An exploration of profile, perceptions, barriers, and predictors of research engagement among resident doctors: a report from CHARTING study

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Abstract

Purpose/Aims: This research aimed to study the profile, perceptions, barriers, and predictors of Nigerian resident doctors’ level of engagement in scientific research.

Methods: This study was a descriptive cross-sectional quantitative survey of 438 resident doctors in Nigeria. This study forms a part of the big CHARTING Study, the protocol of which was published in “Nigeria Journal of Medicine 2019;28:198-205.”

Results: Three hundred and eighteen (72.8%) respondents were male and 119 (27.2%) were female. There were 229 (52.4%) registrars and 208 (47.6%) senior registrars, while residents in surgical versus nonsurgical specialties were 190 (44.5%) and 237 (55.5%), respectively. Three hundred and sixty-eight (85%) respondents had participated previously in research; 67 (15.6%) and 72 (16.6%) had their papers published in local or international journals, respectively; and only 46 (10.6%) had held first authorship positions in peer-reviewed journal publications. The significant barriers to research identified among them included lack of funding, lack of free time, inadequate training/knowledge on research methodology, and the onerous nature of clinical research. The independent predictor of previous engagement with research was years on current job ($P = 0.007$). This was similar to finding for the first authorship of a peer-reviewed article among the respondents ($P = 0.017$).

Conclusion: This study concludes that publication and grantsmanship rates were very low among the surveyed resident doctors, despite their high rate of engagement in research projects. There is a need for increased research capacity building among resident doctors in Nigeria.

Keywords: Academics, Nigeria, publication, research, resident doctors, workplace

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INTRODUCTION
Research is a major driver of innovation and advancement in health care. It has served as the foundation for evidence-based medicine and thus it has defined the various approaches to modern health-care service delivery globally.\[1\]

Engagement in research is a critical component of residency training for post-graduate doctors in Nigeria to this effect, and the West African College of Physicians/Surgeons and the National Postgraduate Medical College have made high-quality research a major pre-requisite for the successful completion of Nigerian postgraduate (a. k. a. residency) training programs.\[2\] Research activities in postgraduate medical/dental training help in remodeling and guiding the thoughts of resident doctors via objective analysis and proper understanding of disease entities. This thus adds value to their knowledge and clinical skills and invariably enhances their problem-solving abilities which ultimately improve patient care.

Even though a research dissertation is one of the compulsory requirements for the attainment of a fellowship award from the postgraduate medical and dental colleges in Nigeria, resident doctors are still also expected to engage in other research activities and as well publish their research findings in reputable outlets. The rationale behind the aforementioned requirements is to enhance the training outcomes of resident doctors during the 4–8 years period of their residency training.\[3\] However, the current level of involvement of resident doctors in Nigeria in research activities is very limited and worrisomely low for non-curricular participation.\[2\]

Residency training in Nigeria is hinged on the tripod of clinical services, research, and training. Resident doctors embarking on these postgraduate medical/dental training programs are expected during training to acquire logical and analytic skills and knowledge in their specific fields of interest; thus, research participation is a very crucial component of their training.\[2\] Research plays a pivotal role in postgraduate training as it empowers critical appreciation, appraisal, and judgment, promotes both imagination and self-education, and as well enhances the acquisition of sound knowledge.

Only scanty literature exists on the research knowledge, attitudes, perception, and challenges among resident doctors in Nigeria.

Based on the above, this study was conducted with the objectives of exploring the profile and practices and also determining the barriers, perceptions, and predictors of participatory engagements in research among resident doctors in Nigeria.

METHODS
Study design and setting
This study was a descriptive cross-sectional quantitative survey of resident doctors in Nigeria which adopted the use of a structured self-administered questionnaire. This study was a part of the bigger CHARTING Study. The protocol of this study had been previously published.\[4\]

Description of study participants in the Nigerian context
Resident doctor
A doctor undergoing postgraduate medical/dental training in any of the accredited postgraduate medical colleges in Nigeria. A resident doctor can be in any of these two categories: registrar and senior registrar.\[3\]

Registrar
A resident doctor who is yet to pass the Part 1 fellowship/membership examination. It normally takes 2–3 years of residency training before a registrar can be eligible to sit for the part 1 fellowship examination.\[3\]

Senior registrar
A resident doctor who has passed the Part 1 fellowship examination and is currently undergoing further residency training but is yet to pass the part 2 fellowship examination. It normally takes another 2–4 years of additional training before a senior registrar can be eligible to sit for the Part 2 fellowship examinations. A fellowship award is issued by the concerned postgraduate medical/dental college after a senior registrar has passed the Part 2 fellowship examination and as well satisfied other given criteria.\[3\]

Study instrument
The data for this study were extracted from the CHARTING study instrument which was a structured paper questionnaire. Five sections (Sections A to E) were utilized: Section A obtained information about the sociodemographic characteristics (including age, gender, cadre, specialty type, and academic qualifications) of the participants; Section B obtained information about the participants’ research practices; Section C obtained information about the factors influencing participants’ engagement in research; Section D obtained information about participants’ perception of research; and Section E obtained information about participants’ perceived barriers to engagement in research projects. Fifteen questions were on perception and were rated in Likert scale of 1–5 (1 = strongly disagree, 2 = disagree, 3 = undecided, 4 = agree, and 5 = strongly agree).

Selection criteria
The criteria for participants’ selection include:
1. Being a resident doctor registered under any of the two accredited postgraduate medical colleges in Nigeria
ii. Being affiliated to any of the Nigerian training centers (i.e., teaching hospitals and medical centers) chosen as the study’s catchment area, in accordance with the study protocol[4]

iii. Giving written informed consent to participate in the study.

**Sampling and sample size**

Multistage sampling was used to select participants, and this has been described in the previously published protocol.[4]

The study’s sample size was determined based on past findings. The prevalence of work-related stress as one of the barriers to research among physicians in developing countries ranges between 52.3% and 57.2%. The sample size, \(n\), was determined using Leslie Kish formula: 

\[
N = \frac{z^2 \times pq}{d^2},
\]

where \(p\) is the prevalence, \(q = 1 - p\), \(z = \) level of significance at 5% (using 95% confidence interval) = 1.96, \(d = 0.05\) which is the level of precision (\(P = 57.2\%), q = 0.428, z = 1.96, d = 0.05\), and 

\[
N = 376.
\]

Based on nonresponse rate of >15%, the sample size was increased to 438.

**Data collection and analysis**

This study was carried out within the period of 8 months (June 2019–January 2020) in which data collection, entry, and analysis was done. The data collection process adopted was in line with the study protocol. A total of 438 questionnaires which met up with the selection criteria were analyzed for the study.

Data analysis was done using SPSS statistical package 23 (SPSS Inc, IBM, Armonk, NY, USA). Continuous variables were summarized using arithmetic mean and standard deviation, whereas the categorical variables were summarized as proportions and frequencies.

Chi-square was used to test the association between the dependent and independent variables, whereas associations between their means were compared using ANOVA. The dependent variables were questions included in the questionnaire to explore the perception, barrier, and practices of medical research among resident doctors, whereas the independent variables were sociodemographic characteristics (e.g., age, gender, and marital status), year of graduation, qualification, year on the current position years of experience, and years since graduation among others.

Binary logistic regression (multivariable analysis) was done to determine the predictors of engaging in research and of ever being a first author of a peer-reviewed article. \(P < 0.05\) was considered significant.

**Ethical considerations**

Ethical approval was obtained from the National Ethics Review Committee, Federal Ministry of Health before fieldwork was commenced in accordance with the National Code of Health Research Ethics Committee (NHREC) (NHREC Approval Number NHREC/01/01/2007–26/06/2019). Written informed consent was also sought and obtained from all consenting participants; hence, only those that were willing to participate in the study after knowing fully well the purpose of the study were recruited for the study. Furthermore, all participants’ identities were kept with strict confidentiality.

**RESULTS**

Not all the 438 respondents responded to all the variables in the questionnaire; hence, the percentages used in the presentation of the study variables were based on the total number of respondents that responded to that particular variable.

Three hundred and eighteen (72.8%) were male and 119 (27.2%) were female, giving an approximated male-to-female ratio of 2.7:1. Two hundred and twenty-nine (52.4%) were registrars, and 362 (85.8%) had graduated from undergraduate medical/dental school at least six years ago. The mean (±SD) number of years spent by respondents after graduation from undergraduate medical/dental schools was 8.54 (±2.99). Only 82 (18.8%) had an additional academic qualification, and the most common was master’s degree (10.1%) [Table 1].

Majority (77.6%) of the respondents had average working hours of more than 40 h/week (self-reported). Also, majority (85.0%) of them had participated in a research work, 147 respondents (33.9%) had presented their research work in public forum, while only 46 (10.6%) had been a first author of a peer-reviewed article [Table 2]. Seventy-two (16.6%) and 67 (15.6%) of the respondents had published their research works in international and local journals, respectively. Only 10 (2.3%) and 9 (2.1%) respondents, respectively, were able to obtain grants from local and international agencies for their previous research or projects [Table 2].

The factors that positively predict resident doctors’ involvement in research were having >8 years postgraduation experience and spending >4 years on the current job with \(P < 0.05\) [Table 3]. Also, having a master’s degree, having >8 years postgraduation experience, and spending >4 years on the current job with were positive predictors of first authorship position in the scientific publications of the respondents \(P < 0.05\) [Table 4].
Comparison between the male and female genders as well as among cadres of registrar and senior registrars showed no significant statistical difference as depicted in Tables 5 and 6.

**DISCUSSION**

The importance of research in evidence-based clinical practice cannot be overemphasized. Resident doctors are future research leaders, especially in clinical fields; it is therefore imperative that there is relevant information concerning research among residents. In the present study, roughly 9 out of every 10 surveyed resident doctors had participated in research work as at the time of this study.

In Nigeria, residency training requires undertaking a research thesis project in order to meet one of the fulfillments required for bagging a fellowship award from postgraduate medical/dental colleges in Nigeria. This requirement applies only to senior registrars as research thesis forms a major component of their Part 2 fellowship examination, unlike those in the registrar category where research thesis submission is not a component required for the eligibility toward Part 1 examination. However, it is very laudable that most of the respondents had some experience in research, despite the fact that over 50% of them were registrars and registrars are not usually required by postgraduate medical
colleges in Nigeria to undertake a major research project at that stage of their training.\cite{3} With this relatively large percentage of these respondents having history of participation in research, it is suggested that more studies should be conducted to assess the depth of knowledge of resident doctors in Nigeria on clinical research methodology, because high rate of participation in research projects does not necessarily translates to deep understanding of research methodology.

We found in this study that only 33.9% of the respondents had presented their research works in various public fora; this observed rate was lower than those reported among Indian (44%) and Pakistani (51.7%) resident doctors.\cite{6,7}

Furthermore, a small fraction of the surveyed resident doctors had been able to publish their research articles in international (16.6%) and local (15.6%) journals; our observed rates are similar to the that reported, by Satav and Wankhede, in an Indian study but was lower than that reported by Sumi et al. among Japanese resident doctors.\cite{6,7} These key research-related activities are important indicators of their research outputs or perhaps an excellent reflection of their contribution to scholarship. This implies that a significant population of Nigerian resident doctors may commence their postresidency careers with their thesis as the only research output. Most (92.6%) of the respondents in this present study considered lack of financial support, or funding, as a challenging factor when it comes to conducting research. This implies that most of them do not have access to research grants which help defray expenses of rigorous research project.

Multivariate analysis showed that more than 4 years on the current job was associated with increased interest in research. This would mean that more years on the residency program increase their chances of publishing. Additional qualifications, however, did not have any significant impact in research probably due to the small proportion of those who had such degree.

**Table 3: Predictors of respondents’ engagements in research**

| Variables | Bivariate analysis | Multivariate analysis |
|-----------|-------------------|----------------------|
|           | Ever participated in any research work | Odds ratio | 95% CI | P | B | Adjusted odd ratio | 95% CI | P |
|           | Yes (%) | No (%) | 1.168 | 0.622–2.194 | 0.629 | 1.124 | 3.079 | 1.351–7.017 | 0.007* |
| Marital status (n=432) | | | | | | | | |
| Married | 292 (85.4) | 50 (14.6) | | | | | | |
| Not married | | | | | | | | |
| Years of graduation (n=418) | | | | | | | | |
| <5 years | 47 (79.7) | 12 (20.3) | 0.649 | 0.322–0.811 | 0.222 | 0.166 | 1.180 | 0.603–2.311 | 0.629 |
| >5 years | 308 (85.8) | 51 (14.2) | | | | | | |
| Years of graduation (n=417) | | | | | | | | |
| <8 years | 169 (80.1) | 42 (19.9) | 0.457 | 0.260–0.803 | 0.006* | 0.166 | 1.180 | 0.603–2.311 | 0.629 |
| >8 years | 185 (89.8) | 21 (10.2) | | | | | | |
| Years on the current job (n=406) | | | | | | | | |
| <4 years | 204 (81.0) | 48 (19.0) | 0.327 | 0.164–0.809 | 0.001* | 1.124 | 3.079 | 1.351–7.017 | 0.007* |
| >4 years | 143 (92.9) | 11 (7.1) | | | | | | |
| Masters (n=434) | | | | | | | | |
| Yes | 38 (88.4) | 5 (11.6) | 1.382 | 0.523–3.653 | 0.513 | | | |
| No | 330 (84.6) | 60 (15.4) | | | | | | |
| PhD qualification (n=433) | | | | | | | | |
| Yes | 1 (100.0) | 0 (0.0) | 1.177 | 1.131–1.225 | 1.000* | | | |
| No | 367 (85.0) | 65 (15.0) | | | | | | |
| Resident duty hours (n=411) | | | | | | | | |
| <40 h | 72 (78.3) | 20 (21.7) | 0.561 | 0.311–1.012 | 0.053 | | | |
| >40 h | 276 (86.5) | 43 (13.5) | | | | | | |
| Call days per month (n=415) | | | | | | | | |
| <7 days | 142 (83.5) | 28 (16.5) | 0.902 | 0.528–1.541 | 0.706 | | | |
| >7 days | 208 (84.9) | 37 (15.1) | | | | | | |
| Educational activities (n=399) | | | | | | | | |
| <7 h | 222 (86.4) | 35 (13.6) | 1.226 | 0.692–2.171 | 0.484 | | | |
| >7 h | 119 (83.8) | 23 (16.2) | | | | | | |
| Duration of research involvement (n=352) | | | | | | | | |
| <7 h | 134 (84.8) | 24 (15.2) | 0.788 | 0.429–1.450 | 0.443 | | | |
| >7 h | 170 (87.6) | 24 (12.4) | | | | | | |
| Age (n=389) | | | | | | | | |
| <30 years | 297 (84.6) | 54 (15.4) | 0.647 | 0.221–1.887 | 0.424 | | | |
| >30 years | 34 (89.5) | 4 (10.5) | | | | | | |

\*x2=7.66, *0.006 x2=10.91, *0.001, n: Total number of respondents per category, CI: Confidence interval
With regard to first authorship in a paper, doctors who had spent >4 years on the current job were more likely to have been first authors in a research paper. The reason why those respondents with the aforementioned attributes are more

### Table 4: Predictors of ever being a first author of a peer-reviewed article among the respondents

| Variables                                | Ever been the first author of a peer-reviewed article | Odd ratio | 95% CI     | P     | B       | Adjusted odd ratio | 95% CI     | P     |
|------------------------------------------|------------------------------------------------------|-----------|------------|-------|---------|---------------------|------------|-------|
| Marital status (n=433)                   |                                                      | 1.277     | 0.574–2.843| 0.548 |         |                     |            |       |
| Married                                  |                                                      | 38 (11.1) | 305 (88.9) |       |         |                     |            |       |
| Not married                              |                                                      | 8 (8.9)   | 82 (91.1)  |       |         |                     |            |       |
| Years of graduation (n=419)              |                                                      |           |            |       |         |                     |            |       |
| <5 years                                 |                                                      | 4 (6.8)   | 55 (93.2)  | 0.551 | 0.190–1.597| 0.266               |            |       |
| >5 years                                 |                                                      | 42 (11.7) | 318 (88.3) |       |         |                     |            |       |
| Year of graduation (n=418)               |                                                      |           |            |       |         |                     |            |       |
| <8 years                                 |                                                      | 11 (5.2)  | 201 (94.8) | 0.267 | 0.132–0.542| <0.001*             | 0.889      | 2.432 | 0.709–8.343| 0.158 |         |
| >8 years                                 |                                                      | 35 (17.0) | 171 (83.0) |       |         |                     |            |       |
| Years on the current job (n=408)         |                                                      |           |            |       |         |                     |            |       |
| <4 years                                 |                                                      | 14 (5.5)  | 239 (94.5) | 0.232 | 0.119–0.453| <0.001*             | 1.280      | 3.597 | 1.253–10.329| 0.017*|
| >4 years                                 |                                                      | 31 (20.1) | 123 (79.9) |       |         |                     |            |       |
| Masters (n=434)                          |                                                      |           |            |       |         |                     |            |       |
| Yes                                      |                                                      | 14 (32.6) | 29 (67.4)  | 5.416 | 2.602–11.275| <0.0001*            | –20.264    | 0.000 | 1.000    |       |
| No                                       |                                                      | 32 (8.2)  | 359 (91.8) |       |         |                     |            |       |
| PhD (n=435)                              |                                                      |           |            |       |         |                     |            |       |
| Yes                                      |                                                      | 0 (0.0)   | 1 (100.0)  | 1.119 | 1.083–1.156| 1.00f               |            |       |
| No                                       |                                                      | 46 (10.6) | 387 (89.4) |       |         |                     |            |       |
| Number of spouses (n=304)                |                                                      |           |            |       |         |                     |            |       |
| Monogamous                               |                                                      | 39 (11.5) | 301 (88.5) |       |         |                     |            |       |
| Resident duty (n=412)                    |                                                      |           |            |       |         |                     |            |       |
| <40 h                                    |                                                      | 14 (15.2) | 78 (84.8)  | 1.615 | 0.822–3.176| 0.161               |            |       |
| >40 h                                    |                                                      | 32 (10.0) | 288 (90.0) |       |         |                     |            |       |
| Call days per month (n=416)              |                                                      |           |            |       |         |                     |            |       |
| <7 days                                  |                                                      | 19 (11.2) | 151 (88.8) | 1.021 | 0.548–1.902| 0.949               |            |       |
| >7 days                                  |                                                      | 27 (11.0) | 219 (89.0) |       |         |                     |            |       |
| Educational activities (n=400)           |                                                      |           |            |       |         |                     |            |       |
| <7 h                                     |                                                      | 21 (8.2)  | 236 (91.8) | 0.581 | 0.301–1.121| 0.102               |            |       |
| >7 h                                     |                                                      | 19 (13.3) | 124 (86.7) |       |         |                     |            |       |
| Duration of research involvement (n=353)  |                                                      |           |            |       |         |                     |            |       |
| <7 h                                     |                                                      | 16 (10.1) | 143 (89.9) | 0.793 | 0.405–1.550| 0.496               |            |       |
| >7 h                                     |                                                      | 24 (12.4) | 170 (87.6) |       |         |                     |            |       |
| Age (n=390)                              |                                                      |           |            |       |         |                     |            |       |
| <30 years                                |                                                      | 35 (9.9)  | 317 (90.1) | 0.489 | 0.201–1.192| 0.161f              |            |       |
| >30 years                                |                                                      | 7 (18.4)  | 31 (81.6)  |       |         |                     |            |       |

### Table 5: Gender difference in perception toward research among the respondents

| Variables on perception                          | Male | Female | P   |
|-------------------------------------------------|------|--------|-----|
| [Mean±SD] Median (IQR)                          | Mean±SD Median (IQR) | |
| RD should be more involved in medical research  | 4.63±0.85 5.00 (0.00) | 4.62±0.71 5.00 (1.00) | 0.899 |
| Training in medical research should be made compulsory among RD | 4.39±0.97 5.00 (1.00) | 4.44±0.72 5.00 (1.00) | 0.627 |
| Medical research will promote Resident Doctors’ appraisal skills | 4.46±0.88 5.00 (1.00) | 4.36±0.67 4.00 (1.00) | 0.292 |
| Medical research among Resident Doctors will improve patient’s care | 4.37±0.89 5.00 (1.00) | 4.28±0.79 4.00 (1.00) | 0.340 |
| Medical research among RD will provide a better understanding of disease | 4.41±0.89 5.00 (1.00) | 4.38±0.65 4.00 (1.00) | 0.755 |
| Medical research among RD will help in changing health policies | 4.36±0.95 5.00 (1.00) | 4.43±0.63 4.50 (1.00) | 0.437 |
| Research will enhance your career               | 4.70±2.98 5.00 (1.00) | 4.55±0.69 5.00 (1.00) | 0.579 |
| Medical research is difficult                   | 2.86±1.61 3.00 (2.00) | 2.87±1.09 3.00 (2.00) | 0.912 |
| Lack of knowledge about medical research        | 4.34±4.60 4.00 (0.00) | 3.84±0.92 4.00 (0.00) | 0.236 |
| Lack of training about medical research         | 4.53±4.34 4.00 (1.00) | 4.18±0.75 4.00 (1.00) | 0.391 |
| Lack of research methodology                    | 4.35±2.39 4.00 (1.00) | 4.25±0.86 4.00 (1.00) | 0.648 |
| Lack of time to engage in medical research      | 4.28±2.41 4.00 (1.00) | 4.28±0.82 4.00 (1.00) | 0.999 |
| Lack of financial support or funding for research | 4.40±0.83 5.00 (1.00) | 4.43±0.74 5.00 (1.00) | 0.714 |
| Lack of facility for medical research           | 4.22±0.93 4.00 (1.00) | 4.29±0.94 5.00 (1.00) | 0.529 |
| Will you carry out research after residency     | 1.28±0.69 1.00 (0.00) | 1.58±0.90 1.00 (2.00) | <0.001 |
| Do you think your future research plans will help you in your career | 1.23±0.63 1.00 (0.00) | 1.22±0.63 1.00 (0.00) | 0.929 |

SD: Standard deviation, IQR: Interquartile range, RD: Resident doctors
likely to hold first authorship positions in published papers is most probably due to the simple fact they are current in the residency training program, which is essentially in tertiary health institutions where senior doctors or faculty are likely to join residents in coauthorship of articles.

Many of our survey respondents were of the belief that training in medical research should be compulsory at all levels of residency training. This is a good opinion that needs to be considered by all stakeholders involved in the residency training program. Furthermore, research had shown that there are limited time, technical skills, and other resources needed for medical research among resident doctors in developing countries, including Nigeria. For instance, some resident doctors in Nigeria had been found to demonstrate poor level of knowledge of biostatistics. Another study in Pakistan showed inadequate knowledge of research among Residents Doctors studied.

Comparing the gender disparity in perception and practice of research among resident doctors in this study, there exists no significant difference in many parameters except that females hope to continue with research following completion of their residency program. The explanation for this pattern is that in Nigeria like many part of the world, medicine is a male-dominated field and females may have the perceived need to work a lot harder in order to make a mark in the ever competitive industry and to remain relevant. Research achievement is a potential distinguishing career feature that keeps one’s relevance, more especially in academic arena. In Chennai, Chellaiyan et al. found that there was no gender difference in the research practices among medical students which was similar to the findings by Soubhanneyaz et al. in Saudi Arabia. Soubhanneyaz et al., however, noted that males were more likely to be engaged in proposal writing than females.

This study did not reveal any significant differences between the perceptions and practice of research among the participating registrars and senior registrars. Both groups agreed equivocally on the need for training on medical research and the overall importance of research to their careers. The compulsory nature of dissertation writing before acquisition of the fellowship degree in the residency training programs may have played a major role in this; hence, all residents are aware of the need to have in-depth knowledge on the principles and practice of medical research for their careers.

More effort needs to be done by the relevant stakeholders to ensure residents doctors are involved in research activities in early stage of their career. This can be attained by provision of more funding, quality mentorship, initiation and promotion of research reward schemes, and support publication fee for articles where resident doctors are first authors.

Some of the limitations to this study include the context of “research,” as used in this study, as research includes various types of work including baseline surveys, clinical trials, narratives, systematic review, and others. Also, the types of research writings (such as editorial, commentary, letter to the editor, review article, systematic review, and others) which the respondents contributed to were not highlighted in this study.

However, it is recommended that the interest of resident doctors in Nigeria should be sustained in research activities while funding should be provided for research activities by all levels of governments and also the training institutions.
CONCLUSION

This study concludes that publication and grantsmanship rates were very low among the surveyed resident doctors, despite their history of high rate of engagement in research projects. Thus, there is a need to support research capacity building among resident doctors in Nigeria. The government at all levels, the training institutions, and as well the trainees (i.e., resident doctors) are stakeholders that should come together and developed workable strategies that will strengthen research capacities of resident doctors in Nigeria.

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Conflicts of interest

There are no conflicts of interest.

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