

Original Article

Research awareness and engagement among medical students in Maiduguri, northeastern Nigeria.

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Abstract

Introduction: In recent times, Africa has been afflicted by unique disease burdens with high mortality rates. Despite the significance of medical research towards exploring problems and implementing strategies, research engagement is low. Medical students' participation in research is underrated, as future physicians, research skills are crucial for evidence-based medical practice. Understanding their knowledge, attitudes, and barriers toward research is vital for promoting effective research engagement. **Methodology:** A cross-sectional study was conducted among undergraduate medical students at the University of Maiduguri. Data was collected with a pre-tested self-administered questionnaire on Google Forms. Data analysis was done using IBM Statistical Package for Social Sciences software (SPSS) version 27. Results were presented in frequency tables. The chi-square test was used to test the association between variables, with the level of significance set at 5% ($p < 0.05$). **Results:** The study participants had a mean age of 24.02 ± 2.85 . Overall, 23.9% demonstrated good knowledge of research, 54.9% had an average level of knowledge, and 21.2% showed poor knowledge. Further more, 37.9% of respondents had previously participated in curricular or extracurricular research. The Chi-Square analysis identified significant correlations between higher class levels, direct entry students, and prior research experience with good research knowledge. Barriers to research engagement included lack of mentoring (82.2%), time constraints (77.3%), insufficient motivation or reward (71.6%), and lack of funding (67.8%). **Conclusion:** This study showed that despite medical students' average knowledge of research, they had a positive attitude towards participating in research.

Keywords: Barrier, Knowledge, Participation, Research, Student.

Introduction

Medical research is an essential component of medical education and healthcare development.^{1,2} The research competence of medical doctors is fundamental to medical advancement, the incorporation of scientific evidence into patient care, and the intellectual capacity building of the clinician for better healthcare outcomes.^{3,4} Medical students' engagement in research at the undergraduate level is vital in order to equip students with adequate research skills, develop a positive attitude towards research

participation, and spur interest in evidence-based medical practice.⁴⁻⁶

Furthermore, in Africa, despite its unique disease burden, it has been ascertained that there is a comparatively low research output and a huge reliance on foreign scientific evidence applied to its peculiar clinical practice.^{2,3} Despite the significance of medical research towards exploring problems and implementing strategies and policies of national advancement, research engagement is relatively low,

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which makes medical students' involvement in research unappreciated and an afterthought.^{7,8} To curb this decline in physician-scientists and augment the research productivity of academic and health institutions, especially in developing countries, physician-scientists have to emerge from future doctors to avoid the retardation of medical advancement and evidence-based clinical practice.^{2,9} In addition, students in high-income countries are comparatively more engaged in research, thereby improving the research output of the institution and also being involved in making major scientific discoveries;⁴ As a result, higher education institutions maintain and grow their global ranking and prestige, which is established by their research productivity along with the quality of education.

Although interventions have been put in place to augment research output through the implementation of research methodology in the medical education curriculum of many developing countries,^{2,3,6,9} In Nigeria, it is a mandatory prerequisite for final year medical students to carry out a research study under the supervision of a medical faculty staff as a prerequisite for graduation from medical school. However, most medical students do not acquire and hone their research skills due to the short period the research study is conducted, which is their first research exposure; students develop a negative attitude towards research. Medical students, therefore, see research participation as a must have criteria for graduation rather than a foundational skill as a clinician.¹⁰ The research projects of the students are mostly not publication-worthy; therefore, student research output does not augment the research productivity of the institution.^{4,10}

Inadequate or limited research exposure and engagement amongst medical students can give rise to future doctors with research incompetence or lack of research skills to contribute findings and evidence to local and global medical knowledge, inability to keep up with the ever-expanding knowledge of medicine, and retard evidence-based practice in healthcare.^{2,10,11,12}

Unlike other low- and middle-income countries, there is a paucity of published studies assessing the factors influencing students' research participation in medical schools across Africa.³ Most medical students in sub-Saharan Africa are not aware of research significance to medical education and clinical practice; therefore, the study aims to assess medical students' knowledge, attitude, and identify perceived barriers towards medical research participation at the University of

Maiduguri, Maiduguri, Borno State, Nigeria.

The findings and results of this study are imperative to recommend strategies to allow medical students to gain indispensable skills and intangibles like critical thinking, appraisal of data, collaboration, self-discipline, and time management thus reducing the inadequate number of physician-scientists and helping emerging countries like Nigeria achieve self-sufficiency in medical research and evidence-based practice, foster the institution and country's contribution to medical advancement.^{4,6,13,14}

Materials and methods

Study design, sampling, and population.

This was a quantitative cross-sectional study of undergraduate medical students at the College of Medical Sciences, University of Maiduguri, Maiduguri, Borno State. The study population comprised second to fifth year undergraduate medical and dental students at the College of Medical Science, University of Maiduguri, Borno State, who provided consent to take part in the study. However, first-year and final-year undergraduate medical students were excluded because basic and premedical science courses are taken during the first year, and at the time of the study, final-year medical students had already taken their requisite research methodology classes.

Ethical consideration

Ethical approval was obtained from the health research ethics committee of the College of Medical Sciences, University of Maiduguri, Maiduguri, Borno State. The aim of the study was briefly described to the study participants, and verbal consent was sought from the respondents before they filled out the Google form.

Study instrument, data collection, and data analysis.

The questionnaire was an online, structured Google form with closed-ended questions adopted from previous studies.^{2,3,4,15} The questions were modified to fit the local context of our study population and reviewed by expert faculty academic staff for content, validity, and reliability. It was pre-tested by undergraduate students of the Faculty of Sciences to validate its comprehension and determine the duration of completion.

From each class surveyed, a student of good repute was recruited for the conduct of the study to reduce the risk of coercion and assist in the dissemination of the Google form link. Data collection was carried out from the 4th of July 2023 till the 26th of August 2023, after which the Google form link was closed.

The data collected was reviewed and entered into Microsoft Excel to avoid errors. Data cleaning was

done before analysis to exclude incomplete, inconsistent, or inaccurate data.

Data analysis was carried out using IBM Statistical Package for Social Sciences (SPSS) Software Version 27. All the Categorical variables were described using percentages and frequency distributions. The chi-square test was used to test for a significant association between categorical variables (sociodemographic characteristics against knowledge and research practice). Hence, a probability of <0.05 was considered statistically significant for all tests of significance.

Results

Two hundred sixty-four (264) undergraduate medical students participated in this study. The sociodemographic characteristics of the participants in this study are presented in Table 1.

Table 1: Sociodemographic Characteristics

Characteristic	Frequency (%)
Sex	
Male	171 (64.8%)
Female	93 (35.2%)
Age	
≥ 20	23 (8.7%)
21 -25	167 (63.3%)
26 - 30	69 (26.1%)
≤ 31	5 (1.9%)
Mean ± Standard Deviation	24.02 ± 2.85
MBBS/BDS Level (Class at the time of Study)	
MBBS/BDS 2	66 (25.0%)
MBBS/BDS 3	62 (23.5%)
MBBS/BDS 4	72 (27.3%)
MBBS/BDS 5	64 (24.2%)
University Entry Point	
UTME (Including Remedial Studies)	243 (92.0%)
Direct Entry	21 (8.0%)
Secondary School Background	
Public School	47 (17.8%)
Federal Public School	51 (19.3%)
Private School	166 (62.9%)

Most of the participants were male (64.8%), with a smaller proportion of females (35.2%), totaling 264 participants. The age distribution showed that most participants were between 21 and 25 years old (63.3%), with a mean age of 24.02 ± 2.85 .

The participants were almost evenly distributed across the four MBBS/BDS classes surveyed at the time of the study, with the largest group being MBBS/BDS 4 (27.3%). Most participants entered the university through UTME (92.0%), and the majority had a secondary school background in private schools (62.9%).

Table 2 illustrates the knowledge of participants regarding medical research. A significant number of participants correctly identified that medical research is not solely conducted in hospital settings (42.0%) and is not principally concerned with experiments to develop new drugs (67.0%). A high percentage of participants recognized the importance of writing research proposals (89.8%) and the necessity of obtaining consent from research participants (85.2%). However, less than half were familiar with Google Scholar (42.4%), and a significant majority considered Microsoft PowerPoint a useful analytical tool in research (75.8%).

The overall knowledge score (Table 3) showed that 54.9% had an average level of knowledge, 23.9% had a good knowledge score, and 21.2% had a bad knowledge score.

Participants' attitudes towards research engagement were generally positive. A majority agreed or strongly agreed that research skills are beneficial for their future medical careers (95.1%). In terms of practice, as indicated in Table 4, only 37.9% of participants had been involved in curricular or extracurricular research, and 31.8% had attended any research methodology workshop or training.

Barriers to research engagement were identified in Table 5. The most common barriers reported by participants included lack of adequate research mentoring and professional supervision (82.2%), lack of ample time for students to engage in research (77.3%), and lack of motivation or reward for engaging in research (71.6%).

The Chi-Square analysis in Table 6 revealed significant associations between MBBS/BDS level and knowledge score, university entry point, and research experience with knowledge score.

Table 2: Student's Knowledge of Research

Question	Frequency (%)	
	Correct Answer (%)	Incorrect Answer (%)
Is medical research best conducted in a hospital setting?	111 (42.0%)	153 (58.0%)
Is medical research principally concerned with experiments to develop new drugs?	177 (67.0%)	87 (33.0%)
Do you think writing a proposal is important for the conduct of research?	237 (89.8%)	27 (10.2 %)
Are you familiar with Google Scholar?	112 (42.4%)	152 (57.6%)
Do you know the importance of references?	219 (83.0%)	45 (17.0%)
Is Microsoft PowerPoint a useful analytical tool in research?	64 (24.2%)	200 (75.8%)
Do you think research is conducted by final-year students, postgraduate students, and academic staff only?	190 (72.0%)	74 (28.0%)
Is research grant the clearance required for research to take place?	118 (44.7%)	146 (55.3%)
Are social media platforms (e.g. Facebook) reliable sites to access research articles?	149 (56.4%)	115 (43.6%)
Is taking consent from research participants necessary in the research process?	225 (85.2%)	39 (14.8%)

Table 3: Overall, Knowledge Score

Knowledge Score	Frequency (%)
Good	63 (23.9%)
Average	145 (54.9%)
Poor	56 (21.2%)

Table 4: Prior Research Practice

Question	Frequency (%)	
	Yes (%)	No (%)
Have you been involved in curricular or extracurricular research before?	100 (37.9)	164 (62.1)
Have you previously attended any research methodology workshops or training?	84 (31.8)	180 (68.2)

Discussion

Research is an integral part of healthcare advancement, and it is important that medical students participate in research for improved evidence-based medical practice. We found that though most students had a positive attitude towards research, there was an average understanding of it. Lack of mentoring and supervision in research, lack of ample time for research, and lack of motivation or reward to participate in research were major

deterrents to their participation in research.

This study reported that 23.9% had good knowledge of basic research concepts. This result is consistent with studies conducted in Lagos (21.3%)³ and Rajasthan (9.2%)⁴ that had low percentages of students with a good understanding of research. Our study also reported a higher percentage of students with fair knowledge, a finding similar to surveys in Pakistan¹⁴ and Malaysia.¹⁶ However, this contrasted with findings from studies in Lagos³ and Rajasthan,⁴ where

most students had poor research knowledge. The questions in our knowledge assessment tool, which were adapted from previous studies and simplified further were regarded as basic scientific research questions. This may result in an overestimation of the moderate level of knowledge, as seen in our study.

We also found that students at higher levels of study and those with prior research experience had better knowledge of research methodology. This finding agrees with studies by Awofeso *et al.*³ and Htoo Htoo Kyaw Soe. *et al.*,¹⁶ which showed a positive correlation between a higher level of study, prior research involvement, and a good knowledge score. However, our findings were contrary to the same Malaysian survey,¹⁶ which showed age was positively correlated with good knowledge. The average research knowledge of respondents results from routine class and seminar presentations, term paper assignments, and involvement as research assistants and data collectors for research studies. Community Medicine mandatory course in this study centre also exposes students to basic research processes, concepts, and biostatistics towards the end of their preclinical year, into their clinical year, which tends to improve students' knowledge of research.

Direct Entry (DE) students also showed a positive correlation with having good research knowledge. These DE medical students matriculate into medical school after graduating with a Bachelor of Science degree, after undergoing a mandatory research methodology course and a curriculum-required research project. This level of research exposure improves knowledge of research.

From our findings, only 37.9% of medical students have had prior involvement in research. This was lower than findings in Kenya⁶ and Lagos³, which showed 52.9% and 38.4% of students were involved in research, respectively. However, our result surpassed findings in Uganda,² Egypt,¹¹ and Rajasthan⁴, which reported comparatively lower research participation at 30.2%, 23.8%, and 7.3%, respectively. Nonetheless, this participation in research could be students serving as research assistants for academic staff and students engaging in online or physical scientific interest groups, where they are presented with opportunities to participate in research-related activities or assist final-year students in carrying out their curricular required research study. Previous studies highlighted medical students' research from developed countries, contributing immensely to the research output and prestige of a medical school/university. On the other hand, research

participation among medical students in developing countries has not been translated into productive research output for their affiliating institutions.^{3,9,17,18}

Our study also showed that age is positively related to participation in research, findings similar to Kiyimba *et al.*² in Uganda. Our analysis also showed that a higher year of study was not statistically significant with research participation, which is a contrast to reports from Uganda,² Malaysia,¹⁶ the USA,¹⁷ and Sweden¹⁹ that showed students in the clinical year are most likely to take part in research endeavours. This could be because medical students' research participation helps to strengthen their resume and residency application in these countries, unlike medical students in Nigeria.⁹

The medical school mode of entry was also positively related to research participation. This corroborates with Burgoyne *et al.* (20 who outlined the high research involvement in Irish graduate entry medical students. These students had prior research experience and demonstrated research competency when compared to undergraduate medical students. Our study participants showed a noteworthy positive attitude towards research and a high level of interest in research engagement. This is congruent with research conducted in India,⁴ South Africa⁹ and a survey assessing Students' attitudes towards research in the United States of America.¹⁷ This is attributed to students' willingness to develop research skills, which will help them add to their repertoire of skillsets and intangibles, which will be valuable as future physicians and help improve patient care. Notwithstanding, students are faced with barriers to participation in research. Most of the perceived obstacles identified were extrinsic factors, with lack of motivation and inadequate research knowledge as the significant intrinsic factors limiting students' participation in research. Our study highlighted the lack of research mentoring and supervision as a major hindrance to research engagement among medical students, a finding that corresponds to other studies.^{15,21,22} These findings could result from inadequate teacher-student professional relationships to enlighten students on the significance of research and involve students in academic staff research from the early stages. Studies conducted in Maiduguri by Oyeyemi *et al.*⁷ and Bukar *et al.*⁸ assessed the research productivity of academic staff and clearly pointed out the low research productivity, for which medical students' engagement is imperative to augment the research output of the institution as demonstrated in a study conducted in Germany¹⁸ that reported medical

students contributed 28% of publications to medical schools' publication output. Encouragement of faculty members through voluntary involvement in research methodology seminars and webinars, and research collaboration with students will help improve students' participation in research, and in any case, nurtured professional mentorship can bud into a lifelong relationship.²³

Lack of funding is a deterrent to research globally; however, researchers and medical students in developed countries are comparatively reasonably funded. Socioeconomic issues in Nigeria have a tremendous negative impact on research activities. These socioeconomic issues affecting research activities have also been highlighted by studies in developing countries.^{4,16,15,21,23} Therefore, governments, non-government organizations, and institutions need to sponsor medical students' research projects to improve their participation in research. Academic staff with experience and track records of funding should share these opportunities with students to help boost their participation in research. It is crucial that, despite limited resources, students should be encouraged to participate in financially less demanding research projects like synthesizing medical literature for systematic reviews, and research requiring secondary data collection, like retrospective studies, commentaries, and review articles. These are feasible ways for students to take part in research activities, improve their research skills, develop mentor-student relationships, and augment their institution's scientific output.²³

In Nigeria, final-year medical students conduct research projects; however, the lack of ample time for their completion is one of the factors for suboptimal research work unworthy of publication. The lack of allotted time for research is another major hindrance to research participation. Medical students' research is done simultaneously with the demanding workload of medical school, thus limiting time to engage in research activities.^{2-4,15,16,21} In a survey conducted in Maiduguri, the burden of teaching and lack of dedicated time for research have also been highlighted as deterrents to practical research activities among medical staff.^{7,8} The curriculum should be adjusted to provide students and academic staff ample time for elective courses in research methodology and research engagement.

As highlighted by respondents' low-level knowledge of research, there should be more training in research methodology. A study by H.H. Soe *et al.*¹⁶ and Sanjay Kini *et al.*²⁴ showed that a lack of research knowledge

was a significant deterrent to participation in research. Proper training and an active research assistant/mentoring program for medical students will improve their knowledge base, enlighten them on the significance of research, and stimulate participation in research. Students who are involved in research should be acknowledged through financial compensation, prizes, and awards to promote a research-rewarding academic environment. This initiative has been shown to improve medical students' and clinicians' research participation.¹⁹ Several limitations were noted in this study. Firstly, there is recall and responder bias because of self-reported responses. This study was also conducted in a publicly owned medical school in Northeastern Nigeria; thus, these findings cannot be generalized to other areas due to different educational backgrounds and socioeconomic differences. However, this research will catalyse more empirical studies to assess medical students' knowledge and awareness of research and determine the motivating factors behind research participation among students.

Further studies are needed with a sophisticated tool to measure scientific research in-depth for more precise results on students' knowledge of research. Allied health sciences should also be considered subjects for future studies on practice and attitude towards research. Finally, medical faculty staff play a vital role in stimulating students' interest in research. Therefore, it will be novel to appraise medical educators' perceptions towards students' participation in research.

Establishment of a college research administrative unit charged with the responsibility of improving students' and staff research productivity through research resources, workshops, and seminars. Academic institutions should ensure the active involvement of students in scientific conferences by organizing local scientific meetings, and students should be allowed to attend scientific conferences by providing subsidized conference registration fees. Medical school curricula should undergo refining and modification to provide medical students and lecturers with ample time for research and elective activities. Establishment of an institutional research assistant program to improve mentorship and students' research opportunities and contributions to projects. Medical schools should ensure that final-year medical students conduct publication-worthy research projects by undergoing the thorough rigor of the research process to contribute significantly to the scientific literature. Previous research publications

should be a priority for the selection of doctors for medical internships, residency applications, and other medical-related roles. Local and international journals should encourage medical students' publications through free or subsidized publication fees.

Medical students are future doctors, medical educators, and policymakers; medical faculty must nurture medical students' research skills early enough to bridge the gap in biomedical research productivity and contribute to healthcare sufficiency and development.^{16,23}

Conclusion

This study showed that medical students had average knowledge of research, and they had a positive attitude towards participating in research. Lack of mentors, lack of motivation, lack of time, and lack of funding were significant limitations to medical students' research participation. Appropriate interventions like proper mentoring and supervision, provision of funding, and reasonably allotted time for research engagement are vital for productive research participation.

Conflict of interest

All contributing authors declared no financial and non-financial conflicts of interest.

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