Women in Nigerian Neurosurgery: A Cross-Sectional Survey

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BACKGROUND: **Although women have made remarkable strides in several medical specialties in Sub-Saharan Africa, their presence and contribution to the development of neurosurgery remain limited. We sought to study the gender differences within Nigerian neurosurgery, identify challenges resulting from these differences, and recommend how African female neurosurgeons can maximize their effects in neurosurgery.**

METHODS: **A structured online survey captured data on neurosurgical infrastructural capacity, workforce, and training from neurosurgical consultants and residents in neurosurgical centers in Nigeria. All the collected data were coded and analyzed.**

RESULTS: **Altogether, 82 neurosurgical consultants and 67 neurosurgical residents from 50 primary medical institutions in Nigeria completed the online survey. Only 8 of the respondents (5.4%) were women, comprising 3 consultants, 2 senior residents, and 3 junior residents. Although 40.2% of the respondents did not believe that being female affected the decision of whether to specialize in neurosurgery, 46.3% believed that being female was a disadvantage. Most did not believe that being female affected admission (57.8%), completion of a neurosurgery residency (58.5%), or life working as a neurosurgeon after graduation (63.4%). The most common challenges women face while navigating through neurosurgery training and practice are erosion of family and social life, lack of female mentors, and lack of a work–life balance.**

CONCLUSIONS: **There is a deficit of both female consultants and trainees among Nigerian neurosurgeons. Identifying female medical students with a strong interest in neurosurgery and providing early mentorship might increase the number of female neurosurgeons.**

INTRODUCTION

Despite global advocacy in recent decades for the awareness of gender imbalances in surgery and adopting a more inclusive approach toward women in surgical

Key words
- Gender-based inequity
- Neurosurgical workforce
- Nigeria
- Women in neurosurgery

Abbreviations and Acronyms
WINS: Women in Neurosurgery

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specialties, women still constitute a minority among surgeons.[1] Worldwide, the emergence of Women in Neurosurgery (WINS) has been against an environment of male dominance and an unfavorable work milieu.[2-5] Although women have made remarkable strides across all continents in neurosurgery, including Sub-Saharan Africa, the universal membership of WINS remains low and was estimated in 2019 at 3200 of a total neurosurgical specialist population of 49,940 (i.e., 6.4%).[6,7] A comprehensive review of African WINS in 2021 identified 243 trained female neurosurgical specialists, more than three quarters of whom were from the northern part of the continent.[7] This pattern of underrepresentation of African women in neurosurgery is most evident in East and West Africa, with a total of 15 and 14 female neurosurgeons, respectively.[8] Although Kenya has the largest population of WINS in Eastern African countries (40%), Nigeria has the most female neurosurgeons in West Africa (36%).[8-10]

In 2014, Dr. Salamat Aliu emerged as Nigeria's first female neurosurgeon after 52 years of evolution of the neurosurgery specialty.[8] This landmark event heralded the graduation of more female neurosurgical specialists during the past 8 years as the general neurosurgical workforce also increased.[11] With the current number at 5 of the total of 132 specialist neurosurgeons in Nigeria (3.8%), a significantly wide gender gap still exists.[12,13] The population of female neurosurgeons in Nigeria is expected to progressively expand over time as more women within this field become increasingly involved in the supervision and mentorship of other female residents and consultants. Given the novelty of WINS in Nigeria, it is unsurprising that no reported data are available on gender-related issues among the Nigerian neurosurgical workforce. This study aimed to explore the gender differences within Nigerian neurosurgery; to identify the challenges to diversity, equity, and inclusion, if any exist; and to suggest potential strategies to mitigate them.

METHODS

Study Design and Setting

A structured online survey was distributed to all neurosurgery consultants and residents to assess the neurosurgical infrastructural capacity, workforce, and training in various neurosurgical centers in Nigeria, as described by Ukachukwu et al.[14] in this issue of the Journal on the methodology we used. Participation in the online survey was voluntary, and all responses were anonymous.

Data Analysis

The collected data were exported to Google Sheets and analyzed descriptively. The data analysis software used included Google Sheets and the R statistical package (R Foundation for Statistical Computing, Vienna, Austria). The barriers to pursuing neurosurgery as a woman and the challenges potentially faced in medical school and during residency and practice as a female neurosurgeon were assessed. A subgroup analysis was used to compare all female and male respondents' perceptions of the effect of being a woman for 6 different stages—admission into medical school, graduating from medical school, choosing to specialize in neurosurgery, admission into a neurosurgery residency, completing a neurosurgery residency, and working as a neurosurgeon. We conducted the same comparison analysis to study the gender perceptions toward the barriers faced by women during medical school and neurosurgery training and working as a neurosurgeon.

Ethical Statement

The Duke Health institutional review board and University of Ibadan/University College Hospital, Ibadan, ethics committee provided ethical approval (Pro00110539 and UI/EC/22/0078. respectively). The study participants completed an online informed consent form and had the option to enroll in a collaborative authorship list.

RESULTS

Demographic Information of Survey Participants

A total of 82 neurosurgical consultants and 67 neurosurgical residents completed the online survey as described by Ukachukwu et al.[14] in this issue. Women comprised 5.4% ($n = 8$) of all respondents, including 3 consultants, 2 senior residents, and 3 junior residents. Survey responses from 22 neurosurgery unit or department heads or residency program directors revealed that the median, mean, and maximum percentages of female applicants into neurosurgery were 0%, 2%, and 20%, respectively. The median, mean, and maximum percentages of current residents in their neurosurgical residency programs who identified as female were 0%, 1%, and 20%, respectively. We analyzed each gender-related question according to the number of responses received for each particular question.

General Trends

When asked about the effects of gender during training, 79.3% of the respondents (including both women and men) did not believe that being a woman affects the ability to gain admission into medical school and 68.3% did not believe that being a woman affects the completion of medical school. Also, 40.2% of the respondents did not believe that being a woman affects the decision on whether to specialize in neurosurgery. Despite this, a combined 46.3% believed that being a woman was either a disadvantage or a strong disadvantage when deciding to specialize in neurosurgery. However, most of the respondents did not believe that being a woman affected medical school admission (57.8%), completion of neurosurgery residency (58.5%), or life working as a neurosurgeon after graduation (63.4%; **Figure 1**).

Perceived Barriers

The greatest challenges during medical school indicated by those who completed the question (both male and female) were erosion of family and social life (54.0%), a lack of female mentors (51.0%), and prejudice from patients and other medical staff (39.0%; **Table 1**). Other barriers included fewer leadership roles, a lack of a school—life balance, a lack of clear institutional policies regarding maternity leave, a lack of networking opportunities, the long-standing stigma against female medical students, a lack of opportunities to assist in surgeries, a lack of recognition for work, less support from supervisors and/or senior colleagues, and a lack of opportunities for research.

In terms of the barriers women face during neurosurgery training, respondents selected the these as the top 3: erosion of family and social life (62.0%), a lack of female mentors (54.0%), and the lack of a work–life balance (39.0%). Other challenges included fewer leadership roles, prejudice from patients and other medical staff, a lack of mentorship during training, a lack of clear institutional policies regarding maternity leave, the longstanding stigma against female neurosurgeons, a lack of networking opportunities, the lack of dedicated research time, less career support from supervisors, a lack of acceptance by the neurosurgery community, a lack of opportunities to operate, a toxic work environment, sexism, preconceived gender-based bias, and the need to do more to achieve equal recognition (Table 1).

Regarding the challenges women face while working as consultant neurosurgeons, the most commonly indicated included erosion of family and social life (46.0%), the lack of a work–life balance (43.0%), and a lack of female mentors (29.0%; Table 1). Other barriers included prejudice from patients and other medical staff, a lack of clear institutional policies regarding maternity leave, fewer leadership roles, difficulty finding preferred consultant employment, a lack of acceptance by the neurosurgery community, a lack of networking opportunities, a lack of recognition for work, the longstanding societal stigma against female neurosurgeons, a lack of dedicated research time, a lack of opportunities for career advancement, less support from supervisors and/or senior colleagues, and unequal pay.

Subgroup Analysis

All the female respondents thought that being a woman did not affect their admission into or graduation from medical school. Three quarters of the female respondents thought that being a woman was a disadvantage when choosing to specialize in neurosurgery (Figure 2). Although most were neutral, ≥20% of the female respondents believed their sex was also a disadvantage when obtaining admission into a neurosurgery residency, completing the residency program, and working as a neurosurgeon. Male respondents were more likely to select that being a woman was a strong disadvantage at various stages in the medical journey. Also, >40% of the male respondents thought that being a woman was either a disadvantage or a strong disadvantage when choosing to specialize in neurosurgery. Furthermore, most male and female respondents selected work–life balance as a challenge for women during medical school and neurosurgery training. Most of the male respondents—>50%—chose this same barrier (work–life balance) as a challenge while working as a consultant neurosurgeon. In contrast, most of the female respondents—>70%—selected the training culture or environment and a lack of career advancement opportunities as the main barriers for female neurosurgeons (Figure 3).

DISCUSSION

Neurosurgery is among the most complex branches of medicine, with the journey to becoming a neurosurgeon extremely daunting.[10] Globally, neurosurgery is still a male-dominated specialty, with only a few female neurosurgeons, especially in low- and middle-income countries, including Nigeria.[2-6,8-10] Women are uniquely challenged and face multiple barriers when entering such a specialty.[10] A recent study showed that more women gravitate toward pursuing lifestyle-friendly surgical subspecialties such as

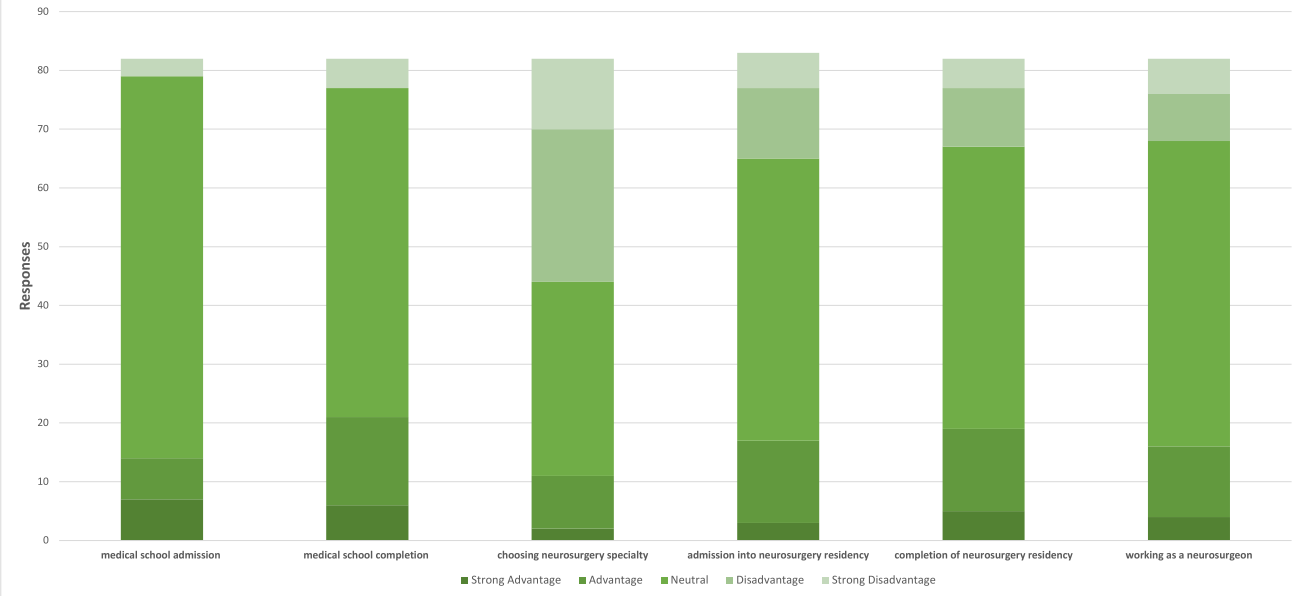

Figure 1. Stacked bar chart showing respondents' views on the effects of being a woman on medical school admission, medical school completion, choosing a neurosurgery specialty, admission into a neurosurgery residency, completion of a neurosurgery residency, and working as a neurosurgeon.

Table 1. Perceived Barriers Women Face in Medical School, Neurosurgery Residency, and Neurosurgery Practice

Barriers	%
In medical school	$n = 96$
Erosion of family and social life	54.0
Lack of female mentors	51.0
Prejudice from patients and other medical staff	39.0
Fewer leadership roles for women	29.0
Lack of a school—life balance	24.0
Lack of clear institutional policies regarding maternity leave	18.0
Lack of networking opportunities	12.5
Longstanding stigma against female medical students	7.3
Limited opportunities for female students to assist in surgeries	6.3
Lack of recognition for work	5.0
Less support from supervisors and/or senior colleagues	5.0
Lack of opportunities for research	4.0
Neurosurgery residency	$n = 95$
Erosion of family and social life	62.0
Lack of female mentors	54.0
Lack of a work—life balance	39.0
Fewer leadership roles for women	24.0
Prejudice from patients and other medical staff	22.0
Lack of mentorship during training	21.0
Lack of clear institutional policies regarding maternity leave	20.0
Longstanding stigma against female medical students	13.0
Lack of networking opportunities	10.5
Lack of dedicated research time	9.5
Less support from supervisors	8.0
Lack of acceptance by the neurosurgery community	7.0
Lack of opportunities to operate	4.0
Other*	4.0
Neurosurgery practice	$n = 93$
Erosion of family and social life	46.0
Lack of a work—life balance	43.0
Lack of female mentors	29.0
Prejudice from patients and other medical staff	17.0
Lack of clear institutional policies regarding maternity leave	16.0
Fewer leadership roles for women	14.0
Difficulty finding preferred consultant employment	12.0
Lack of acceptance by the neurosurgery community	9.0
Lack of networking opportunities	9.0
Lack of recognition for work	7.5
Longstanding stigma against female neurosurgeons	7.5
Lack of dedicated research time	6.5
Lack of opportunities for career advancement	6.5
Less support from supervisors and/or senior colleagues	4.0
Unequal pay	3.0

*Toxic work environment, sexism, preconceived gender-based bias, and the need to do more to achieve equal recognition.

plastic surgery and pediatric surgery, instead of specialties such as neurosurgery due to a lack of family support structures.[9] This survey-based study provides an overview of the current state of this male-dominated field in Nigeria and the barriers to the evolution of women within the specialty.

Effects of Being Female

We found in our study that at different stages, from admission into medical school to working as a female neurosurgeon, respondents believed that being a woman proved to be the most significant disadvantage when choosing to pursue a neurosurgical career. In comparing the responses between the female and male participants, it was observed that male respondents were more inclined to perceive being a woman as a significant disadvantage at all stages of their careers. In contrast, female respondents tended to express a greater tendency toward neutrality or acknowledging the disadvantage to a lesser extent (**Figure 2**). Researchers assessing the perception and interest of clinical medical students in Africa and other parts of the world toward a career in neurosurgery found that most students are of the perception that it is more difficult for women to pursue a career in neurosurgery than for men.[15-17] Furthermore, it was found that students with formal neurosurgical exposure had a stronger consensus than those without regarding the greater difficulties for women pursuing a career in neurosurgery.[15-21] This view is influenced mainly by the clear lack of female representation in neurosurgical departments at all levels of training. Despite the growing numbers of female neurosurgeons globally, stark gender inequalities persist and are even more evident in developing countries, such as Nigeria.[6,8] Women in Nigeria are traditionally restricted to engaging in domestic work and child-rearing. With such notions instilled in their minds, many women are very reluctant to choose a specialty such as neurosurgery due to concerns of balancing a family and a demanding career.[2,3,19] Additionally, the idea of being educated or receiving schooling has been a privilege generally reserved to the men, although this perception is gradually changing. Both conscious and unconscious prejudice exists against female neurosurgeons, and a subtle selection bias is often present when it comes to mentoring a female candidate in a residency program.[4,19-21] Especially in developing countries, where the attitude of some men toward women is judgmental and not inclusive, it is less likely for female candidates to be chosen as mentees.[6]

Barriers and Challenges

Our findings also showed that women in medicine and, ultimately, neurosurgery, face considerable social and cultural barriers during their medical careers. Although one of the first of its kind, these results are similar to the findings from studies conducted in other parts of the world.[6,8-10,18-21] The lack of work–life balance, female mentorship, and career advancement opportunities for women were the main deterring factors for women considering entering the medical field and eventually specializing in neurosurgery in the Nigerian workforce. When comparing the responses of the female and male respondents, most selected work–life balance as a barrier and challenge for women during medical school and neurosurgery training. Most of the male respondents working as a consultant neurosurgeon selected work–life balance as a deterring factor. In contrast, female respondents chose the training culture or environment and the lack of career advancement opportunities as the greater barriers. Additional barriers to neurosurgical training included discouragement from others regarding the lack of an "ideal personality" trait, culture and cultural beliefs related to gender roles, a lack of mentorship, inadequate neurosurgical training opportunities, poor health infrastructure for neurosurgical practice in Africa, poor patient outcomes, and challenges with work–life balance and were some of the outstanding barriers in Africa.[22] Many of these are similar to those we found in this study. These barriers, coupled with the identity of being a woman in Africa, lead to great hurdles when pursuing a career as a neurosurgeon. Delineating the challenges and barriers is an important step toward the development of sustainable mechanisms for the support of burgeoning Nigerian female neurosurgeons.

Female Mentorship

The lack of women in leadership positions and higher academic and professional ranks is widespread.[1-4,8-10,18-21,23-28] In Nigeria, most neurosurgical facilities have between 0 and 1 female neurosurgeon and neurosurgical trainees. We found only 5 female neurosurgeons, with 1 currently working outside of Nigeria. Although we could not ascertain the total number of female neurosurgical residents in Nigeria, only 5 responded to our survey, 1 of whom has access to a female instructor. This finding highlights that no direct female mentorship is available for most female neurosurgical residents in Nigeria. The consistently low

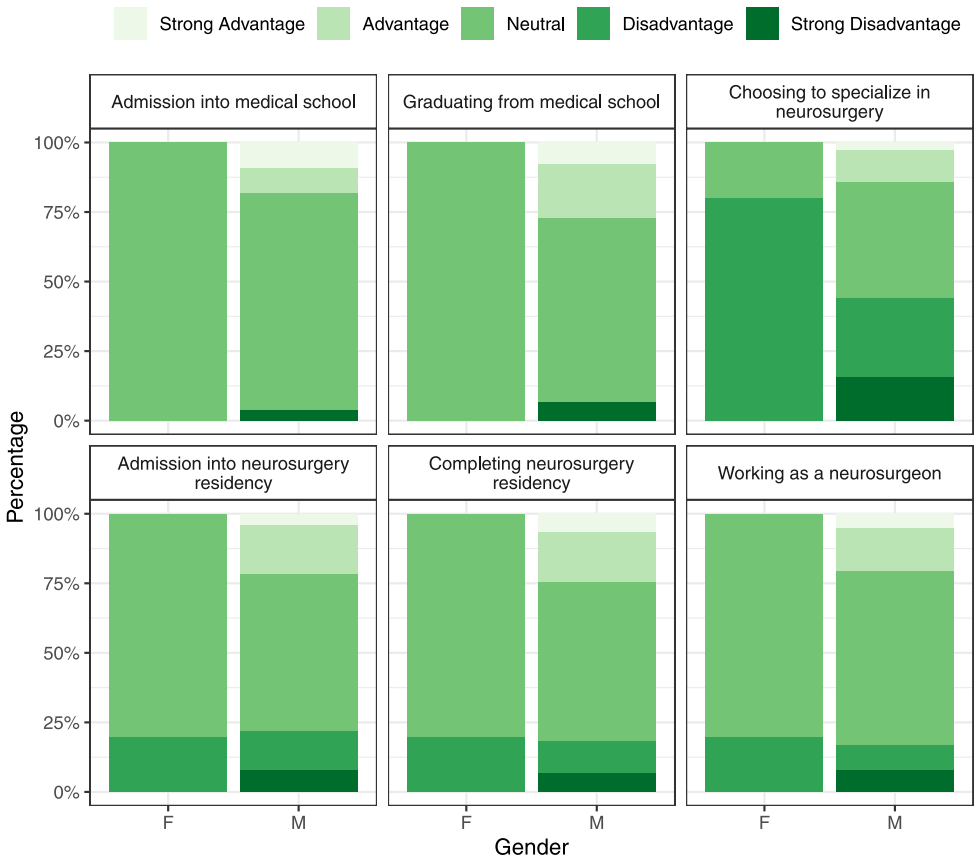

Figure 2. Stacked bar chart showing comparisons of female and male respondents' perception of the effect of being a woman at the different stages of obtaining a medical degree and practicing as a neurosurgeon.

numbers of women in neurosurgery training programs and in the workplace results in a scarcity of female role models for mentoring residents and junior practitioners.[25] The absence of female mentors is believed to be a major contributing factor to the persistent male culture and resultant barrier to career advancement of female academics in surgical specialties.[24,26] This study highlights the deficit of both female neurosurgical trainees and trainers and the consequent mismatch in distribution in Nigeria. Medical students, surgeons, and surgical leaders have acknowledged the value of effective mentorship.[27] The lack of such for female medical students in Nigeria has proved to be one of the hampering factors and a possible cause for the limited female presence in the neurosurgical workforce. The presence of senior female neurosurgeons in practice encourages younger generations of women in the field. With evidence that some female patients actively choose female surgeons, diverse representation could better meet the needs of a diverse patient population.[28] Several initiatives have been instituted to bridge the gender divide such as WINS, which is fostered by the World Federation of Neurosurgical Societies, and has chapter activities within Nigeria.[6,25] These initiatives seek to create a safe space for female neurosurgeons to network, share their experiences, seek advice, and improve mentorship.

Recommendations

Future interventions could focus on identifying female students with a strong interest in neurosurgery and providing early mentorship before these students begin their neurosurgery training. Additionally, we recommend that medical schools and training programs increase their efforts to admit more female candidates based on merit and interest. Fostering the development of female neurosurgeons as role models will include the training and promotion of keen, competent, female trainees and surgeons. With the deficit in female instructors, most of the medical training will be by male instructors. Male neurosurgeons need to be more aware and supportive of women entering the field to create a conducive work environment for all. An increase in the number of neurosurgery training facilities throughout Nigeria would also obviate the need for female trainees to seek training in a distant environment, improving the chances of women to choose neurosurgery as a specialty, because it ensures that they can remain close to their support systems.

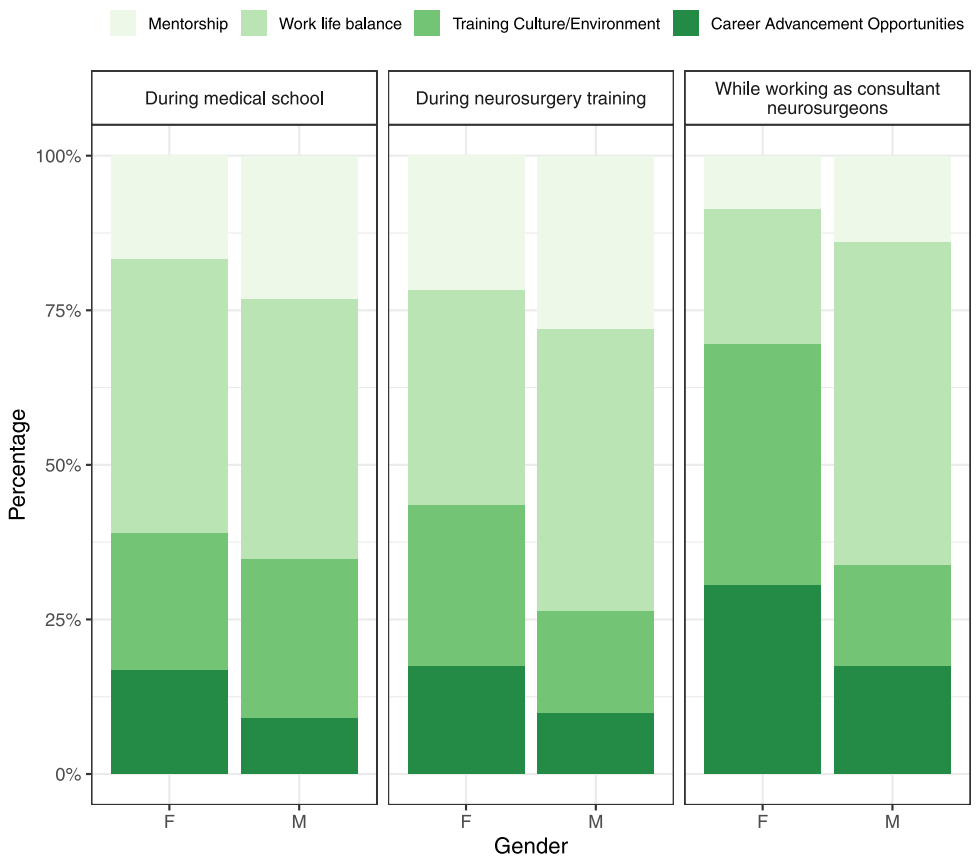

Figure 3. Stacked bar chart showing comparisons of female and male respondents' perception toward the barriers faced by women during medical school and neurosurgery training and working as a neurosurgeon.

Study Limitations

This study has several limitations primarily related to the nature of the survey and its responses. We observed an unequal distribution of responses regarding the gender-related questions. Women accounted for only 5% of the 149 survey participants, resulting in low statistical representativeness of the female population. These findings should, however, be viewed in the context of the dearth of female neurosurgeons in Nigeria, because only 5 of the 132 neurosurgeons in Nigeria identify as female.[12] With most of the respondents being men, we cannot conclude whether significantly different experiences exist due to gender for Nigerian neurosurgeons or neurosurgeons in training. Finally, we learned from the survey that most Nigerian male neurosurgeons have not worked with a female colleague and might lack an optimal perspective on gender-related issues.

CONCLUSIONS

The overall population and contribution of women to neurosurgery development in Nigeria is currently deficient. Apart from general gender differences in a male-dominated field, this survey reveals other factors such as erosion of family and social life, a lack of female mentors, and a lack of a work—life balance as possible key factors contributing to the disparity. The deficit of female trainers and trainees among Nigerian neurosurgeons is similar to the general trend in many African societies; however, this could be mitigated by identifying female medical students with a strong interest in neurosurgery and providing early mentorship for these students before they make decisions to enroll in any training program. Equitable inclusion is a goal worthy to work toward and would boost the morale of interested women who are discouraged by the general perceptions about neurosurgery.

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Supplementary Table 1. Women in Nigerian Neurosurgery: A Cross-Sectional Survey

Checklist Item	Explanation	Page Number
Describe survey design	**A structured online survey was distributed to all neurosurgery consultants and residents to assess neurosurgical infrastructural capacity, workforce, and training in various neurosurgical centers in Nigeria, as described in the accompanying Methods manuscript in this issue.**	2—3
IRB approval	**Ethical approval was obtained from Duke Health Institutional Review Board (Pro00110539) and University of Ibadan/University College Hospital, Ibadan, Ethics Committee (UI/EC/22/0078).**	3
Informed consent	**The study participants completed an online informed consent and had the option to enroll in a collaborative authorship list.**	3
Data protection	**Participation in the online survey was voluntary, and all responses were anonymous.**	3
Development and testing	State how the survey was developed, including whether the usability and technical functionality of the electronic questionnaire had been tested before fielding the questionnaire.	Described in accompanying Methods manuscript.
Open survey versus closed survey	An "open survey" is a survey open for each visitor of a site, while a closed survey is only open to a sample which the investigator knows (password-protected survey).	Described in accompanying Methods manuscript.
Contact mode	Indicate whether or not the initial contact with the potential participants was made on the Internet. (Investigators may also send out questionnaires by mail and allow for Web-based data entry.)	Described in accompanying Methods manuscript.
Advertising the survey	How/where was the survey announced or advertised? Some examples are offline media (newspapers), or online (mailing lists — If yes, which ones?) or banner ads (Where were these banner ads posted and what did they look like?). It is important to know the wording of the announcement as it will heavily influence who chooses to participate. Ideally the survey announcement should be published as an appendix.	Described in accompanying Methods manuscript.
Web/e-mail	State the type of e-survey (e.g., one posted on a Web site, or one sent out through email). If it is an e-mail survey, were the responses entered manually into a database, or was there an automatic method for capturing responses?	Described in accompanying Methods manuscript.
Context	Describe the Web site (for mailing list/newsgroup) in which the survey was posted. What is the Website about, who is visiting it, what are visitors normally looking for? Discuss to what degree the content of the Web site could preselect the sample or influence the results. For example, a survey about vaccination on an antiimmunization Website will have different results from a Web survey conducted on a government Website	NA
Mandatory/voluntary	**Participation in the online survey was voluntary, and all responses were anonymous.**	3
Incentives	**The study participants completed an online informed consent and had the option to enroll in a collaborative authorship list.**	3
Time/date	In what timeframe was the data collected?	Described in accompanying Methods manuscript.
Randomization of items or questionnaires	To prevent biases items can be randomized or alternated.	NA

IRB, institutional review board.

This checklist has been modified from Eysenbach G. Improving the quality of Web surveys: the Checklist for Reporting Results of Internet E-Surveys (CHERRIES). J Med Internet Res. 2004 Sep 29;6(3):e34 [erratum in J Med Internet Res. 2012; 14(1): e8.]. Article available at https://www.jmir.org/2004/3/e34/; erratum available https://www.jmir.org/2012/1/e8/. Copyright ©Gunther Eysenbach. Originally published in the Journal of Medical Internet Research, 29.9.2004 and 04.01.2012.

Continues

Supplementary Table 1. Continued

Checklist Item	Explanation	Page Number
Adaptive questioning	Use adaptive questioning (certain items, or only conditionally displayed based on responses to other items) to reduce the number and complexity of the questions.	Described in accompanying Methods manuscript.
Number of Items	What was the number of questionnaire items per page? The number of items is an important factor for the completion rate.	NA
Number of screens (pages)	Over how many pages was the questionnaire distributed? The number of items is an important factor for the completion rate.	NA
Completeness check	It is technically possible to do consistency or completeness checks before the questionnaire is submitted. Was this done, and if "yes," how (usually JAVAScript)? An alternative is to check for completeness after the questionnaire has been submitted (and highlight mandatory items). If this has been done, it should be reported. All items should provide a nonresponse option such as "not applicable" or "rather not say," and selection of one response option should be enforced.	NA
Review step	State whether respondents were able to review and change their answers (e.g., through a Back button or a Review step which displays a summary of the responses and asks the respondents if they are correct).	Described in accompanying Methods manuscript.
Unique site visitor	If you provide view rates or participation rates, you need to define how you determined a unique visitor. There are different techniques available, based on IP addresses or cookies or both.	NA
View rate (ratio of unique survey visitors/unique site visitors)	Requires counting unique visitors to the first page of the survey, divided by the number of unique site visitors (not page views!). It is not unusual to have view rates of less than 0.1 % if the survey is voluntary.	NA
Participation rate (ratio of unique visitors who agreed to participate/unique first survey page visitors)	Count the unique number of people who filled in the first survey page (or agreed to participate, for example by checking a checkbox), divided by visitors who visit the first page of the survey (or the informed consent page, if present). This can also be called the "recruitment" rate.	Described in accompanying Methods manuscript.
Completion rate (ratio of users who finished the survey/users who agreed to participate)	The number of people submitting the last questionnaire page, divided by the number of people who agreed to participate (or submitted the first survey page). This is only relevant if there is a separate "informed consent" page or if the survey goes over several pages. This is a measure for attrition. Note that "completion" can involve leaving questionnaire items blank. This is not a measure for how completely questionnaires were filled in. (If you need a measure for this, use the word "completeness rate.")	Described in accompanying Methods manuscript.
Cookies used	Indicate whether cookies were used to assign a unique user identifier to each client computer. If so, mention the page on which the cookie was set and read, and how long the cookie was valid. Were duplicate entries avoided by preventing users access to the survey twice; or were duplicate database entries having the same user ID eliminated before analysis? In the latter case, which entries were kept for analysis (e.g., the first entry or the most recent)?	NA
IP check	Indicate whether the IP address of the client computer was used to identify potential duplicate entries from the same user. If so, mention the period of time for which no two entries from the same IP address were allowed (e.g., 24 hours). Were duplicate entries avoided by preventing users with the same IP address access to the survey twice; or were duplicate database entries having the same IP address within a given period of time eliminated before analysis? If the latter, which entries were kept for analysis (e.g., the first entry or the most recent)?	NA
Log file analysis	Indicate whether other techniques to analyze the log file for identification of multiple entries were used. If so, please describe.	NA

Continues

Supplementary Table 1. Continued

Checklist Item	Explanation	Page Number
Registration	In "closed" (nonopen) surveys, users need to login first and it is easier to prevent duplicate entries from the same user. Describe how this was done. For example, was the survey never displayed a second time once the user had filled it in, or was the username stored together with the survey results and later eliminated? If the latter, which entries were kept for analysis (e.g., the first entry or the most recent)?	NA
Handling of incomplete questionnaires	Were only completed questionnaires analyzed? Were questionnaires which terminated early (where, for example, users did not go through all questionnaire pages) also analyzed?	Described in accompanying Methods manuscript.
Questionnaires submitted with an atypical timestamp	Some investigators may measure the time people needed to fill in a questionnaire and exclude questionnaires that were submitted too soon. Specify the timeframe that was used as a cut-off point, and describe how this point was determined.	NA
Statistical correction	Indicate whether any methods such as weighting of items or propensity scores have been used to adjust for the nonrepresentative sample; if so, please describe the methods.	NA

IRB, institutional review board.