enter the professional workforce. Therefore, we determined the career plans of the final year radiography students of Nnamdi Azikiwe University, Anambra state Nigeria.

## 2. Materials and Methods

### Study Design

We adopted a cross-sectional prospective design and was conducted in Nnamdi Azikiwe University, Nnewi Campus that offers radiography.

### Study Population

The research cohort comprises exclusively of final year radiography students at Nnamdi Azikiwe University, Nnewi Campus. The Class Representative for the final year class provided the precise count of senior-year radiography students, indicating an approximate total of 160 individuals. This projected population will serve as a benchmark for determining the sample size in the study.

### Sample Size

The sample size will be determined using Taro Yamane's formula, which states that:

The sample size is calculated using Yaro Yamene formula (as adopted by [12])

$$jn = \frac{N}{1+N\,(e)\,2}$$

Where;

n = sample size

N = finite population

e = level of significance, usually 0.05

1 = unity, which is constant

Applying the digits

$$n = \frac{160}{1+160\ (0.05)\ 2}$$

$$n = \frac{160}{1 + 0.4}$$

$$n = \frac{160}{1.4}$$

n = 114

**Sampling Technique**

A convenience sampling technique was used to recruit final year radiography students in Nnamdi Azikiwe University, Nnewi Campus.

**Inclusion Criteria**

The sample will include all final year radiography students in Nnamdi Azikiwe University, Nnewi Campus who have given their consent to participate in the study.

**Exclusion Criteria**

1. Non final year radiography students.
2. Students from other departments and faculties.
3. Students in their final year studying medical radiography but not in Nnamdi Azikiwe University, Nnewi Campus.
4. Post graduate Radiography students.

**Data Collection Tool**

A pre-designed, pre-tested, self-administered structured questionnaire was used for data collection. The questionnaire contains 23 questions consisting of both open-ended and closed-ended questions. The closed-ended questions consisted of multiple-choice questions and a 3-point Likert interval scales. The questionnaire is divided into four sections, sections A, B, C and D. Section A contained 2 questions on the demographic data of the respondents; Section B contained 8 questions aimed at assessing career plans of final year radiography students; Section C contained 5 questions which identified the possible factors influencing students' choice of area of specialization; and Section D contained 9 questions aimed at assessing the respondents reason for studying radiography. To ensure co-operation, objectivity and sincerity, anonymity of respondent and confidentiality of their reports were guaranteed.

**Method of Data Collection**

Data were collected using the adapted questionnaire. The consent letter was taken along with the questionnaire. The questionnaire were self-distributed by the researchers and explained to the students prior to filling. Any question that is unclear was made clear so as to ensure correct answering of the questions.

**Method of Data Analysis**

Data were analyzed using Microsoft Statistical Software Package for Social Sciences (SPSS) version 27 (SPSS incorporated, Chicago, Illinois) for both descriptive and inferential analysis. The descriptive statistics of tables and percentages were done and incorporated into the study with a value of $p< 0.05$ considered to be statistically significant.

## 3. Results

**Table 1.** Demographic characteristics of respondents.

| Items | Characteristics | Frequency | Percentage (%) |
|---|---|---|---|

| | | | |
|---|---|---|---|
| Age(years) | 20 and below | 13 | 8.7 |
| | 21 – 25 | 94 | 62.7 |
| | 26 – 30 | 39 | 26 |
| | 30 – above | 4 | 2.7 |
| | Total | 150 | 100 |
| Gender | Male | 81 | 54 |
| | Female | 69 | 46 |
| | Total | 150 | 100 |

Table 1 shows the mean overall age of the students which is 21-25 yrs (62.7%) and males composed 54% (n=81) majority of the study population.

**Table 2.** Career plans of final year radiography students.

| Parameters | Response | Frequency | Percentage (%) |
|---|---|---|---|
| Do you intend to practice medical radiography after graduation? | YES | 117 | 78 |
| | NO | 33 | 22 |
| | Total | 150 | 100 |
| If yes, what area do you intend to specialize in? | Conventional radiography | 12 | 94 |
| | Mammography | 16 | 6 |
| | Ultrasound | 34 | |
| | CT | 25 | |
| | MRI | 20 | |
| | Radiotherapy | 5 | |
| | Total | 110 | 100 |
| What do you think is a barrier to practicing your desired area of specialization? | Very competitive | 39 | 35.5 |
| | High work related risks | 24 | 21.8 |
| | Job opportunities | 35 | 31.8 |
| | Learning opportunities | 12 | 10.9 |
| | Total | 110 | 100 |
| If No, what career plan would you love to embark on after graduation? | Go for further training and lecture. | 2 | 6.1 |
| | Venture into sales of radiographic equipment and consumables | 17 | 51.4 |
| | Go for trainings and venture into industrial radiography | 3 | 9.1 |
| | Go back to school and study medicine | 4 | 12.1 |
| | Pursue my talent. | 5 | 15.2 |
| | Go into research | 2 | 6.1 |
| | Total | 33 | 100 |
| Will you prefer to practice locally or abroad? | Locally | 110 | 94 |
| | Abroad | 7 | 6 |
| | Total | 117 | 100 |

Table 2 shows the interest level of respondent that intends to practice medical radiography after graduation, majority of the respondents 117(78%) intends to practice. Majority of the respondent 34(30.9%) intend to specialize in ultrasound. Majority of the respondent 39(35.5%o) think that competition can stand as a barrier to practicing their

desired area of specialization. Majority of the respondent 17(51.4%) want to venture into sales of radiographic equipment and consumables after graduation. Majority of the respondent 110 (94%) prefer to practice abroad.

**Table 3.** Factors influencing student's choice of area of specialization.

| Parameters | Response | Frequency | Percentage (%) |
|---|---|---|---|
| Passion/Keen interest for the subject | Agree | 92 | 83.6 |
| | Uncertain | 8 | 7.3 |
| | Disagree | 10 | 9.1 |
| | Total | 110 | 100 |
| Anticipated Income | Agree | 83 | 75.5 |
| | Uncertain | 21 | 19.0 |
| | Disagree | 6 | 5.5 |
| | Total | 110 | 100 |
| Some field are gender sensitive | Agree | 50 | 45.5 |
| | Uncertain | 32 | 29.0 |
| | Disagree | 28 | 25.5 |
| | Total | 110 | 100 |
| Less health associated with the field | Agree | 57 | 51.8 |
| | Uncertain | 24 | 21.8 |
| | Disagree | 29 | 26.4 |
| | Total | 110 | 100 |
| **Flexibility of practice in the specialty** | **Agree** | **68** | **61.8** |
| | **Uncertain** | **28** | **25.5** |
| | **Disagree** | **14** | **12.7** |
| | **Total** | **110** | **100** |

In table 3, majority 92(83.6%) agreed that passion/keen interest is one factor influencing student's choice of specialization while few 10(9.1%) disagreed. Majority 83(75.5%) agreed that anticipated income is one of the factors influencing student choice of specialization while few 50(45.5%) agreed that gender sensitivity is one of the factors influencing their choice of specialization,

**Table 4.** Respondents reasons for choosing radiography as a career.

| Parameters | Percentage (%) |
|---|---|
| To save lives/service to humanity | 13.9 |
| Huge financial reward | 11.8 |
| Opportunities for self-employment | 13.2 |
| Great passion for the profession | 12.8 |
| My role model is a radiographer | 11.0 |
| Personal interest | 6.0 |
| My lecturers are doing well financially | 10.4 |
| Good employment opportunities | 9.7 |
| Pressure from family/family tradition | 10.7 |
| Total | 100 |

Table 4 shows reasons why the respondent chose radiography as a career, majority of the respondent 13.9% chose radiography to save live/service to humanity followed by 13.2%who chose radiography for opportunities for self-employment while few 6.0% chose radiography for personal interest.

## 4. Discussions

The result from this study showed that majority of the respondents were males (54%) as against the females (46%). This is in conformation with the study by [13] which revealed that the number of male respondents were far more than that of female respondents. According to their findings, females are more likely to be detracted from radiography due to the predominance of the male radiographers/students in the profession which happens to be in line with works by [14]. However, [15] disagrees with this after investigating the issues affecting diversity of the radiography students' population in the United States. He found out that males were less likely to choose the profession due to predominance of female radiographers.

These studies show that gender has an impact in choosing radiography as a career. Nevertheless, [13] noted the fact that fear of radiation hazards among women with respect to procreation may account for gender inequality and the normal traditional role in the society with the men thinking that women are professionally disadvantaged because of child care responsibilities. However, [14] noted that the technological aspect of the profession rather than caring was the incentive for more male students than females in the radiography profession.

Findings from this study also revealed that majority (62.7%) of the respondent were within the age group of 21-25 years and few (2.7%) were within 30and above. This is however possible since the study of radiography in Nigerian tertiary institutions take a minimum of 5years and Nigerian tertiary institutions offer admission to individuals from 16 years and above.

Results from this study revealed that majority (over 75%) of the respondents are intending to practice medical radiography and specializing in one of the various imaging modalities. Regarding their choice of area of specialization, majority 34(30.9%) intend to specialize in ultrasound, and in descending order are as follows; computed tomography, magnetic resonance imaging, mammography, conventional radiography, radiotherapy. On what the respondents think will be a barrier to practicing their desired area of specialization, majority 39(35.5%) sees a specialty being very competitive as a barrier to practicing in that specialty whereas the rest think high work-related risks, job opportunities and minority 12(10.9%) think learning opportunities are barriers.

Revelation from this study has a great number of the respondents indicating they have other career plans aside practicing radiography. The career plans are stated in descending order as follows: venture into sales of radiographic equipment and consumables, pursue my talent, go back to school and study medicine, go for trainings and venture into industrial radiography, go for further training and lecture and go into research. Majority 17(51.4%) of the respondents would love to venture into sales of radiographic equipment and consumables and minority 2(6.1%) would love to go into research. Research and academics came lower down at 6.1% which is in line with the work carried out by [16] which shows that research and academics came lower down at 11.8% reiterating the earlier observation that fewer people want to join faculty positions. Remarkably the interest in academics and research is consistently a downward spiral from entry to exit. It is food for thought that the inclination for medical research, consistently decreased over the years in undergraduate education [16] This is however in contrast with findings from China, where research seems to be gaining popularity among medical undergraduates [17]. [17] suggested that medical educators should work to stimulate students' research interest at an early stage to maximize chances for a research career. On preference on whether to practice locally or abroad, majority of the respondent 110 (94%) prefer to practice abroad. This preference can be attributed to the fact that there are better opportunities abroad. The respondent may be attracted to advanced technology, higher salaries, and access to cutting-edge research and treatments. Some may also be seeking

better quality of life for themselves and their families, including better healthcare, education, and living standards [18]. Several other factors like challenges in the Nigerian healthcare system, political instability and economic challenges may also be attributed to the reason for this preference.

A greater percentage (83.6%) of the respondents opted for their chosen specialty because of their passion for and their keen interest in that subject. This was followed by 75.5% who agreed that their choice of specialty is influenced by the anticipated income. A small number opted for their choice of specialty because they believe that some specialties are gender sensitive. This is in line with a study by [6] where majority 91% of students chose their branch of specialization since they had a passion for it. This percentage of students would also love to undertake postgraduate study and further in their preferred specialty area. In the study performed across five medical schools in Germany, bright career prospects, economic stability and a flare for the subjects were cardinal reasons why students chose a specific specialty [19]. In another study from Rajasthan India; researchers reported interest in the subject, service to community and monetary gains to be three top factors influencing choice of specialty [20]. This is similar to findings of our study.

In a report from Gujarat, India 42% of the students chose their specialty based on reputation assigned to it [21]. Only 11% based their choice primarily on monetary gains unlike findings from our study. However, [22] on Factors affecting the career plans of university students after graduation found out that university students need counselling services on their career planning. The large part of this need he stated depends on universities and them to support students in parallel; to responding to country's economy. This support may be possible by including career planning courses to all department of the universities. Also, [23]in their work on challenges facing guidance providers in higher education found out that students have negative opinions and thoughts about their careers and future. Inclusion of career counselling to the curriculum is advised as this will go a long way in improving students' opinions and thoughts about the future.

Service to humanity and opportunities for self-employment were the most common reasons why the students chose radiography as a career which is in line with research by Bamba et al (2008), which indicated that many of the students chose medical radiation science as a career with the goal of helping others. Financial security was another common reason cited for their career choice. From the result of this study on possible reasons that influenced respondent's choice of radiography as a career, an overwhelming percentage (13.9%) of respondents stated that their reason is to save lives. This is followed by opportunities for self-employment, great passion for the profession, huge financial reward, my role model is radiographer, pressure from family/family tradition, my lecturers are doing well financially, good employment opportunities and personal interest. Earlier studies from India have elicited similar responses where self-interest and passion for the profession were the most common reasons why respondents chose medicine as a career [24]. In a study among medical students in Delhi by Lal et al (2007), to serve the needy was the most common reason quoted for becoming a medical personnel. In contrast only 3.9% of the students in a study carried out by [25] listed to serve the needy as a reason for choosing medicine as a career.

[26] found out that desire for a health career was a highly motivating factor in career decision of medical radiation science students. Availability of good employment opportunities and huge financial rewards were also a major factor affecting their career aspirations and plans which happens to be similar to studies by [27] which showed that apart from 'personal interest', good employment prospects signalled by 'easier to find a job', 'expect good income', 'academic reputation of the institution' constituted one of the main reasons for students' choices of subject and destination for postgraduate study. [28] and [29], also revealed that job opportunities and societal needs were highly motivating factors in career planning, which disagrees with [26] study that revealed that most students

in nuclear medicine and radiation therapy indicated poor employment opportunities in their stream of medical radiation science.

According to [30], radiographers were influenced by intrinsic and extrinsic factors when deciding to pursue radiography education and one key extrinsic factor was availability of funding and search for improved remuneration and a study by [31] indicated that financial security was the main incentive to enter the profession, but these disagrees with [26] who indicated that financial rewards were not an important factor influencing students' study of medical radiography. [32] advised that prospective professionals should have a free choice of employers and careers.

## 5. Conclusion

Based on the findings, gender inequality happens to still be a problem in radiography profession as females are still under represented in the profession in Nigeria despite the advancement opportunities recorded in the profession and the gradual acceptance of gender equality witnessed in the society.

This study happens to have majority of its respondents among the age group of 21-25 which happens to correspond with the expected age of graduation in the Nigerian tertiary institution where admission is granted to individuals at 16 years and above.

However, majority of the respondents intend to practice and specialize in the different modalities found in radiography. Furthermore, the result gotten from their preferred area of specialty upon graduation showed a greater number going into ultrasonography, followed by computed tomography, magnetic resonance imaging, mammography, conventional radiography, with the least being radiotherapy. This may be due to the unavailability of such modalities at their areas of clinical placement.

Also, some of the respondents indicated that they have other career plans they would love to embark on rather than practicing medical radiography such as; venture into sales of radiographic equipment and consumables, pursue my talent, go back to school and study medicine, go for trainings and venture into industrial radiography, go for further training and lecture and go into research.

Interestingly, majority of the respondent prefer to practice abroad for better opportunities; advanced technology, higher salaries, and access to cutting-edge research and treatments. It may also be for better quality of life for themselves and their families, including better healthcare, education, and living standards.

The following factors were seen to greatly influence respondents' choice of area of specialization. The major ones include the respondents' passion for and their keen interest in that subject and financial security, while the least factor is that some specialties are gender sensitive.

The following are reasons why the respondents chose radiography as a career. The most common reasons were service to humanity, opportunities for self-employment and financial security followed by great passion for the profession, huge financial reward, my role model is radiographer, pressure from family/family tradition, my lecturers are doing well financially, good employment opportunities with the least being student's personal interest.

This study also has wide ranging implication in the formulation of national policies which include: Passion for the subject is the paramount reason to choose a specialty, Money does not quite make the world go round in all cases, technological proficiency does not parallel interest in research and academics, research and academics appear less rewarding to medical radiography students in the present scenario. There appears to be a need to make these fields more lucrative and impressive in print and electronic media so as to attract more talents in these arenas.

**Recommendations**

1. The institutions and regulatory boards should formulate policies that will sustain identified attractors and improve on the detractors thereby encouraging radiography practices among radiography students in Nigeria.

2. There should be provision of various imaging modalities especially at areas of clinical postings and students should be allowed to practicalize as this will help the students have a better knowledge of each, thereby making their choice on area of specialty upon graduation easier and certain.

3. There is need to include into schools' curriculum seminar relating to sales of radiographic equipment as most students are interested in venturing into it.

4. The medical educators should work to stimulate students' research interest at an early stage to maximize chances for a research career as it has been noted that the inclination for medical research has consistently decreased over the years in undergraduate education.

5. Inclusion of career planning courses in the department will also help enhance certainty of career plans of final year students upon graduation.

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