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Editorial

Medical Research and Publication in Sudan: What Sudan Could Reasonably Expect to Achieve in the Longer Term, and How?

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Since its start in the early 19th century, Sudan has had a robust and hugely influential medical research community. Dr Andrew Balfour, an Englishman, proposed and equipped a tropical medicine research laboratory in 1902 [1, 2]. As a result, numerous entomology and parasitology breakthroughs were achieved, including discovering novel mosquito species that spread malaria, dengue fever, filariasis, and yellow fever [2, 3]. The Sudanese pioneer, Professor Mansour Ali Haseeb, the first Sudanese head of the Stack in medical research laboratories 1952, made his research as impactful as possible [4, 5]. For example, when a small-pox outbreak occurred in Gazira in 1938, a study involved collecting pathogenic material from patients and animals. Other notable research studies included yellow fever, leishmaniasis, poliomyelitis, schistosomiasis, and onchocerciasis [5]. Haseeb was one of the first editors of Sudan Medical Publication [4] who also contributed to the *Alhakeem Journal*, the official journal of the medical students of Khartoum University [6].

The above activities have resulted in a moderately healthy domestic output with regards to publishing research and developing journals, but not quite as advanced as one might expect given the current and historical strength of Sudan's research activities. According to the Sudanese Federal Ministry of Health's research department, 31 research centers are working in health research; one specializes in endemic diseases, one in malaria, and another in mycetoma (the latest update of the department's website was in 2015) [8]. As of March 2019, there were 19 Arabic and 30 English online Sudanese journals published by different higher education institutes [9]. Unfortunately, none of them is Scopus-indexed, and only one is PubMed-indexed. Much research is published in local and other journals, but not in Scopus-indexed.

According to the SCIMAGO institute ranking, Sudan ranks 100th in the number of annual publications worldwide (240 countries) in all subject areas from 1996 to 2021. With 13,309 documents, 12,464 citable documents, 181,733 citations, 14,717 self-citations,

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13.65 citations per document, and 119 H index. These metrics are based on Scopus® data as of April 2022 [10]. Furthermore, Sudan ranks 15 out of 59 African countries and 13 out of 22 Arab countries in all categories, as seen in Figures 1 and 2.

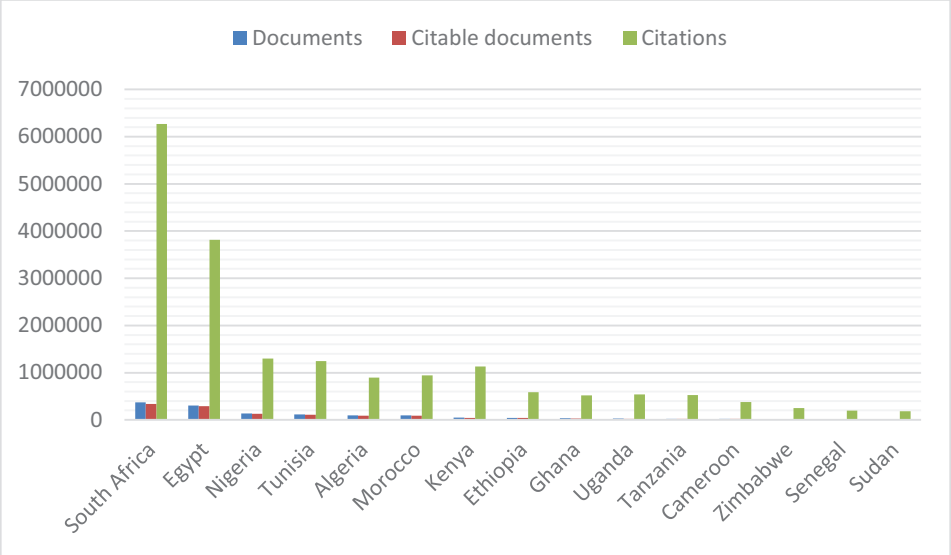

Figure 1: Number of documents, citable documents, and citations published in 1996–2021 by the first fifteen African countries (based on Scopus data as of April 2022).

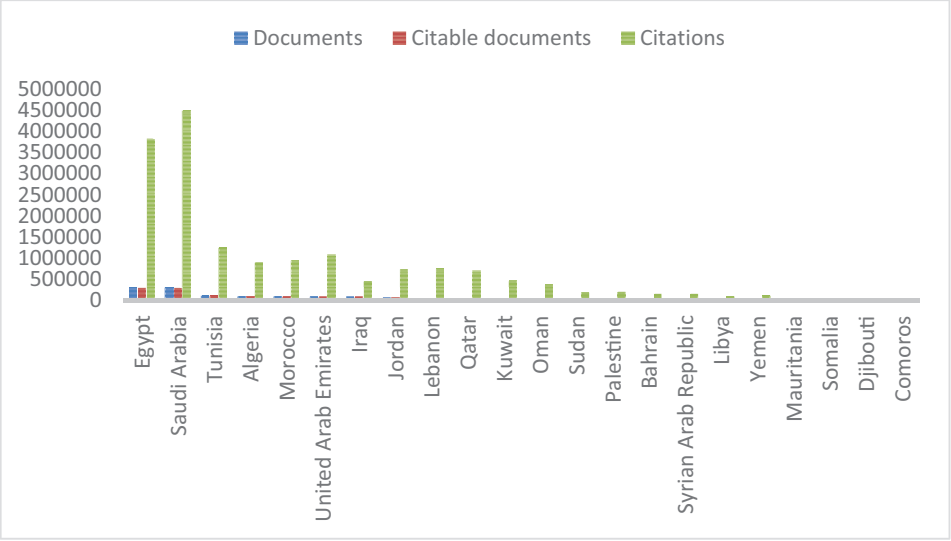

Figure 2: Number of documents, citable documents, and citations published in 1996–2021 by the Arab countries (based on Scopus data as of April 2022).

Figure 3 shows the research subject areas with the most publications: Medicine, Biochemistry, Genetics and Molecular Biology, and Agricultural and Biological Sciences. The medicine-categorized documents make 5115 documents and 92,361 citations, while citations per document are 18.06, and the H Index is 95 (1996–2021). Out of the medical papers published in 2021, 127 were on Infectious Diseases, 123 on Public Health,

Environmental and Occupational Health, 43 on Medical Microbiology, 9 on Pathology and Forensic Medicine, and 306 Miscellaneous [10].

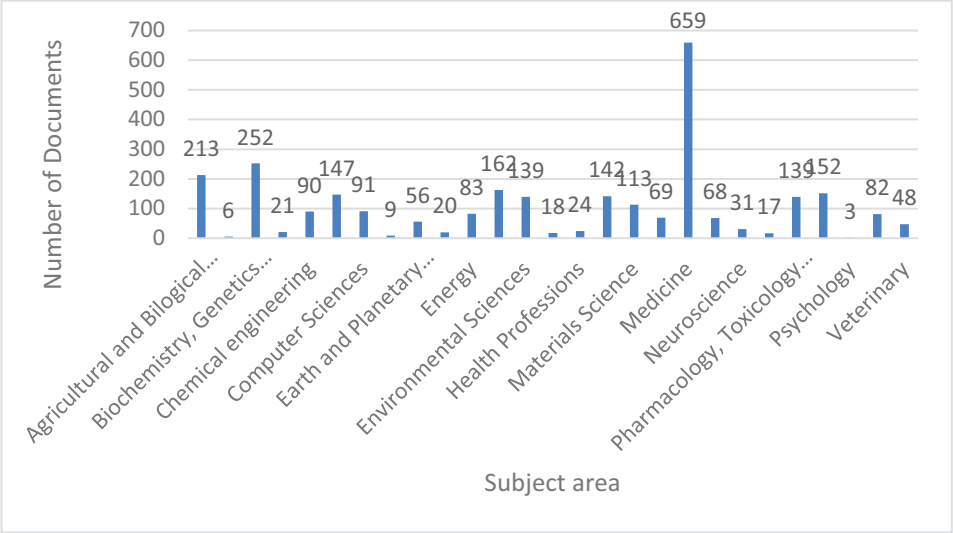

Figure 3: Number of Sudanese documents published in 1996–2021 according to the different subject areas (based on Scopus data as of April 2022).

With a strong history and a reasonable number of research centers and journals, Sudan is expected to be a leading country in research and publications. However, lack of funding [11], time [12], conflict, political instability, and brain drain [13] are significant threats to medical and health research in the country. During the 1990–2001 period, Sudan's average expenses for all scientific research institutions made 0.11% of the country's gross domestic product. And the average value declined consistently by 9% each year [10]. Considering Sudan's current situation, seeking to reduce reliance on the public budget in financing research is a step in the right direction. It can be done by encouraging the private sector contribution and internal and external collaboration. In addition, linking scientific research to development requirements may convince decision-makers that spending on scientific research is an investment form whose returns are reflected positively in reducing poverty and achieving developmental goals.

Furthermore, strengthening and coordinating the professional relationship between research and the statistical production centers is essential. These centers can produce a quantitative knowledge base that helps decision-makers develop and implement poverty reduction strategies and evaluate their performance scientifically. Another crucial step is reducing economic and political factors of expulsion to preserve minds and attract those who emigrated. Training on research methods and ethics will increase the chance of publication in Scopus-indexed journals and advance citable published

research. Fortunately, many publishers incorporate a policy that waves publication fees for researchers in low and middle-income countries.

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