

Ethiopian Biomedical Research Publication and International Visibility Trends in the Last Three Decades.

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Background: Reports indicate that most African countries have low level of publications that could appear in the internationally recognized websites and databases and most of the published works are also too weak to influence local practices and policy makers. The objective of this study is to show the listing/output of human biomedical publications from Ethiopia and identify trends observed on the world-largest medical database. The study also tries to summarize the general trends observed and the relations with factors like national GDP.

Method: we reviewed a complete list of biomedical research outputs from Ethiopia using the largest electronic database-PubMed; so as to enable us examine its international visibility and trends of Ethiopian first authorship in the last three decades. The trend of publication was also examined in relation to the country's Gross National Per capita (GDP)

Results: Altogether there were 4,687 articles published between 1980 and 2008. Even though the impact Factor (IF) is low, the Ethiopian Medical Journal (EMJ) is a leading publisher of scientific articles from Ethiopia with 839 publications during the period. HIV/AIDS and tuberculosis related health issues were the most frequently published researches. The total number of articles published yearly showed steady growth from 49 in 1980 to 367 in 2008. The increase in the number of published articles matched the growth of the National Domestic Product, per capita.

Conclusion: The number of published works from the country in the last three decades is one of the lowest by any standard. Generally, there is a slightly increasing matched trend of Ethiopian GDP and number of articles published over the last three decades. Ethiopian First authorship emerged and kept dominating starting a decade and half ago. We recommend that this trend has to further be strengthened and continued.

Introduction

Research publications play a major role in the scientific process of developing new knowledge sharing experience and bringing about positive changes in a society. While low-income countries are theoretically expected to make use of researches to deal with their health related and other challenges that affect their societies, in practice research is a least prioritized area in most of these nations¹. Reports indicate that most African countries have low level of publications that could appear in the internationally recognized websites and databases² and it is also criticized that published works are also too weak to influence local practices and policy makers³. The challenges of many African journals are also complicated by inadequate funding, technological resources and skilled manpower to review, efficiently manage the journal's operation and maintaining their regularities and work towards indexing them⁴. With regards to health related scientific publications from Ethiopia, only one out of the seven medical publications in the country is indexed on Medline (PubMed) database.

Although Ethiopian Medical Journal (EMJ) is the oldest and the only PubMed registered medical journal published by the Ethiopian Medical Association (EMA) since 1962, the quality of published researches, the proportion of case mix and the growth pattern of the number of articles published in the last five decades is not evaluated. Its journal impact factor (IF) is also one of the lowest. The first appearance of web registered health related work from Ethiopia appeared in scientific literature in 1935 by Stallings⁵.

In this study we aimed at reviewing a complete list of biomedical research outputs from Ethiopia using electronic PubMed database so as to enable us examine its international visibility and trends of Ethiopians first authorship in the last three decades. The trend of publication was also examined in relation to the country's Gross National Per capita (GDP).

Material and Methods

We preferred PubMed for its being the principal online bibliographic citation database system that is used internationally to provide access to most of the world's biomedical journals and literature. We selected this database because it is the largest database in health and is also accessed via Scirus. In addition to this, full text of most PubMed Central articles could also be easily accessed as NLM is taking the lead in preserving and maintaining unrestricted access to the electronic literature, as it did for decades with the printed biomedical literature.

In December 2010, we explored PubMed database for biomedical publication lists from Ethiopia. In order to characterize articles originated from Ethiopia up to 2010 we used lodging search term "Ethiopia". Dates "1979, 12 to 2010, 12" and "humans" as key terms in the limits. Additional key terms of Specialty (e.g. "orthopedic Surgery"), and areasted in a total of 4,164 articles. List of all PubMed registered published articles during the period of publication (E.g. 'Mental illness') were also used as search keys. This result, authors, journals and year of publication were printed-out and manually inspected to ascertain their origin and variables were entered into a Version 17 Statistical Package for Social Science (SPSS) for further analysis. We employed two criteria as (A) 'broad definition', i.e. all searched publications during the period and (B) 'narrow definition', focusing only on articles that addressed directly human health researches to enable us look into patterns of human health issues through the period. Abstracts of articles with doubtful titles and authors' name and affiliations were fully accessed and inspected for their contents and relevance to health issues. Based on this ground, 1036 articles were excluded by the 'narrow definition' analysis as they focused mainly on veterinary medicine, agricultural and plant researches, evolution and other non public health areas. First authorship in human health related research topic articles were manually inspected and categorized as expatriate and Ethiopian. Names that are common in both groups were discussed in the researchers meeting and in few cases; articles were accessed to ascertain affiliation of the authors. Information related to Gross Domestic Product (GDP) was obtained from the International Monetary Fund (IMF) website⁶

Results

There are about 7 local journals that published health related articles in Ethiopia during the search period (Table 1). But, only one, The Ethiopian Medical Journal, (EMJ) was indexed in Medline since 1962. Altogether, as classified by PubMed, there were 4,164 exclusively human research articles published between 1980 and 2010 out of which 180 were reviews. These articles were selectively taken from more than 600 journals. There were 145 Nursing Journals. Only 290 (7%) of the articles were taken from journals PubMed classified as "Core Clinical Journals"; . such as the Lancet and Cancer. About 245 (5.22%) of the accessed articles were in languages other than English (57 articles in French, 44 in Germany are the main ones). Nearly half (2,157) subjects were males; 2,123 were children (age <18), 811 infants and 263 (6.3%) were neonates. There are 593 (14.4%) free full text articles, all the rest were only abstracts of purchasable articles.

The Ethiopian Medical Journal (EMJ) is a leading publisher of scientific articles from Ethiopia with 866 publications indexed on Pubmed during the 30 year period, 1980-2008. The total number it published during this period was 1,042 leaving 16.9% (176) of its articles not indexed. (Table 2). In its 50th year

golden anniversary in 2012, emj has reported to publish 1467 articles of which 980 were original. Most journals contributed only single or few articles. HIV/AIDS and tuberculosis related health issues were the most frequently addressed research areas in the publications (Table 3). Only 169 articles were classified as “clinical trials” and 73 were randomized controlled trials. Table 4 shows that a very limited number (14.6%, 610/4164), of research articles emerged from the “common” clinical departments. The total number of articles published yearly showed steady growth from 49 in 1980 to 367 in 2010. The increase in human health research was also marked from only 35 in 1980 to 303 in 2009. The number of Ethiopian first authors in human health researches showed steady increase each year, from 12 in 1980 to 148 in 2008 while the expatriate first authorship number grew from 32 in 1980 to 112 in 2008, showing a ‘crossed’ transition point after 1995 (Figure 1).

Table 1. List of all Medical journals in Ethiopia, 2009

	Journal name	First published	Copies/Year	ISSN (International Standard Serial Number)
1	Ethiopian Medical Journal (EMJ)*	1962	4	0014-1755
2	Ethiopian Journal of Health Development (EJHD)	1984	3	1021-6790
3	Journal of Ethiopian Medical Practice (JEPM)	2001	4	1560-1560
4	Ethiopian Journal of Health Sciences	1990		1029-1857
5	Ethiopian Journal of Health and Biomedical Sciences	2008	2	2070-6898
6	Ethiopian Journal of Pediatrics and Child Heal.	New		
7	Ethiopian Journal of Reproductive Health	New		

***The only Medline Indexed medical journal from Ethiopia is Ethiopian Medical Journal (Ethio Med J, emj). In the last 50 years (Until January 2012), EMJ has published 1452 articles of which 980 were original articles.**

Of these only 50 (5.1%) articles are categorized under surgery and orthopedics²².

Table 2. Top 10 Journals that published PubMed listed articles from Ethiopia, 1980 - 2010.

R. No	Journals Publishing(Code)	Number published (%)	Journal impact factor from ISI. (Year calculated)
1	Ethiopian Medical Journal (Ethiop Med J)	882 (21.1)	0.128(2005)
2	East African Medical Journal (East Afr Med J)	266(6.7)	0.35
3	Lancet	95 (2.3)	28.409(2008)
4	Leprosy Review (<i>Lepr Rev</i>)	66(1.6)	1.33
5	Israel Journal Medical Science (Isr J Med Sci)	61(1.5)	-

6	Tropical Doctor (Trop Doct)	51(1.2)	0.405
7	Social Science Medicine (Soc Sci Med)	51 (1.2)	2.604
8	Tropical Medicine & International Health (Trop Med Int Health)	50(1.2)	2.312
9	Tropical Geography & Medicine (<i>Trop Geogr Med</i>)	42 (1)	1.057(2008)
10	Bulletin of the WHO (Bull World Health Organ)	37 (0.8)	5.302 (2009)
*	TOTAL		

Table 3. Top 10 Research Topics Addressed by Biomedical Researchers in Ethiopia, 1980-2010

R. No	Research topics	Number published
1	AIDS	550
2	Tuberculosis	324
3	Nutrition	323
4	Malaria	217
5	Psychiatric illness	169
6	Maternal health	167
7	Upper Respiratory Tract Infection	157
8	Trauma	157
9	Diarrheal Disease	147
10	Injury (Physical)	125

Table 4. List of 'Common Clinical' departments in Ethiopia conducting and publishing biomedical researchers selected by PubMed , 1980-2010.

S. No	Departments	Number of Articles
1	Internal Medicine	163
2	Pediatrics	148
3	Gyne-Obs	76
4	Ophthalmology	60
5	Psychiatry	47
6	General Surgery	44
7	Neurology	24
8	Dermatology	22
9	Neurosurgery	16
10	Orthopedic Surgery	10
	TOTALS	<u>610</u>

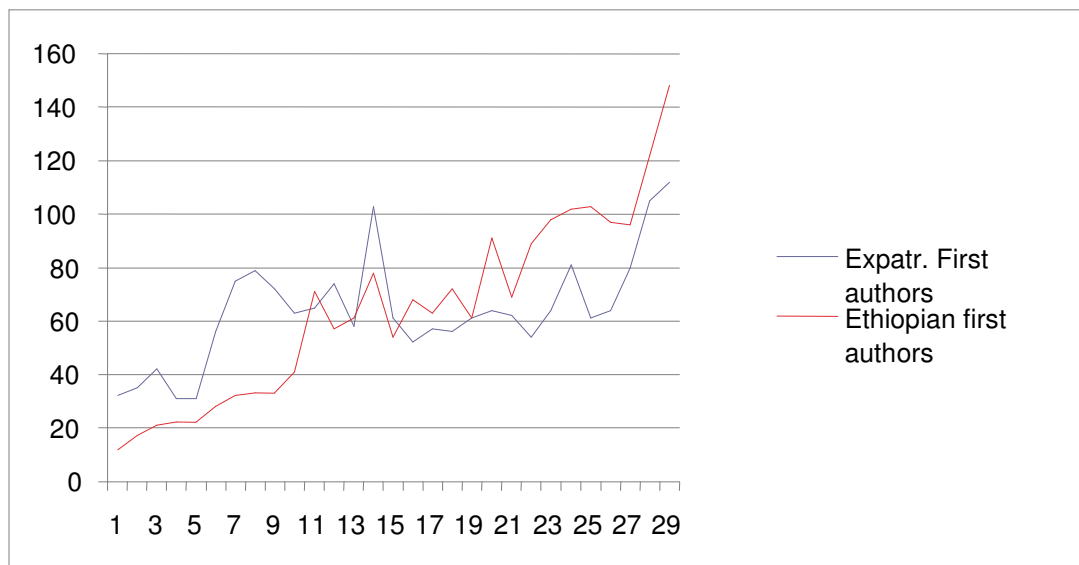


Figure 1. Three-decade Pattern of First Ethiopian versus Expatriate Biomedical authorship, 1980-2010 .

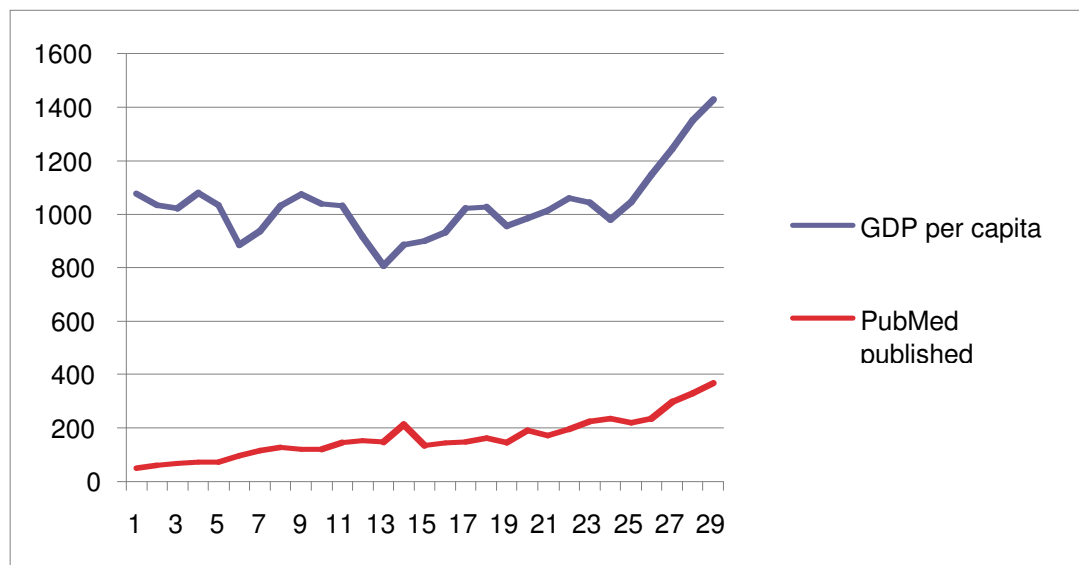


Figure 2. A three-decade pattern of publications from Ethiopia in the PubMed database and Country's GDP 1980-2010

Table 4. List of freely accessible internationally notable medical journals available online for Ethiopian researchers [L]:

Abbr.	IF	Users (In millions)	URL
N Engl J Med	51		www.nejm.org
CMAJ	7.1	25	http://www.cmaj.ca/
BMJ	12.8	1.3 unique hits /Mt.	http://www.bmj.com
<i>Int. J. Med. Sci.</i>	4.45		http://www.medsci.org/
J Postgrad Med	1.54		http://www.jpgmonline.com /

The increase in the number of published articles matched the growth of the National Domestic Product, per capita (GDP), which was 1076.70 in 1980, and has also shown increment to 1,468.75 in 2008 and 1,524.92 in 2009 and an estimate of 1,586.59 for 2010. As these numbers change frequently, regular updates should be obtained from IMF website. (Figure 2). Ethiopian researchers have an opportunity to freely access some of the world's high impact factor journals to improve their research work and capacity (Table 4)

As of June 2007, the pubmed archive contains approximately a million items, including articles, editorials, letter etc and it appears to be growing by at least 7% per year⁷. A total of 5376 journals were indexed by the Pub Med during the period of our search⁸. MEDLINE is the U.S. National Library of Medicine's (NLM) premier bibliographic database and it is the largest component of PubMed that contains over 20 million citations from Medline and other health science journals since 1950.

Discussion

Academic institutions own most African journals. The journals are not indexed in major databases, are poorly funded, have poor circulation, and have difficulties maintaining publication schedules^{9,10,11}. Currently, only about 38 of the 5200 journals indexed in Medline are from Africa, representing 13 African countries. As of December 2007, among 6700 journals in Science Citation Index (ISI), only 20 were from Africa (four countries; only one in medicine). The vast majority of local researchers choose to publish in western journals, which have higher impact factors and larger circulation, leaving local journals with inadequate and poor quality submissions¹².

Favourable conditions for researchers in Ethiopia

Ethiopia as a country started practicing organized modern medicine earlier than most African nations, during the battle of Adwa in 1886¹³ The Ethiopian Medical Journal (EMJ) was also started and indexed in 1962 long before many African journals. Besides the EMJ, the status of other journals such as the Ethiopian Journal of Health Development are good and with positive reputation in terms of published

articles quality and regularities of their publications but are not indexed possibly because of the politics and biases as it is a case for publishing articles⁹. The country's history of medical education also goes back to decades much earlier than many African countries. Currently there are 11 medical schools in the country. There are seven local medical journals that publish biomedical research articles. The fact that Addis Ababa, Gondar and Jimma Universities are World Health Organization (WHO) recognized teaching institutions and the emerging credible Institutional Review Boards (IRB) at Addis Ababa University¹⁴ and Armour Hansson's Research Institute (AHRI) that are formally recognized by the WHO are also rewarding evidences that could bring about sparks of hope for researchers who would like to conduct clinical trials or collaborate with other intuitions. The University legislations that encourage the involvement of staff in research undertakings, allocating 10-25% of staff's time for research and granting academic merit on the bases of research publications, including case reports are all opportunities to the researchers¹⁵. This fact and the allocated research leaves should encourage the clinician to publish his research work.

Availability of ample patient case mix and a variety of presentations that may be encountered only in the tropical setups also give researchers and clinicians opportunities to report. The Ethiopian Medical Association and subspecialty associations in the country have also created ample opportunity for local and international researchers to present their findings during the annual conferences. The fact that the number of Ethiopian first authorship increased after 1995 could be a reflection of the emerging subspecialties. Despite these and other opportunities for conducting and publishing biomedical researches in Ethiopia, the number of published works from the country in the last three decades is one of the lowest by any standard.

Challenges for local researchers

We tried to look into factors that might have been obstacles and challenges. To list some among the many difficulties;

1. Brain drain of researchers and professionals in general has affected the research and publications at least as much as it has affected other areas. Most of young researchers are left without mentors.
2. Inadequate funding for research in the country and difficulties related to writing proposals that could attract international donors
3. Poor financial administration system for the granted amounts that affect timely execution of the research and reporting
4. The amount of money assigned to research by the government is very minimal
5. There are very few institutions in the country that are dedicated to research both by the government and other agencies and the value given to research seems minimal
6. Research and evidence-based clinical practice and policies are not strong enough so as to encourage decisions to be research based.
7. So far there is only one indexed medical journal in the country, which has very low impact factor. This gives little opportunity for researchers who wish to publish their studies in high circulation journals and therefore are obliged to submit their work abroad.
8. Very long delays of up to over a year period to review a submitted article have also been a major problem of some local journals. This, coupled with the poor communication system as to where about of the submitted papers have contributed to preference to the international journals.
9. Access to Internet facilities and electronic publications is also a major rate-limiting factor for professionals engaged in research. This has major implication in accessing the freely available high IF and reputable journals.
10. Teaching institutions have no or little mechanism of making sure their faculties are engaged in research activity or have published any article with a possibility of created a state of stagnancy where a senior faculty may not publish any research for years.

Journal's Impact Factor

The impact factor, often abbreviated IF, is a measure of the citations to science and social science journals and is calculated every year for indexed journals as a proxy measure for the relative importance of a journal within its field. The publication of each year covered occurs in the summer of the following year¹⁶. Impact Factor as a quantitative tool for ranking, evaluating categorizing, and comparing journals is used to determine the frequency with which the "average article" in a journal has been cited in a particular year or period.

That means the journals that have a longer years of publications and frequent issues per year could have a chance of larger citable literatures because of the fact that the larger the number of previously published articles, the more often the journal will be cited. As one examines the EMJ in this light, though it is one of Africa's Indexed oldest journal, because of the irregularities in the publication and that it is only published a maximum of four times a year could not contribute much to its IF. EMJ could also raise its IF by making available its full articles online. Currently, there is no easy, credit card system to order articles or the journal online. This hinders the researchers to cite the article to which they have no access and this in return contributing to the low IF.

Does Impact Factor matter?

In addition to other things, one of the most important uses of impact factor is its use in the process of academic evaluation. The impact factor can be used to provide a gross approximation of the prestige of journals in which individuals have published. This is best done in conjunction with other considerations such as peer review, productivity, and subject specialty citation rates.

RESEARCH and GDP

Researchers and institutions have described the correlation between countries research output and GDP. One method developed by Organization for Economic Co-operation and Development (OCED) is to measure this correlation in describing research activity of a nation is to consider the proportion of nation's GNP spent on research and development¹⁷. In line with this thought, in general there seems to be a good trend of increased research output and publications from Ethiopia with the increased GDP per Capita of the country.

It is to be remembered that in 2004 assembly, Africa's Science Ministers of New Partnership for Africa's Development (NEPAD) have agreed to allocate 1% of their member-state's GNP for research. High income nations spend 2-3% of their GNP on research while most African nations spend one tenth of what was promised by NEPAD members¹. The recommendations of Commission on Health Research for Development (CHRD) states that developing nations should allocate 2% of their expenditure on health for research^{18,19,20}. The Ethiopian government, through Ethiopian National Science and Technology Commission assigned 1.5% of the country's GDP to Science and Technology, but how much of this is spent on health-related research is not clearly known²¹. Hence, most of the research works are donor interest driven rather than being problem based. While it is generally believe that TB/HIV/AIDS are major public health problems that should be researched, one could also raise the importance of fairness in setting priorities. This fact could also be a reflection of the availability of money to conduct the researches.

The way forward should be building research capacity from within rather than depending only on external donors. The country could benefit from encouraging biomedical research works by allocating adequate grant as in other fields and making important public health decisions research based.

Limitations

Even though it is the main database for biomedical researches our search is only limited to PubMed. This might have omitted many internationally recognized indexing databases and published articles on biomedical researches from Ethiopia. The researchers have a limited capacity to address all medical databases in the world - it will be an endless and laborious exercise. Yet we feel that PubMed is a representative database as it collected Articles published from Ethiopia on more than 600 journals, across the world!

Since the last 15 years, surgeons from our part of the world seem to be publishing more and more surgical/orthopedic articles on East and Central African Journal of Surgery (ECAJS) regularly published by COSECSA and hosted online by Bioline international. This journal is recently gaining popularity and is on the process of getting indexed on PubMed. Sadly, lack of being indexed limited excellent articles published on ECAJS from being internationally well 'visible'.

Conclusion and Recommendations

Based on our findings, we conclude and recommend the following:

- Surgical research and Medical research output from our country, including the number of journals available is by far below the standard, this has to be given due attention
- "Common Clinical" fields have a rather very small output (visibility) to the international medical literature. Causes and solutions for these have to be further studied
- Working hard towards indexing regional or local surgical journals already available in Africa will increase the international visibility of research work published in/from the constituent countries.
- Ethiopian First authorship emerged and kept dominating starting a decade and half ago. We recommend that this trend has to further be strengthened and continued.

Acknowledgments

We acknowledge colleagues, editorial boards and journal offices involved at different levels of in the conduct of this study.

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