

Barriers to Research, Scientific Writing, and Publishing: Sudanese Paediatricians Perspective

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ABSTRACT

Background: Research, scientific writing, and publishing are essential for expanding knowledge and understanding, informing health policies, and guiding clinical practices. There has been a noticeable decline in the published research output by Sudanese clinicians, including pediatricians, in both quality and quantity.

Methods: A cross-sectional web-based survey was conducted to study the barriers to research, writing, and publishing activities among Sudanese fully trained pediatricians. A link to an online questionnaire was sent to Sudanese paediatric professional and social groups on the WhatsApp platform. Data from submitted responses were analysed using descriptive statistics.

Results: One hundred and sixty-four pediatricians completed and submitted the questionnaire. Overall, $\approx 43\%$ of Sudanese pediatricians who responded to this survey declared they have never authored or co-authored any published work; and $\approx 40\%$ have authored/co-authored 1 to 4 published articles. Insufficient time, lack of appropriate training, lack of funds and monetary incentives, personal financial difficulties, prohibitive institutional cultures and regulations, and lack of technical support were the most critical barriers to research conduction, scientific writing, and publishing among Sudanese pediatricians.

Conclusion: The scholarly productivity of Sudanese pediatricians is shown to be relatively low. A carefully designed and holistic national research strategy is thought to provide long-term remedies for the problem. Meanwhile, intermediate-and-short-term solutions can be achieved through individual institutions assuming research-promoting culture and research-facilitating regulations, taking more care of research education and training, and providing technical support and financial incentives for researchers.

Key words: Child health, Paediatrics, Sudan, Research, Writing, Surveys and questionnaires, Scientific publishing, barriers

HOW TO CITE THIS ARTICLE: Mohammed Abdulrahman A Alhassan, Barriers to Research, Scientific Writing, and Publishing: Sudanese Paediatricians Perspective, J Res Med Dent Sci, 2021, 9(6): 331-339

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Received: 03/04/2021

Accepted: 23/06/2021

INTRODUCTION

Research, scientific writing, and publishing are crucial for expanding our knowledge and understanding and thus guiding our behaviour toward human health and wellbeing issues. It is therefore not surprising that scholarly research output is proportional to growth not only in the general context [1] but also at the individual level, and the notion of “publish or perish” has not been closer to reality. The critical importance of research is reflected in informing local, regional, and frequently international clinical practices and relevant guidelines. In most instances, decisions related to local public health policies are derived from data for which domestic studies represent an essential supply line [2].

We are inquisitive creatures by nature, and this should be one of the many motives to undertake research, write down our findings in a systematic way, and communicate them with our fellow humans. Besides being a prerequisite for academic job promotion and maintenance in almost every academic position, research and scientific writing obligate careful observation, extensive reading and learning, and enriching discussions. These provide considerable supply to the knowledge and skill repertoire of a clinician. In addition, clinicians involved in research, writing, and publishing are more likely to use evidence-based medicine to inform their practice. A researcher paediatrician is thus believed to be a better clinician than a non-researcher one [3–5]. There is a career-related type of self-satisfaction the clinician involved in research, writing, and publishing finds that is difficult to describe.

The history of health research in Sudan can be traced back to 1903 [6]. Pioneer research at that time impacted health services and policies not only in Sudan but also in tropical Africa [7]. The late 20th century up to the early two

thousands has shown important developments in research and scientific publishing in the country [7,8], with paediatric and child-health-related research not being an exception [9]. Over the last ten to fifteen years, there has been an astrological increase in the numbers of medical schools across the country (currently more than 65) [10]. This has resulted in two relevant observations. The attention to numbers without due quality assurance measures has resulted in less emphasis on research education in undergraduate programs and a shrinking research share in curricula. Secondly, the increasing numbers of faculty members have been accompanied by higher numbers of scientific publication output for promotion purposes, with more focus on quantity over quality. This is shown as an increasing proportion of scientific articles from Sudan being published in potentially predatory and deceptive journals [11]. The end result is less research and publishing activity per individual Sudanese clinicians on the one hand, and declining quality of health research output in general, on the other. This observed backwardness is thought to be multifactorial but has not been explored sensibly. On looking in major medical databases (PubMed, Embase, Web of Science, Scopus), no similar study attempting to explore obstacles to scholarly production among Sudanese clinicians or academicians was found.

This study aims at defining the main factors that may have led to the decline in scientific productivity by Sudanese clinicians, as viewed by the Sudanese pediatricians. Describing this previously unexplored area is the first step in addressing the problem. The study also describes the scientific output per individual paediatrician and its potential relation to those factors.

MATERIALS AND METHODS

This is an online cross-sectional survey that was conducted in September 2020. A questionnaire consisting of 2 open-ended questions and 31 multiple-choice questions was formulated utilizing literature review [12–19] besides the author's contemplative effort. The questionnaire was installed on a survey administration software (Google Forms, Google LLC, California). It was then pre-tested for clarity, validity, and rigorousness in 5 pediatricians. A few amendments were made in reflex, including adding an Arabic translation for the questions and giving the respondents a choice to write their answers in either English or Arabic for the open questions. The questionnaire took 10 to 15 minutes to complete.

The target population was Sudanese pediatricians, working inside the country or abroad, who have attained

their clinical MD or an equivalent degree. Trainee residents in paediatrics were excluded. A link to the web-based questionnaire was distributed primarily through a social media platform (2020 © WhatsApp Inc.) in which six relevant Sudanese pediatric professional and social groups were identified. These contain most of the target group population. Each group included 200 to 257 members, with considerable members subscribing to 2 or more groups. The questionnaire was also sent to WhatsApp's contacts of the author (pediatricians= 102 contacts). Reminder messages were posted daily over ten days until no further responses were recorded for two consecutive days. A brief description of the study and consent statement was provided at the beginning of the questionnaire. The anonymity of respondents was preserved. Ethical approval was obtained from the Institutional Review Board of Prince Sattam Bin Abdulaziz University.

Responses to the two open questions were organized into 38 educed themes. Several related themes were pooled into common categories, ending up with 18 major categories. Where a response was felt to span over more than one theme, an opinion of a colleague physician was sought to agree on the theme that most suited the answer.

Retrieved data were analyzed using descriptive statistics. Google sheets (Google Sheets, Google LLC, California) and IBM SPSS® software programs were used for data analysis. Chi-square tests were employed to evaluate potential significant relationships between the number of published articles and other participants' characteristics.

RESULTS

Respondents' profile

One hundred sixty-four pediatricians responded to and submitted the questionnaire. Of those, 61% were females, and 39% were males. Consultants represented approximately 42% of the respondents, while the rest were specialists, senior specialists, or equivalent other designations, with varying clinical experiences after the MD (or equivalent degree) (Table 1). Most of the respondents received their general paediatrics residency training in Sudan (~80%), an Arab Gulf country (~15%), or a western country (~3.5%). The majority of responses came from pediatricians who worked (or are still working) in Saudi Arabia for most of their post-MD career (~ 50%). Approximately 30% of the respondents are full-time university staff members; of these, 90% work in 23 different Sudanese medical colleges.

Table 1: Respondents' characteristics and published output.

Characteristic (number of responses)	Responses (%)
Gender (164)	
Male	64 (39)
female	100 (61)

Position (164)	
Consultant	68 (41.5)
Specialist/senior specialist/senior registrar/assistant consultant	96 (58.5)
Experience post-MD in years (164)	
6 to 9 years	68 (41.5)
3 to 5 years	32 (19.5)
10 to 14	22 (13.4)
Less than 3 years	15 (9.1)
15 to 19 years	14 (8.5)
20 or more years	13 (7.9)
General pediatric training (164)	
Sudan	129 (78.7)
Gulf country	24 (14.6)
Western country (UK, USA, etc.)	6 (3.7)
Others	5 (3)
University staff member (164)	
No	113 (68.9)
Yes	51 (31.1)
Career country in not university staff (113)	
Saudi Arabia	57 (50.4)
Sudan	44 (38.9)
Oman	3 (3.5)
United Arab Emirates	3 (3.5)
Qatar	2 (1.8)
United Kingdom	2 (1.8)
Other	2 (1.8)
University job position (51)	
Assistant professor	32 (62.7)
Associate professor	14 (27.5)
Lecturer	3 (5.9)
Professor	2 (3.9)
University country (51)	
Sudanese university	46 (90.2)
Non-Sudanese university	5 (9.8)
Number of scientific publications (164)	
None	70 (42.7)
1 to 4	66 (40.2)
5 to 9	16 (9.8)
20 to 30	6 (3.6)
15 to 19	3 (1.8)
10 to 14	2 (1.2)
30 or more	1 (0.6)

Respondents’ scientific production

Overall, ≈ 43% of Sudanese pediatricians who responded to this survey declared they have never authored or co-authored any published work; and ≈ 40% have authored/co-authored 1 to 4 published articles (Table 1). Of the respondents who are also faculty staff members (assistant professors and higher), ≈27% have zero publications. This percentage rises to ≈ 50% among non-university staff pediatricians. Of the 14 associate professors who participated in the survey, 1 (≈ 7%) had

no published work, and 6 (≈43%) had four or fewer publications. Approximately 25% of the Sudanese consultant pediatricians have zero published works; the corresponding figure in more junior positions is ≈55%. For the same finding (no previous publications), the percentages, if we consider male and female pediatricians, are ≈34% and 48%, respectively (Table 2). Seventy-eight percent of surveyed pediatricians have at least one unpublished research, while only 22% have never been involved in research work.

Table 2: Variable associated with a higher number of published articles and their significance.

Barriers to/factors affecting publication output (number of published articles)	p-Value (*= significant)
Years of clinical experience after the MD (or equivalent degree)	0.012*
Being a university staff member (faculty member)	0.004*
Being a consultant (vs. more junior positions)	0.001*
Working in a non-Sudanese (vs. Sudanese) university	0.000*
Gender	0.315
Country of general pediatrics residency training (Sudan versus abroad)	0.261
Career country (Saudi Arabia versus Sudan)	0.222

Barriers to research, writing, and publishing: Open-ended questions

Participants were asked to list the most important personal and organizational (institutional) obstacles that might be holding them back from research conduction, scientific writing, and publishing. Most of the respondents gave 1 to 3 factors. No responder gave more than seven reasons. Time-related constraints, financial and economic-related factors, factors related to the employing institution, and insufficient knowledge, skills,

and training were the most common thematic categories that appeared in the responses (Table 3). Timeconstraints were primarily attributed to work overload and other job responsibilities, and family commitments. The financial obstacles revolved around lack of research funds, personal financial difficulties, and lack of monetary incentives/rewards for scientific publishing. A significant number of participants (n= 38) spontaneously mentioned the insufficient training, knowledge, and/or skills in research, scientific writing, and publishing as one of the significant barriers.

Table 3: Barriers to research, writing and publishing as voluntarily mentioned by respondents.

Barrier (number of responders who mentioned it)	Percentage of responders who mentioned it (out of 164 total responders) %
Time constraints (148) *	
Insufficient time due to work overload/other job responsibilities (67)	40.8
Non-specified time constraints (45)	27.4
Insufficient time due to family commitments (24)	14.6
Time management difficulties (6)	3.7
Insufficient time due to social responsibilities (6)	3.7
Financial/funding constraints (75) *	
Lack of funding for research and publishing (35)	21.3
Personal financial difficulties (21)	12.8
Lack of monetary incentives/rewards (10)	6.1
Prohibitive cost of research or publishing (9)	5.5
Insufficient training, knowledge, and/or skills (38)	23.2
Institutional factors (excluding financial/funding) (69) *	
Culture is not research-oriented or does not value research/academic environment is not stimulating (22)	13.4
Prohibitive institutional regulations (20)	12.2
No dedicated research unit/department (6)	3.7

Other institutional factors (21)	12.8
Disinterest/dislike/demotivation (19)	11.6
Poor medical records/incomplete patient data documentation (15)	9.1
Lack of research support services (statistics, IT, administrative, etc.) (14)	8.5
Lack of mentorship/experienced supervisor (11)	6.7
Laziness/procrastination issues (9)	5.5
Prohibitive internet connection (8)	4.9
Lack of research assistants/personnel to help in conducting research (7)	4.3
Lack of collaborative research teams/groups (5)	3

*Multiple responses allowed

Barriers to research, writing, and publishing: multiple-choice questions

Respondents were asked to agree or disagree on given additional factors that might constitute barriers to their research, writing, and publishing activities. Of note, ≈ 64% of responders stated there is no funding/grants for research where they work. Around 63% revealed their institutions offer no financial incentives/rewards for publishing scientific papers. When asked about how familiar they are with the scientific publishing policies and procedures, ≈ 60% thought they have little or no familiarity. A similar percentage (60%) rated their

knowledge in research methodology as minimal or little. About 50% rated their skills in undertaking scientific/clinical research as either beginner-level (very limited) or little (inadequate). Approximately 34% of responders have very limited access to online literature and information sources, while 64% have adequate or full access. When asked whether their institutions offer statistical support or services for researchers, ≈54% replied “no,” while ≈ 27% did not know whether such services existed (Table 4 and 5).

Table 4: Scaling the potential barriers to research, writing, and publishing.

Access to research fund/grant (164)	
No	104 (63.4)
I do not know	34 (20.7)
Yes	26 (15.9)
Research fund/grant coverage (26)	
Some of the expenses	10 (38.5)
Most of the expenses	7 (26.9)
I do not know	5 (19.2)
All the expenses	4 (15.4)
Incentives/rewards for publishing (164)	
No	103 (62.8)
I do not know	45 (27.4)
Yes	16 (9.8)
Familiarity with publishing policies and procedures (164)	
Little familiarity	54 (32.9)
Not familiar	44 (26.8)
Adequate familiarity	44 (26.8)
Good familiarity	21 (12.8)
Expert-level familiarity	1 (0.6)
Research methodology knowledge (164)	
Minimal knowledge (I can only list 1 to 4 methods)	59 (36)

Little knowledge (I can list all the major methods)	40 (24.4)
Adequate knowledge (I can discuss major methods with ease)	40 (24.4)
Good knowledge (I can compare, contrast, and analyze major methods with ease)	23 (14)
Expert-level knowledge (I can synthesize innovative methods)	2 (1.2)
Research conduction skills (164)	
Just adequate skills	45 (27.4)
Little skills (inadequate)	44 (26.8)
Beginner (very limited skills)	36 (22)
Good skills	35 (21.3)
Expert-level skills	4 (2.4)
Scientific-English writing skills (164)	
Adequate to write a scientific paper with MINOR English language corrections	69 (42.1)
Adequate to write a scientific paper with only typing or punctuation errors.	41 (25)
Just adequate to write a scientific paper with MAJOR English language corrections	25 (15.2)
Expert/editor -level English writing skills.	17 (10.4)
Not adequate to write ANY scientific paper	12 (7.3)
Access to online literature and info resources (164)	
Adequate access	71 (43.3)
Very limited access	55 (33.5)
Full or almost full access	34 (20.7)
I do not/rarely do an online literature search	4 (2.4)
Institutional statistics support (164)	
No	89 (54.3)
I do not know	45 (27.4)
Yes, free service	20 (12.2)
Yes, but I have to pay for the service	10 (6.1)
Language editing service availability (164)	
I am not aware of such services	72
NO	57
Yes, but not free	29
Yes, for free	6
Medical statistics knowledge and skills self-rating (1= poor; 5= excellent) (164)	
2	59 (36)
3	56 (34.1)
1	30 (18.3)
4	19 (11.6)
5	0 (00.0)

Table 5: Barriers to conducting, writing, and publishing research as perceived by respondents.

Barrier	Mode (% Respondents)*
Limited/restricted access to statistics service	Yes, important barrier (43.3)

Lack of personal motivation	Yes, important barrier (43.9)
Lack of research assistant	Yes, important barrier (40.9)
Demotivating university/institution regulation	Maybe a barrier (40.9)
Research, writing, and publishing not adequately valued/emphasized by university/institution	Maybe a barrier (40.2)
Lack of mentor/experienced supervisor	Maybe a barrier (40.2)**
Poor internet connection	No, not a barrier (50)
Inadequate number of cases	No, not a barrier (49.4)
The academic environment is not stimulating	No, not a barrier (36.6)
I do not see personal benefit	No, not a barrier (79.9)
I do not like doing research or writing scientific papers	No, not a barrier (67.7)
*Available choices: yes, important barrier (light orange); maybe a barrier (pale gold); no, not a barrier (light green).	
** 38.4% responded it is a barrier.	

DISCUSSION

Probably the most revealing parts of the study are the figures showing the academic output of Sudanese pediatricians in academic appointments, where 27% have no previous publications, and 43% of associate professors having four or fewer publications. This confirms the hypothesis that scientific research and publishing productivity per individual Sudanese pediatricians is comparatively very little [20,21]. Time constraints, lack of funding, prohibitive institutional culture and regulations, and insufficient training, knowledge, and skills were the top factors negatively affecting the research, writing, and publishing activities of Sudanese pediatricians.

“Family commitments and having to work in the private clinic (in the evenings) besides the ordinary (public) hospital duties” would leave one in a vicious circle of “hectic indulgence in the provision of livelihood and thus not being mindful of the likes of scientific research.” Perhaps these two quotes from responses to the open-ended question on possible personal barriers to research, writing, and publishing activity sum it up more explicitly than any paraphrasing. Lack of time has been historically (and notoriously) one of the most critical obstacles in the way of research and publishing productivity among clinicians [15,17]. However, having 148 out of 164 participants, voluntarily mentioning a time-related factor as one of the barriers in this study necessitates a pause of reflection. Given the current “stressful socioeconomic situations” in Sudan, as one participant noted, most clinicians will have to resort to undertaking after-hours private sector part-time jobs [22]. This, in addition to the increasingly demanding full-time public jobs, would make a conversation about research and publishing a “luxury that most of (them) cannot afford to care about,” as another participant commented. Apparently, expatriation has not been the answer, as shown by that no significant difference in the number of publications existed between pediatricians working in Sudan versus Saudi Arabia. This can be explainable as most of these appointments are either service-oriented or private

sector jobs which view productivity as the number of patients seen and do not emphasize research as a job responsibility. A logical remedy, at least for pediatricians in academic appointments in Sudan is the concept of “protected time” for research [23,24]. This might take the form of paid leaves for university staff members, to be dedicated for research, writing, and publishing, with a strict regulatory condition of producing at least one publication in a peer-reviewed journal for each leave.

One respondent highlighted that “almost all research endeavours in paediatrics in Sudan are personal and not supported administratively.” The lack of research funds (63%) and technical, secretarial, and statistical (54%) support emerged as prominent factors in this study. Lack of research fund presents an expected hurdle that can be difficult to solve in the short run. However, resourcing extra-institutional funds through regional and international collaborators should be sought by Sudanese higher educational institutions. Lack of monetary incentives for publishing in peer-reviewed journals besides the loophole in promotion regulations that enables faculty members to be promoted based on long service [25] has resulted in a state of apathy towards research and publishing.

Insufficient training in research methodology and lack of dedicated training courses in scientific writing and publishing process is anecdotally evident in Sudanese undergraduate and postgraduate curricula, resulting in “insufficient familiarity with the basics of scientific research and publishing, which creates some apprehension towards entering this field,” as one participant stated. Another paediatrician wrote: “unfortunately, in (Sudanese) medical schools there is no emphasis on research. It was taught to us as a 2-week course”. This must be addressed through ensuring, by the Sudan Medical Council as the accrediting body, that the incorporation of appropriate research training is mandatory in undergraduate and postgraduate programs as a prerequisite for accreditation and re-accreditation. The percentage of pediatricians who have been involved in research work (78%) is inconsistent with that of

respondents who have never published any article (43%), which might reflect that some of them lacked the necessary writing skills or familiarity with the publication processes. Deterioration of English proficiency in Sudan [26] may have added to the complexity. Thus, apart from research education, the introduction of scientific writing training in the early medical school years is crucial [27]. Familiarity with practices around scholarly publishing could be augmented through regular workshops for paediatric trainees.

Other critical potential barriers mentioned by participants were poor medical records or incomplete patients' data documentation, and lack of mentorship in research. For a novice researcher, mentorship has been emphasized as one of the main pillars in research and writing skill attainment and propagation [28]. On the other hand, an inexperienced supervisor could pose a detrimental effect. The large number of paediatric trainees in Sudan relative to that of research expertise available to oversee graduation theses has mandated a de facto policy in which novice researchers supervise novice trainees. In this era of distance learning and enhanced online communications, networking with Sudanese research expertise working abroad could represent a plausible way out. An important pitfall in this survey is that a direct question on whether the lack of collaborative research groups represented a barrier to research among pediatricians should have been included. This has been highlighted in previous similar studies as an important factor [29].

This study does not claim to offer quick answers to deep-rooted and complex problems. It primarily portrays the landscape of barriers faced by Sudanese pediatricians in conducting and publishing research. There is no reason to assume the results cannot be generalized to Sudanese clinicians in other clinical specialties if not to the whole community of Sudanese health care professionals, given similar circumstances. Thus, the results of this study can provide a useful preliminary understanding of the problem to inform future efforts to address these barriers. National research strategic decisions and plans should be devised to frame and drive forward any possibility of a comprehensive research renaissance. The study bears the well-known limitations of similar web-based surveys, namely, self-selection bias and relatively lower response rate. Pediatricians who chose to participate may have different characteristics from those who did not. Internet connection issues may have partly resulted in a higher number of participants from outside Sudan. However, other factors, such as time and work occupancy, may have had a more significant influence.

CONCLUSION

Insufficient time, lack of appropriate training, lack of funds and monetary incentives, financial difficulties, prohibitive institutional cultures and regulations, and lack of technical and expertise support were the most important barriers to research conduction, scientific writing, and publishing among Sudanese pediatricians.

The scholarly productivity of participants is shown to be relatively low as a result. A national health-research conference with input from various stakeholders is needed as a foundation stone for long-term holistic reforms. Meanwhile, any intermediate-and-short-term solutions are the responsibility of individual institutions in the form of assuming research-promoting culture and research-facilitating regulations, taking more care of research education and training, and providing technical support and financial incentives for researchers.

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