

# Anatomy Education in Nigeria: An Empirical Study of Students' Knowledge and Perceptions on Training and Prospects Towards Meeting the Country's Need

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**Introduction:** Anatomy is currently a basic medical science bachelor program in Nigerian universities. The roles of anatomists in the Nigeria health, education and other relevant sectors are vaguely defined. Career prospects have been perceived to be very limited.

**Materials and Methods:** This study was a total population survey of all Nigerian private university students that were enrolled in the Anatomy programs. Structured questionnaires were distributed to the students after securing their written informed consent. Data were obtained about the structure of their training and the program, knowledge of career prospects, motivation, potential career paths and employment prospects, as well as general opinions of the program. The target population was estimated at 1000 [N=1000].

**Results:** A total of 902 [n=902] properly completed and returned questionnaires were considered suitable for analysis. The results showed that 55% of the respondents were female. Half of the respondents (50.8%) had a moderate interest in Anatomy as a career while others had an interest in alternative careers. Training was found to include intensive classroom teaching and laboratory work mainly in the Gross Anatomy and Histology. Hands-on training in forms of clinical, field and industrial experiences was limited. Furthermore, slightly more than half of the respondents (51.7%) had poor attitudes towards the bachelor's degree in Anatomy. They also perceived their job or career prospects in Anatomy as poor, citing perceived unfavorable governmental policies and very limited professional opportunities in relevant sectors including health, research, education and the public as the major influencing factors.

**Conclusion:** These results showed that the students had a moderate interest in pursuing a career in Anatomy. Their training was however limited in the aspects of practical and experiential learning. Their attitude was also negatively influenced by their perception of limited career prospects. Training was therefore robust in the cognitive domain but limited in psychomotor and affective. Curricular review and strategic restructuring of training methods in line with the competencies that are expected of the Anatomy program graduates would help.

**Keywords:** anatomy, education, students, training, universities, Nigeria, bachelor's degree, philosophy

## Introduction

Anatomy is defined as the study of the structure of the body. Human Anatomy is an ancient medical science, and one of the cornerstones of medical education.<sup>1</sup> Modern Anatomy now considers the study of the human body from its gross form to molecular level, including its development. Anatomy or Anatomical sciences also consider the

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applications of the knowledge of the human body. Anatomy is, therefore, fundamental to understanding the body's functions and how both structure and function are modified by disease processes.<sup>2</sup> The word Anatomy originated from the Latin word that means "dissection" which further means cutting up or cutting through the body.

Nigerian universities offer Anatomy as a course of study and award bachelor's degree certificates after 4–5 years. Anatomy was first taught as a subject for the medical degree programme in 1930.<sup>3</sup> Anatomy education in Nigeria began in 1963 at the University of Ibadan. Currently, many Nigerian universities offer programs leading to the award of bachelor's degrees in Anatomy. The need to properly define career prospects, develop effective policies and improved training methods with respect to the training of Basic Medical Scientists toward developing human resources and personnel in the field of Anatomy is important.<sup>4–6</sup> The series of changes that have accompanied the evolution of Anatomy as a course of study over the years demands for conscientious efforts to adapt the philosophies, methodology and the course contents of Anatomical courses towards meeting the need of the society in the 21st century.<sup>7,8</sup> While developed countries have advanced in several areas and aspects related to Anatomy teaching and career development, Nigeria and Africa is still largely stuck with the traditional and ancient philosophies and pedagogy of teaching.<sup>4,9,10</sup> There is the need to invest in research and advancement of Anatomy education as this would have effects on the availability of expertise for research and medical education. A decline and dearth of anatomy lecturers to match the number of medical schools and increasing student populations has been reported in the United States and India.<sup>2,11</sup> Efforts should be made to ensure that similar problems do not affect medical science and education in Nigeria.

Since 1933, the Nigerian Anatomical act has been a part of the Nigerian Federal Laws. It is however now obsolete because it has never been amended. This no doubt has negative effects on Anatomy as a medical science and a career. Most graduates of Anatomy work in Universities as teachers and few others as researchers. There is a paucity of research findings on Anatomical education and its prospects in Nigeria. This suggests that the attention given to developing Anatomy education has been relatively poor. The primary aim of this study was to study the Nigerian Anatomy students' perceptions, knowledge of training and career prospects towards preferring practical and sustainable and solutions to the current challenges of limited career prospects for graduates of the program. The research might help in developing improved and modern

curricula, enriched with solution-oriented philosophy, pedagogy and competencies towards training anatomists to meet the demands of the 21st century, especially in Nigeria. This research is therefore very important towards ensuring a holistic approach to addressing the identified challenges.

## Materials and Methods

### Design of Questionnaires

Structured questionnaires for the purpose of educational research were prepared. The original information was collected with the aid of pilot study questionnaires administered for the purpose. Research method was primarily quantitative. Questionnaire was validated prior to use using a cohort of University students.

### Sample Size Selection and Determination

General Criteria for the selection of participating institutions:

1. The participating institutions offered the bachelor's degree program in Anatomy/Anatomical Science.
2. The institutions were accredited by the National University Commission [NUC] of Nigeria.
3. The institutions had graduated a minimum of one set of anatomists [post-accreditation] with a bachelor's degree in Anatomy [eg B Sc., Anatomy].
4. The institutors were private universities because they had all run uninterrupted school calendars and were all in session at the time of study. The study gave consideration to the following:
  - a. Total population Survey – of all students at all levels in the targeted schools was carried out.
  - b. All returned and properly completed questionnaires were considered.
5. Ethical consideration: participants all signed the written informed consent form that was presented with each questionnaire on its front page as an evidence of consent. All respondent whose responses were considered signed the informed consent form. The study was approved by the Babcock University's research ethical board. Institutional Ethical Review Board approval was obtained, and the research project approval document was assigned the number BUHREC 701/18.

### Data Handling, Statistical Analysis and Record Keeping

1. Data management procedure: questionnaires were collected and organized to only consider those that

meet the criteria that included proper, clear completion and accompanying consent. Microsoft Excel was used to create a raw data database to serve as an accessible data pool before onward analysis.

2. Data analysis: The Graph Pad Prism Software was used for descriptive and inferential statistical analyses and result presentations. Where applicable, the P value has been taken as  $P \leq 0.05$  to determine the level of statistical significance for inferential statistics.
3. Data safety: Only the researcher[s] had access to the raw completed questionnaires and these were handled with utmost adherence to ethics. There was also no conflict of interest in the study.
4. Data confidentiality: Respondent's identity was kept confidential. Any information given was assigned a code number. Respondent names and specific identities were not included in the analysed final report.

## Results

### General Information

To ensure optimal participation, students were given the option of paper questionnaire or google form [electronic]. Most respondents preferred the paper questionnaire option. The response was good with a success of >90% properly completed and returned questionnaires.

### Demography of Respondents

There were nine hundred and two (902) respondents for this study, with a mean age of  $19.09 \pm 1.76$ . They were all enrolled in the Bachelor of Science [BSc] program of Anatomy. Fifty-five percent (55%) of the respondents were females, compared to 45% who were males. All respondents were Nigerians with Ekiti state (15.5%), Kogi state (13.1%), Nassarawa state (12.9%), Delta state (12.0%) and Ogun state (11.2%) being the five top states of origin of the respondents (Table 1).

### Background Information About Respondents' School's Anatomy Program

All the respondents selected 4 years for the duration of the Anatomy program in their schools, while 97.8% indicated that the Anatomy program was offered as a bachelor's degree course program and 80% indicated that the program was offered as human Anatomy. Furthermore, more than half of the respondents (53%) indicated that Anatomy was offered as

**Table 1** Respondents' Personal Information

Variables	Frequency (N = 902)	Percentage
Course of Study BSc Anatomy	902	100%
Level of Education		
100/200 level	131	14.5
300 level	241	26.7
400 level	530	58.7
Gender		
Female	496	55.0
Male	406	45.0
State of Origin		
Abia state	50	5.5
Abuja	45	5.0
Delta state	108	12.0
Edo state	34	3.8
Ekiti state	140	15.5
Kano state	43	4.8
Kogi state	118	13.1
Nassarawa state	116	12.9
Ogun state	101	11.2
Osun state	79	8.8
Oyo state	29	3.2
Rivers state	31	3.4
No response	8	0.9

Note: Mean age =  $19.09 \pm 1.76$ .

a basic medical science degree program in their schools (Table 2).

### Anatomy in Context

There were 61.9% of the students who responded that Anatomy was a requirement for a medical degree in their schools while less than half (49%) perceived Anatomy to

**Table 2** Background Information About Your School's Anatomy Program

Statements	Yes (%)	No (%)	Not Sure (%)	No Response (%)
Anatomy offered as a bachelor's degree course/programme	882 (97.8)	–	12 (1.3)	8 (0.9)
Anatomy offered as human anatomy primarily	722 (80.0)	115 (12.7)	65 (7.2)	–
Anatomy offered as a basic medical science degree	478 (53.0)	120 (13.3)	296 (32.8)	8 (0.9)
Anatomy offered as a biological science degree	177 (19.6)	272 (30.2)	427 (47.3)	26 (2.9)

be a foundational degree for biomedical specialisations. Furthermore, 68% of the respondents perceived Anatomy to be a basic medical science research degree while more than half (56.2%) perceived Anatomy to be a bridge programme for medicine and surgery and 39.1% perceived Anatomy to be a cul-de-sac programme for unqualified medical school prospects (Table 3).

## Knowledge of Programme Philosophy, Course Structure and Importance

Majority of the respondents (70.7%) believed that they are trained for teaching jobs in the universities and higher institution while 71% believed they are being trained as graduates of basic medical science in preparation for the medical school. Furthermore, more than half of the respondents (57.5%) believed they are being trained as medical scientists for the biomedical technology industries and less than half (47.6%) believed they are being trained as medical scientist for the paramedical services (Table 4).

## Interest in Anatomy

Half of the respondents (50.8%) had a moderate interest in Anatomy, while 54.3% had a moderate interest in alternative job opportunities. Interest in teaching, however, was below average (44%) among the respondents. About one third of students (34%) responded that they had high interest in research, less than half (48.1%) had a moderate interest in applied and public services related to Anatomy and a similar percentage (45.7%) had a moderate interest in applied and public services not related to Anatomy (Table 5). Interest in Anatomy was generally high (73%).

**Table 3** Anatomy in Context

Statements	Yes (%)	No (%)	Not Sure (%)	No Response (%)
Requirement for a medical degree	558 (61.9)	160 (17.7)	184 (20.4)	–
Foundational degree for biomedical specialisations	442 (49.0)	175 (19.4)	269 (29.8)	16 (1.8)
Basic medical science research degree	613 (68.0)	90 (10.0)	199 (22.1)	–
A bridge-programme for medicine and surgery	507 (56.2)	166 (18.4)	229 (25.4)	–
A cul-de-sac programme for unqualified medical school prospects	353 (39.1)	208 (23.1)	326 (36.1)	15 (1.7)

**Table 4** Knowledge of Programme Philosophy, Course Structure and Importance

Statements	Yes (%)	No (%)	Not Sure (%)	No Response (%)
Teaching jobs in the universities and higher institutions	638 (70.7)	93 (10.3)	171 (19.0)	–
Graduates of basic medical sciences in preparation for the medical school	640 (71.0)	91 (10.1)	171 (19.0)	–
Medical scientists for the biomedical-technology industries	519 (57.5)	147 (16.3)	236 (26.2)	–
Medical scientists for the paramedical services	429 (47.6)	242 (26.8)	231 (25.6)	–

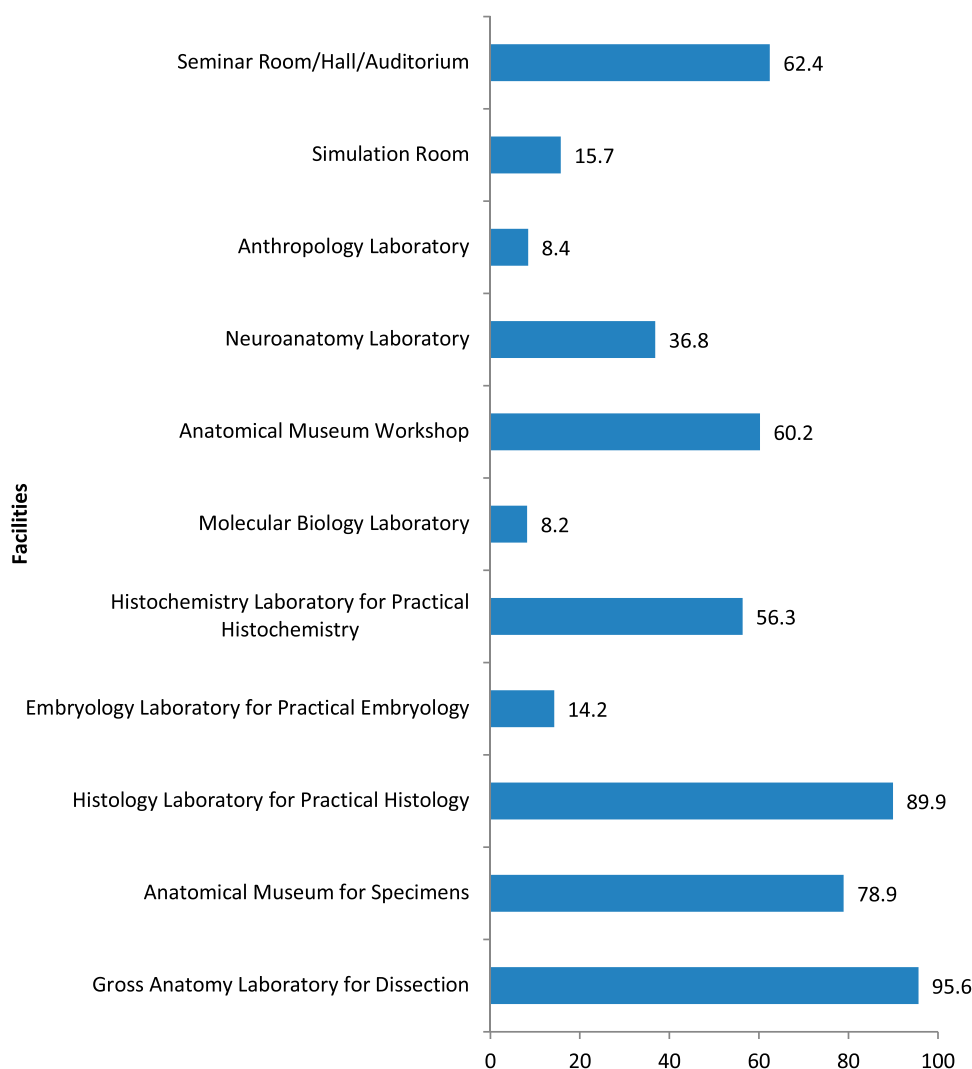
**Table 5** Interest in Anatomy

Statements	Low (%)	Moderate (%)	High (%)
Anatomy	135 (15.0)	458 (50.8)	309 (34.3)
Alternative job opportunities	162 (18.0)	490 (54.3)	250 (27.7)
Teaching	397 (44.0)	353 (39.1)	144 (16.0)
Research	274 (30.4)	304 (33.7)	307 (34.0)
Applied and public services related to Anatomy	205 (22.7)	434 (48.1)	246 (27.3)
Applied and public services not related to Anatomy	232 (25.7)	412 (45.7)	250 (27.7)

However, interest in teaching was relatively average (57%), with interest in alternative job opportunities being higher (69.9%). Likewise, interest in applied fields and public services related to Anatomy (68.2%) was higher than an interest in teaching.

## Training Facilities and Methods in the Schools

Data showed that almost all the respondents (95.6%) had Gross Anatomy laboratory dissection sessions. Also, 89.9% indicated that they had Histology laboratory sessions and 78.9% indicated that they had anatomical museum observation sessions. Availability of seminar room/hall/auditorium and anatomical museum workshop was confirmed by 62.4% and 60.2% of the respondents, respectively. The availabilities of the following facilities ranked low in percentages: anthropology laboratory (8.4%), molecular biology laboratory (8.2%) and Embryology laboratory (14.2%) (Figure 1).



**Figure 1** Available training facilities and methods in your school (%). Gross Anatomy dissection lab and Histology laboratories were the most available teaching and training facilities.

## Types of Specimens and Teaching Aid

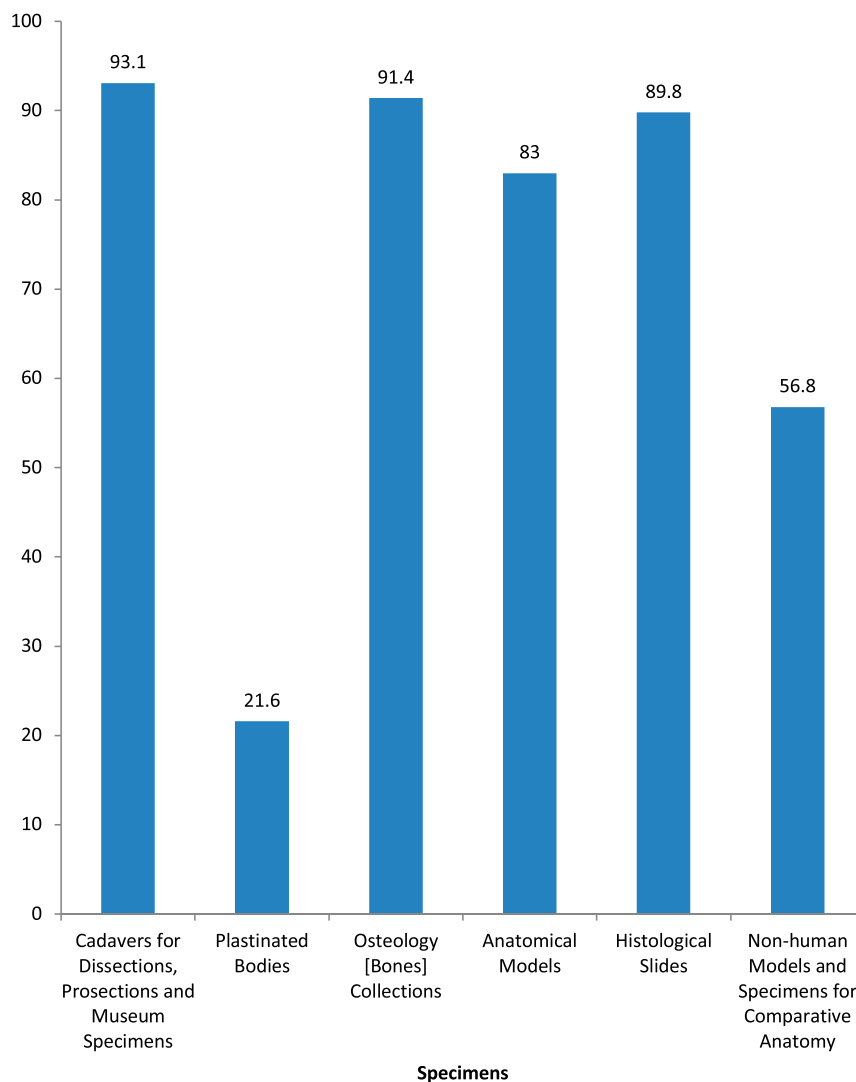
The most available specimen to respondents were cadavers for dissections, prosections and museum specimens (93.1%), followed by osteology (bones) collections (91.4%) and histological slides (89.8%). Plastinated bodies was, however, the least available specimens to respondents (21.6%) (Figure 2).

## Mode of Teaching (%)

It was evident from data that 96.5% of the respondents had classroom lectures method of teaching; likewise, gross dissection method of teaching was also predominant among 92% of the respondents. However, video lectures (20.7%) and simulations of body functions and activities (24.5%) were ranked lowest as modes of teaching (Figure 3).

## Opportunities for Practical Exposure and Industrial Experiences

There were 28.4% of the respondents who indicated that their training included routine regular practical experience compared to 56.5% who did not. Also, 18.5% of the respondents indicated that their training included regular out-of-the-class field experiences eg field anthropological studies. Only, 22.2% indicated that their training included curriculum-based industrial experiences eg 3–6 months of industrial attachment in at least 1 session. Likewise, only 19.8% of the respondents had in-hospital training experience eg 3–6 months of hospital attachment in at least 1 session. However, almost all the respondents (93.8%) had in their training a compulsory final-year supervised research project as a requirement for the award of a bachelor's degree (Table 6). It was also observable



**Figure 2** Types of specimens and teaching aids: Cadavers, osteology collections and Histology slides were the most readily available teaching aids.

that almost all the respondents (93.7%) had neither industrial nor professional experiences (Table 7).

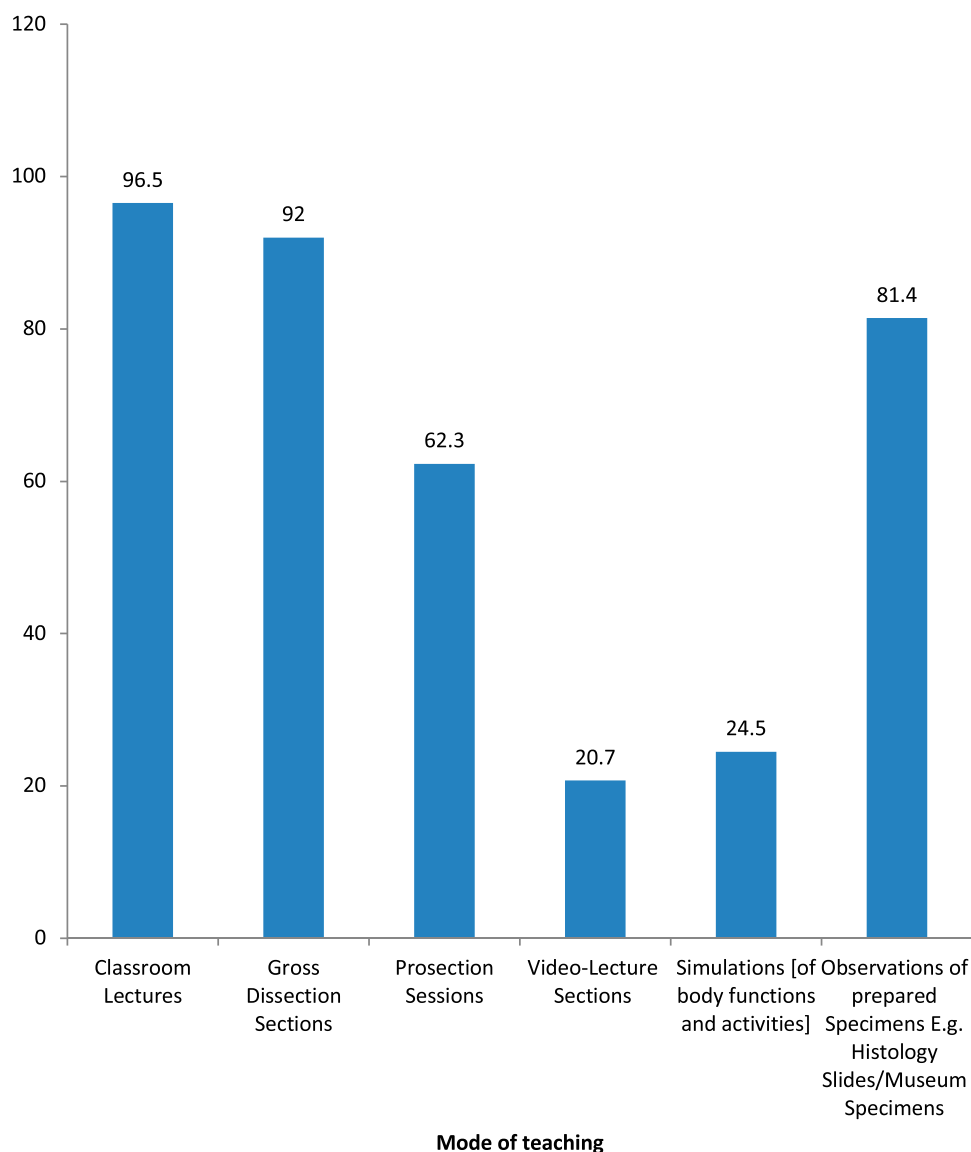
## Knowledge of Career Prospects

Respondents generally indicated their agreement concerning specific job prospects and these were given as percentages [%], while they rated their perceived feasibility of such jobs between 1 [lowest] and 5 [highest] and these were reported as means. The level of knowledge of respondents on availability of jobs in academia was found to be good with a mean of  $3.08 \pm 1.14$  (61.6%), knowledge on the availability of jobs in hospital was, however, low with a mean of  $2.36 \pm 1.00$  (47.2%). Equally, respondents' knowledge about the availability of jobs in industries was low with a mean of  $2.45 \pm 0.88$  (49%), a similar scenario was observed in knowledge on the availability of jobs in public sectors which was also low

with a means of  $2.47 \pm 1.06$  (49.4%). Knowledge on the availability of jobs in the private sector was also relatively average (53.4%). Respondents, however, indicated a very high level of knowledge of the availability of jobs in research institutes (78.2%) (Figure 4).

## Perceived Importance of Anatomical Subjects

In response to questions that assessed the perceived importance of basic anatomical courses, it was found that Histology and Embryology were perceived as being the most important with their importance rated in percentages as at 89.33% and 89.29%, respectively. This, however, was not significantly different from perceived importance of Gross Anatomy at 88.94%. Genetics and Histochemistry were also perceived to



**Figure 3** Mode of teaching: Classroom lectures, gross dissection sessions and observation of prepared specimens constituted the major modes of teaching.

be highly important at 81.89% and 78.86%, respectively (Table 8). Among the selected applied anatomical courses, Research Methods had the highest score based on perceived importance [88.28%], followed by Histological and Histochemical Techniques (85.71%), Anatomical Museum Techniques (84.33%) and Clinical Anatomy (84.31%). Other notable courses that were perceived to be highly important by respondents were: Histochemistry (83.54%), Endocrinology (83.23%), Anthropology (82.76%), Neuroscience (82.62%) and Radiological Anatomy (82.62%). Other rated courses on the basis of perception included Mortuary Science and Remains Preservation (58.27%), Entrepreneurial Anatomy (53.48%), Fundamentals of Anatomical Education (56.74%) and Forensic Anatomy/Morphological Analysis (54.26%)

were the least perceived important of the applied courses (Table 9).

### Other Courses That Were Offered [Taught] in Respondents' Schools

Data showed that almost all the respondents (94.9%) took Physiology courses while 92% took Biochemistry courses. Pharmacology courses were taken by 88.4% of the respondents, similar to Biostatistics (87%). However, community health was only taken by 23.8% of the respondents (Figure 5).

While assessing the basic science subjects taken by respondents [either prior to their university admission or the foundational year], Biology, Physics and Chemistry were taken by 92.3%, 91.1% and 90.1%, respectively.

**Table 6** Opportunities for Practical Exposure and Industrial Experiences

Statements	Yes (%)	No (%)	Not Sure (%)
Routine/regular practical experiences in the hospital	256 (28.4)	510 (56.5)	104 (11.5)
Routine/regular out-of-the-class field experiences	167 (18.5)	525 (58.3)	178 (19.7)
Curriculum-based industrial experience	200 (22.2)	540 (59.9)	130 (14.4)
Curriculum-based hospital experience	179 (19.8)	549 (60.9)	142 (15.7)
Compulsory final-year supervised research project as a requirement for the award of bachelor's degree	846 (93.8)	16 (1.8)	8 (0.9)

**Table 7** Industrial and Professional Experience

Industrial and Professional Experience	Frequency (N=902)	Percentage
Clinical lab posting	3	0.3
Hospital experience	4	0.4
Hospital	4	0.4
Industrial attachment	4	0.4
Industrial experience	4	0.4
Internship	6	0.7
Information technology	11	1.2
Laboratory technician [BUTH and LASUTH]	3	0.3
Medicine and surgery and pharmaceutical	3	0.3
Radiology and histopathology laboratory	4	0.4
Research seminar and research project	3	0.3
Seminar	4	0.4
None	845	93.7

Health Science, however, had the least score (30.5%) (Figure 6).

## Attitude and Opinion Towards the Bachelor's Degree in Anatomy

More than half of the respondents (56.1%) agreed that the Anatomy bachelor's program was very crucial while 13.4% disagreed. Also, 61.1% of the respondents agreed that the Anatomy bachelor's program was required, hence important. Likewise, more than half (55%) agreed that the Anatomy bachelor was necessary. However, 39.8% of the respondents were not sure if the Anatomy degree program would be indispensable. Similarly, 41.1% were not sure whether the Anatomy bachelor program was essential (Table 10). Further analysis showed that more than half

of the respondents (51.7%) had a poor attitude towards the bachelor's degree in Anatomy (Figure 7).

## Themes of Respondents' Personal Insights into Anatomical Education in Terms of Philosophy, Training and Prospects in Nigeria

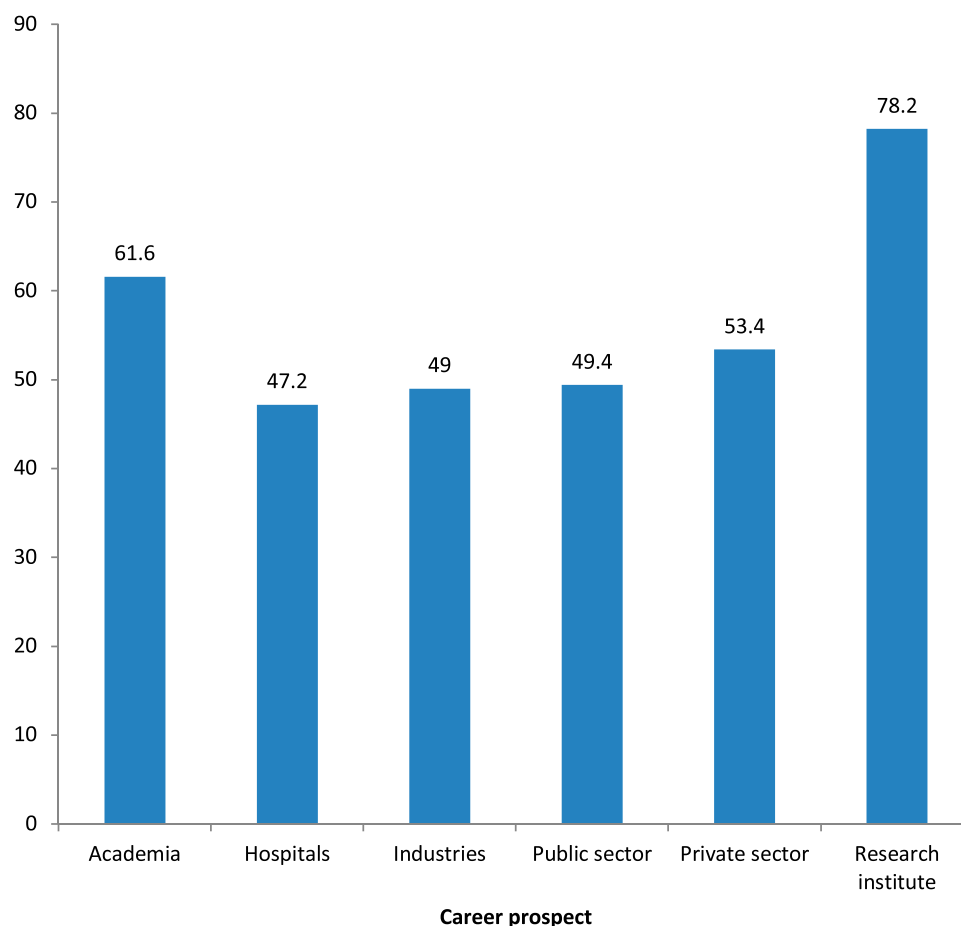
1. Anatomy is a very fundamental and necessary medical science that is of the utmost importance and it is needed in the country but unfortunately fails to be recognised for its importance. This is because it does not fit adequately in the labour market. The Nigerian economy is built to accommodate those traditionally titled and named professional qualifications such as accounting, banking, law and Medicine.
2. The availability of jobs is quite limited, and this puts people off from pursuing Anatomy; therefore the limitation of job opportunities is tied to the perceived little importance of the course.
3. Anatomy in Nigeria has a long way to go, in terms of development and training, more laboratories should be provided, and "external" [industrial and professional] exposure should be facilitated.
4. Student should be made to go for compulsory clinical/field/industrial training in order to gain practical experience and build their work ethics.
5. The curriculum should be restructured to meet the needs of the current job markets.
6. There is the need for intensive awareness in Nigeria on the importance of the Anatomy course for it not to be perceived as an unimportant or intangible course.
7. Adequate awareness will educate prospective undergraduates and parents and reduce the current confusion about what the prospects of Anatomy are upon graduation.

## Discussion

### General Findings and Background Information

The mean age of Anatomy students in the universities was  $19.09 \pm 1.76$  years. This showed that most of the respondents are of the expected age range in the university in the Nigerian educational system. There were slightly more females than males. This also showed that females were





**Figure 4** Knowledge of career prospects: Most respondents' knowledge of career prospects was about working in research institutes and academia, respectively.

not averse to studying Anatomy in Nigeria and they were not disadvantaged. The distribution of the students based on their states of design followed a pattern that suggests that the distribution by the state of origin reflected the proximities of the students' states to the geographical locations of the school. This also might provide insight into the factors that influence the choices of universities in Nigeria, whereby proximity to the state of origin or residence plays a significant role.

It was important to examine the perspectives from which Anatomy as a subject was considered in the universities and

whether the students had a proper understanding of this. The Anatomy bachelor's degree program in Nigeria was found to be basically a four [4] year program. The overwhelming majority of respondents stated that Anatomy was offered as a bachelor's degree programme. The study showed that the students understood the nomenclature of the program on this basis. Still on nomenclature, it was found out that a significantly large percentage [80%] of students understood that Anatomy was offered primarily as Human Anatomy. Furthermore, about half [53%] agreed that Anatomy, as offered in their institution, was a basic medical science while 19.6% would consider it to be a biological science program. It was clear that respondents [80%] largely perceived the Anatomy primarily as Human Anatomy and this was the overwhelming consensus. It was clear that the Anatomy program in Nigeria is currently structured as Human Anatomy in the context of basic medical sciences. It would be necessary to emphasise the need for students to appreciate the Anatomy program as a basic medical science program as purposed by the government of Nigeria through its regulatory arm and

**Table 8** Perceived Importance of Basic Anatomical Courses

Courses	Mean	Standard Deviation	Percentage
Gross Anatomy	2.67	0.610	88.94
Histology	2.68	0.548	89.33
Embryology	2.68	0.561	89.29
Genetics	2.46	0.751	81.89
Histochemistry	2.37	0.753	78.86

**Table 9** Perceived Importance of Applied Anatomical Courses

Courses	Mean	Standard Deviation	Percentage
Teratology	2.05	0.847	68.47
Human Reproductive Technologies	2.13	0.851	71.11
Biostatistics	2.40	0.738	79.94
Molecular Biology Genetic Engineering	2.22	0.820	74.06
Introduction to Histopathology	2.23	0.835	74.23
Developmental Mechanics	1.95	0.810	65.14
Applied Anatomical Sciences and Skills	1.87	0.868	62.38
Fundamentals of Anatomical Education	1.70	0.812	56.74
Mortuary Science Remains Preservation	1.75	0.792	58.27
Entrepreneurial Anatomy	1.60	0.725	53.48
Forensic Anatomy Morphological Analysis	1.63	0.775	54.26
Neuroscience	2.49	0.760	82.99
Anatomical Museum Techniques	2.53	0.732	84.33
Radiological Anatomy	2.48	0.788	82.62
Histological Histochemical Techniques	2.57	0.694	85.71
Anthropology	2.48	0.725	82.76
Clinical Anatomy and Clinical Examination	2.53	0.696	84.31
Histochemistry	2.51	0.706	83.54
Research Methods	2.65	0.707	88.28
Biomedical Genetics	2.48	0.741	82.63
Cell Biology and Tissue Culture	2.42	0.815	80.68
Endocrinology	2.50	0.750	83.23

agency known as the Nigerian University Commission.<sup>12</sup> The students' level of awareness should be increased as this would influence their understanding of the context of their training.

According to the NUC:

The general philosophy of the programme is to produce graduates of high academic standing with adequate practical exposure who can function adequately in the medical education process, complement ancillary laboratory medical services to

the greater society and develop entrepreneurial expertise in related disciplines.

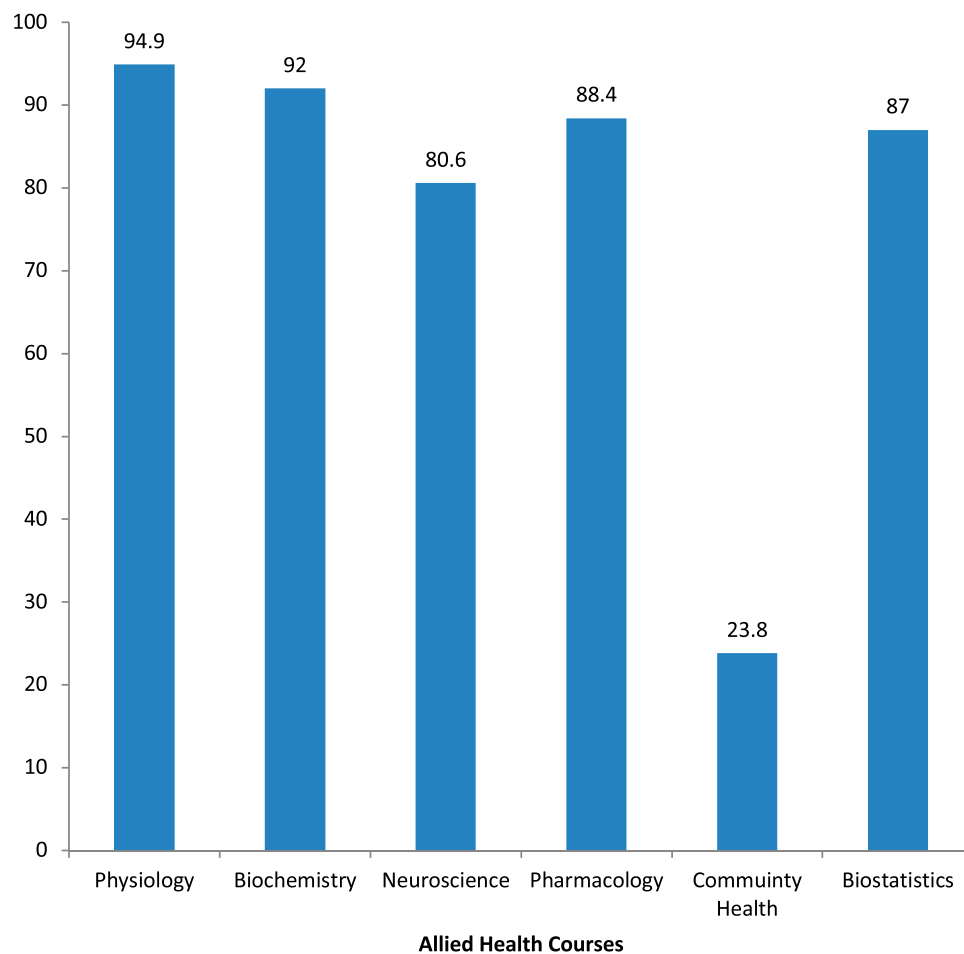
Furthermore, "aim and objectives" as published by the NUC is to produce graduates with competences to serve as medical and allied health educators and researchers who are also skilled users and managers of laboratory equipment and facilities.<sup>12</sup>

## Anatomy in Context

It was observable that a larger percentage of the respondents perceived Anatomy as a requirement for them to proceed unto their pursuit of a medical degree [61.9%], while about half [49%] would perceive Anatomy as a foundational degree for biomedical specialisations. To further probe their mindset, the question was asked about what Anatomy program might be to them and more than half of respondents perceived Anatomy as a bridge programme for Medicine and Surgery [56.2%]. The study also further probed a purported perception by certain students that Anatomy was a "cul de sac" programme (dead end) for unqualified medical school prospects. In their response, 39.1% of students responded in affirmative. This was perceived as being unhealthy for the Anatomy program in the current Nigerian context. If about two out of every five students would think that their training barely leads anywhere important and significant; it calls for more effort to be put into enlightening students on their career prospects while the training should also emphasise prospective fields and areas of job and employment opportunities. In addition, the fact that several students that were enrolled in the programme believed that the program served as a bridge to a medical school opportunity than anything else might have also influenced their insight into the importance of Anatomy as an end to itself in addition to being a means to other ends including medical school training. In an earlier study, Obaje et al<sup>13</sup> had reported that students opined that Anatomy was not promising because of poor government policies, interest and support as well as limited career and job opportunities.

## Knowledge of Programme Philosophy, Structure and Importance

Results on students' knowledge of course structures and importance indicated that most respondents believed that they were being trained for teaching jobs in the universities and higher institutions [70.7%]. They also believed they were being prepared as graduates of basic medical



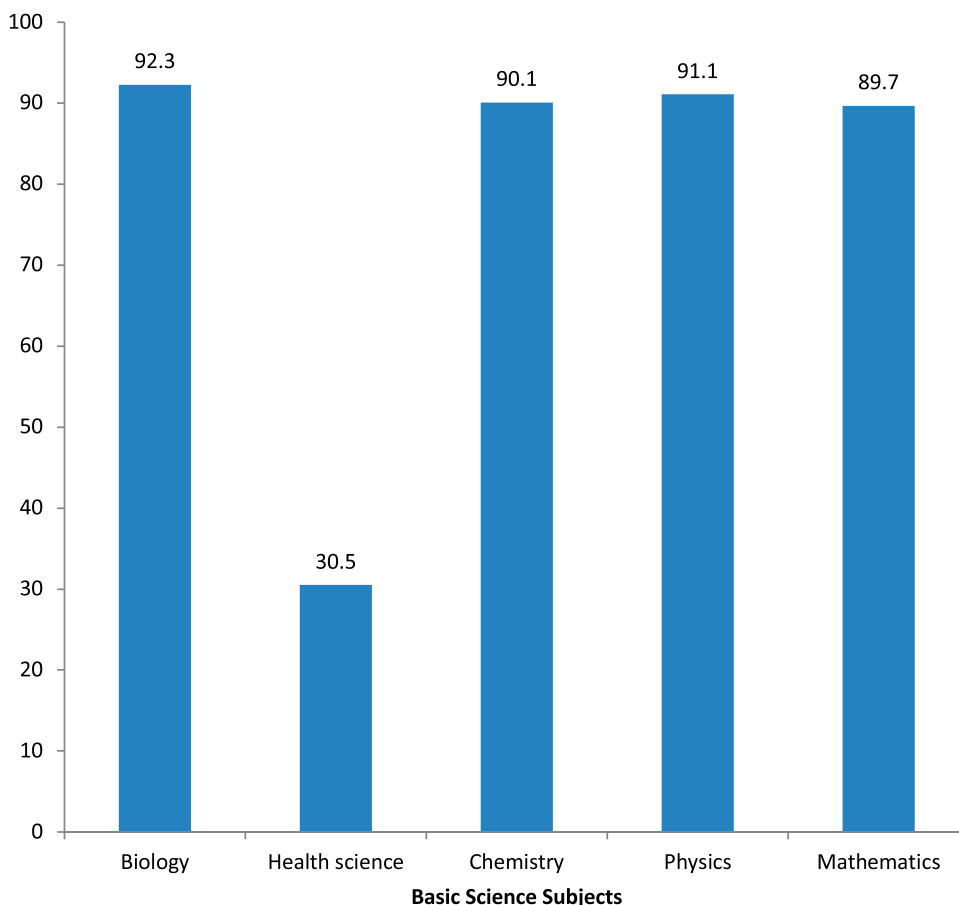
**Figure 5** Other allied health courses offered by respondents. Responses indicated that Anatomy students took courses from sister basic medical science fields generally, except community health.

sciences in preparation for the medical school [71%]. When asked whether they thought their training included preparations of medical scientists for the biomedical technology industries, 57.5% of respondents responded in the affirmative. From the results 26.8% of the respondents did not agree that that training would prepare them for a career in the paramedical services, 25.6% were unsure about this prospect while 47.6% answered in the affirmative. Interestingly, most Nigerian universities that train anatomists would state in their philosophies that they were training medical scientists as medical and allied health school educators as well as basic medical scientists for the industries. However, students appeared to think that the latter was much less feasible than just being a medical school teacher and proceeding to medical schools for medical education. There is, therefore, the need to emphasise training and skill acquisition to prepare Anatomy undergraduates for specific and realistic jobs in the industries. The current results showed that emphasis is largely

laid on knowledge acquisition or the cognitive domain, in the basic sub-disciplines of Anatomy. The skills or psychomotor and the affective domains appear to suffer from inadequate attention and emphasis, hence might be deficient. This had been previously reported by Ebeye et al.<sup>14</sup>

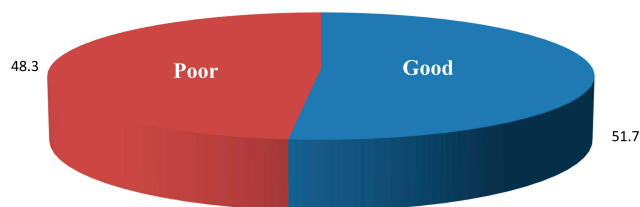
### Interest in Anatomy

Respondents were asked to rate their interest in Anatomy (1 being the lowest, 2 being moderate and 3 being the highest). From the responses, it could be observed that the respondents generally had a moderate interest in the Anatomy program and its prospects. In rating their interests in Anatomy, 15% of the respondents rated their interest as “low”, 50.8% of the respondents rated their interest in Anatomy as moderate while 34.3% of the respondents rated their interest in Anatomy as high. In rating their affinity for alternative job opportunities 18% had a low interest, 54.3% had a moderate interest while 27.7% had a high-interest rating. While rating their interest in teaching, 44% had a low interest, 39.1% had



**Figure 6** Basic science subjects offered. Most respondents took the pre-university science subject collections except Health Science.

a moderate interest in teaching, 16% had a high interest in teaching while 0.9% did not respond. Rating the interest in research, 30.4% had low interest in research, 33.7% had a moderate interest in research and 34% had a high interest in research, while 1.9% did not respond to this. Interest in applied and public services related to Anatomy, 22.7% had



**Figure 7** Attitude towards the bachelor's degree in Anatomy. Responses were almost balanced between poor and good; with the poor attitude having a slightly higher proportion.

**Table 10** Attitude and Opinions Towards the Bachelor's Degree in Anatomy

Statements	Yes (%)	No (%)	Not Sure (%)
Anatomy bachelor's programme is very crucial	506 (56.1)	121 (13.4)	275 (30.5)
Anatomy bachelor's is required	551 (61.1)	110 (12.2)	241 (26.7)
Anatomy bachelor's is necessary	496 (55.0)	91 (10.1)	288 (31.9)
Anatomy bachelor's is indispensable	349 (38.7)	171 (19.0)	359 (39.8)
Anatomy bachelor's necessary is very crucial	358 (39.7)	130 (14.4)	371 (41.1)

low interest in applied services related to Anatomy, 48.1% had a moderate interest in applied services related to Anatomy, 27.3% had a high interest while 1.9% did not respond. In rating their interest in applied and public services not related to Anatomy, 25.7% of the respondents had a low interest, 45.7% of the respondents had a moderate interest, 27.7% had a high interest while 0.9% did not respond. Generally, students' interest in teaching and research as anatomist appeared to be average or less. There is again, evidence, showing that efforts should be put into factors and practices that can genuinely inspire students' interest in

the defined prospects of this programme as stated in the curricula of schools. It might be much healthier if these students generally would have moderate to high interests in the key areas of teaching and research.

## Training Facilities, Methods, Specimens and Teaching Aids, Opportunities for Practical Exposure and Experiences

The quality of training facilities and methods evidently affected the interest of students. From the result, the training facilities that these schools had were the basic facilities like the gross anatomical laboratory for dissection. Furthermore, the different types of specimens that were used for teaching were the cadavers (for dissection and prosections), the histological slides for microscopy. It could be deduced that these teaching aids helped to improve the interest of students in these areas. It is known that the mode of teaching can greatly influence the attitude of students in Anatomy because proper use of specimen studies and observations in forms of cadavers, samples, organs and histological slides can significantly enhance learning.<sup>5</sup> Generally, it is known that practical experiences or exposure could enhance learning, understanding and assimilation.<sup>15</sup> Furthermore, the primary pedagogy or mode of teaching that was employed in the schools that were considered in this study was the didactic classroom lecture. It might be helpful if these institutions and departments would make use of the provision of the NUC BMAS<sup>12</sup> that stated as a requirement, a semester of attachment to clinical and/or laboratory facility for hands-on experiences.

## Knowledge of Career Prospects, Attitude and Opinion Towards the Bachelor's Program in Anatomy

The student's awareness of career prospect was limited. The ratings obtained from the result showed that careers as teachers or researchers were likely to be the only job opportunities for these students when they become graduates. The attitude of the students towards getting a Bachelor of Science [BSc] degree in Anatomy was almost balanced between being good and poor. This is not in any way a good indicator of prospect for the bachelor's degree in Anatomy. The factors that were responsible for the less than healthy attitude and opinions of students about the program should be tackled adequately. This is important because students' motivation about their career prospects and fulfilment significantly influences their motivation and commitment to their studies. Previous studies, including the reports

of Owolabi et al<sup>5</sup> and Ebeye et al<sup>16</sup> found out that students' lack of interest in Anatomy was partly due to the fact that Anatomy was not their primary choice when they applied to the universities for admission. Furthermore, training methods should advance in line with modern trends and demands towards solving societal problems. Technology would help if properly deployed and adapted to the training of anatomists. While the ancient and conventional methods of dissections, microscopy and didactic lectures have persisted; technology and innovations would greatly add value to the training of anatomists and improve prospects and employability.<sup>17</sup>

## Respondents' Personal Insight into Anatomical Education in Terms of Philosophies, Training and Prospects

The themes of students' response could be summed up to imply that the current quality of training should be improved upon to provide skills for employment in fields that extend beyond academia. There should be clearly defined career prospects for the trainees which can be achieved through quality awareness and clear job descriptions upon graduation. Respondents generally wanted the programs to be enriched with more practical hands-on training to acquire skills and expertise through adequate exposure in the laboratories, clinics, training fields and relevant industries and institutions. While Didia and Olotu<sup>18</sup> had advocated for the expansion of career opportunities into forensic sciences – especially Forensic Anthropology, Forensic dactyloscopy, Forensic DNA analysis, Forensic Podiatry and others including Forensic facial reconstruction and Forensic photography – such results can only be achieved with adequate training that would facilitate the acquisition of relevant competencies, skills and expertise. It is also important to appreciate the evolution of Anatomy as a science over the years and put the training in proper perspectives.<sup>19</sup>

## Final Remarks

This research has significantly contributed to knowledge especially in the area of Anatomical education which currently requires more attention. It is worthy of note that less than significant research and publications exist on Anatomy education in Nigeria. This research, to the best of our knowledge, is the largest population study on Anatomy education ever in Nigeria. Therefore, we hope that it will contribute to career development, improvement of training and strategic policy change.

## Conclusion

Findings from this study showed that the students had a moderate interest in pursuing a career in Anatomy. It also provided evidence that perceived poor job prospects, lack of clearly defined career paths and poorly structured training methods that lack adequate competence-based training strategies affected students' opinions negatively and might influence their career advancements. Training emphasised the cognitive domain [robust theoretical knowledge] but it appeared limited in the psychomotor and affective domains. We, therefore, recommend curricular review and strategic restructuring of training methods in line with the competences that are expected of the Anatomy program graduates. The use of diverse pedagogies and the introduction of educational technology and innovations will also be of help.

## Disclosure

The authors report no conflicts of interest in this work.

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