A Bibliometric Analysis of Health and Medical Journals: Issues in Medical Scholarly Communication in Africa

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Abstract

The study was conducted to examine the scholarly impact of health and medical journals in Africa. A descriptive informetric research approach was used to analyse 134 health and medical journals hosted in the African Journal Online (AJOL) database. Harzing's Publish or Perish (PoP) software was used to extract publication and citation indicators of the journals. These indicators include number of citations, number of paper publications, cites per year, cites per paper, and the h-index of the journals. The performance of the journals was equally examined in other major databases like Thomson Reuters and Scopus. Findings reveal that only 20 African countries contributed health and medical journals to the AJOL database with Nigeria and South

Africa producing nearly 70% of the journals. A rank list of 29 journals was developed with *South African Medical Journal* and *African Health Sciences* ranking highest in the list respectively. Only 14 of the journals were found in Thompson Reuters while Scopus indexes only 38.8% of the journals. These findings challenge the criteria Thompson Reuters and Scopus use in the selection of journals for their databases.

Keywords: Bibliometrics, informetrics, citation analysis, health research, journal evaluation, health and medical journals, Africa

1. Introduction

Quality health and medical services are critical indicators of the socioeconomic and scientific development of any nation. Consequently, many development plans give priority to ensuring that citizens receive good health services. However, improved medical and health services are usually propelled by the amount and quality of research conducted in the area. Evidence abounds that Africa has one of the worst developed health systems in the world, as it performs poorly in major health indicators compared to other regions (WHO, 2014; WHO, 2015; World Bank, 2015). For instance, the 2015 World Development Indicators shows that major indicators of good health and general wellbeing such as maternal and child mortality, HIV/AIDS prevalence, preventable communicable diseases, degenerative diseases, and poor nutrition are high in sub-Saharan Africa when compared with other regions (World Bank, 2015). The implication is that there is a need for a substantial increase in health and medical research by African researchers with focus on the region's health challenges particularly tropical diseases. This has been underscored by Pang, Sadana, Hanney, Bhutta, Hyder and Simon (2003), and its importance in the generation of scientific knowledge has been noted by Lee (2003). Literature is replete with Africa's low research productivity (Olukoju, 2004; Lor, 2007; Bako, 2005; Ezema, 2010; Ezech, Izugbara, Kabiru, Fonn, Kahn, Manderson, Undieh, Omigbodun & Thorogood 2010; Gailard, 2010). Mouton's (2010) study has shown a decline of African publications in the ISI Web of Science, while a recent study by Ioannidis, Boyack and Klavans (2014) posits that 42% of the global scientific research outputs from 1996 to 2011 were generated by less than 1% of the global scientific community. A large proportion of the overall global scientific productivity is not always relevant to the African sub-region due to the transatlantic divide in research publications

(Falagas, Karavasia & Bliziotis, 2006). Apparently, research reports from Africa are poorly disseminated resulting in a lack of visibility in the international scholarly community (Ezema, 2011). Hence Nwagwu (2006) had earlier proposed a scholarly database for international visibility of African research productivity. In continuation of this position, Nwagwu & Onyancha (2015) have argued for the democratisation of research dissemination where scientists would be free to disseminate research products without the journal for enhanced universal availability of scientific outputs.

Usually, research evaluation metrics are useful indicators for determining research productivity and its impact in the global scientific community. The studies are usually conducted using source data from journals, theses, and dissertations among other scholarly communication channels. Bibliometric studies are generally used to evaluate the research productivity of a geographical area, institution, journals, or an individual author. This has been applied in health and medical journals to determine productivity in HIV/AIDS (Onyancha, 2008; Rosas et Al, 2011), biomedical research in Nigeria (Nwagwu, 2005 and 2006), tropical medicine research (Falagas, Karavasiou & Bliziotis, 2006; Smith, 2008), cardiovascular disease research (Rosmarakis et al, 2005), chronic obstructive pulmonary diseases (Gu, Yuan, Yang, Qi, Jin, Yan, 2015), homeopathy research productivity (Chiu & Ho, 2005), and preventive, occupational, environmental medicine and public health (Smith, 2010). It has also been applied in evaluation of health and medical research in some countries such as Nepal (Simkhada, Baral & Teijlingen, 2010), Kenya, and South Africa (Onyancha & Ocholla, 2007). Bibliometric analyses of health and medical-related subjects has also been applied in research evaluation in academic institutions (Hendrix, 2008) and general health and medical practice as has been documented in Falagas,

Michalopoulos, Bliziotis and Soteriades (2006); Kim, Park, Yoo and Shen (2010); and Hsu and Ho (2014).

Many studies employ the Web of Science (WoS) database, which is recognised internationally as a key source for bibliometric data. Much as the WoS indexes several top journals in its three-pronged databases (Science Citation Index (SCI), Social Sciences Citation Index (SSCI), and Arts & Humanities Citation Index (A&HCI)), journal entries in the databases are skewed in favor of the advanced countries of Europe, North America and Canada since a lot of other journals, particularly in developing countries, lack presence in WoS Journal Citation Report (JCR) (Ezema, 2010). Similarly, other researchers have criticised WoS for promoting and propagating flawed and biased bibliometric data (Segel, 1997; Walter, Bloch, Hunt & Fisher, 2003; Loonen, Hage & Kon, 2007; Moed, 2005; Meho, 2007; Hendrix, 2008), while at the same time excluding the vast majority of other journals across the globe. Besides these arguments, the belief is that health and medical research relevant to African development is often published largely by African scholars in African journals (Fonn, 2005; Ezech et al, 2010). For this reason, this study deviates from using Thomson Reuters (JCR) as a source of data; rather, the most popular database of African origin (i.e., African Journals Online - AJOL) was used. This database was launched in 1997 by the International Network for Availability of Scientific Publications (INASP) to provide global visibility for African research publications (Mouton, 2010). INASP was established in 1992 by the International Council for Science (ICSU) to improve access, production, and use of research information and knowledge to assist in addressing developmental challenges in many countries (see INASP website www.inasp.info).

Currently AJOL hosts over 500 journals from all African countries in its website/database, found at <http://www.ajol.info/>, with 165 of the journals in Health and Medical Sciences. This study therefore aims at using bibliometric analysis to examine research productivity in health and medical sciences using the AJOL database. The study specifically intends to do the following:

1. Determine the country-wise distribution of health and medical journals in Africa.
2. Develop a rank list of the most cited health and medical journals in research in Africa.
3. Determine the most productive health and medical journals in Africa.
4. Examine the performance of the most cited journals in other major indexing databases.

2. Literature Review

Research productivity (that is quantity of research outputs and their impact in the global scientific community) in Africa is an interesting area of concern among many stakeholders such as governments, institutions of higher learning, research institutes, and academics. Apart from its role in most national development agendas, research constitutes one of the instruments used in ranking institutions and countries. For example, the latest ranking of African universities by Journals Consortium (<http://ranking.journalsconsortium.org/>) was based on research publications found on the Internet – a large number of them published in journals.

2.1 The need for journal evaluation

Journals have for a long time been the major channel of communication of research reports to the global scientific community. Researchers on a daily basis generate new knowledge, which has led to an information explosion and proliferation of journals and other channels of scholarly

communication. Consequently, indexing and abstracting agencies spend time and funds on the bibliographic control of information emanating from journals. This, however, has given way to a huge challenge to these agencies because of the large number of journals scattered in many disciplines – some of them of high quality with international visibility and impact, and others very substandard, highly localised, and often seen by only the authors and the editors (Ezema, 2011). A recent development in journal publishing is the infiltration of predatory open access journals in the scholarly communication platform, of which Jeffrey Beall has progressively updated a list of these suspected predatory journals (Beall, 2016) and created awareness of this concern (Beall, 2015). Although controversies surround Beall's list, studies has shown that the major interest of predatory open access journals is mainly article processing charges (APC) rather than the scholarly peer review mechanism of reputable journals (Shen & Bjork, 2015; Webster & Butler, 2015; Christopher & Young, 2015). As a result, funding bodies, government agencies, libraries, and researchers need reliable information regarding the quality and impact of these journals in the global scholarly community – resulting in the need for journal evaluation and ranking. Evaluation is critical in establishing the authoritativeness, objectivity, validity, reliability, comprehensiveness, and timeliness of the information source where the research is published (Kentucky Virtual Library, 2004a and 2004b). Studies on why sources of scientific information are evaluated are numerous (Onyancha, 2008b; Scott, et al, 2010). Scott et al identified three key issues of importance in bibliometric analysis, namely activity, impact, and linkage measurements, but Rousseau (2002), cited in Onyancha, (2008b: 56), summarised the relevance of journal evaluation thus:

- Funding agencies and governments want their grantees to publish in the most prestigious journals;
- Editors and publishers may relate high citation scores to successful editorial practice and policy;
- Commercial publishers are interested in subscription data and sale;
- Information brokers are interested in finding the sources that have the greatest potential to satisfy their clients' needs;
- University research councils use journals' impact scores and ratings of prestige as elements in local research evaluation studies, with a view to enlarging the visibility of the university research outputs.

In the evaluation and ranking of journals, different approaches, techniques, or methods are often deployed. Onyancha (2008b: 56) remarked that both bibliometric and non-bibliometric techniques are used for journal evaluation. According to him, non-bibliometric indicators include “circulation statistics, the prestige or reputation of publishing company, the number of databases indexing a given source (journal), the number of subscriptions and the corresponding amount of revenue, the number of interlibrary loan requests and peer review.” Bibliometric evaluation techniques are mainly through citation studies that provide such metrics as influence weight, h-index, impact factor, and popularity factor, among other indicators. Bibliometric techniques apply quantitative analysis and statistical indicators to describe the pattern of publications and citations within a given field of study, period, geographical area, authors, institutions, and sometimes countries (Chiu & Ho, 2005; Hendrix, 2008). Ezema & Asogwa (2012, 2014) have also applied it to develop rank list of journals in veterinary medicine and linguistics.

2.2 Citation analysis and journal evaluation

Attempts to measure the impact of journals or an author in a particular field have always been a critical issue in the library and information science profession. As far back as 1927, Gross and Gross made a bold attempt to conduct a study of citation patterns in order to determine the most valuable journal in chemistry by manually counting the number of citations in the *Journal of American Chemical Society* and ranking them in frequency of citation (Herzel, 2003). Later, Bradford (1934) published a classic article, which was widely referred to as the law of scattering of journals where he propounded that “If scientific journals are arranged in order of decreasing productivity of articles, in a given subject, they may be divided into a nucleus of periodicals more devoted to the subject and several groups or zones containing the same number of articles as the nucleus, when the number of periodicals in the nucleus and succeeding zones will be a 1: $n: n^2$ ”.

Citation to articles or journals is believed to determine the impact of the publication in global research communities and relatedness between scientific publications (Belter, 2015). Despite the value of citation analysis in research evaluation, there are several criticisms against its use (MacRoberts & MacRoberts, 2006; Meho, 2007; Belter, 2015; Gu, Yuan, Yang, Qi, Jin & Yan, 2015; Stegehuis, Litvak & Waltman, 2015; Clough, Gollings, Loach & Evans, 2015). Some of the major criticisms include authors citing what they have not read, self citation, currency citation bias reported by Griggs & Christopher (2015), phenomenon of homographs that make it difficult to separate citations of two or more unrelated researchers; the problem of cronyism, where friends or related colleagues reciprocally cite each other for increased citation counts;

ceremonial citation, where an author may cite an authority in a field without consulting the work, and negative citation, which points out incorrect research results but still counts in favor of the document (Meho, 2007). In spite of these flaws of citation analysis, it has remained a relevant tool for journal evaluation.

2.3 Application of citation analysis in health and medical research evaluation

The need for the evaluation of health and medical research productivity is of serious concern because of the pivotal roles of adequate health and medical services in the development indicators of every country. Apart from this, Ezech et al (2010) posited that Africa should wake up and tackle the challenges of disease burdens that are being aggravated by socioeconomic, political, and environmental changes. According to the authors, attempts in mitigating this rising disease burden in Africa require public research capacity. The belief is that knowledge generated through health research, if widely disseminated, will positively impact the performance of national, regional and global health systems (Onyeka, 2014; Hsu, Y.-H & Ho, Y.-S. (2014). Health and medical research has a wide coverage, namely biomedical, clinical, epidemiological, health systems and policy research, socioeconomic and behavioral research, etc. (Pang, Sadana, Hanney, Bhutta, Hyder & Simon, 2003). This wide scope is likely to be reflected in the number of journals and other publication channels of health and medical research leading to a number of studies in research evaluation in the field.

Glover & Bowen (2004) and Schoonbaert (2004), in separate studies, examined citation patterns in tropical medicine journals and found that Europe and Africa contributed more papers and citations, with malaria, HIV/AIDS, and schistosomiasis as the most researched diseases. Another related study by Falagas, Karavasiou, and Bliziotis (2006) found that Africa produced

only 20.9% of the global research in tropical medicine despite the fact that it is a field of research where Africa stands to benefit most. Another bibliometric study in Nepal by Simkhada, Baral, and Van Teijlingen (2010) found that only 11% of the researches were published in Nepalese journals, but two thirds of articles are published by authors from Nepal – an indication that often publications from developing countries appear not to reach the required audience. Hsu and Ho (2014) also found that 76% of highly cited articles in health care science were published in the United States. Recent studies (Gu, Yuan, Qi, Jin & Yan) also found that the United States, England, and Canada are leading in chronic obstructive pulmonary diseases research; while in obesity research, United State still leads (42%), but many European and Japanese institutions ranked higher in citations and collaboration (Khan, Choundhury, Uddin, Hossain & Baur, 2016). Another recent study by Nwagwu and Ojemeni (2015) looked at the penetration of Nigeria biomedical open access journals and found out that Nigeria, China, and India make the highest contributions of articles to the journals and citation penetration is higher from Asia and Africa. It appears there is no study that has been conducted to focus on health and medical research in Africa generally, and none has used a database of African origin, hence the need for the present study.

3. Methods and Materials

This study takes the form of descriptive informetrics, which Diodato (1994:15) refers to as “the collection of descriptive information about documents to provide bodies responsible for the production and transmission of information; form of transmission; medium of communication; nature of information conveyed and geographical origin.” The study used 165 health and medical

journals listed in the African Journals Online (AJOL) database. AJOL is the most popular database that indexes journals of African origin with strong presence in medical and health journals. The database indexes all journals in all fields of study with a web presence and emanating from Africa. Onyeka (2014) describes AJOL as a database that provides free, low cost access to research literature in Africa. After careful examination of the 165 journals, 20 of them were found not to be core health and medical journals (journals in health and physical education, counselling, undergraduate journals, etc.) and therefore were excluded from the study. The remaining 145 journals therefore constituted the target population in this study. Details of the journals used for the study are provided in Appendix 1. The journal titles were entered into the Harzing's Publish or Perish (PoP) software (Harzing, 2007) to extract relevant data for this study. The software has an inbuilt mechanism for the extraction of author, journal impact, and general citations data using Google Scholar or Microsoft Academic Search platforms. The Google Scholar platform was used to extract informetric data of the journals, namely the total number of papers, total number of citations, number of citations per paper, number of citations per year, and h-index for a five-year period (i.e., 2010 to 2014). For the purpose of this study, h-index metric was chosen to determine the research impact of the journals. Its choice was based on its popular use in research evaluation. H-index was developed by J.E Hirsch in 2005 as an index that attempts to measure both scientific productivity and impact. It is defined as "the number of papers with citation number $\geq h$, and a useful index to characterize the scientific output of a researcher (Hirsch, 2005). Of the 145 journals, 11 were not recognised by the Publish or Perish software, and therefore, no result was generated for the journals. These journals were equally excluded from the study, leaving 134 journals for the final analysis. Ulrich Global Serials

(<http://ulrichsweb.serialssolutions.com/>) was searched to determine the size of journals published in the African countries and compare them with journals found in AJOL. The search was refined using the following limiters: country of publication, subject- medicine and health, scholarly journals, and active journals. A search was also conducted using Scopus and ISI Web of Science to determine the journals' performance in these major databases when compared to Google Scholar. Microsoft Excel was used to determine the frequency distribution of the data. These searches were conducted over a week (13-20 August 2015). To generate a list of the most frequently cited medical journals, the cut-off mark for the citations was taken from journals that met the average citation of 333.3. Similarly, journals that met the average paper productivity of 190.3 were listed in the high productivity journals.

4. Results

This section provides the findings of the study.

4.1 Distribution of health and medical journals by country in Africa

Table 1 presents results of the country-wise distribution of health and medical journals in Africa. It was observed that only 20 countries contributed the 145 health and medical journals found in the AJOL database. Nigeria contributes more than half the journals in medical and health sciences with 79 (54.4%) journal titles. This is followed by South Africa with 20 (13.8%) journal titles while Kenya and Egypt have 9 (6.2%) and 8 (5.5%) journal titles respectively. Close observations show that proportions of medical journals in AJOL is higher than that of Ulrich for Nigeria, South Africa, Egypt, Kenya and many other countries. The overall proportion of AJOL

medical journals is 29.8% while Ulrich is 24.1%; only 30.3% of the health and medical journals are found in AJOL database.

<Insert Table 1. Country-wise distribution of health and medical journals in Africa.>

4.2 Citation performance of health and medical journals in Africa

South African Medical Journal received the highest number of citations from Google Scholar. The journal received followed by *African Health Sciences* with an h-index of 20 and 3 348 citations (see Table 2), while Kenyan journal *Pan African Medical Journal* has 2 957 citations. *Tropical Journal of Pharmaceutical Research* published in Nigeria received 2 611 citations. In WoS, *South African Medical Journal* also has the highest citations, followed by *African Health Sciences* and *Tropical Journal of Pharmaceutical Research*. *South African Medical Journal* remains consistent in citation counts as it also received the highest citations in Scopus followed by *West African Journal of Medicine*. A close observation shows that 29 (21.6%) of the total number of journals produced a total of 37 448 citations representing 83.8% of the citations received by all the journals investigated in the study. This indicates that almost one fifth of the journals are the most frequently cited, which mostly correlates with Bradford's law of the scattering of journals.

4.3 Most productive health and medical journals in Africa

The journal with the highest paper productivity in Google Scholar as shown is *Pan African Medical Journal* with 2 753 papers, followed by *South African Medical Journal* with 1 853

papers and the third journal is *South African Family Practice* with 1 748 papers. In WoS, *African Journal of Traditional, Complementary and Alternative Medicines*, and *Tropical Journal of Pharmaceutical Research* produced the highest papers with 244 papers each followed by *Nigerian Journal of Clinical Practice*. However, in Scopus, *Pan African Medical Journal* produced the highest number of papers followed by *South African Medical Journal* and *Tropical Journal of Pharmaceutical Research*. The 35 most productive journals constitute 26.2% of the total journals, but produced about 71.4% of the papers (see Appendix 1). This implies that very few core journals (most productive) publish a large percentage of papers in the field, and the remaining 28.6% are scattered between several other journals, in line with Bradford's law of scattering.

Although Nigerian journals still dominate the list of top ranked journals in terms of their productivity and impact, the percentages in both productivity and citations are lower than the country's total contribution to the overall journal titles (see Table 1). This is an indication that a large proportion of Nigerian journals failed to make the list of highly productive and cited journals. South Africa contributed 9 (25.7%) journals and 6 (20.9%) journal titles in the lists of highly productive and cited journals respectively. Egypt has 4 journals in the list of most productive journals and 2 in the highly cited journals, while Tanzania has 2 each in both lists.

All the journals found in the AJOL database were searched within Thompson Reuters ISI to determine their performance and the findings are presented in Table 4. Indications from the search show that only 14 of the journals representing 10.2% of all the journals were found in

Thompson Reuters. It is important to observe that 17 of the highly productive journals are completely absent in Web of Science, while 4 journals that failed to make the list of highly productive journals in AJOL are present in WoS. This means that only 10 (37%) of the highly productive journals are indexed in WoS. South Africa produced 42.8% of the journals found in WoS, while Nigeria followed with 21.4%. The remaining countries – Ethiopia, Malawi, Kenya, Libya and Uganda – have 1 (7.1%).

<Insert Table 2. Comparative performance of the journals in major indexing databases.>

It can be observed that 24 out of the 29 most cited journals are indexed by Scopus, while only 10 of the most productive journals could be located in Thompson Reuters JCR. It is also important to note the remarkable reduction in the number of publications and citations of the journals that appeared in the Thompson Reuters JCR. A close observation also shows that the first two ranked journals are general medical journals; but there is almost an even distribution of medical and speciality journals – 15 (51.7%) as compared to 14 (49.3%) speciality journals. Similarly, although international journals dominate (based on their names) the first ten high impact journals, generally there more national journals (17, 58.6%) than international journals (12, 41.4%). Figure 1 shows the percentage of the journals indexed in the major databases. All the 134 (100%) journals are indexed by Google Scholar while 52 (38.8%) of the journals are indexed in Scopus and only 14 (10.5%) of the journals are indexed by Thompson Reuters. It is expected that with the high citations received by many of the journals resulting in high impact (h-index) as

measured by Google Scholar, a large proportion of the journals would be indexed in Thomson Reuters' and Scopus databases.

<Insert Figure 1. Percentage of AJOL journals in citation databases.>

5. Discussion, Conclusions and Recommendations

Findings from this study provide insight about the coverage, visibility, and impact of health and medical research published in Africa and as indexed in AJOL. The country-wise distribution of health and medical journals in Africa shows that Nigeria contributes more than 50% of health and medical journals found in AJOL followed by South Africa with 13.8%. Much as this is a reflection of earlier, separate studies of the database in (Ezema, 2010; Mounton, 2010); it is surprising that South Africa's journal contribution is still low. Perhaps this is because South Africa has a national database where journals are also indexed (SABINET South Africa), while Nigeria is yet to develop a national database for hosting as well as disseminating journals published in the country. This development calls for further study on the composition and research impact of medical journals in SABINET South Africa in relation with others in AJOL. It is of interest, however, to observe that some countries such as Kenya, Egypt, and Tanzania make reasonable contributions to the number of health and medical journals in Africa.

African health and medical journals have been impressive in terms of productivity and citation impact within the period under review. Up to 29 of the journals met the average citation counts (333.3) to be ranked among the most frequently cited journals. Within the review period, three of the journals produced over 1 000 papers each, with six of them receiving over 2 000

citations each. This citation impact is an indication that many of the journals can compete favorably with other high profile health and medical journals in the world. Though Nigeria contributes more to the list of top journals, it is interesting to observe the geographical spread of the highly cited journals among the regions of Africa; namely West Africa (Nigeria and Ghana); East Africa (Kenya, Tanzania, and Uganda); Southern Africa (South Africa) and North Africa (Egypt, Libya, and Ethiopia). The distribution of highly productive and cited journals, as measured by Google Scholar, reflects earlier bibliometric studies in Africa as documented in studies by Onyancha (2008a & 2008b), Ezema (2010b), and Mouton (2010). It is a source of concern that some highly productive journals receive very low citations. For instance, the *Pan African Medical Journal*, which produced the highest number of papers, received only 2 957 citations with 1.07 cites per paper, while the *South African Family Practice* with 1 748 papers has only 0.63 cites per paper. Could this be as a result of the quality of papers published in the journals or lack of access to such journals by researchers? The high uncited rates of these journals could be a result of very few researchers in the research scope of the journal or lack of access to the journals because of high subscription fees. Poor editorial quality could equally result in a lack of citations of journals articles. Since, all the journals in AJOL publish online full-text articles, the low citation rate of some of the journals could also be attributed to lack of popularity of AJOL among scholars outside Africa.

A search of the African health and medical journals in Thomson Reuters reveals a very disturbing result. Out of the 134 journals in the list, only 14 are tracked through the Journal Citation Report of WoS. Out of the 14 journals, four did not make the list of highly productive and cited journals. This calls into question the position of African scholarship in the global

scientific community. This skewed evaluation of journals in favor of Europe and America by Thomson Reuters has generated a lot of concern from various scholars (see Walter, Blosh, Hunt & Fisher, 2003; Nwagwu, 2006; Loonen, Hage & Kon, 2007; Ezema, 2010a; Nwagwu & Onyancha, 2015). Obviously, the situation does not provide a level playing field for the global research community and, apparently, Scopus and especially Web of Science appear to exclude a large proportion of the global scientific community, and they may not remain globally competitive if this continues.

Apart from the fact that the performances of some of the journals are below expectation, it is also of concern that Scopus and WoS index very few African medical journals, ignoring so many of them with high citations and paper productivity. This leads one to ask: what are the criteria for selection of journals indexed in these databases – productivity or citations? Is it possible that with the performance of African health and medical journals, only 38.8% from Scopus and 10.5% from WoS meet the criteria? Though Scopus indexes only 52 of the journals, the database is evidently more inclusive than WoS.

6. Issues in Medical Scholarly Communication in Africa

These findings raise some issues in medical research and its communication in Africa and the entire international scientific community. With about 59 independent countries in Africa, the region has the potential capacity to generate high profile research output that will mitigate a number of medical and health challenges facing the continent, especially in the areas of tropical diseases and HIV/AIDS. However, it is surprising that only 20 out of the 59 countries have

medical and health journals in the AJOL. Findings indicate that Africa has 479 medical and health journals in Ulrich Global Periodical Directory. This implies that the continent is involved in medical and health research, which is published in journals. It is however surprising that only 30 percent of the journals are hosted in the AJOL database. Since AJOL was founded to provide wider visibility to African research productivity, which hitherto lacks international readership, African journal publishers as a matter of priority should register all their journals in the database to enhance wider visibility and readership.

Communication of research reports is usually sustained by reputable journals with a high profile editorial board, quality peer review mechanism, and regular publication. More than 140 journal titles in health and medical research in Africa are large enough to sustain medical research in the region. However, a close observation of these journals in relation to publication outputs and citation counts indicate that many of the journals performed below expectation (see Appendix 1 for details). This questions their continuous existence for the few that produced less than 50 papers in a five-year period. This should be of serious concern to the editorial board and the publishers of such journals.

Another issue of great concern is the sustainability of the journals through adequate funding or sponsorship. This is an area various governments and their agencies and professional bodies in the health sectors would need to address. From observations, many of the journals in Africa are self-sustaining through publication fees from authors. This usually erodes the quality of research published in the journals since editors must accept them to ensure sustenance. Failure to address this may result in inclusion of some of the journals in the list of predatory journals.

For libraries and librarians, the findings have provided a guide for journal subscriptions in their medical libraries. It also gives researchers in the field directions on the journals that would be a useful channel to follow in order to communicate their research papers to a wider audience. The debate about the use of journals indexed in Web of Science for evaluation and promotion of academic staff in some African universities is another issue of concern. Evidently, highly productive journals are excluded from WoS. This calls into question the criteria that WoS uses in the selection of journals indexed in the database. Would African researchers continue to depend on Euro-American biased database for promotion and retention of tenureship? This is where Nwagwu and Onyancha's (2015) call for democratisation of global scientific publications and their communication – an open access scholarly communication model that is not in tandem with the current journal platform requires serious support from African researchers to avoid academic imperialism from the West.

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Appendix 1. Rank list and details of all the African health and medical journals used for the study.

Rank	Journal	ISSN	Country	Papers	Citations	Cites/year	Cites/paper	h-index
1	South African Medical Journal	003-8-2469	South Africa	1853	5450	1090	4.19	26
2	African Health Sciences	1680-6905	Uganda	591	3348	669.6	5.66	20
3	Pan African Medical Journal	1937-8688	Kenya	2753	2957	591.4	1.07	18
4	Tropical Journal of Pharmaceutical Research	1596-5996	Nigeria	804	2611	522.2	3.24	20
5	Nigerian Journal of Clinical Practice	1119-3077	Nigeria	588	2437	487.4	4.14	17
6	African Journal of Traditional, Complementary and Alternative Medicines	0189-6016	Nigeria	580	2248	449.6	3.86	19
7	African Journal of Reproductive Health	1118-4841	Nigeria	406	1672	334.4	4.19	16

8	Journal of Medicine and Medical Sciences	1119 – 3999	Nigeria	867	1565	313.0	1.81	12
9	Annals of African Medicine	1596-3519	Nigeria	290	1244	248.8	4.29	15
10	South African Family Practice	1726-426x	South Africa	1748	1109	229.6	0.63	8
11	African Journal of Paediatric Surgery	0189-6725	Nigeria	418	1095	219.0	2.62	12
12	Ghana Medical Journal	0855-0328	Ghana	205	992	198.4	4.84	15
13	Ethiopian Journal of Health Sciences	1029-1857	Ethiopia	211	948	189.6	4.49	15
14	Nigerian Medical Journal	N/A	Nigeria	363	943	188.6	2.60	10
15	Nigerian Journal of Medicine	1115-2613	Nigeria	438	892	178.4	2.04	10
16	African Journal of AIDS Research	1608-5906	South Africa	207	814	162.8	3.93	13
17	Annals of Medical and Health Sciences Research	2141-9248	Nigeria	244	807	161.4	3.31	12
18	Libyan Journal of Medicine	1819-6357	Libya	182	738	147.	4.05	12

						6		
19	Ethiopian Journal of Health Development	1021-6790	Ethiopia	188	660	132.0	3.51	13
20	West African Journal of Medicine	0189-160X	Nigeria	288	648	129.6	2.25	11
21	Tanzania Journal of Health Research	0856-6496;	Tanzania	224	642	128.4	2.87	11
22	South African Journal of Clinical Nutrition	003-8-2469	South Africa	200	537	107.4	2.69	12
23	Southern African Journal of HIV Medicine	0038-2469	South Africa	180	524	104.8	2.91	10
24	South African Journal of Surgery	0038-2361	South Africa	241	495	99.0	2.05	10
25	Egyptian Journal of Medical Human Genetics	1110-8630	Egypt	224	457	91.4	2.04	9
26	Malawi Medical Journal	N/A	Malawi	287	444	88.8	1.55	10
27	East African Journal of Public Health	0856-8960	Tanzania	278	427	85.4	1.54	8
28	Alexandria Journal of Medicine	2090-2948	Egypt	262	373	74.6	1.42	8
29	African Journal of	1119-5096	Nigeria	251	371	71.2	1.48	9

	Biomedical Research							
30	Health SA Gesondheid	1025-9848	South Africa	153	314	62.8	2.05	8
31	Arab Journal of Nephrology and Transplantation	1858- 554X	Sudan	102	303	60.6	2.97	9
32	Journal of Surgical Technique and Case Report	2006-8808	Nigeria	144	284	56.8	1.97	7
33	South African Journal of Psychiatry	003-8- 2469	South Africa	420	268	53.6	0.64	7
34	South African Journal of Child Health	N/A	South Africa	197	267	53.4	1.36	7
35	Southern African Journal of Anaesthesia and Analgesia	1027-9148	South Africa	407	265	53.0	0.65	5
36	African Journal of Clinical and Experimental Microbiology	1595- 689X	Nigeria	143	262	52.4	1.83	8
37	East African Medical Journal	0012 835x	Kenya	384	257	51.4	0.67	7
38	Scientific Medical Journal	1110-5607	Egypt	479	243	48.6	0.66	6
39	Continuing Medical Education	N/A	South Africa	743	237	47.4	0.32	6
40	Journal of Medicine and	1596-6941	Nigeria	186	237	47.4	1.27	7

	Biomedical Research							
41	South African Journal of Sports Medicine	1015-5163	South Africa	149	220	44.0	1.48	8
42	Nigerian Journal of Paediatrics	0302-4660	Nigeria	241	213	42.6	0.88	5
43	International Journal of Medicine and Biomedical Research	2315-5019	Nigeria	90	198	66.0	2.2	9
44	Internet Journal of Medical Update – EJOURNAL	1694-0423	Mauritius	109	193	38.6	1.77	5
45	East and Central African Journal of Surgery	2073-9990	Uganda	263	158	31.6	0.60	5
46	Annals of Nigerian Medicine	0331-3131	Nigeria	101	151	30.2	1.5	6
47	International Journal of Health Research	1596-9819	Nigeria	69	138	27.6	2.36	5
48	Nigerian Quarterly Journal of Hospital Medicine	0189 – 2657	Nigeria	114	128	26.5	1.12	6
49	Journal of Medical and Biomedical Sciences	2026-6294	Ghana	58	127	25.4	2.19	6
50	African Journal of Urology	1110-5704	Egypt	261	120	24.0	0.46	4
51	Nigerian Journal of Surgery	1117-6806	Nigeria	82	114	22.8	1.39	4

52	Sierra Leone Journal of Biomedical Research	2076-6270	Sierra Leone	61	113	22.6	1.85	5
53	Journal of Child and Adolescent Mental Health	1728-0583	South Africa	125	112	22.4	0.9	6
54	South African Journal of Obstetrics and Gynaecology	0038-2329	South Africa	114	112	22.4	0.98	5
55	Journal of Medicine in the Tropics	0795-9168	Nigeria	147	110	22.0	0.75	5
56	Annals of Ibadan Postgraduate Medicine	1597-1627	Nigeria	79	98	19.6	1.24	5
57	African Journal of Drug and Alcohol Studies	1531-4065	Nigeria	58	96	19.2	1.66	6
58	Annals of Pediatric Surgery	1687-4137	Egypt	141	95	19.0	0.67	4
59	African Journal of Infectious Diseases	2006-0165	Nigeria	96	91	18.2	0.95	5
60	Egyptian Journal of Pediatric Allergy and Immunology (The)	2134-8934	Egypt	111	85	17.0	0.77	6
61	Nigerian Health Journal	1597-4292	Nigeria	95	72	14.6	0.76	5
62	Nigerian Journal of Parasitology	1117-4145	Nigeria	157	70	14.0	0.45	4

63	Journal of Basic and Clinical Reproductive Sciences	2320-2041	Nigeria	77	69	13.8	0.90	4
64	Medical Journal of Zambia	0047-651X	Zambia	111	62	12.4	0.56	3
65	Southern African Journal of Critical Care	1562-8264	South Africa	47	60	12.0	1.28	4
66	African Journal of Health Sciences	1022-9272	Kenya	45	57	11.4	1.27	5
67	Journal of Pharmaceutical and Allied Sciences	1596-8499	Nigeria	145	56	11.2	0.39	3
68	Clinics in Mother and Child Health	1812-5840	Cameroon	59	55	11.0	0.93	4
69	Afrimedic Journal	2141-162X	Nigeria	80	54	13.5	0.68	4
70	Sahel Medical Journal	1118 – 8561	Nigeria	175	53	10.6	0.30	3
71	Port Harcourt Medical Journal	0795-3038	Nigeria	178	52	10.4	0.29	3
72	Tropical Journal of Obstetrics and Gynaecology	0189 - 5178	Nigeria	179	49	9.8	0.27	3
73	Nigerian Medical	0189 0964	Nigeria	132	43	8.6	0.33	3

	Practitioner							
74	Sudan Journal of Medical Sciences	1858-5051	Sudan	177	41	8.2	0.23	3
75	East African Orthopaedic Journal	1994-1072	Kenya	64	41	8.2	0.64	3
76	Obstetrics and Gynaecology Forum	1027-9148	South Africa	156	39	7.8	0.25	3
77	Benin Journal of Postgraduate Medicine	0795-0268	Nigeria	10	37	7.4	3.7	3
78	Jos Journal of Medicine	2006-0734	Nigeria	96	36	7.2	0.38	2
79	East and Central African Journal of Pharmaceutical Sciences	1026-552X	Kenya	53	35	7.0	0.66	3
80	African Journal of Physiotherapy and Rehabilitation Sciences	2141-8322	Nigeria	32	35	7.0	1.09	3
81	Annals of African Surgery	1999-9674	Kenya	130	34	6.8	0.26	3
82	Anatomy Journal of Africa	2305-9478	Kenya	39	32	6.4	0.82	3
83	African Journal of Neurological Sciences	1992-2647	Cote d'Ivoire	100	31	6.2	0.31	3
84	Nigerian Journal of	1596-4582	Nigeria	90	31	6.2	0.34	2

	Orthopaedics and Trauma							
85	Journal of Community Medicine and Primary Health Care	0794- 7410	Nigeria	49	31	6.2	0.63	2
86	Rwanda Journal of Health Sciences	2226- 728X	Rwand a	17	29	9.67	1.71	3
87	Tropical Journal of Health Sciences	1117-4153	Nigeria	87	26	5.2	0.30	2
88	Central African Journal of Medicine	0008-9176	Zimbab we	38	23	4.6	0.61	2
89	Nigerian Hospital Practice	1597-7889	Nigeria	88	22	4.4	0.26	2
90	Nigerian Journal of Clinical Medicine	2141-1123	Nigeria	47	22	4.4	0.47	3
91	Nigerian Journal of Pharmaceutical Research	0189-8434	Nigeria	46	20	4.0	0.43	1
92	Nigerian Dental Journal	0189-1006	Nigeria	62	18	3.6	0.2	2
93	Orient Journal of Medicine	1115-0521	Nigeria	83	17	3.4	0.2	2
94	Nigerian Journal of Ophthalmology	0189-9171	Nigeria	63	16	3.2	0.25	2
95	Tropical Journal of Medical Research	1119-0388	Nigeria	80	15	3.0	0.19	2

96	Tanzania Dental Journal	0856-0625	Tanzani a	24	15	3.0	0.63	2
97	Journal of the Nigerian Optometric Association	0795-0039	Nigeria	9	14	2.8	1.56	2
98	South African Gastroenterology Review	1812-1659	South Africa	126	13	2.6	0.10	1
99	Ethiopian Pharmaceutical Journal	1029-5933	Ethiopi a	28	12	2.4	0.43	2
100	Archives of Medical and Biomedical Research	1694-2078	Mauriti us	17	12	2.4	0.71	2
101	Nigerian Journal of Plastic Surgery	0794-9316	Nigeria	58	11	2.2	0.19	2
102	Nigerian Journal of Surgical Research	1595-1103	Nigeria	14	11	2.2	0.79	2
103	Ebonyi Medical Journal	1597-1260	Nigeria	66	10	2.0	0.15	2
104	Tanzania Medical Journal	0856-0719	Tanzani a	31	10	2.0	0.32	1
105	Journal of Medical Laboratory Science	1116-1043	Nigeria	113	9	1.8	0.08	2
106	Nigerian Journal of Gastroenterology and	2251-0079	Nigeria	44	9	1.8	0.20	1

	Hepatology							
107	African Journal of Anaesthesia and Intensive Care	0794-2184	Nigeria	43	9	1.8	0.21	1
108	Nigerian Journal of Natural Products and Medicine	1118-6267	Nigeria	30	9	1.8	0.30	2
109	West African Journal of Pharmacology and Drug Research	0303- 691X	Nigeria	18	9	1.8	0.50	2
110	West African Journal of Radiology	1115-3474	Nigeria	73	8	1.6	0.11	1
111	Journal of the Eritrean Medical Association	1998-6017	Eritrea	3	8	1.6	2.67	1
112	Savannah Journal of Medical Research and Practice	2276-6839	Nigeria	37	7	1.4	0.19	1
113	Zagazig Journal of Occupational Health and Safety	1687-8671	Egypt	2	6	1.2	3.00	2
114	Nigerian Journal of General Practice	1118-4647	Nigeria	63	5	1.0	0.08	1
115	African Journal of	2307-2482	Kenya	35	5	1.0	0.14	1

	Rheumatology							
116	Nigerian Journal of Health and Biomedical Sciences	1595-8272	Nigeria	13	4	0.8	0.31	1
117	Journal of Medical Investigation and Practice	9783-1230	Nigeria	10	3	1.0	0.30	1
118	IMTU Medical Journal	1821-7613	Tanzani a	38	2	0.4	0.05	1
119	South African Journal of Radiology	0038-2469	South Africa	35	2	0.4	0.06	1
120	Nigerian Journal of Surgical Sciences	1116-5898	Nigeria	23	2	0.4	0.09	1
121	Nigerian Endocrine Practice	2251-0362	Nigeria	21	2	0.4	0.1	1
122	International Journal of Medicine and Health Development	188-2601	Nigeria	9	2	0.4	0.22	1
123	Sudanese Journal of Dermatology	1815-3941	Sudan	9	2	0.4	0.22	1
124	Archives of Ibadan Medicine	1467-6958	Nigeria	1	2	0.4	2.0	1
125	Journal of Experimental and Clinical Anatomy	1596-2393	Nigeria	45	1	0.2	0.02	1
126	Highland Medical Research	1596-2407	Nigeria	38	1	0.2	0.03	1

	Journal							
127	Journal of Health and Visual Sciences	1119-2006	Nigeria	34	1	0.2	0.03	1
128	Nigerian Journal of Family Practice	2141-9884	Nigeria	16	1	0.2	0.06	1
129	Global Journal of Medical Sciences	1596-2911	Nigeria	14	1	0.20	0.07	1
130	Revue de Médecine et de Pharmacie	2410-8936	Cameroon	58	0	0.0	0.0	0
131	Nigerian Journal of Postgraduate Medicine	2006-8530	Nigeria	6	0	0.0	0.0	0
132	Egyptian Journal of Medical Laboratory Sciences	1110-5593	Egypt	4	0	0.0	0.0	0
133	International Journal of Malaria and Tropical Diseases (IJMTD)	1596-3381	Nigeria	1	0	0.0	0.0	0
134	Journal of Biomedical Investigation	1597-0043	Nigeria	1	0	0.0	0.0	0.0
135*	Journal of Endocrinology, Metabolism and Diabetes of South Africa	003-8-2469	South Africa					

135*	Journal of Phytomedicine and Therapeutics	1118-1028	Nigeria					
135*	Journal Tunisien d'ORL et de Chirurgie Cervico-Faciale	1737-7803	Tunisia					
138*	African Sanguine	1560-8646	South Africa					
138*	African Journal of Oral Health	0189-5710	Nigeria					
138*	African Journal of Oral Health Sciences	1608-7232	Kenya					
138*	Global Journal of Community Medicine	1597-9857	Nigeria					
138*	Journal of Ethiopian Medical Practice	1560-1560	Ethiopi a					
138*	Journal of the Nigerian Infection Control Association	1119-1716	Nigeria					
138*	Mary Slessor Journal of Medicine	1119- 409X	Nigeria					
138*	Nigerian Journal of Otorhinolaryngology	978- 31230-9-2	Nigeria					

	Total			25,495	44,658			
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Average paper productivity = 190.3

Average Citation = 333.3 Average

cite/paper = 1.8

*Journals that were not recognised by the software

Table 1. Country-wise distribution of health and medical journals in Africa.

S/N	Country of Origin	Total journals in Ulrich's	Medical journals in Ulrich's	% of Ulrich's medical journals	Total journals in AJOL	Medical journals in AJOL	% of AJOL medical journals	% of AJOL to Ulrich's medical journals
1	Nigeria	713	186	26.1	218	79	36.2	42.5
2	South Africa	575	105	18.3	94	20	21.3	19.0
3	Kenya	112	25	22.3	29	9	31.0	36.0
4	Egypt	275	104	37.8	14	8	57.1	7.7
5	Tanzania	41	5	12.2	18	5	27.8	100
6	Ethiopia	57	12	21.1	29	4	13.8	33.3
7	Sudan	13	8	61.5	3	3	100	37.5
8	Cameroun	12	2	16.7	8	2	25.0	100
9	Ghana	48	4	8.3	27	2	7.4	50.0
10	Mauritius	5	1	20.0	3	2	66.7	200
11	Uganda	18	6	33.3	12	2	16.7	33.3
12	Eritrea	1	0	0.0	1	1	100	0.0
13	Cote d'Ivoire	9	1	11.1	4	1	25.0	100

14	Libya	3	0	0.0	2	1	50.0	0.0
15	Malawi	14	2	14.2	4	1	25.0	50.0
16	Rwanda	9	2	22.2	3	1	33.3	50.0
17	Sierra Leone	2	2	100	1	1	100	50.0
18	Tunisia	33	7	21.2	2	1	50.0	14.3
19	Zambia	15	3	20.0	2	1	50.0	33.3
20	Zimbabwe	37	4	10.8	12	1	8.3	25.0
	Total	1992	479	24.1	486	145	29.8	30.3

Table 2. Comparative performance of the journals in major indexing databases.

S/ N	Journal	Country	Google Scholar			Web of Science			Scopus		
			Total Papers	Total Cites	h- index	Total Papers	Total Cites	JIF*	Total papers	Total Cites	SNI P
1	South African Medical Journal	South Africa	1835	5450	26	129	3018	0.566	1613	18304	0.648
3	Tropical Journal of Pharmaceutic al Research	Nigeria	804	2611	20	244	637	0.589	746	1732	0.711
2	African Health Sciences	Uganda	591	3348	20	150	871	0.722	627	3562	0.822
4	African Journal of Traditional, Complement ary and	Nigeria	580	2248	19	244	586	0.500	535	2678	0.621

	Alternative Medicines										
5	Pan African Medical Journal	Kenya	2753	2957	18	-	-	-	2453	755	0.22 4
6	Nigerian Journal of Clinical Practice	Nigeria	588	2437	17	156	377	0.52 7	609	1590	0.76 5
7	African Journal of Reproductive Health	Nigeria	406	1672	16	-	-	-	343	2488	0.25 7
8	Annals of African Medicine	Nigeria	290	1244	15				285	1246	0.92 4
9	Ghana Medical Journal	Ghana	205	992	15	-	-	-	130	192	0.36 9
10	Ethiopian Journal of Health	Ethiopi a	211	948	15	-	-	-	82	19	0.18 5

	Sciences										
11	African Journal of AIDS Research	South Africa	207	814	13	41	307	0.79 0	183	1363	0.44 0
12	Ethiopian Journal of Health Development	Ethiopi a	188	660	13	NA	409	0.12 7	144	346	0.90 0
14	African Journal of Paediatric Surgery	Nigeria	418	1095	12	-	-	-	412	529	0.51 1
13	Journal of Medicine and Medical Sciences	Nigeria	867	1562	12	-	-	-	272	3004	0.17 1
16	Libyan Journal of Medicine	Libya	182	738	12	18	147	1.05 7	194	346	0.49 2
17	South African	South Africa	200	537	12	-	-	-	193	538	0.30 2

	Journal of Clinical Nutrition										
15	Annals of Medical and Health Sciences Research	Nigeria	244	807	12	-	-	-			NI
18	West African Journal of Medicine	Nigeria	288	648	11	-	-	-	298	3103	0.64 5
19	Tanzania Journal of Health Research	Tanzan ia	224	642	11	-	-	-	250	655	0.18 5
21	Nigerian Journal of Medicine	Nigeria	438	892	10	-	-	-	430	1758	0.17 1
23	South African Journal of Surgery	South Africa	241	495	10	30	205	0.39 7	207	1216	0.73 9

22	Southern African Journal of HIV Medicine	South Africa	180	524	10	33	106	0.89 8	182	513	0.34 1
24	Malawi Medical Journal	Malawi	287	444	10	24	104	0.38	182	224	0.23 7
20	Nigerian Medical Journal	Nigeria	363	943	10	-	-	-		NI	
25	Egyptian Journal of Medical Human Genetics	Egypt	224	457	9	-	-	-	211	163	0.52 9
26	African Journal of Biomedical Research	Nigeria		371	9	-	-	-	-	-	-
27	South African	South Africa	1748	1109	8	-	-	-	516	838	0.18 6

	Family Practice										
28	East African Journal of Public Health	Tanzania	278	427	8	-	-	-	170	712	0.219
29	Alexandria Journal of Medicine	Egypt	262	373	8	-	-	-			NA
	Total		15,371	37,448		1069	6,661		11,267	47,874	

JIF = Journal impact factor; SNIP = Source Normalised Impact per Paper

Figure 1. Percentage of AJOL journals in citation databases.

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