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Evaluation of the capacity of Pediatricians in Nigeria to conduct research: A nationwide survey

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Abstract*:* *Background*
Research is key to quality healthcare. Clinicians should possess adequate research capacity to generate evidence. This study aimed to evaluate the research capacity of pediatricians in Nigeria.
Methods: The study was a cross-sectional using a questionnaire developed from the Research Capacity Assessment Framework. Information on previous research work, challenges encountered, and utilization of research outcome were obtained. The data was analyzed using SPSS version 20. Qualitative variables were grouped under thematic headings.
Results: Paediatricians who had received grants for research were 21 (19.4%). Those whose research outcomes had informed policy and practice were 20 (18.2%). Less than 40% of the participants had received training on research capacity areas.
Conclusion: The research capacity among pediatricians was low partly due to underfunding and lack of research training programs. Improvement on government fund allocation for research and introduction of short research trainings programs will improve research capacity in Nigeria.

Key words: Clinical research; Pediatrician; Research Capacity; Policy-Practice Change

Introduction

In the current climate of outcomes-focused healthcare, the application of evidence-based practice from research is crucial for achieving optimal healthcare services.[1,2] Building research capacity and embedding research into core healthcare services has been recognized as a priority for healthcare organizations due to its benefits to patients, clinicians, organizations, and the overall society.[3,4] Although required evidences should be generated through clinicians' involvement in clinical service and consultancy, research, education/teaching, clinical leadership and clinical service planning and management,[5] literature have revealed that the involvement of clinicians and allied health disciplines in research is considerably low.[6-10] Among the identified barriers to clinicians' involvement in research in low- and middle- income countries (LMIC) were heavy workload, underinvestment in universities and research institutions, and lack of access to grants. Thus, many clinicians devote more of their time to teaching and consultancy.[11,12] Strengthening research capacity among pediatricians in the LMIC is a recognized step towards achieving development goals.

Research capacity encapsulates the ability to learn, develop, and execute the skills that are necessary to engage in research activities, with a progressive shift in complexity along the research continuum (conceptualization and development of research questions, proposal writing, grant writing, ethics and protection of human research subjects, quality assurance, budgeting, data management, manuscript writing, dissemination of research findings and mentorship); and Institutional capacities (availability of support systems such as institutional-based health ethics committee, functional standard laboratory, funds, trained personnel and manpower).[13] Building research capacity has been defined as "a process of individual and institutional development which leads to higher levels of skills and greater ability to perform useful research."[12,14,15] Basically, before any system can be strengthened, there is need to first conduct need assessment, to note the areas of weakness that will be needing fortification, and the areas of strength that will be sustained, using a standard framework.

According to Cooke *et al.*,[7] a framework for evaluating research capacity should assess individual, team, and organizational levels as well as include both output and process measures. Output measures capture the main goals of research activity, such as generation of important research evidence, which informs policy reform, change in practice, and improvement in the health outcomes. Other measures like number of peer-reviewed journal publications and conference presentations, and amount of competitive grant funding accessed are part of output measures.[16] In contrast, process measures capture little steps toward achieving aforementioned outputs, such as organizational dynamics and improvement in clinicians' research experience, knowledge, skills, attitudes and confidence, partnerships, and the number of grant applications and research protocols developed.[17] These measures can be used together or separately to assess research capacity. It is assumed that process measures are more sensitive and can complement output measures,[18] especially among research-emergent professions, which may find it difficult to attract competitive grants and publish in peer-reviewed journals[17] since there are no outputs to evaluate. Most research capacity evaluation and strengthening efforts are often component of major research projects, all in an effort to ensure successful execution of the project. Research team members are often taken through training to bring them up in the components of research they will require for the study. This is a good means of developing research capacity, however, it is often the case that only few clinicians get involved in such processes.

In an organized effort to understand the existing research capacities among pediatricians both on individual and institutional levels, as well as position pediatricians to impact their practices positively through research, and to continually influence policy reform and change in practices borne out of research,[19,20] the Paediatric Association of Nigeria (PAN) inaugurated a Research Committee (PAN-RC). This committee aimed to understand the existing research capacities among pediatricians in Nigeria. As at the time of conduct of this research, our literature review revealed that no study has yet been conducted in Nigeria to evaluate the research capacity of pediatricians. Thus, this study aims to evaluate the proportion of the pediatricians that have received training on basic research components: proposal writing, good clinical practices, grantsmanship, data management, and analysis and manuscript writing, as well as the existing institutional support. The outcome of this study will be relevant in proffering solutions on how to design and implement an intervention program that can strengthen research capacity among pediatricians in Nigeria and other LMIC.

Materials and Methods

Ethical Consideration

The Health Research Ethics Committee of University of Nigeria Teaching Hospital (UNTH) reviewed the research protocol and approved the study. Written informed consent was obtained from the participants before participating in the study.

The Setting

Paediatric Association of Nigeria (PAN) is the umbrella association of all academic and practicing pediatricians in Nigeria with over 1000 members. Its members provide healthcare to children and adolescents in healthcare facilities all over the country including but not limited to training of undergraduate medical students and resident doctors in addition to providing consultancy services to national and international governmental and non-governmental organizations. The association aspires to see that child and adolescent health interventions are

based on local evidence in addition to global observations.

Study Design

The study used a cross-sectional questionnaire-based survey carried out over 7 months from August 2017 to February 2018. A combination of both online and physical surveys utilizing both quantitative and qualitative research methods were used.

Sample size

The minimum sample size of 130 respondents was adopted according to the minimum sample sizes used in the studies by Howard *et al.*[2] and Curtis *et al.*[21]. The studies were on capacity evaluation of medical professional and allied health workers.

Development of Study Tool

The survey questionnaire was developed based on the research capacity assessment scoring framework by Dana *et al.*[22] designed to explore competence of researchers to the conduct of clinical research. The survey questionnaire had some close- and open-ended fields. Some direct questions on whether the respondents had received previous training on different components of research like manuscript writing, data management, quality assurance etc. were asked to elicit individual research capacities. Questions on whether their individual facilities had the required capacity like laboratory, funding, ethics committee etc. required to support research activities were also asked. The open-ended questions enabled gathering of in-depth information on what influenced the choice of research area/topic and how research translated to policy and practice. The questionnaire was pretested among resident doctors in the pediatric department of University of Nigeria Teaching Hospital and Federal Medical Centre, Umuahia. Ambiguous questions were corrected to improve their clarity.

Data collection

The study used a combination of online and conference survey. The same questionnaire was used for both the online and conference surveys

Online survey

Pediatricians were invited by e-mail using the Paediatric Association of Nigeria (PAN) mailing list to participate in the online survey. [23] The informed consent form was administered to study participants online inviting them to participate in the study. Online recruitment lasted over 6 weeks and a reminder was sent every week throughout the period of the study. The participants who returned their completed consent forms accepting to be part of the survey received the survey questionnaire.

Conference survey

Pediatricians who attended the Training of Trainers (TOT) workshop on the Management of Severe Acute Malnutrition (SAM) in Asaba August 2017 and the annual Paediatric Association of Nigeria Conference (PANConf) in January 2018 were invited to participate in the survey. The information sheet, consent form, and the questionnaires were in the conference bags prior to distribution. Later during the conference, information about the study was given generally and pediatricians who attended were asked to consent and fill the questionnaire. Those who had filled the online survey were told not to participate.

Data analysis

The data was double-entered into SPSS version 20 software. The qualitative data was reviewed and categorized under thematic headings. Their responses to the open-ended questions, "*what influenced your choice of research area/topic*, and *how do you think the policy change was achieved*, were grouped under thematic headings. A deductive approach was used to categorize the respondents' answers to these questions. Ten headings were generated for the choice of research area, and eight headings generated for the policy change. The number of times comments that belong to a heading was mentioned was documented and their frequencies calculated. Frequencies were calculated for discrete variables, while means and standard deviations were calculated for continuous variables. The scores for the level of challenges were categorized under Likert scale of no challenge (0), low challenge (1), medium challenge (2 - 4) and high challenge (5 – 7). The Likert scale is an ordered scale of options which aligns with the views of the respondents on an issue.[24]The proportion of individuals whose responses are within the given score range was used to calculate the frequencies and percentage.

Results

The demographic characteristics of study participants are shown in Table 1. The participants included 40 (36.4%) males and 70 (63.6%) females. The mean age of participants was 44.8 years. The number of the participants that had acted as lead investigator in a research (whether with external fund or self-sponsored) was 102 (92.7%). Eighty five percent of their previous works were prevalence studies. The least frequent conducted research was randomized clinical trial, representing 9 (8.8%) responses. The most cited reasons for embarking on clinical research work were *to answer prevailing question/fill an existing knowledge gap* (41.2%), and *interest in the area/topic* (40.1%). The least reported reasons were *suggestion by funder/collaboration* (1.9%) and *prompted by rare condition* (0.9%). The majority (80.6%) of pediatricians had not received grants/ sponsorship to conduct research." Most of the outcomes of their previous research works had not informed

change in policy or practice.

Table 1: Demographic characteristics of participants' pediatricians and their assessment of individual research activities and their contribution to policy reform.

Variables	n= 110	%
Gender		
Female	40	36.4%
Male	70	63.6%
Age (Years)		
Mean (SD)	44.8	
Range	(7.45) 29 – 64	
Have you ever been a Principal Investigator (PI) in a research?		
Yes	102	92.7%
No	0	0
Missing response	8	7.3%
*Which type of research were you the PI? (n=102)***		
Prevalence Research	87	85.5%
Observational Research	20	19.6%
Operational Research	13	12.7%
Experimental (Randomized Clinical Trial)	9	8.8%
Others (Reviews)	1	0.9%
Determinants of research area (n=102)‡		
Answer prevailing question/Existing Knowledge gap	42	41.2%
Interest in the area/topic	41	40.1%
Benefit to patients/Clinical Observation	33	32.4%
Feasibility of conducting the research	24	23.5%
Availability of fund	17	16.7%
Disease burden (mortality/morbidity)	13	12.7%
Needs assessment	11	10.8%
Dissertation/Academic appraisal	9	8.8%
Suggested by funder/Collaboration	2	1.9%
Rare condition	1	0.9%
Have you ever received grants to conduct a research (n=108)		
Yes	21	19.4%
No	87	80.6%
Had any of your previous research informed policy change (n = 110)		
Yes	20	18.2%
No	90	91.8%
How did you think the policy change was achieved (n = 14)		
Notified Hospital Management	3	21.4%
Collaborated with policy makers	3	21.4%
The findings is cited globally/Published	2	14.3%
Included in the management protocol	2	14.3%
Intervention Program	1	7.15%
Personal implementation	1	7.15%
Liaised with WHO	1	7.15%
Interaction and notification of relevant bodies	1	7.15%

**: Some respondents were PI in more than one type of research. ‡ Some respondents gave more than one reasons for embarking on a research;

Table 2 shows the reported challenges in conducting research. The most frequently cited challenges were in getting sponsorship (78.2%), developing the research proposal (72.7%), and choosing the research area/topic (71.8%).

To determine the areas that will require capacity development, respondents were asked to list research related trainings they had received. The least received trainings were in data quality assurance (7.3%) and team science (8.2%). The proportion of institutions that have a Research Ethic Committee was 28 (29.1%), and those that organize grant writing and manuscript development were 7 (7.1%) and 8 (8.3%), respectively. (Table 3).

Out of the 21 (19.4%) respondents that had accessed research grants, majority of the grants were from Tertiary Education Trust Fund (TET Fund) and 4 (19.0%) were from McArthur Foundation. See Table 4.

Table 3: The pediatricians identified individual research areas they have received training and assessed to have competence and their institutions Training Capacity.

Variables	N	%
Aspect received training		
Research Ethics	78	70.9
Good Clinical Practice	51	46.4
Responsible Conduct of Research	40	36.4
Manuscript Development	39	35.5
Biostatistics	38	34.5
Data Management	35	31.8
Grant Writing	29	26.4
Monitoring and Evaluation	22	20
Good Laboratory Practice	17	15.5
Budgeting	13	11.8
Research Monitoring	12	10.9
Crises Communication	11	10
Team Sciences	9	8.2
Data Quality Assurance	8	7.3
Institution Capacity to conduct Training capacities (n-98)		
Research Ethics	28	29.1
Good Clinical Practice	25	25.5
Responsible Conduct of Research	12	12.2
Manuscript Development	8	8.3
Data Quality Assurance	8	8.3
Grant Writing	7	7.1
Research Monitoring	7	7.1
Monitoring and Evaluation	7	7.1
Data Management	6	6.1
Team Sciences	6	6.1
Biostatistics	5	5.1
Good Laboratory Practice	4	4.1
Crises Communication	0	0
Budgeting	0	0

Table 4: The overall research grants accessed by pediatricians

Sources of Grant	N (21)	%
Tertiary Education Trust (TET) Fund	10	47.5
McArthur Foundation	4	19.0
Clinton Foundation	2	9.5
Central Research Grant	1	4.8
Thalassemia International Foundation	1	4.8
European Society of Paediatric Endocrinology	1	4.8
Usman-Dan Fodio University Teaching Hospital	1	4.8
SCSN Organization	1	4.8

Table 2: The Respondents' identified major challenges and bottlenecks in conduct of research and their assessing the rate of these challenges.

Variables	No challenge n (%)	Challenging (%)	Average rating where 1 is the least and 7 highest	1 (Low challenge)	2 - 4 Medium challenge)	5 - 7 High Challenge)
Getting Sponsor/Fund	24 (21.8)	86 (78.2)	4.24	26	25	35
Publishing of research findings	50 (45.5)	60 (54.5)	3.43	13	34	14
Coordinating Field Work	38 (34.5)	72 (65.5)	2.81	19	41	12
Analysis	34 (32.7)	74 (67.3)	2.65	15	49	8
Developing Research Proposal	30 (27.3)	80 (72.7)	2.60	22	50	8
Getting collaborators	52 (47.3)	58 (52.7)	2.38	26	20	12
Choosing Research Area/Topic	31 (28.2)	79 (71.8)	2.26	34	36	9
Others (n= 9) Default of subjects (n=3) Default of parents/caregivers (n=3) Time management (n=2) Retirement of Grants (n= 1)						

Discussion

A relatively low proportion (18.2%) of previous research output by Nigerian pediatricians had informed policy change. This finding is, perhaps, not unexpected given that majority of research done by the pediatricians were prevalence studies. We could, however, not find any previous studies with which to compare our findings. This finding is not unexpected when majority of the research works carried out by pediatricians were prevalence studies. Potentially useful programs such as roundtable discussions to generate ideas and collaborations for future research projects; workshops on research, national/administrative dataset analysis, and research funding; and short-term training courses in statistical analysis and methodology and writing and publishing research, can improve the quality of research works. Opportunities to develop multicenter research networks are strongly desired as this will increase collaboration and ensure integration of hospital medicine within scientific circles and other specialties, giving new researchers opportunities to share their findings, and may also bring funding to hospital-based research.[27]

This study revealed that Nigerian pediatricians with access to adequate support were better positioned to conduct research. This is supported by the reported high (92.7%) involvement in research as the lead researcher. Furthermore, their interest in research was driven by their quest to answer prevailing questions and fill gaps in knowledge, interest in the area, and benefit to patients, and less by funders' interest and for academic appraisal. However, this motivation to participate in research was countered by the reported lack of formal research training, similar to what has been reported.[25] This lack of training on research may be due to the immediate hiring of most pediatricians at the completion of their residency training with very few opportunities to pursue any form of fellowship or research training program. Also, there are relatively no research fellowship programs in Nigeria and/or a lack of established mentor-mentee active in residency program to guide residents interested in research and help them acquire required research capacities. Additionally, most research exposure that most pediatricians have had were the exposure to research obtained as prerequisite for the residency program centered on clinical care, teaching, and for residency training dissertation. While formal academic fellowships may be the most efficient way of training pediatricians in rigorous research, the lack of such programs makes it important to develop alternative training opportunities and support pediatricians who want to do some research.

To acquire research skills, there is need to attend workshops and short-term training courses in research methodology, manuscript writing, mentorship and grantsmanship. Lack of access to grants was reported as one of the reasons for failure to conduct high-quality research. Although there are numerous research funding agencies, but the respondents had only accessed few it could be due to poor access to information. Increased awareness and capacity development especially on grant writing and collaborations, which were reportedly low in this survey, will improve access to grants. Pediatricians need opportunities for mentorship and the development of multicenter research networks and collaboration with other researchers and institutions. Such opportunities could be crucial for the development of research capacity. For example, the Nigerian Institute of Medical Research (NIMR) has developed a short-term program on grantsmanship and mentorship to improve faculty scholarly skills and research output. The program targets new faculty with a multifaceted approach including dedicated coaching relationships with more senior faculty mem-

bers (mentee-mentors relationship), a core curriculum on grantsmanship and mentorship and other activities to meet expectations towards achieving set objectives. If this materializes, there will be improvement in grant applications and access to grants.

One of the limitations of this study is the inability to achieve the minimum sample size of 130 respondents due to the relatively low response rate: 1% and 13.5% for the online and conference surveys, respectively, therefore, our findings may not be representative of all pediatricians in Nigeria. Of note, despite over 1000 e-mail contacts on PAN mailing list and weekly reminders that were sent over a 6-week period, only 10 respondents were obtained. The original design of the study was to be an online e-mail survey but due to the poor response supplementary conference and workshop surveys were also included, although these still had poor responses. Notwithstanding the low response rate, this study is still the first and only study of pediatricians in Nigeria and the seconds worldwide after the study by Bekmezian*et al*[25] on pediatric hospitalists in the United States of America. Although most online surveys have a response rate of 10% to 40% as already reported,[26-30] the reason for the poor response requires further evaluation.

Conclusion

The research capacity among pediatricians was low partly due to underfunding and lack of research training programs. Introduction of short research trainings programs[31] and improvement on government fund allocation for research through a competitive transparent processes[32], will improve research capacity in Nigeria.

Authors' contribution: The authors are members of the Paediatric Association of Nigeria Research Committee. Study conceived and designed by MDU, SO, AO, NI, ANO, Study performed by MDU, SO, AO, NI, ANO, IJ, DN, Data analysis and write ups MDU, Wrote the paper: MDU, SO, MM, BO, AO, NI, ANO, Critically reviewed for intellectual content and approval the final manuscript: All the authors.

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References

1. Pirkis, J., Goldfeld, S., Peacock, S. et al (2005), Assessing the capacity of the health services research community in Australia and New Zealand. Aust. N. Z. Health Policy 2, 4.
2. Howard AJ, Ferguson M, Wilkinson P, Campbell KL(2013). Involvement of research activities and factors influencing research capacity among dieticians. *J Human Nutrition and dietetics 26(suppl 1)180-187) doi.10.1111/jhn.12053*
3. Australian Government Department of Health and Ageing. (2013) Strategic Review of Health and Medical Research Final Report. Canberra: Commonwealth of Australia;.
4. Hanney S, Boaz A, Jones T, Soper B.(2013) Engagement in research: an innovative three-stage review of the benefits for health-care performance. Health Services and Delivery Research. 1(8):1–152.
5. NSW Health, Clinical Nurse Consultants- Domains and Functions. (2005) Department of Health North Sydney, Australia.
6. Farmer, E. & Weston, K. (2002) A conceptual model for capacity building in Australian primary health care research. Aust. *Fam. Physician 31, 1139 –1142.*
7. Cooke, J. (2005) A framework to evaluate research capacity building in health care. *BMC Fam. Prac. 6, 44.*
8. Pickstone, C. ,Nancarrow, S., Cooke, J., et al (2008) Building research capacity in the allied health professions. *Evidence & Policy 4, 53–68.*
9. Pager, S., Holden, L. & Golenko, X. (2012a) Motivators, enablers, and barriers to building allied health research capacity. *J. Multidiscip. Healthc. 5, 53–59.*
10. O'Baugh J, Wilkes IM, Vaughan K, O'Donohue R, (2007) The role and scope of the clinical nurse consultant in Wentworth area health service, New South Wales, Australia. *J Nursing Management,15(1).12-21*
11. Lesley W, Cummings J, Mckay N. (2013) Developing a culture to facilitate research capacity building for clinical nurse consultants in generalist paediatric practice. Nursing research and Practice; http://dx.doi.org/10.1155/2013/709025
12. ESSENCE on Health Research**.**(2014) Seven principles for strengthening research capacity in low- and middle-income countries: simple ideas in a complex world. ESSENCE Good practice document series http://www.who.int/tdr/partnershipd/initiatives/essence/en/
13. Wylie-Rosett, J., Wheeler, M., Krueger, K. & Halford, B. (1990) Opportunities for research-oriented dietitians. *J. Am. Diet. Assoc. 90, 1531–1534*
14. Matus J, Wenke R, Hughes I, Mickan S. (2019) Evaluation of the research capacity of allied health professionals in public health services. *J Multidisciplinary Healthcare. ;12:83-96*

15. Trostle J. (1992) Research capacity building in international health: definitions, evaluations and strategies for success. *Soc-Sci Med;35(11): 1321–1324.*
16. Patel VM, Ashrafian H, Ahmed K, et al.(2011) How has healthcare research performance been assessed? a systematic review. *J R Soc Med.;104(6): 251–261.*
17. Pighills AC, Plummer D, Harvey D, Pain T. (2013) Positioning occupational therapy as a discipline on the research continuum: results of a cross-sectional survey of research experience. Aust Occup Ther *J. 60(4): 241–251*
18. Carter YH, Shaw S, Sibbald B. (2000) Primary care research networks: an evolving model meriting national evaluation. *Br J Gen Pract.;50(460):859–860.*
19. Clancy CM, Glied SA, Lurie N. (2012) From Research to health policy impact. *Health Serv Res,47(1)337-343.*
20. Poot CC, van der Kleij RM, Brakema EA, et al (2018) Vermond D, Williams S, Cragg L, van den Broek JM, Chavannes NH. From research to evidence-informed decision making: a systematic approach. Journal of Public Health;40(1)i3-i12. Available at https://doi.org/10.1093/pubmed/fdx153
21. Curtis P, Dickinson P, Steiner J, Lanphear B, Vu K. (2003) Building capacity for research in Family Medicine. Is the blueprint faulty? *Fam Med 35 (2):124-30*
22. DanaBurde, Joel Middleton, Cyrus Samii. (2016) Research Capacity Assessment Scoring Framework, available https://www.alseproject.com
23. Survey Methods. (2018) www.surveymethods.com. Accessed on 4th May 2018
24. Losby J, Wetmore A. 2012.CDC Coffee Break: Using Likert Scales in Evaluation Survey Work. National Center for Chronic Disease Prevention and Health Promotion
25. Bekmezian A, Teutel R, Wilson KM. (2011) Research needs of Pediatrics Hospitalists. Hospital Pediatrics doi:10.1542/hpeds.2011-0006
26. B. Duffy, K. Smith, G. Terhanian, J. Bremer. (2005) Comparing data from online and face-to-face surveys. *International J. Market Research 2005;47(6):615-639*
27. G. Szolnoki, D. Hoffmann. (2013) Online, face-to-face and telephone surveys – comparing different sampling methods in wine consumer research. *Wine Economis and Policy 2(2):57-66*
28. Sheehan K. (2001) E-mail survey response rates: a review. J Comput Mediated Commun.6(2). Available at: http://jcmc.indiana. edu/vol6/issue2/sheehan.html.
29. Kaplowitz MD, Hadlock TD, Levine R. (2004) A comparison of web and mail survey response rates. *Public Opinion Q. 68(1):94-101.*
30. Cook C, Heath F, Thompson RL. (2000) A meta-analysis of response rates in Web- or Internet-based surveys. *Educ Psychol Meas.;60(6):821-836.*
31. Käser M, Maure C, Halpaap BMM, et al (2016) Research Capacity Strengthening in Low and Middle Income Countries – An Evaluation of the WHO/TDR Career Development Fellowship Programme. *PLoSNegl Trop Dis 10(5): e0004631. doi:10.1371/journal.pntd.0004631*
32. Canada budget overlooks basic research.(2019) *Nature, 567,443-444. Doi:10.1038/d41586=019-00852-0.*