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ORIGINAL RESEARCH

A Bibliometric Analysis of Health and Medicine Research in Uganda

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Abstract

Background: Research is one of the many domains that help countries to provide solutions to various challenges and improve facilities. The bibliometric analysis measures the research output of individuals/research teams, institutions, and countries and identifies national and international research networks across the globe.

Objective: To examine key research topics, interrelations, and collaboration patterns of published health-related research in Scopus from Ugandan institutions and authors.

Methods: Using the search term "Uganda, health, medicine" in the title, abstract and keywords, documents published between 1963 and 2022 were retrieved from Scopus. The extracted records were analysed in terms of keywords analysis and collaboration networks. The R Bibliometrics package was used to analyse and visualise the data.

Results: The results reveal to scholars and practitioners the most relevant authors, affiliations, publication sources, trends in research topics and collaborating countries. The results provide valuable information for more investigation into the revealed research trends.

Conclusion: Bibliometric analysis of health research in Uganda revealed that the most frequent topics are medicinal plants, traditional medicine and herbal medicine. Research work on malaria, Covid-19 and HIV/AIDS is also evident. There is a significant research collaboration with authors from the United States and the United Kingdom.

Keywords: *Bibliometrics, Health, Medicine, Plant medicine, Traditional medicine, Uganda*

Introduction

The Organisation for Economic Cooperation and Development (OECD) glossary of statistical terms defines bibliometric research as the statistical analysis of books, articles, or other publications used to measure the research output of individuals/research teams, institutions, and countries. The bibliometric analysis identifies national and international research networks and maps emerging multi-disciplinary research fields

in various disciplines. Bibliometric analysis is defined as "The use of published scientific literature (articles, books, conference proceedings, etc.) for measuring research activity such as output volume, science 'quality', interdisciplinarity, and networking" from the elements of bibliometrics analyses. Besides publications, other elements of interest in the bibliometric analysis include (co-)authors, references, and citations. Publications can be analysed by journal, institutional or country

affiliation of authors, references and subject category citation, among others. Bibliometric analysis is divided into three levels, i.e., macro, meso and micro. At the macro level, the analysis focuses on comparing countries and regions. At the meso level, the analysis addresses the performance/output of research organisations, universities and institutes. At the micro level, the bibliometric analysis addresses the output of programmes, groups or individual researchers. Alternatively, bibliometrics can be divided into performance and science mapping analysis (SMA). Using performance analysis, different scientific actors such as researchers, institutions, and countries can be evaluated based on publications and citation data. On the other hand, SMA evaluates a research field's cognitive and social structure using its topological and temporal representation. As an analysis and assessment tool, bibliometric analysis has been used to analyse and assess the output of researchers, research cooperation between universities, the effect of funding on national research and development performance and educational efficiency. [1] Systematic literature reviews have been increasingly used to provide insights and guidance to practitioners and policymakers on the best avenues or interventions. [2] Systematic literature reviews have been employed when investigating new research lines or building new theories. [3,4]

Guiding questions such as: “what is the new research field/theory? how does it relate to existing fields or theories?” have been used many times to guide researchers. To pursue this, literature reviews become helpful, especially in cases with few relevant studies or a lack of research on a particular issue and topic. The review can then be used as the foundation for a discussion regarding the knowledge gap and probably how this gap can be filled. Bibliometric analysis has guided this process of collecting, handling, and analysing quantitative bibliographic data derived from scientific

publications. [5] Through bibliometric analysis, we can obtain general descriptive statistics identifying the number of documents, type of documents, main authors, and publishing journals. [6] Beyond descriptive analysis, more sophisticated methods like document co-citation analysis and collaboration networks can be done. [7-9]

Unlike other literature review techniques, more objective and reliable analyses can be obtained by bibliometrics. Bibliometrics can be used to infer trends over time, research themes, and detect prolific scholars and institutions from the overwhelming volume of new information by providing structured analyses. The rationale of bibliometric analysis is that the results of cumulative research on any field of study can be captured through citations. The citations of an article intellectually represent linkages to various areas of research. Therefore, examining linkages generates possibilities of systematically scrutinising relationships among documents that contribute to developing a defined research field. [10] For example, Fangfang *et al.* [11] used bibliometric analysis to evaluate the situations and trends of the most cited articles in gastric disease. Their work provided physicians with a practical guide on assessing articles that were the most influential on the subject.

The first stage of bibliometric analysis is to decide the best data source that fits with the scientific coverage of the research area. Moral-Muñoz *et al.* [1] explain the different features of several bibliographic databases. Such features include whether the database is free or subscription required, the possibility of data download, the limit of downloadable records, availability of Application Programming Interfaces (APIs) and the available data formats. These databases include Web of Science, Scopus, Google Scholar, Microsoft Academic and Dimensions. Gusenbauer [12] provided a comparative overview based on official information on

database sizes and previous scientometric studies of 12 of the most used scientometric databases. A similar study [13] compared citation counts for Google Scholar, Web of Science and Scopus databases. They found that Google Scholar citations for the sample of journal articles were manually captured and reviewed. The purpose of accessing bibliometric databases is to get data on which bibliometric analysis can be done. In general terms, bibliometric analysis focuses on identifying a research field's knowledge base and intellectual structure, examining its conceptual design or producing a social network structure for a research community. Co-word analysis, co-author analysis and co-citation analysis are the major data analysis techniques done using bibliometric analysis. To study the conceptual structure and understand the cognitive structure of a research field, document keywords are used in co-word analysis. In co-author analysis, authors and their affiliations are examined for social structure and collaboration. Co-citation analysis, on the other hand, measures the citation counts of similarity between authors, documents, and journals. [14] Co-citation analysis uses network theory to generate a map as an output. [9] Using this map, scholars can identify relevant research domains and, at the same time, examine the level of connection among the research domains. The nodes in the map represent cited documents, and the links represent the co-occurrence of cited documents in the reference lists. Manuscripts that appear together in the reference list are co-cited. An implication is that these documents belong to a similar subject area. [7, 15] Popular bibliometric software tools, among others, include Bibliometrix, Bib Excel, Cite Space, Eigen Factor Score, HistCite, Pajek, Publish or Perish, Scholar meter, and Scholar h-index Calculator, among others.

Over the years, health-related research has been done at various institutions in Uganda. In this study, we use bibliometrics to quantitatively

analyse and explore the impact of research on health and medicine published in Scopus by Ugandan authors in different Ugandan Institutions. The study's general objective was to examine key research topics, inter-relations, and collaboration patterns of published health-related research in Scopus from Ugandan institutions and authors. Specifically, the study addressed the following objectives:

- a) To identify established and emergent topics on health research done in Ugandan institutions.
- b) To identify inter-relations and collaboration patterns of health research done at Uganda's institutions.

In this research, we studied meso and micro level analyses of the research published in Scopus peer-reviewed journals by authors affiliated with various institutions in Uganda. These analyses will help identify priorities for future research, including how universities in Uganda can use and share their works and give the researchers a more precise scope of the articles or citations available in their university. The study findings will increase awareness about research on human health and medicine done in Ugandan institutions. This study aims to conduct a bibliometric analysis to answer the following research questions:

- a) What are the most researched topics on health and medicine in Uganda?
- b) Which countries collaborate with Uganda on human health and medicine research?

Methods

The research design followed a five-step methodology earlier proposed [7] for data collection and comprehensive evaluation to identify the most influential studies and determine the topical areas of research. This five-step process begins with the definition of the database to query and the search terms to adopt.

We then screened the initial search results, refined the search results, developed descriptive statistics, and performed a detailed bibliometric

data analysis. The Flow chart for the research design used in this study is shown in Figure 1 below.

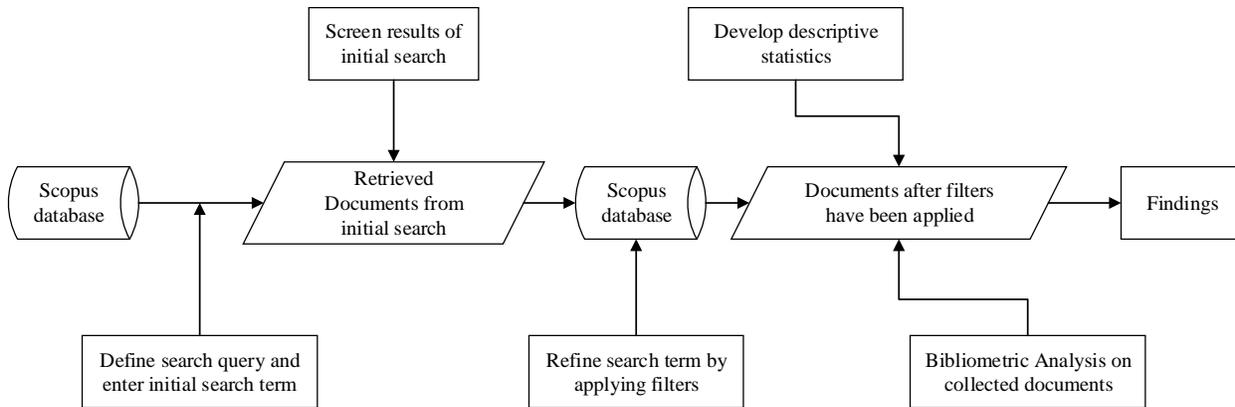


Figure 1: Flow chart for the study

Data collection

Data was collected from Scopus. It offers access to databases and citation data in various scientific fields, including social, physical and health sciences. The three types of sources covered in Scopus include book series, journals and trade journals. The database hosts citation records (including their cited references) from scholarly

journals and conference proceedings. Scopus can be searched by specific keywords in fields such as the title, abstract, topic, author or source title. We collected data using the search term "Uganda, health, medicine" in the titles, abstract and keywords. Our initial search yielded 1132 documents, as shown in Figure 2.

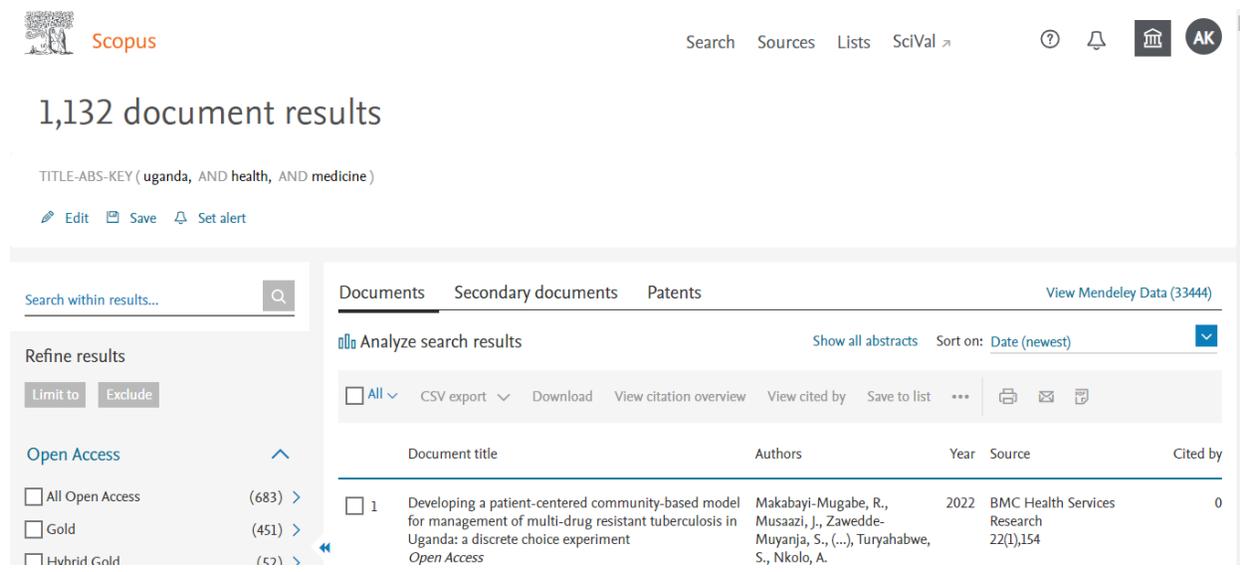


Figure 2. Initial search

The search term was revised using subject area, affiliation, and country filters. We did not filter document types, though. In the filter by subject area, we focused on only publications in the health/medicine domain. Filter by affiliation

aimed at getting only Ugandan Institutions and country filter targeted author's affiliation country. After applying these filters, the search revealed 195 documents, as shown in Figure 3.

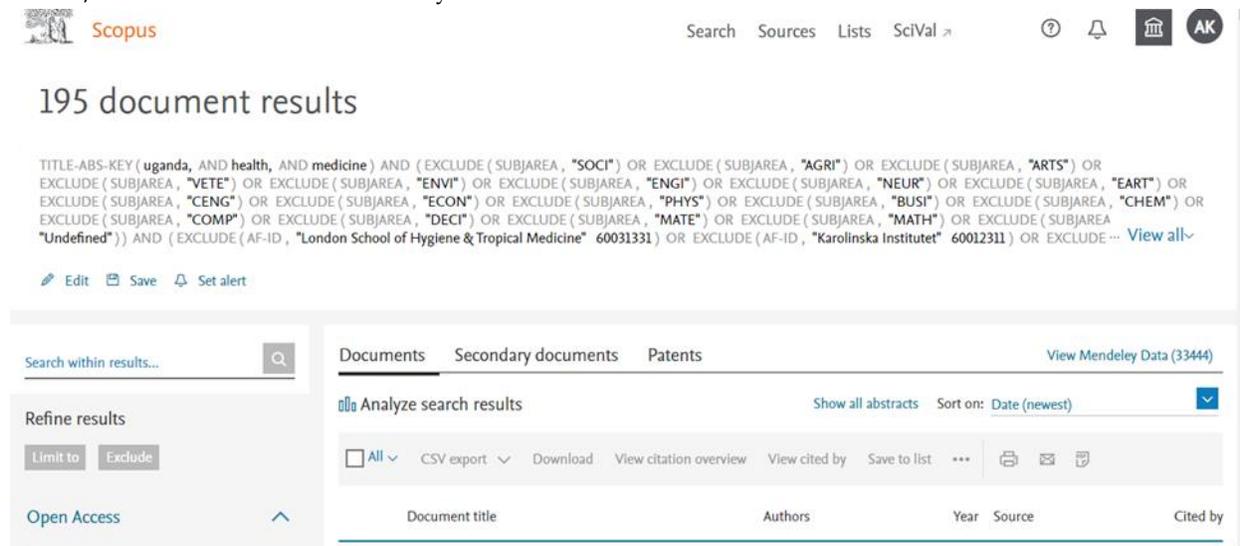


Figure 3. Search results after refining

After collecting data, we used Bibliometrix for the analysis. Bibliometrix is an R statistical package for analysing and visualising the bibliographic data from Web of Science and Scopus databases. More so, R is an open-source environment ecosystem that encompasses algorithms for statistical analysis, mathematical functionality and visualisation capabilities. This makes it a good candidate for bibliometric analysis. Bibliometrix covers the whole bibliometric workflow. [16] Data retrieved from SCOPUS can be saved as BibTeX (.bib) or plain text (.txt). Either way, this can be directly imported in Bibliometrix. [17]

Results

Screening initial search results and refining the search

Screening initial results revealed that in Scopus, there are many documents with the exact

keywords in our search term but on different subject areas. This initial screen is shown below in Figure 4.

From the results shown in Figure 4, we observed that there are quite a several documents from various subjects. We chose to exclude those subject areas we regarded were not directly connected to health and medicine. Tables I, II and III show descriptive statistics of the main information, document types and author statistics, respectively, for the filtered search results indicating Ugandan institutions. In Table I, we observed that the first document on research about Uganda's health and medicine published in Scopus was in 1963. Since then, there have been 10.40 average publications per year. With this average publication, the total health and medicine research from Uganda has been published in 94 sources. There is a 16.81 average citation per document and an average of 1.58 per document per year.

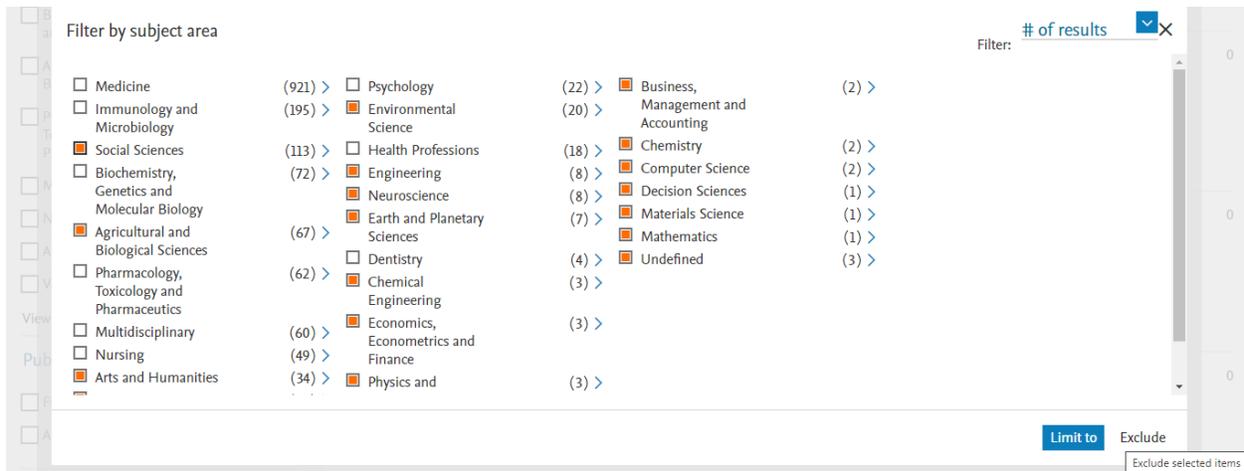


Figure 4. Breakdown of initial search according to the subject area.

Table I: Main information about data

Description	Results
Timespan	1963:2022
Sources (Journals, Books, etc.)	94
Documents	195
Average years from publication	10.40
Average citations per document	16.81
Average citations per year per doc	1.58
References	1

Table II shows the document types published on health and medicine research in Uganda. In total, original articles were the largest among the publication types with some 177, followed by 12 reviews, two notes and one each of editorial,

erratum, letter and short survey. This means that Ugandan researchers preferred to publish original research as opposed to other types of documents.

Table II: Publication types

Description	Results
Original Article	177
Editorial	1
Erratum	1
Letter	1
Note	2
Review	12
Short survey	1
Total	195

In Table III, the search gave a total of 799 authors in 922 appearances. Out of the 799 authors, there were 24 for single-authored documents and 755 for multi-authored manuscripts. That observation indicated that Ugandan researchers collaborated with others in their research. Hence,

the collaboration index of 4.56. There was also a total of 25 single-author documents out of 195 papers, and the 170 documents were multi-author documents. The search also revealed that there were 0.24 documents per author and 4.73 co-authors per document.

Table III: Author statistics and collaborations

<i>Authors</i>	
<i>Description</i>	<i>Results</i>
Authors of single-authored documents	24
Authors of multi-authored documents	775
Total Authors	799
Author Appearances	922
<i>Authors Collaborations</i>	
Single-authored documents	25
Documents per Author	0.24
Authors per Document	4.10
Co-Authors per Documents	4.73
Collaboration Index	4.56

Bibliometric analysis

We conducted a bibliometric analysis using Biblioshiny to get more insight into the data, including author, affiliation and keyword statistics. Biblioshiny is a graphical bibliometric analysis version of a bibliometric package.

As shown in Figure 5, there was an increasing trend in the publications over the years. This means that Ugandan universities were actively involved in research, and the results were published. It is worth noting that over the period between 1979 and 1987, there was no significant research output from Ugandan researchers; this could be a result of the civil war in the country at that time. However, after that period, there was a steady increase in the publications, though with drops, but the declines were not remarkable. The year 2021 had the greatest number of publications of all the years studied.

Relevant sources

Figure 6 shows that most of the health research work done in Ugandan universities and institutions were mainly published in African Health Sciences. This observation could be attributed to the fact that Makerere University Medical School publishes African Health Sciences, and most researchers are affiliated with that institution, so it is easier for them to publish their work in that journal. The keyword analysis shows that the most commonly used keywords were traditional medicine, medicinal plants and herbal medicine. This explains why the Journal of Ethnopharmacology ranked second in publishing research works from Uganda. The journal publishes research about the traditional therapeutic use of plants and their biological and pharmacological effects. Geographically, Uganda is in the tropics, which explains why other relevant sources, as shown in Figure 6, are

selected for publication because they publish works related to tropical medicine.

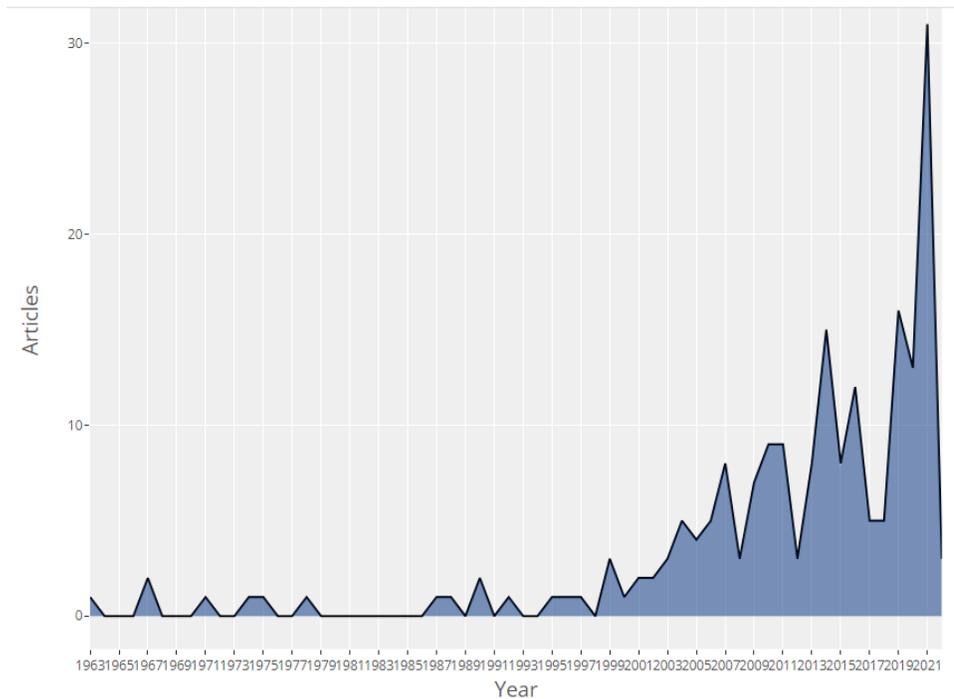


Figure 5. Annual scientific production

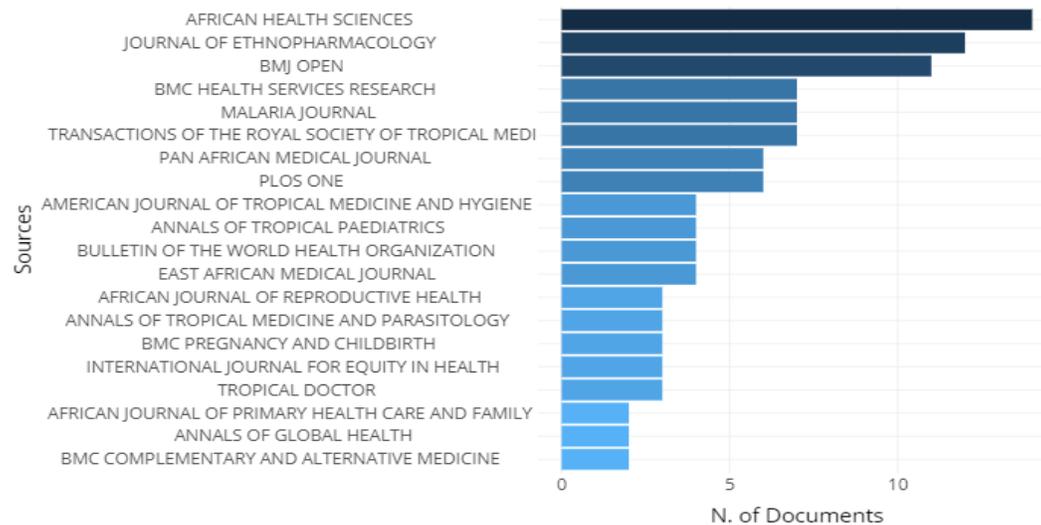


Figure 6: Most relevant sources

Keywords Analysis

In Figure 7, the keywords specified by the authors are shown in a word cloud. Here we noted that ‘Uganda’ was the most frequent

keyword used by authors, followed by traditional medicine, medicinal plants, and herbal medicine. The explanation is that

practices are no surprise because traditional medicine stood out in the concurrence network.

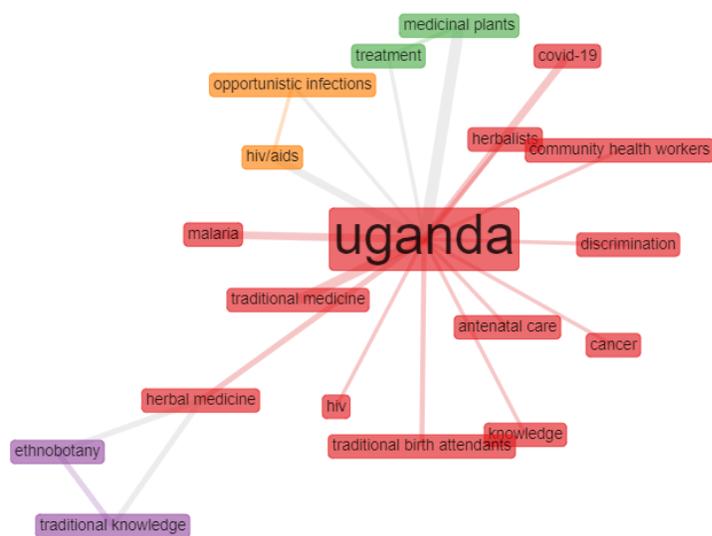


Figure 10. Concurrence network

Discussion

The study offered an overview of the research work on health and medicine conducted in Uganda by identifying the established and emerging topics. From Scopus, 195 documents published for the years from 1963 up to 2022 were retrieved. One hundred and seventy-seven of these were original articles. The study revealed a steady increasing scientific production over the years. Keyword analysis using word cloud revealed that the most used keywords by the authors were medicinal plants, traditional medicine and herbal medicine.

The African Health Sciences and Journal of ethnopharmacology ranked high among the journals where the research works were published. This is because the African Health Sciences, published by Makerere University medical school and the Journal of Ethnopharmacology, publish research on the traditional medicinal use of plants and their

biological and pharmacological effects. The results also indicate that Ugandan researchers not only collaborate with fellow researchers from the United States and the United Kingdom, but there is also a significant collaboration with researchers from neighbouring countries like Kenya, Tanzania and the Democratic Republic of Congo. This collaboration reveals that concerted efforts are being used to fight regional diseases. The study has also shown that there has been an increasing scientific production over the years. This gives hope that more Ugandan authors researching health-related topics want to see their work published in well-known and high-ranking journals, which is a good indicator of improved research quality and impact. The study's major limitation is that it is based on documents published in Scopus only. Secondly, we could not find similar study/studies in the literature, so a comparative analysis of our results in this study was impossible. Therefore, we cannot say that it is a comprehensive representation of all the research on health done

by Ugandan authors and institutions. Still, it can give an insight into some of the health and medicine research topics that interest Ugandan researchers.

Conclusion

This bibliometric analysis of health research in Uganda revealed that medicinal plants, traditional medicine and herbal medicine are the most frequently researched topics. Research collaboration networks are mainly with researchers from the US and UK. These results will help future researchers on health-related research in Uganda to adopt an appropriate research collaboration and publication strategy. For the decision-makers and practitioners, the analysis results will help formulate policies that favour the identified significant themes and collaborations. Besides bibliometric analysis, text analysis and association rule mining could also be used to get a deeper insight into research themes conducted in Ugandan universities.

Authors' Contributions: KA conceived and designed the study, and MB did data collection while SAM did data analysis and interpretation. KA drafted the manuscript, while SAM revised the manuscript for sound intellectual content. All the authors read and approved the final version of the manuscript.

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References

1. Moral-Muñoz JA, Herrera-Viedma E, Santisteban EA, Cobo MJ. Software tools for conducting bibliometric analysis in science: An up-to-date review. *El profesional de la información* 2020; 29: <https://doi.org/10.3145/epi.2020.ene.03>.
2. Tranfield D, Denyer D, Smart P. Towards a methodology for developing evidence-informed management knowledge by means of systematic review. *Brit J Manag* 2003; 14: 207-222. <https://doi.org/10.1111/1467-8551.00375>.
3. Cai CW. Disruption of financial intermediation by FinTech: A review on crowdfunding and blockchain. *Accounting Finance* 2018; 58: 965-992. <https://doi.org/10.1111/acfi.12405>.
4. Cai CW. Nudging the financial market? A review of the nudge theory. *Accounting Finance* 2019; 60: 3341-3365. <https://doi.org/10.1111/acfi.12471>.
5. Verbeek A, Debackere K, Luwel M, Zimmermann E. Measuring progress and evolution in science and technology: the multiple uses of bibliometric indicators. *Int J Manag Rev* 2002; 4: 179-211. <https://doi.org/10.1111/1468-2370.00083>.
6. Wu YCJ, Wu T. A decade of entrepreneurship education in the Asia Pacific for future directions in theory and practice. *Manag Decision* 2017; 55: 1333-1350. <https://doi.org/10.1108/MD-05-2017-0518>.
7. Fahimnia B, Sarkis J, Davarzani H. Green supply chain management: A review and bibliometric analysis. *Int J Production Economics* 2015; 16: 101-114. <https://doi.org/10.1016/j.ijpe.2015.01.003>.
8. Appio FP, Martini A, Massa S, Testa S. Unveiling the intellectual origins of social media-based innovation: insights from a bibliometric approach. *Scientometrics* 2016; 108: 355-388. <https://doi.org/10.1007/s11192-016-1955-9>.
9. Liu Z, Yin Y, Liu W, Dunford M. Visualizing the intellectual structure and evolution of innovation systems research: a bibliometric analysis. *Scientometrics* 2015; 103: 135-158. <https://doi.org/10.1007/s11192-014-1517-y>.

10. Di Stefano G, Peteraf M, Verona G. Dynamic capabilities deconstructed: a bibliographic investigation into the origins, development, and future directions of the research domain. *Industrial Corporate Change* 2010; 19: 1187-1204. <https://doi.org/10.1093/icc/dtq027>.
11. Fangfang Y, Jizhen C, Bin L, Xiaowei T. Bibliometric Analysis of 100 Top-Cited Articles in Gastric Disease. *BioMed Res Int* 2020; 2020: 1-8. <https://doi.org/10.1155/2020/2672373>.
12. Gusenbauer, M. Google Scholar to overshadow them all? Comparing the sizes of 12 academic search engines and bibliographic databases. *Scientometrics* 2019; 118: 177-214. <https://doi.org/10.1007/s11192-018-2958-5>.
13. Chapman K, Ellinger AE. An evaluation of Web of Science, Scopus and Google Scholar citations in operations management. *Int J Logistics Manag* 2019; 30: 1039-1053. <https://doi.org/10.1108/IJLM-04-2019-0110>.
14. Massimo A, Corrado C. Bibliometrix: An R-tool for comprehensive science mapping analysis. *J Informetrics* 2017; 11: 959-975. <https://doi.org/10.1016/j.joi.2017.08.007>.
15. Hjørland, B. Citation analysis: a social and dynamic approach to knowledge organisation. *Information Processing Management*. 2013; 49: 1313-1325. <https://doi.org/10.1016/j.ipm.2013.07.001>.
16. Derviş H. Bibliometric Analysis using Bibliometrix an R Package. *J Scientometric Res* 2019; 8: 156-160. <https://doi.org/10.5530/jscires.8.3.32>.
17. Linnenluecke MK, Marrone M, Singh AK. Conducting systematic literature reviews and bibliometric analyses, *Australian J Manag* 2020; 45: 175-194. <https://doi.org/10.1177/0312896219877678>.

