

Essay



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Advancing medical research in sub-Saharan Africa: barriers, facilitators, and proposed solutions

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Abstract

Sub-Saharan Africa (SSA) bears a considerable disease burden, but its health systems struggle to reduce this burden. Research can help identify the challenges to reducing the disease burden. Research can equally propose solutions to these challenges. Unfortunately, SSA lags behind other regions in terms of research. In this essay, we identify the challenges and propose solutions to advance medical research in SSA. We discuss increasing the medical research workforce and building capacity among young researchers. We equally propose alternative funding solutions for research, and we address scientific communication among African researchers.

Essay

We define African research in this piece as research pertaining to the health and healthcare of Africans and African researchers as those conducting research at African institutions. Sub-Saharan Africa (SSA) is consistently among the regions with the greatest infectious, non-communicable, and injury disease burdens [1-3]. These diseases are slowing down SSA countries' development and weakening their healthcare systems. High-quality medical research can guide clinical practice, inform health policy formulation and implementation. While the disease burden is significantly higher in SSA than other regions, medical research is scarce in SSA compared to other regions [4-6]. The paucity of medical research in Africa is often the result of collaborations with high-income country (HIC) institutions, and African researchers tend to be "stuck as middle authors" in these collaborative research papers [7]. These challenges stifle the development of African researchers, given that research output is a form of academic currency. Academic currency is not equally distributed, and those who lack it have slower career advancement, difficulties securing funding, lesser remuneration, and fewer invitations to national or international conferences [8,9]. Global health stakeholders are aware of these disparities and have called for equitable research practices in the field [10,11]. Unfortunately, the perhaps well-intentioned promotion of equitable research has inadvertently led to "inequitable" research practices like gift authorships and has shifted the burden from SSA governments and researchers to HICs. In this essay, we discuss the current situation of medical research in Africa and the role of African medical scientists in improving the quality and quantity of research.

Unethical practices: African research works and publications are mined with arguably unethical practices such as gift authorship and substitution of first and last authors. Although these practices are meant "to promote African researchers," they are, in fact, detrimental since they do not follow

authorship recommendations established by the International Committee of Medical Journal Editors. Unethical research practices generate opprobrium and cast doubts on the capabilities of African researchers. Another trap African researchers must be cautioned against is predatory journals. In an attempt to meet career advancement eligibility criteria, some African researchers have given into predatory journals for quick publications [12]. Unfortunately, there is no comprehensive and up-to-date list of predatory journals. However, researchers can use resources such as Think. Check. Submit. to avoid falling into this trap.

The next generation of researchers: more Africans are getting tertiary education in health-related fields [13]. However, the trends in research productivity do not reflect the growing number of healthcare graduates. Few graduates choose a research path often because they did not have a role model or mentor [14]. Mentorship is crucial to the development of budding researchers [15]. Senior researchers should encourage young researchers to get involved in research early on. Young researchers can start on by submitting manuscripts with no or simple research methodology (case reports, letters to the editor, commentaries, brief communications, and clinical pictures) or be involved in more sophisticated research methods with diverse roles such as data collectors, website and social media managers, and project secretaries. The more a young researcher writes, the more he/she gets acquainted with scientific writing, study conception, study designing, and data analysis. A researcher learns from each research article, and this makes each succeeding manuscript often better than the preceding one by the same researcher. Hence, young researchers can get at it, and the earlier they start, the better [16]. The presentation of scientific research is a common prerequisite for graduating from most tertiary academic institutions in SSA. The outputs from these studies are a valuable data source of African research, but they often end up as grey literature or unpublished valuable scientific wealth. Although it is customary for students of

medicine and allied health professions to write a scientific document before they graduate, the research experience of African students is generally limited [17,18]. We must mentor and capacitate these futures graduates on how to disseminate the findings of their studies. Dissemination can be done by uploading unto open access repositories or by publishing as the students' first peer-reviewed paper with them as first authors. This will go a long way to boost their future career and spur them to conduct more research. Peer-review is a valuable experience for young researchers because it improves the quality of their manuscripts and adds credibility to successful publications [19].

Funding and scientific communication: the most commonly reported barrier to research in SSA is the lack of research funding [14,18]. The quantity of funds available for medical research through local institutions is quite limited. Hence, SSA researchers either self-fund or secure funding from an international organization [20]. These research grants are extremely competitive and often require that SSA institutions partner with HIC institutions. Funding determines the domain of interest and consequently sets the public health agenda. Researchers who cannot secure funding might have to choose between a domain they are not passionate about or give up their research plan and even career altogether. For SSA to regain control of its medical research agenda, it must fund its research. It will be difficult for SSA governments to fund all local research projects given their limited resources and competing budgeting priorities. It is, however, possible to rethink the funding model of African medical research. The research community must engage with local foundations and major industry stakeholders to secure funding for research projects. This is feasible if the scientific community of SSA improves its communication strategy. Few African academic institutions and researchers have a sustained presence on social media, and it is uncommon for African scientists to disseminate their findings through non-scientific means (op-eds, TV/Radio appearances, banners, webinars, and visual abstracts), let alone bioinformatics [21].

Lack of communication has contributed to the narrative that African researchers are not capable of scientific prowess and has reinforced the acceptance of foreign expertise to be superior. If African scientists wish to secure public and private funding for medical research locally, then we must make the most of the situation by formulating context-specific sustainable strategies for the advancement of scientific research in Africa. Likewise, it is also important for African researchers to foster collaboration with traditional local media outlets and use social media intelligently. There is a high need for such measures because the African continent is still quite a fertile ground awaiting scientists to exploit it for research. The likelihood of such exploitation to succeed is quite high. Nevertheless, few African researchers still dare to venture. Some African research groups have successfully implemented these strategies. They include Ifakara Research Institute in Tanzania, KEMRI in Kenya, and Noguchi Memorial Institute in Ghana. We must encourage collaborations with these groups and replicate their models.

The grant application and management are essential to securing research funds. Grant applications are incredibly competitive even more so if the funding agency is foreign to Africa [22]. Few African research institutions propose grant development services leaving researchers to fend for themselves [14]. Researchers have to juggle between applying and managing grants, administering research projects, and honoring their pedagogic appointments. Grant applications are complex in themselves, but their management in low-resource settings brings another level of complexity [23]. Funding agencies have numerous firewalls such as strict disbursement measures to avoid the mismanagement of funds. These well-intentioned firewalls can be a hassle for researchers without grant management training. Grants are indispensable for advanced research, especially for high-quality research multinational/multicenter/large scale randomized controlled trials. Furthermore, for African researchers, grant application skills are just as critical as research skills. African researchers who

lack access to grant development services must learn the basics of grant application and management.

Leveraging the internet: the internet is the greatest ally of African medical research, and Africans must make the most of it. There is a plethora of free of charge software and online research capacity building courses available to researchers on the internet. Statistical software packages like R and Epi Info and their tutorials are available free of charge [24]. Also, Coursera, Udemy, and edX offer free courses while Google, Trello, and Slack offer free of charge software that can facilitate and improve on scientists' learning and their overall organization. Unfortunately, these free resources are often not accessible because few African universities offer free internet access to their students and researchers [25]. Moreover, it is not uncommon for professors to ask student-researchers to print out documents and meet them at distant physical locations and unsociable hours to get feedback on projects when sharing the document on Google Docs will eliminate the need for this time-wasting and energy-sapping. The barriers mentioned above slow down research progress and can discourage young scientists from pursuing a career in research. African medical researchers must learn to use the internet to their advantage in a cost-effective manner, given that its use is often at their expense.

Stakeholders in African research: medical research often requires ethical approval from an Institutional Review Board (IRB). This step can be a limiting factor for most African scientists, especially when this entails experimental clinical research. Most IRBs in SSA do not meet regularly, and the cost of IRB approval can be prohibitive for local researchers [26]. These costs often make it easier for foreign researchers to run studies locally, creating an inequity. A solution to these barriers may be the allocation of public funds to IRB applications by local researchers. This has the advantage of facilitating the management of IRBs and ensuring researchers conduct their studies at a reduced IRB cost and strict respect of the principles

of research ethics as regulated by the IRB [27]. Other research stakeholders need to be supported - these are the local journals. These journals tend to have lower impact factors than HICs' journals. SSA researchers have to support regional journals and improve the quality of research published in them as part of advancing medical research in Africa. Also, all researchers should volunteer as reviewers for SSA journals so that they can help to shorten peer-review durations and enrich the scientific discourse. SSA researchers cannot publish exclusively in local scientific journals. It is difficult, especially for middle career researchers, to choose less prestigious journals. All research should aim to have the greatest impact. Often this impact is maximal when the research findings are available to the local community, and it is cited several times by other researchers. This impact can be evaluated through the h-index of the researcher on Scopus. Fortunately, most African journals are open access to everyone, and nobody is compelled to pay any fees to get access to the study [28,29]. This is a positive attitude that is commendable and should encourage African researchers whenever possible to submit their manuscripts to open access journals for the benefit of all Africans, of which the majority are poverty-stricken.

Finally, African medical research will benefit from collaborations between its institutions from different African countries and overseas. Research collaborations promote the exchange of ideas and the sharing of resources. Nevertheless, African research institutions collaborate with HIC institutions more often than they collaborate with other SSA institutions. Collaborations between African institutions should be encouraged as they focus on themes that are germane to SSA countries and are context-specific to the SSA region. An example of this is the African Surgical Outcomes Study by Biccard *et al.* [30] that evaluated 7-day perioperative mortality rates in 247 African hospitals. Biccard *et al.* recruited 11,422 patients from 27 African countries with the help of 418 researchers. Through this study, Biccard *et al.* proved that SSA researchers could successfully run a multicentric clinical study by collaborative efforts.

African Researchers can learn from the experience of Biccard *et al.* and expand the African research collaborative model to cover more medical specialties and more countries.

Conclusion

SSA will play a significant role in medical research if it can tap into its potential. In this essay, we highlighted challenges to medical research and suggested solutions.

Competing interests

The authors declare no competing interests.

Authors' contributions

Ulrick Sidney Kanmounye: conceptualization, administration, writing original draft and review and editing. Desmond Tanko Jumbam, Joel Tochie Noutakdié, Francky Teddy Endomba, Aimé Noula Mbonda, Nathalie Ghomsi, Jan René Nkeck, Stéphane Nguemba and Mazou Temgoua: writing original draft and review and editing. All the authors have read and agreed to the final manuscript.

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