

Article

Not peer-reviewed version

Research on Neonatal Conditions in Africa: Volume, Impact, Thematic Spectrum, and Collaboration from a Bibliometric Perspective

[Elizabeth Vieira](#) *

Posted Date: 2 October 2024

doi: 10.20944/preprints202410.0186.v1

Keywords: Africa; health; neonatal conditions; bibliometrics; collaboration



Preprints.org is a free multidiscipline platform providing preprint service that is dedicated to making early versions of research outputs permanently available and citable. Preprints posted at Preprints.org appear in Web of Science, Crossref, Google Scholar, Scilit, Europe PMC.

Copyright: This is an open access article distributed under the Creative Commons Attribution License which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.

Article

Research on Neonatal Conditions in Africa: Volume, Impact, Thematic Spectrum, and Collaboration from a Bibliometric Perspective

Elizabeth S. Vieira

LAQV/REQUIMTE, Departamento de Ciências dos Computadores, Faculdade de Ciências, Universidade do Porto, Rua do Campo Alegre, 4169-007 Porto, Portugal; elizabeth.vieira@fc.up.pt

Abstract: The literature has addressed the negative impact of poor neonatal conditions (NC) across regions. This has drawn attention to the need to improve NC, particularly in Africa. NC research can make an important contribution. However, there is no study dedicated to this topic in Africa. Through a bibliometric analysis, we arrive at outputs that can inform scientists in planning ongoing or new NC research and those involved in developing and implementing strategies to combat poor NC. Using bibliometrics, the study identified the scientific knowledge on NC between 2000 and 2019, its visibility in the community, the main topics researched, and collaboration patterns. The results show that knowledge on NC has increased between 2000 and 2019, it is concentrated in a few African countries (Egypt, South Africa, Nigeria, Tanzania and Kenya), its visibility is below the world average, in general, maternal mortality is the most researched topic and collaborative activities are frequently, mainly international research collaboration (IRC), being the United States of America (USA) and the United Kingdom (UK) the main partners (they participated in 57% and 28% of all articles with IRC). The collaboration networks are fragile as 43%-67% of all links represent one article in 20 years. Ongoing or new research on NC in Africa should consider the main African players and their partners. There is a need to implement strategies to increase NC knowledge in other African countries, expand and strengthen the collaboration networks and diversify the sources of knowledge.

Keywords: Africa; health; neonatal conditions; bibliometrics; collaboration

INTRODUCTION

In 2015, the United Nations General Assembly agreed on the 2030 Agenda for Sustainable Development. The agenda comprises 17 Sustainable Development Goals (SDGs) and 169 targets. The third SDG, *Ensure healthy lives and promote well-being for all at all ages*, is of great importance for Africa. The high burden of disease in Africa is responsible for high DALYs (a measure of the total burden of disease, expressed as the number of years lost due to illness, disability or early death) and consequently high GDP losses. A study looking at the productivity costs of disease in Africa estimates 629 603 271 DALYs in 2015, with NC responsible for 12% of those DALYs and an estimated productivity loss of Int\$347 336 223 573 (International Dollars — a hypothetical unit of currency that has the same purchasing power parity that the USA dollar had in the USA at a given point in time) (WHO, 2019).

A study that examined the causes of under-five mortality showed that the mortality burden was highest in Africa in 2010 (3.6 million deaths) (Liu et al., 2012). The authors found that neonatal deaths account for 30% of total mortality and birth complications and intrapartum-related complications as the main causes. Recent studies continue to conclude that neonatal deaths account for a significant proportion of total deaths in Africa, particularly in sub-Saharan Africa (e.g. Ou et al., 2022; UN, 2022; Wang et al., 2014).

Considering these statistics, the international community recognized the need to develop and implement strategies to reduce the negative impact of limited NC. In this regard, NC research is crucial, although there is no study on the topic in Africa.

Bibliometrics allows for meaningful analysis of a particular topic, and this method can be used to identify strengths and weaknesses. The output from this analysis can assist: (1) scientists in ongoing or new NC research and (2) those responsible for policies to combat poor NC.

In this paper, I resorted to a bibliometric analysis to inform about the volume, impact, thematic spectrum, and collaboration patterns regarding NC research in Africa. Based on these results, I point out some implications for practice, policy and future research.

The paper is organized as follows: the next section provides a summary of the methodology (see Supporting Information (SI) for details), the Results and Discussion section presents the results of the bibliometric analysis and discusses its implications, and the Conclusions section presents the main findings.

METHODS

Data identification

I searched the keywords related to NC, validated by peers in Confraria & Wang, 2020, in titles, abstracts and keywords to find the relevant articles indexed in the Web of Science Core Collection (WoS) and published between 2000 and 2019 (see the search query in the Support Information (SI)). I extracted the metadata of 1784 articles published by at least one scientist (not all authors of a publication are scientists in the strict sense of the word, but for simplicity, I use this word to refer to the authors in the publications) whose affiliation is with an African institution (hereafter African scientists). The use of discipline-specific terms imposes limitations that affect the accuracy of the methodology due to the multiple meanings and variety of terms that can be used to represent a topic. I then analyzed each article and retrieved those referring to NC in Africa. The final set comprises 1250 articles. The limitations of the methodology are described in the SI.

Bibliometric analysis

Volume

I used the number of articles to quantify the scientific knowledge on NC in Africa. Where possible, I resorted to longitudinal analyses to identify trends. I also identified the African countries researching NC.

Impact

I looked at the visibility of NC research by using, as a proxy, the number of citations. The number of citations depends on the citation culture of each field, type of document, and year of publication (Clarivate, 2021; Waltman, 2016). Then, I resorted to a normalized indicator: the Category Normalized Citation Impact (CNCI), available in InCites (Clarivate, 2021).

The CNCI of a document is the ratio between the number of citations received and that expected for documents of the same type, published in the same year and belonging to the same scientific field. If the CNCI for a particular document is above 1, the visibility of a document is above the world average, otherwise, it is below.

For document sets, I discussed their visibility using the median value. The CNCI is only addressed for sets with 20 or more articles (see the Methods in the SI for these decisions).

Thematic spectrum

As for the thematic spectrum, I adopted the citation topics schema. This is a document-level classification available through the WoS (for more information on this schema, see the Methods in the SI). I used the micro-level to identify the topics covered in NC research. At this level, each paper is categorized into only one topic.

For each topic with 20 or more articles, I used the CNCI to determine its visibility.

Collaboration activities

As for collaboration activities, I analyzed the patterns at the country and university level, domestic research collaboration (DRC) and IRC. The heuristics I followed can be found in the Methods in the SI.

After the identification of the countries, universities, and types of collaboration, I identified the:

- number of collaborative articles, type of collaborations and partners. I supplemented the information with a longitudinal analysis where possible,
- DRC by African country,
- visibility by type of collaboration,
- areas with more collaboration, and
- collaboration networks and analyzed them using social network analysis.

In the networks, the nodes represent countries/universities and the links are the number of publications in which the scientists from the two countries/universities have participated. I used statistics as the density, degree, and eigencentrality (Cherven, 2015) to discuss the potential of these networks as enablers of knowledge flow.

RESULTS AND DISCUSSION

Volume

The knowledge on NC has increased over time. In 2000, there are 15 articles indexed in WoS and in 2019, 196 (Error! Reference source not found.). The growth can be described as exponential, with an annual growth rate of around 19%.

The production is concentrated in the period between 2010 and 2019, mainly in 2015-2019 when about 61% of the 1250 articles were published (Error! Reference source not found.).

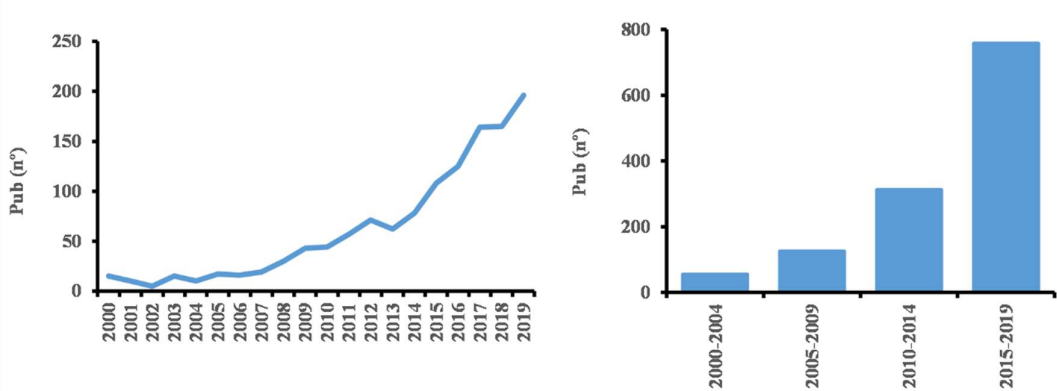


Figure 1. The total number of articles on NC research in Africa. For the graph on the left, the trendline is as follows $y = 7.1842exp^{0.1762x}$ (r-square=0.9831).

A large proportion of the scientific knowledge produced is the responsibility of a few African countries: Egypt, South Africa, Nigeria, Tanzania and Kenya were involved in 787 articles, representing about 63% of all articles (SI, Table 1). This suggests that knowledge may be concentrated in a few places, which is undesirable as the burden greatly affects the whole continent.

These countries are also consistently among the African leaders in the production of knowledge in general (e.g., Cerdeira, Mesquita, & Vieira, 2023; Mouton & Blanckenberg, 2018; Sooryamoorthy, 2021). Therefore, their national scientific systems are expected to have characteristics that put them in a satisfactory position regarding knowledge transfer to other African countries.

Over time, there have been no significant changes in the African countries with the highest contribution (SI, Table 1). Egypt has significantly increased its production; two papers were published in 2000-2004 and 150 in 2015-2019, the country with the highest number. The changes in 2015-2019 indicate that other countries might play a crucial role in NC research in the future. While Egypt, South Africa and Nigeria remain in the top 5, Tanzania and Kenya have been overtaken by Ethiopia. Uganda and Ghana have a similar number of articles to Tanzania.

Impact

The distribution of articles according to their impact is skewed (SI, Figure 1). There are a few articles with a high impact (60 articles have a CNCI of 5 or more) and many articles with a value below the world average (749 articles with a CNCI of less than one and 455 with 0.500 or less). The impact of the articles is, generally, below the world average according to the median value (**Error! Reference source not found.**, left plot). It is 0.754 the world average (SI, **Error! Reference source not found.**) considering all documents. It increased from 2000-2004 (articles published in this period) to 2010-214 and then declined (**Error! Reference source not found.**, right plot), without reaching the world average. In 2015-2019, the median value is 0.85 of the world average. However, as mentioned before and shown in SI, Table 2, some articles have an outstanding impact (interquartile range (IQR) and P75).

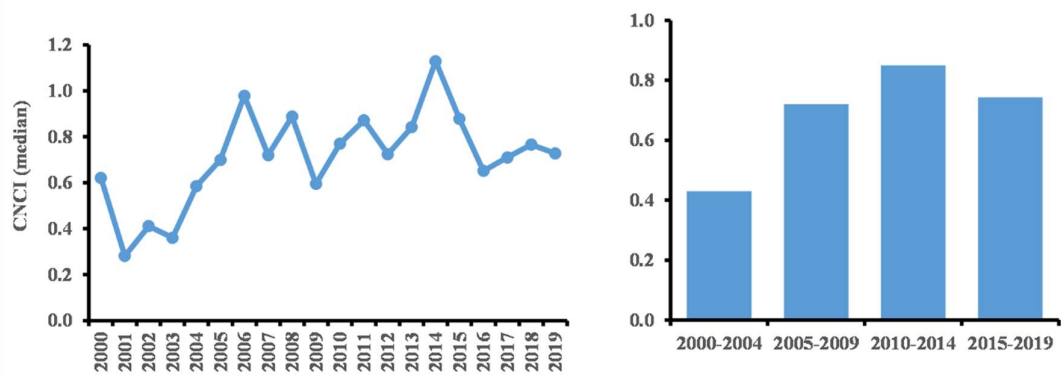


Figure 2. Evolution of the CNCI of NC research. The number of articles is below 20 between 2000 and 2007 (each year). For these years, the results are shown for information purposes and not for discussion.

Thematic spectrum

The distribution by topic is skewed (SI, Table 3); 159 topics and those in the top 5 account for 45% of the 1250 articles. For 83 topics, the number of articles is one. Maternal Mortality, Group B Streptococcus, Bilirubin, Preterm Labor, and Gestational Diabetes Mellitus dominate the top 5 across the period (**Error! Reference source not found.**). This is partly a consequence of the unbalanced distribution of documents by period (these topics dominate the top 5 in 2015-2019, when the number of articles is highest). Over time, we see changes; Gastroschisis, Patent Ductus Arteriosus, Fetal Heart Rate, Malaria and Preeclampsia were in the top 5 in the first two periods.

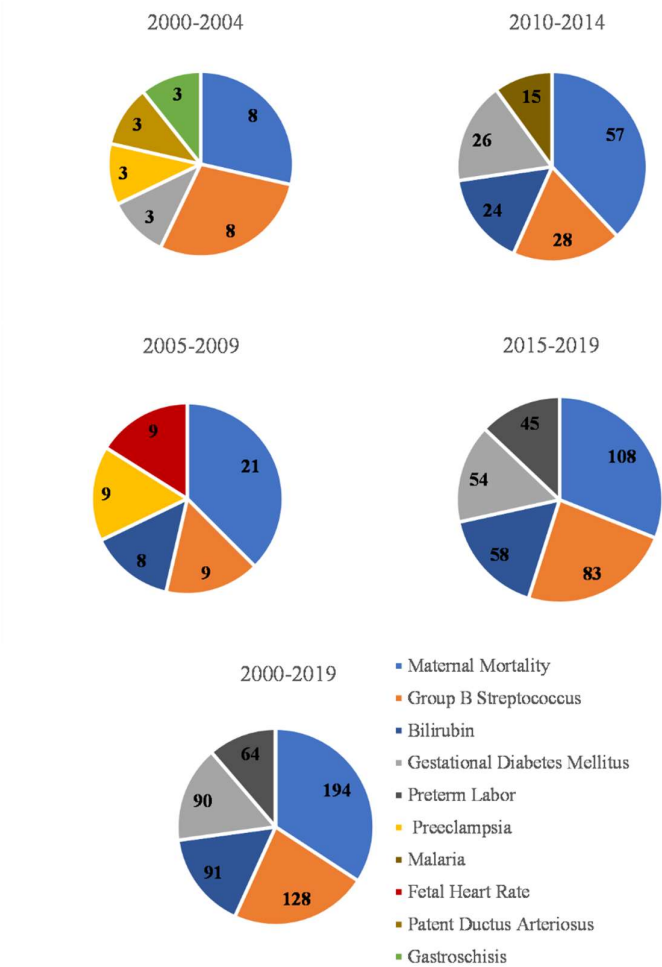


Figure 3. Distribution of articles by topic. Only the top 5 topics, according to the number of articles, are shown.

For topics with 20 or more articles in 2000-2019, visibility is below the world average, except for Bilirubin, HIV Prevalence & Prophylaxis, Malaria, and Antibiotic Resistance, which are slightly above the world average (SI, Table 3-4). Articles on HIV Prevalence & Prophylaxis have the highest impact, median value of 1.105. The articles on Patent Ductus Arteriosus have the lowest visibility; 0.586 the world average.

Collaboration activities

Overview of research collaboration

Collaborative activities are common in NC research (**Error! Reference source not found.**) and have increased. In 2000-2019, there are 555 articles with DRC and 669 with IRC (SI, Table 5). The growth can be characterized as exponential, with an annual growth rate of about 23% for IRC and 17% for DRC. In 2000, collaborative activities are present in all articles and in 2019, in 98%. Considering 5-year periods, we see that DRC is more frequent than IRC in 2000-2004; it is about two times the frequency of IRC (**Error! Reference source not found.**), although the number of articles is small. Over time, IRC has become more frequent and accounts for 54% of all articles in 2015-2019, while DRC accounts for 45% (SI, Table 5).

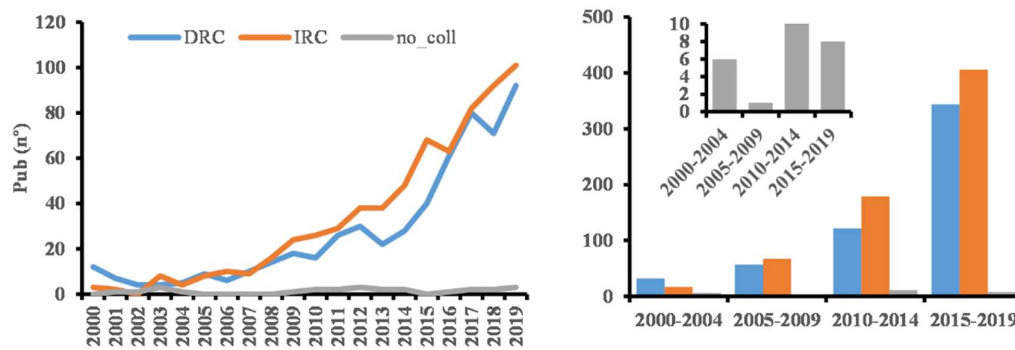


Figure 4. Evolution of DRC, IRC and articles without collaboration (no_coll). For IRC and DRC curves, the trendlines are as follows: IRC- $y = 2.7304exp^{0.2055x}$ (r-square=0.9622); DRC- $y = 4.0071exp^{0.1563x}$ (r-square=0.9448).

Among the types of IRC, collaboration between African scientists without the participation of non-African scientists (IRC_{intra}) was rare. We find 19 articles in 2000-2019, and 16 in 2015-2019 (SI, Table 5).

Articles in which African scientists from various countries and non-African scientists (IRC_{inter_intra}) contributed were practically non-existent until 2009. After that, the number of these articles began to increase; in 2015-2019 they represent 18.5 % of all articles (SI, Table 5).

This rare pattern of collaboration (IRC_{intra} and IRC_{inter_intra}) may not allow the development and establishment of networks among African scientists that permit them to address their local challenges. These collaborations provide insights to answer current research questions and offer African scientists the opportunity to share their previous experiences, acquired knowledge and the challenges in their countries through informal communication. As they interact and realize each other's capabilities and interests, trusting relationships are formed. These relationships and previous collaborations can lead to new joint projects that address local issues (Cerdeira, Mesquita, & Vieira, 2023; Owusu-Nimo & Boshoff, 2017). In addition, trusting relationships may spread among the collaborators of African scientists involved in IRC_{intra} and IRC_{intra_inter} , increasing opportunities for collaboration with these scientists' partners (Newman, 2001). In short, it is expected that all mechanisms involved in collaborative activities will contribute to building a stronger research network between African scientists from different countries with or without the presence of non-African scientists.

Collaboration between African scientists, all from the same country, and non-African scientists (IRC_{inter}) is the most common, in 88.2% of all articles in 2000-2004 and 77.6% in 2015-2019 (SI, Table 5). The benefits of these joint activities can be maximized if the African scientists involved have well-established national and intra/interregional African networks. In this scenario, they can serve as a bridge between other African scientists representing their professional connections in Africa and the non-African scientists involved in IRC_{inter} .

Collaboration networks

If we look at the network behind NC research, we can speculate on the potential benefits of IRC from this perspective.

NC research is characterized by high geographical dispersion as the network consists of 129 countries (89 non-African and 40 African countries, SI, Figure 5). There are 5059 links, which account for 61% of all possible interactions given the number of countries involved. The interactions between non-African countries (the links connecting two non-African countries) dominate the network as they account for 57.4% of all links (SI, Figure 5), followed by the interactions between African and non-African countries, which account for 36.3% of all links. Finally, interactions between African countries

account for 6.3% of all links. In the network, 2192 links (43.3% of all links) represent a single publication in 20 years.

Collaborations between African countries appear to be fragile, as the subnetwork related to these interactions has 60% of its links representing only one article in 20 years (**Error! Reference source not found.**). When these links are removed, the number of African countries with links to another African country drops from 40 to 25.

The subnetwork of the collaborations between African and non-African countries (SI, Figure 6) also shows weaknesses, as the links representing one publication in 20 years account for 49% of all its links. The Republic of Congo, Liberia, South Sudan, and Togo, which also have a fragile position in **Error! Reference source not found.**, albeit Togo to a lesser extent, lost all their connections to non-African countries when the links representing one publication are deleted (SI, Figure 7). In addition, African countries lost connections with 15 non-African countries (Albania, Armenia, Bhutan, Bosnia and Herzegovina, Haiti, Hungary, Jamaica, Kazakhstan, Latvia, Malta, Montenegro, Myanmar, North Macedonia, Syria and Yemen).

The subnetworks indicate that Ghana, Nigeria, Tanzania and Kenya can play an important role in the flow of knowledge, in the continent, and in establishing professional links between African countries. They are quite well connected with other African countries within and outside their region (28 countries in the case of Kenya and 29 for the others). South Africa can also be crucial but is not well connected within Southern Africa. In 20 years, it co-authored a single publication with Botswana. If we ignore the links representing one article, the top 5 consist of the same countries and Uganda also appears at the top.

These countries, in addition to Egypt and Zambia, have the highest number of connections to non-African countries. They are influential in the network, as they are connected to countries with many connections also as supported by the high values of eigencentrality (SI, Table 8).

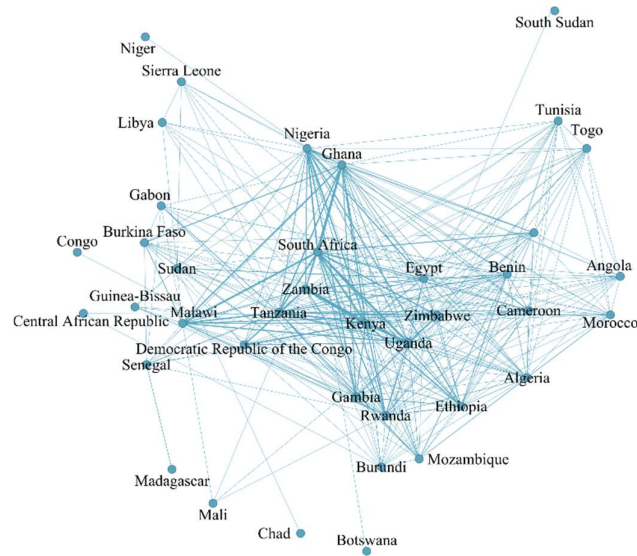


Figure 5. Collaboration subnetwork between African countries in 2000-2019 (the subnetwork derived from Figure 5, SI).

As for non-African countries, the USA and the UK are key players in the flow and access to knowledge as shown by the high number of connections and centrality (they have the highest values for degree and eigencentrality, SI, Table 8).

The role of these countries becomes even clearer when analyzing the number of jointly authored articles by African countries (SI, Table 7). They are among the 5 countries that collaborated the most with African countries in 2000-2019 and in each 5 years. In 2000-2019, about 57% and 28% of the articles with IRC have the collaboration of scientists from the USA and the UK, respectively.

Sweden, the Philippines, and Switzerland lost their positions in this top. Their contribution is limited to two and three articles respectively in 2000-2004 (SI, Table 7), while others such as India, Canada, Pakistan and France emerged, although Pakistan and France are no longer at the top in 2015-2019. The research with multinational clinical trials conducted in India, Pakistan, African countries and other regions could justify the high presence of India and Pakistan at the top.

627 universities participated in IRC (SI, Table 9), and they are present in 96% of all articles with IRC. The distribution of universities by region is asymmetrical, as non-African universities predominate, although those from Africa increased over time (SI, Table 10). In 2015-2019, there are 126 African universities, accounting for 22% of all universities. The distribution of universities by country is also skewed, as those from the USA represent 18.5% of all universities in 2000-2019, followed by the UK with 4.8%.

The University of London (UoL-GBR) is the leader given the number of articles in which it was involved in the entire period, followed by the University of California (UC-System-USA) (**Error! Reference source not found.**). Other well-known universities are present in the top 10, such as Harvard University (HU-USA), Johns Hopkins University (JHU-USA), the University of North Carolina (UNC-System-USA) and the University of Oxford (OX-GBR). As for African universities, the University of Malawi (UNIMA-MWI), the University of Makerere (Mak-UGA) and the University of Witwatersrand (Wits Univ-ZAF) published more articles with IRC in 2000-2019. Over time, the changes in the top 10 are not significant. We see changes from the first to the second 5-year period, but the number of articles we are dealing with is so small that an in-depth discussion is impossible.

Table 1. Universities in the top 10 (highlighted in blue) according to the number of publications with IRC in each period.

Country	Institution	Pub (n°)				
		2000-2019	2000-2004	2005-2009	2010-2014	2015-2019
Egypt	MA-EGY	10	0	4	1	5
Ethiopia	AAU-ETH	15	1	0	2	12
Malawi	UNIMA-MWI	42	1	4	9	28
Mozambique	UEM-MOZ	6	1	0	2	3
Pakistan	AKU-PAK	46	0	2	17	27
Tanzania	MUHAS-TZA	31	2	6	11	12
South Africa	Wits Univ-ZAF	39	0	4	11	24
Uganda	Mak-UGA	44	1	3	10	30
Zimbabwe	UZ-ZWE	10	2	0	2	6
Australia	UNIMELB-AUS	17	2	3	4	8
Norway	UiB-NOR	20	1	1	9	9
Sweden	KI-SWE	17	2	2	6	7
UK	OX-GBR	41	1	5	10	25
UK	UoL-GBR	106	0	14	26	66
USA	JHU-USA	53	4	9	17	23
USA	CU-USA	33	2	2	3	26
USA	HU-USA	57	2	6	15	34
USA	UNC-System-USA	49	0	7	10	32
USA	GWU-USA	17	0	4	6	7
USA	UA-System-USA	35	0	2	17	16
USA	UC-System-USA	65	0	3	16	46
USA	UW-USA	35	0	3	11	21

The collaboration network has 627 universities and 48468 links (SI, Figure 8). The visible links represent 25% of the possible interactions between the participating universities. The interactions between non-African universities dominate the network as they account for 77% of all links (SI, Figure 8), followed by the interactions between African and non-African universities, which are 21% of all links. Finally, interactions between African universities account for 2% of the observed links.

The network is characterized by a dense core dominated by non-African universities. There are clusters of universities that are closely connected to this core. If we move from the core to the periphery, the network consists of small groups of universities with weak connections to each other and fragile connections to the core.

This network can be considered too fragile as 67% of the links represent a publication in 20 years. If these links are deleted, the network consists of 477 universities (397 and 80 African and non-African universities, respectively).

Regarding the subnetwork among African universities, it cannot be said that it is a mature and well-established network, as several universities have a very fragile position (SI, Figure 9). 17 out of 138 universities have no connections to other African universities; they are part of the network because they are only linked to non-African universities. 557 out of 804 links represent one publication in 20 years. If we delete these links, only 48 African universities will still be connected and most of the small groups of African universities, which are at the network periphery, disappear.

The University of Cairo in Egypt (CU-EGY), MUHAS-TZA in Tanzania, Wits Univ-ZAF in South Africa, University of Kinshasa in the Democratic Republic of Congo (UNIKIN-ZAR) and University of Cape Coast in Ghana (UCC-GHA), from different African regions, can play an important role in the flow of knowledge between African universities as they are linked to several universities in other countries from their region and also from other African regions, except Wits Univ-ZAF and UNIKIN-ZAR. Although they are linked to universities in other African regions, they have no joint publications with countries within their region.

It is important to know which African universities can play a crucial role in the flow of knowledge and the expansion of professional relationships within the continent and to identify those that stand out for their links with non-African universities. The role of the above universities is diminished by the absence or presence of a small number of links with non-African universities.

The subnetwork between African and non-African universities, which includes 600 universities (SI, Figure 10), is also fragile, as the number of links representing one publication is 6896 out of its 10409 links. Most African universities have at least one publication with non-African universities, as 127 out of 138 are in the subnetwork. However, the presence of African universities seems delicate as only 74 remain in the subnetwork if the links representing one publication are deleted. In addition, many connections with non-African universities are lost as the number of these universities drops to 239.

Despite these weaknesses, we find African universities that occupy an outstanding position. The universities highlighted above (SI, Figure 9), as well as the University of Ahmadu Bello (ABU-NGA), the University of Stellenbosch (SU-ZAF) and the University of Cape Town (UCT-ZAF) (from Nigeria and South Africa) have the most connections with non-African universities. They are also among the universities with the highest centrality in the network (except for UNIKIN-ZAR), as shown by the eigencentrality values (SI, Table 11).

Finally, as far as non-African universities is concerned, outstanding universities such as UoL-GBR, OX-GBR and UW-USA are important in NC research, as shown by their high number of connections and their centrality in the network (SI, Table 11). These institutions have the most connections to African universities (about 14% of their total connections).

DRC activities

As for DRC, Egypt, Nigeria, South Africa and Tunisia are among the top 3 countries with the highest number of documents in each period, although, Tunisia's presence is marginal as only two articles were identified in 2000-2004 (SI, Table 6). These countries account for 74% of all articles with

DRC. Although the changes concerning DRC are positive for these countries, this concentration indicates a low level of interaction between African scientists within the boundaries of the remaining countries.

As for Egypt, Nigeria and South Africa, it seems that each country is trying to solve its local problems by drawing on local knowledge, as the number of articles with DRC increased, albeit at different rates.

South Africa, which had the highest number of articles with DRC in 2000-2004, about 47% of all articles in that period, was displaced in the following period by Nigeria, which has about 39% of all articles in 2005-2009. In 2010-2014, Nigeria lost its first place to Egypt, which retained the lead in 2015-2019. The relative weight of articles with DRC from South Africa decreased over time, while articles from Egypt increased, accounting for about 34% of all articles with DRC in 2015-2019.

The data indicates that Ethiopia has made a significant commitment to DRC over the last five years. While there were no interactions within the borders in the previous periods (SI, Table 6), articles with DRC in 2015-2019 account for 14% of all articles with DRC in that period.

Visibility and thematic spectrum of collaborative activities

Research involving scientists from several countries leads to results with greater visibility than research conducted only within borders, as the CNCI values show (SI, Table 12). The median value is 0.5 of the world average for articles with DRC, and the value has not changed much over time. As for the articles with IRC, the median values are very close to the world average, and the highest value is recorded for articles published in 2010-2014; 1.272 the world average (SI, Table 12). The highest visibility of articles with IRC was also highlighted in previous studies Vieira, 2023.

Although the articles with IRC_{inter} are prevalent in NC research, articles with IRC_{inter_intra} have a higher visibility (articles published in 2010-2014 and 2015-2019, SI, Table 13). Articles with IRC_{inter_intra} and published in 2010-2014 have a median value that is twice as high as the world average and 1.5 times as high as for articles with IRC_{inter} in the same period. For the most recent articles (2015-2019), visibility decreased for both types of IRC. -

Maternal Mortality, Group B Streptococcus, Bilirubin, Gestational Diabetes Mellitus and Preterm Labor collaborated the most in the entire period (SI, Table 14). Therefore, the distribution is very similar to **Error! Reference source not found.**

Maternal Mortality and Group B Streptococcus have the largest number of collaborative articles in each 5 years. However, the thematic spectrum is dynamic, with Bilirubin and Fetal Heart Rate emerging at the top in 2005-2009, Bilirubin maintaining its position and Preterm Labor appearing in the last period (SI, Table 14).

It has been argued that the scientific production of African countries is dependent on the contribution of foreign scientists Vieira & Cerdeira, 2022. However, the data show that different patterns can be found depending on the level of analysis.

Among the topics for which there are documents with IRC or DRC, IRC is the most common in 25 topics, and in the top 5, we have Maternal Mortality, Gestational Diabetes Mellitus, HIV Prevalence & Prophylaxis, and Malaria. The number of articles with IRC is about three times as high as those with DRC (SI, Table 15). As for Fetal Heart Rate, the distribution is more balanced, and the difference is one document.

DRC is the most frequent in 24 topics, and in the top 5 we find Group B Streptococcus, Bilirubin, Preeclampsia, Preterm Labor and Patent Ductus Arteriosus (SI, Table 15). Still, the differences between DRC and IRC are not as pronounced as in the previous case, except for Patent Ductus Arteriosus.

The IRC articles' visibility is above that of articles with DRC for the topics with 20 or more articles (SI, Table 16). Except for Group B Streptococcus and Gestational Diabetes Mellitus, the visibility of articles with IRC is twice as high as that of articles with DRC. For these topics, the visibility regarding the presence of IRC is also close to or slightly above the world average, except for Bilirubin with a median value of 1.5 times the world average.

CONCLUSIONS

The literature shows that neonatal deaths account for a significant proportion of all deaths in children under 5 years of age in Africa. Poor NC is often cited as the main cause of neonatal deaths (Nieuwoudt, Mackay, & Mda, 2022; UN, 2024). Although there have been several efforts to improve NC in this region, no study addresses the scientific knowledge of NC. The quantity, impact, scientific spectrum and collaborations patterns behind this knowledge can be used by scientists in ongoing and new NC research and stakeholders developing and implementing strategies to combat poor NC.

I looked at the literature on NC in Africa and used a bibliometric analysis to describe NC research. The results are important for practice, policy, and future research.

NC research attracted the interest of the scientific community as the number of articles increased from 15 in 2000 to 196 in 2019. However, it is not examined if this research addresses local needs. Future research should focus on this.

NC research is concentrated in a few African countries: Egypt, South Africa, Nigeria, Tanzania and Kenya. Strategies are needed to increase research in other African countries, and they could consider involving these countries as partners.

NC research has low visibility, in general. However, some articles have aroused great interest. This is the case of Bilirubin research involving scientists from several countries. Future research should shed more light on this point. The low visibility could be because the results are not relevant in the context of high-income countries, as their scientific problems are different (Atal et al., 2018; Evans, Shim, & Ioannidis, 2014). In this situation, the main interested in the research's findings are in Africa.

Maternal Mortality, Group B Streptococcus, Bilirubin, Preterm Labor, and Gestational Diabetes Mellitus are the most studied topics. Future research should investigate whether these topics represent the main challenges regarding NC. If this is not the case, the issues that need more attention should be prioritized.

NC research is highly collaborative, with IRC occurring most frequently, namely between African scientists from the same country and non-African scientists. Future research may look at the positive and negative consequences of this mainly from the perspective of the interactions between the academic, government and industrial sectors.

Research only between African scientists from different countries is rare. Strategies to expand and strengthen research collaboration should focus on these collaborations.

The networks behind NC research are fragile, as most links (43%-67%) between countries/universities represent one publication in 20 years. Ghana, Nigeria, South Africa, Tanzania, Kenya, Egypt and Zambia have high centrality in the network. CU-EGY, MUHAS-TZA, Wits Univ-ZAF, SU-ZAF, UCT-ZAF, UNIKIN-ZAR, UCC-GHA and ABU-NGA have the most linkages with African and non-African universities, except UNIKIN-ZAR, which has no linkages with African universities from other countries. Strategies addressing the flow of knowledge and expansion of networks within the continent should consider these countries/universities as possible bridges. Ongoing or new NC research should consider these countries/universities as possible partners.

The USA and the UK are the main partners, as are the universities of these countries, especially those known for their excellence (e.g. HU-USA, JHU-USA, UoL-GBR, OX-GBR). Strategies that address knowledge sources should emphasize geographical diversification, while maintaining links with the US and UK, to reduce dependence on knowledge from these countries.

Research with IRC has the highest visibility. Strategies aimed at attracting the scientific community should emphasize IRC but always ensure that research meets local needs.

Disclosure statement: The authors report there are no competing interests to declare.

SUPPORT INFORMATION: The following supporting information can be downloaded at the website of this paper posted on Preprints.org. The support information includes additional information about the methods used and their main limitations. It also presents several tables, figures and networks that supplement the Results and Discussion section in the main text.

METHODS

Data identification

The search query used to get the publications from the WoS Core Collection is as follows:

((ts="Preterm birth" OR ts="Birth asphyxia" OR ts="birth trauma" OR ts="Neonatal sepsis" OR tss="neonatal infection*" OR ts="Gastroschisis" OR ts="Jaundice" OR ts="Necrotizing enterocolitis" OR ts="Persistent pulmonary hypertension of the newborn" OR ts="Intrauterine growth restriction" OR ts="Bronchopulmonary dysplasia" OR ts="infant apnoea" OR ts="infant respiratory distress syndrome" OR ts="asphyxia at birth" OR ts="anaemia in neonates" OR ts="neonatal alloimmune thrombocytopenia" OR ts="bronchopulmonary dysplasia" OR ts="cardiac failure in neonates" OR ts="hyaline membrane disease" OR ts="hypocalcaemia in neonates" OR ts="hypoglycaemia of the newborn" OR ts="hyponatraemia in neonates" OR ts="hypothermia in neonates" OR ts="intestinal obstruction in neonates" OR ts="pulmonar interstitial emphysema") and (cu="South Africa" OR cu="Egypt" OR cu="Nigeria" OR cu="Ethiopia" OR cu="Rep Congo" OR cu="DEM Rep Congo" OR cu="Tanzania" OR cu="Kenya" OR cu="Algeria" OR cu="Sudan" OR cu="south sudan" OR cu="MORocco" OR cu="Uganda" OR cu="Mozambique" OR cu="Ghana" OR cu="angola" OR cu="somalia" OR cu="Ivory Coast" OR cu="cote ivoire" OR cu="Madagascar" OR cu="Cameroon" OR cu="Burkina Faso" OR cu="Niger" OR cu="Malawi" OR cu="zambia" OR cu="mali" OR cu="Senegal" OR cu="Zimbabwe" OR cu="Chad" OR cu="Tunisia" OR cu="Guinea" OR cu="Guinea bissau" OR cu="Equat Guinea" OR cu="Rwanda" OR cu="Benin" OR cu="Burundi" OR cu="Eritrea" OR cu="Sierra Leone" OR cu="Togo" OR cu="Libya" OR cu="CENT AFR REPUB" OR cu="Mauritania" OR cu="Liberia" OR cu="Namibia" OR cu="Botswana" OR cu="Lesotho" OR cu="Gambia" OR cu="Gabon" OR cu="Mauritius" OR cu="Eswatini" OR cu="swaziland" OR cu="Djibouti" OR cu="Comoros" OR cu="Cape Verde" OR cu="SAO TOME & PRIN" OR cu="Seychelles") and py=2000-2019)

Limitations

As for the method used to extract the articles on NC, the less positive points must be emphasized.

Non-African scientists, mainly those from high-income countries (HICs) might conduct research on NC in Africa without the participation of African scientists, a phenomenon known in the literature as parachute science (e.g., Stefanoudis et al., 2021). However, we should emphasize the results from the literature of the research done by scientists from HICs on the greatest burden of disease. Most of the research on Medical and Health Sciences (M&HS), which includes NC, has been done by HICs and they have addressed their local scientific problems, which are very different from those of Africa (Atal et al., 2018; Evans, Shim, & Ioannidis, 2014). As for neonatal disorders, results have shown that disease-specific gaps exist in Sub-Saharan Africa (Atal et al., 2018) and that the burden is very prevalent in Africa in general (Ou et al., 2022).

In M&HS, in specific, research involving African and non-African scientists unveiled that while 67% of the total 520 clinical trials conducted in Africa addressed local scientific problems, in 14% of cases the research addressed the needs of developed countries. Therefore, I can not guarantee that all the NC research identified is related to the local needs in Africa.

Impact

Normally, when determined for a set of documents, the CNCI is the average value of the CNCI of all documents. However, when using this indicator, we must consider that the citation distribution of documents is typically skewed (Vieira & Gomes, 2010). We normally find a small number of documents highly cited and many documents with relatively few citations (**Error! Reference source**

not found. in this document). The mean value is affected by highly cited documents therefore the average values might not represent well the impact/visibility. Thus, I decided to present the median, which is not affected by the presence of highly cited documents. The distribution of the values of CNCI (**Error! Reference source not found., Error! Reference source not found., Error! Reference source not found.** in this document) shows that indeed the average value is not a good choice.

When dealing with small sets of documents, the probability of finding a median value of zero is high given that many documents are never cited, and others given their recent publication did not have the time to be acknowledged by the scientific community. Therefore, I only discuss these indicators for sets with 20 or more articles. However, I present the values for sets with less than 20 documents only for information purposes.

Lastly, in calculating the CNCI, I used an open window, i.e. the count of citations represents the cumulative citations between the publication year and September 2023 (the moment when I collected the data from the WoS).

Thematic Spectrum

The citation topics schema names clusters of documents based on cited and citing relationships between documents (Potter, 2020). This is a three-level hierarchical document classification system. The macro, meso and micro level include 10, 326, and 2449 scientific fields, respectively. At the micro-level, each paper is categorized into only one topic. The schema is a dynamic one, meaning that every year the number of scientific fields can change. Some topics might require a change in the name, and others might be added. Therefore, every year, we have an update of the schema. The data presented here is based on the schema available for 2023.

Collaboration

As for collaboration, I followed the following heuristics:

- Using the author's affiliation(s) in the articles, I extracted information concerning the country and universities.
- I only considered universities given that they are the main players in the discovery and creation of knowledge.
- As for universities. I aggregated the information at the higher level of the organization (e.g., information is not available for departments or individual faculties belonging to a given university). In the case of the USA, the results are presented for the university system and not for the individual campuses. For example, the University of California is a university system composed of ten campuses. All the articles mentioning the different campuses of the university were considered as University of California.
- As for IRC, I identified the articles that have at least two authors whose affiliations mention institutions located in two countries. Once the articles with IRC have been identified, I analyzed them with more detail and identified occurrences between: (1) African scientists all from the same country and non-African scientists (IRC_{inter}); (2) only African scientists from different countries (IRC_{intra}); (3) African scientists from different countries and non-African scientists ($IRC_{inter-intra}$).
- Concerning DRC, I considered articles that only represent collaborations between scientists working in the same or different institutions in each African country.

RESULTS

Volume

Table 1. Number of articles on NC by African country, for the whole period and by 5-year periods.

Country	Pub (n°)				
	2000-2019	2000-2004	2005-2009	2010-2014	2015-2019
EGYPT	232	2	21	59	150
SOUTH AFRICA	212	21	27	51	113
NIGERIA	186	9	27	52	98
TANZANIA	101	4	13	29	55
KENYA	92	4	4	24	60
ETHIOPIA	81	2	0	5	74
UGANDA	77	1	4	18	54
GHANA	75	1	6	15	53
MALAWI	64	2	6	10	46
ZAMBIA	52	0	3	18	31
GAMBIA	31	2	3	4	22
TUNISIA	24	2	5	6	11
CONGO DEMOCRATIC REPUBLIC	21	0	2	5	14
MOROCCO	20	0	1	8	11
CAMEROON	20	0	0	7	13
ZIMBABWE	20	2	1	4	13
SUDAN	19	1	4	3	11
SENEGAL	19	1	3	6	9
BENIN	14	0	1	4	9
BURKINA FASO	13	0	0	1	12
MOZAMBIQUE	13	1	0	3	9
RWANDA	13	0	0	1	12
COTE IVOIRE	10	0	0	3	7
MADAGASCAR	10	0	0	2	8
BOTSWANA	10	0	0	0	10
GABON	8	0	0	2	6
MALI	6	0	0	5	1
NIGER	5	0	0	0	5
ALGERIA	4	1	0	1	2
TOGO	3	0	1	0	2
SIERRA LEONE	3	0	0	0	3
BURUNDI	3	0	0	0	3
CONGO PEOPLES REP	3	0	0	1	1
CENT AFR REPUBL	2	0	0	0	2
GUINEA BISSAU	2	0	0	1	1
SOUTH SUDAN	2	0	0	0	2
LIBYA	2	0	0	1	1
ANGOLA	2	1	0	0	1
CHAD	2	0	0	0	2
LIBERIA	1	0	0	0	1
ERITREA	1	0	1	0	0

Impact

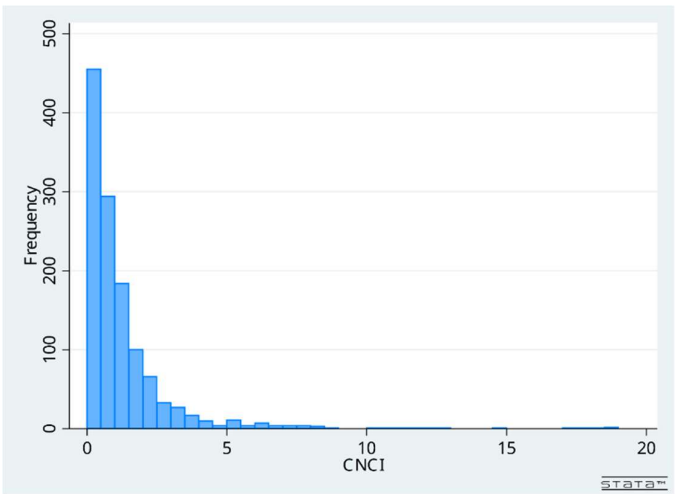


Figure 1. Distribution of the CNCI of the articles on NC published between 2000 and 2019. Due to visualization purposes, only articles with a CNCI equal to or below 20 were considered (they represent 99.2% of the total articles).

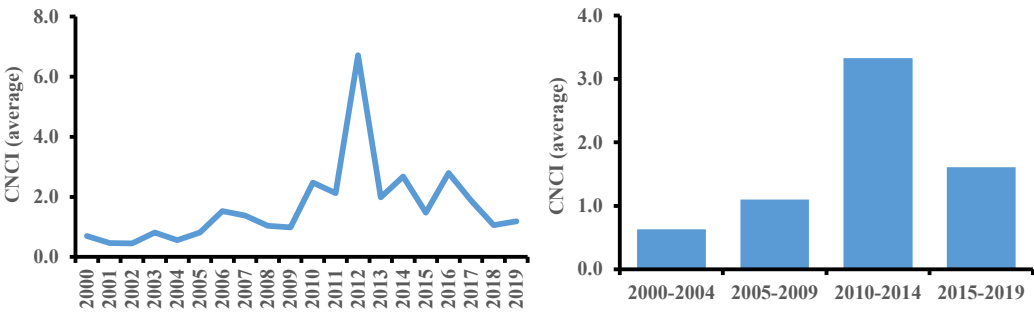


Figure 2. Evolution of the average CNCI for the articles on NC.

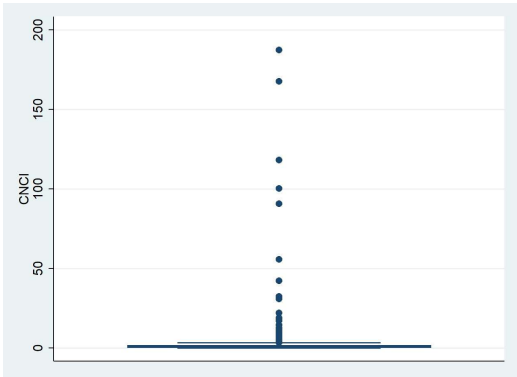


Figure 3. Boxplot for the values of CNCI of the articles published between 2000 and 2019.

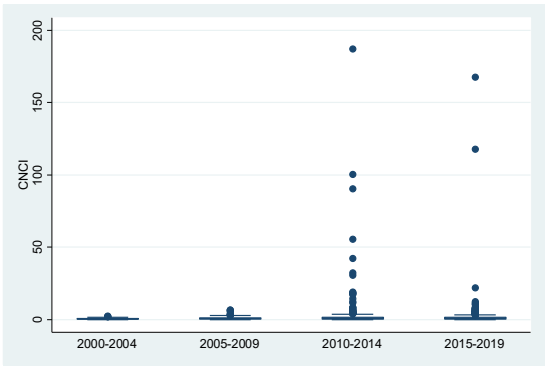


Figure 4. Boxplot for the values of CNCI of the articles by period.

Table 2. Descriptive statistics for the CNCI.

Statistics	CNCI				
	2000-2019	2000-2004	2005-2009	2010-2014	2015-2019
Median	0.754	0.430	0.721	0.850	0.744
Stand. Dev.	9.136	0.576	1.221	13.877	7.562
P25	0.308	0.236	0.328	0.409	0.294
P75	1.535	0.857	1.361	1.748	1.536
IQR	1.227	0.622	1.033	1.339	1.242
Observations	1250				

Thematic spectrum

Table 3. Number of articles on NC by topic.

Micro-topic	Pub(n°)				
	2000-2004	2005-2009	2010-2014	2015-2019	2000-2019
1.156.381 Maternal Mortality	8	21	57	108	194
1.23.1757 Group B Streptococcus	8	9	28	83	128
1.117.1389 Bilirubin	1	8	24	58	91
1.72.182 Gestational Diabetes Mellitus	3	7	26	54	90
1.72.924 Preterm Labor	2	6	11	45	64
1.72.531 Preeclampsia	3	9	11	37	60
1.66.11 HIV Prevalence & Prophylaxis	1	5	12	31	49
1.217.59 Malaria	1	6	15	18	40
1.72.922 Fetal Heart Rate	0	9	6	23	38
1.72.1732 Patent Ductus Arteriosus	3	1	9	12	25
1.72.748 Preterm Infants	0	1	9	13	23
1.23.146 Antibiotic Resistance	0	1	3	17	21
1.216.2287 Gastroschisis	3	2	1	14	20
1.44.1198 Food Insecurity	0	0	9	10	19
1.72.808 Breech Presentation	1	1	1	14	17
1.184.573 Iron Overload	1	1	4	7	13
1.248.655 Chlamydia Trachomatis	0	2	1	10	13

1.72.891 Breastfeeding	1	2	2	7	12
1.125.1718 Hepatitis E Virus	2	3	1	5	11
1.72.1072 Postpartum Depression	0	1	1	9	11
1.80.279 Vitamin D	0	1	0	10	11
1.225.2074 Methemoglobinemia	0	0	6	4	10
1.49.468 Oral Health	0	0	2	8	10
1.154.1057 Pulmonary Surfactant	1	2	2	4	9
1.150.1148 Deaf	0	3	2	3	8
1.156.2047 Global Surgery	0	1	2	5	8
1.157.728 Biliary Atresia	1	1	1	5	8
1.75.326 Antiphospholipid Syndrome	0	1	4	3	8
1.81.979 Twin-Twin Transfusion Syndrome	0	1	4	3	8
8.124.552 Air Pollution	0	0	1	6	7
1.120.384 Gut Microbiota	0	0	2	4	6
1.55.830 Acute Kidney Injury	0	2	0	4	6
1.148.94 Candida Albicans	0	0	2	3	5
1.151.222 Laparoscopic Cholecystectomy	0	0	0	5	5
1.225.626 Sickle Cell Disease	0	0	1	4	5
1.103.1225 ITP	0	1	3	0	4
1.104.975 Respiratory Syncytial Virus	1	0	1	2	4
1.137.217 Melatonin	0	0	0	4	4
1.154.360 Procalcitonin	0	0	1	3	4
1.161.711 Cytomegalovirus	0	2	1	1	4
1.23.173 Staphylococcus Aureus	0	0	0	4	4
1.42.678 Listeria Monocytogenes	1	1	0	2	4
1.82.1066 Cerebral Palsy	0	0	3	1	4
1.104.126 Influenza	0	0	1	2	3
1.125.275 HBV	0	0	0	3	3
1.128.482 Contraception	0	0	0	3	3
1.194.273 Mycobacterium Tuberculosis & Leprosy	0	0	1	2	3
1.216.1563 Volvulus	0	0	0	3	3
1.216.1996 Pneumomediastinum	0	0	1	2	3
1.222.143 Epilepsy	1	1	1	0	3
1.231.432 Homocysteine	1	0	1	1	3
1.248.1317 Mycoplasma	0	0	2	1	3
1.248.2104 Trichomonas Vaginalis	1	0	1	1	3
1.257.983 Hydrocephalus	0	0	2	1	3
1.37.309 Congenital Heart Disease	0	0	1	2	3
1.72.1745 Hyperemesis Gravidarum	0	0	2	1	3
1.95.723 Irritable Bowel Syndrome	0	2	1	0	3
3.91.920 Selenium	0	1	0	2	3
6.24.858 Intimate Partner Violence	0	0	1	2	3
1.125.83 HCV	1	1	0	0	2
1.141.407 Acute Promyelocytic Leukemia	1	0	0	1	2
1.142.832 Fecal Incontinence	0	0	1	1	2
1.161.315 HSV-1	0	0	2	0	2
1.228.200 Dengue	0	0	1	1	2
1.228.994 Ebola Virus	0	0	0	2	2
1.23.1036 Surgical Site Infection	1	0	0	1	2
1.23.422 Gentamicin	0	0	1	1	2
1.235.1679 Foreign Body	0	0	0	2	2

1.258.1958 Leptospirosis	0	0	0	2	2
1.286.845 Complement	0	1	0	1	2
1.42.545 STEC	0	0	0	2	2
1.6.351 Endotoxin	0	0	1	1	2
1.81.1272 HLA-G	0	0	0	2	2
1.81.1408 Fertility Preservation	0	0	1	1	2
4.61.1124 Rough Sets	0	0	1	1	2
6.178.516 Divorce	0	0	0	2	2
1.100.1284 Fetal Alcohol Syndrome	0	0	0	1	1
1.104.1770 Pertussis	0	0	0	1	1
1.104.901 Foot-And-Mouth Disease Virus	0	0	0	1	1
1.105.1677 Vertebral Artery Dissection	0	0	1	0	1
1.111.162 Hepatocellular Carcinoma	1	0	0	0	1
1.117.1309 Acetaminophen	0	0	1	0	1
1.127.1303 Endothelin	0	0	1	0	1
1.128.1489 Hysteroscopy	0	0	0	1	1
1.128.1521 Ectopic Pregnancy	0	0	0	1	1
1.132.2267 Clubfoot	0	0	0	1	1
1.132.759 Matrix Metalloproteinases	0	1	0	0	1
1.136.1749 Down Syndrome	0	0	0	1	1
1.136.1780 Family Quality Of Life	0	0	0	1	1
1.136.283 Autism	0	0	0	1	1
1.14.1293 Emergency Department	0	0	0	1	1
1.14.1359 Interprofessional Education	0	0	0	1	1
1.142.1628 Urinary Diversion	1	0	0	0	1
1.154.1088 Intensive Care	0	0	0	1	1
1.154.277 Mechanical Ventilation	0	0	0	1	1
1.155.598 Informed Consent	0	0	0	1	1
1.158.2138 Porokeratosis	0	0	0	1	1
1.163.446 Schistosomiasis	0	0	0	1	1
1.164.1871 Menarche	0	0	0	1	1
1.168.671 Vascular Access	0	0	1	0	1
1.179.108 Human Papillomavirus	0	0	0	1	1
1.184.1030 Erythropoietin	1	0	0	0	1
1.184.653 Zinc	0	0	0	1	1
1.186.1008 Nuchal Translucency	0	0	0	1	1
1.186.948 Digeorge Syndrome	0	0	0	1	1
1.195.1341 Enteric Nervous System	1	0	0	0	1
1.199.1048 Pleurodesis	1	0	0	0	1
1.213.168 Hypothyroidism	0	0	1	0	1
1.216.2098 Intussusception	0	1	0	0	1
1.217.1038 Toxoplasma Gondii	0	0	1	0	1
1.225.1476 Alloimmunization	0	0	0	1	1
1.225.786 Spectrin	0	0	0	1	1
1.23.1397 Urinary Tract Infection	0	0	0	1	1
1.23.714 Neisseria Meningitidis	0	0	0	1	1
1.231.1650 Thiamine	0	0	1	0	1
1.235.1617 Deglutition	0	0	0	1	1
1.236.1155 Capsule Endoscopy	0	0	1	0	1
1.236.312 Portal Hypertension	0	0	0	1	1
1.243.1012 Vesicoureteral Reflux	0	0	1	0	1
1.246.710 Rotavirus	1	0	0	0	1

1.248.1683 Syphilis	0	0	1	0	1
1.258.227 Lyme Disease	0	0	1	0	1
1.26.107 Adiponectin	0	0	0	1	1
1.26.337 Leptin	0	1	0	0	1
1.261.596 Trypanosoma Cruzi	0	1	0	0	1
1.266.1068 Pressure Ulcer	0	0	0	1	1
1.278.1796 Neuroblastoma	0	0	1	0	1
1.281.1236 Amyloidosis	0	0	1	0	1
1.324.2020 Tetanus	0	1	0	0	1
1.34.1657 Elbow	0	0	1	0	1
1.36.2059 Retinopathy Of Prematurity	0	0	0	1	1
1.37.467 Echocardiography	0	0	1	0	1
1.49.1061 Endodontics	0	0	0	1	1
1.5.1674 Ketogenic Diet	0	1	0	0	1
1.5.420 Cortisol	0	0	0	1	1
1.54.1401 Genome Editing	0	0	1	0	1
1.54.958 HMGB1	0	1	0	0	1
1.55.1904 ACE Gene	0	0	0	1	1
1.6.1437 Common Variable Immunodeficiency	0	0	1	0	1
1.6.452 Somatic Hypermutation	0	0	0	1	1
1.6.609 Toll-like Receptors	0	0	0	1	1
1.65.192 COPD	0	0	1	0	1
1.66.1615 Aids Dementia Complex	0	0	0	1	1
1.68.256 Docosahexaenoic Acid	0	0	0	1	1
1.68.707 Alpha-Tocopherol	0	1	0	0	1
1.71.2048 Mean Platelet Volume	0	0	0	1	1
1.72.1710 Postpartum Hemorrhage	0	0	0	1	1
1.82.1298 Spinal Cord Injury Rehabilitation	0	0	0	1	1
1.94.1664 VKORC1	1	0	0	0	1
1.95.387 Helicobacter Pylori	0	0	0	1	1
1.95.801 Cimetidine	0	0	1	0	1
3.16.1496 Ethnobotany	0	0	0	1	1
3.171.1011 Carotenoids	0	0	0	1	1
3.180.2418 Alginate Lyase	0	0	0	1	1
3.198.400 Mycotoxins	0	0	1	0	1
3.91.496 Cadmium	0	0	0	1	1
6.146.734 Anthropology	0	0	0	1	1
6.73.2331 Health Locus of Control	0	0	0	1	1
8.124.1648 Heat Waves	0	0	0	1	1

Table 4. Values of the CNCI by topic. Note: for several topics, the number of articles is below 20.

Micro-topic	CNCI (median)				
	2000-2004	2005-2009	2010-2014	2015-2019	2000-2019
1.156.381 Maternal Mortality	0.692	1.247	1.128	0.810	0.865
1.23.1757 Group B Streptococcus	0.907	0.449	0.989	0.851	0.851
1.117.1389 Bilirubin	1.034	1.129	1.127	0.900	1.034
1.72.182 Gestational Diabetes Mellitus	0.509	0.571	0.856	1.219	0.885
1.72.924 Preterm Labor	0.296	1.070	1.183	0.706	0.728
1.72.531 Preeclampsia	0.561	0.832	0.528	0.732	0.650
1.66.11 HIV Prevalence & Prophylaxis	1.747	0.387	0.713	1.182	1.105
1.217.59 Malaria	0.155	0.732	1.123	0.879	1.012

1.72.922 Fetal Heart Rate		0.514	2.879	0.883	0.775
1.72.1732 Patent Ductus Arteriosus	0.378	0.836	0.607	0.538	0.586
1.72.748 Preterm Infants		0.355	0.203	0.808	0.724
1.23.146 Antibiotic Resistance		0.700	0.981	1.087	1.013
1.216.2287 Gastroschisis	0.716	1.595	0.488	0.551	0.605
1.44.1198 Food Insecurity			1.291	1.044	1.246
1.72.808 Breech Presentation	0.115	0.428	32.230	0.623	0.508
1.184.573 Iron Overload	0.673	2.516	1.072	1.267	1.267
1.248.655 Chlamydia Trachomatis		1.413	0.504	1.092	1.041
1.72.891 Breastfeeding	0.855	0.682	0.615	1.024	0.705
1.125.1718 Hepatitis E Virus	0.731	3.131	0.561	0.981	0.981
1.72.1072 Postpartum Depression		0.328	0.953	1.571	1.440
1.80.279 Vitamin D		2.210		0.611	0.611
1.225.2074 Methemoglobinemia			0.923	0.893	0.893
1.49.468 Oral Health			1.213	1.003	1.200
1.154.1057 Pulmonary Surfactant	0.125	0.340	1.314	0.347	0.405
1.150.1148 Deaf		0.854	0.262	0.690	0.769
1.156.2047 Global Surgery		0.383	1.792	1.760	1.084
1.157.728 Biliary Atresia	0.855	0.224	0.425	0.264	0.279
1.75.326 Antiphospholipid Syndrome		1.917	0.560	0.297	0.600
1.81.979 Twin-Twin Transfusion Syndrome		0.299	0.739	0.000	0.279
8.124.552 Air Pollution			0.631	0.126	0.144
1.120.384 Gut Microbiota			0.297	0.779	0.292
1.55.830 Acute Kidney Injury		0.555		0.059	0.213
1.148.94 Candida Albicans			0.408	1.067	0.782
1.151.222 Laparoscopic Cholecystectomy				0.058	0.058
1.225.626 Sickle Cell Disease			1.752	0.330	0.366
1.103.1225 ITP		0.184	0.270		0.227
1.104.975 Respiratory Syncytial Virus	0.000		2.082	0.951	0.951
1.137.217 Melatonin				0.526	0.526
1.154.360 Procalcitonin			1.875	0.656	1.265
1.161.711 Cytomegalovirus		0.067	2.382	0.057	0.095
1.23.173 Staphylococcus Aureus				0.487	0.487
1.42.678 Listeria Monocytogenes	0.020	1.330		0.247	0.247
1.82.1066 Cerebral Palsy			0.667	0.741	0.704
1.104.126 Influenza			0.225	4.503	0.323
1.125.275 HBV				0.086	0.086
1.128.482 Contraception				0.273	0.273
1.194.273 Mycobacterium Tuberculosis & Leprosy			14.577	0.506	0.757
1.216.1563 Volvulus				1.147	1.147
1.216.1996 Pneumomediastinum			0.000	0.940	0.266
1.222.143 Epilepsy	0.411	2.051	0.505		0.505
1.231.432 Homocysteine	0.625		0.782	1.378	0.782
1.248.1317 Mycoplasma			1.097	0.413	0.524
1.248.2104 Trichomonas Vaginalis	2.165		0.828	0.983	0.983
1.257.983 Hydrocephalus			2.215	0.473	1.570
1.37.309 Congenital Heart Disease			1.896	1.470	1.896
1.72.1745 Hyperemesis Gravidarum			0.473	0.376	0.376
1.95.723 Irritable Bowel Syndrome		0.389	1.004		0.721
3.91.920 Selenium		0.590		0.190	0.260
6.24.858 Intimate Partner Violence			2.078	5.989	4.888
1.125.83 HCV	0.546	1.320			0.933

1.141.407 Acute Promyelocytic Leukemia	0.278		2.227	1.253
1.142.832 Fecal Incontinence		0.231	2.110	1.171
1.161.315 HSV-1		0.625		0.625
1.228.200 Dengue		0.273	1.134	0.703
1.228.994 Ebola Virus			0.330	0.330
1.23.1036 Surgical Site Infection	0.387		0.324	0.355
1.23.422 Gentamicin		0.628	0.401	0.514
1.235.1679 Foreign Body			0.471	0.471
1.258.1958 Leptospirosis			0.373	0.373
1.286.845 Complement		0.193	0.384	0.288
1.42.545 STEC			0.605	0.605
1.6.351 Endotoxin		0.890	0.936	0.913
1.81.1272 HLA-G			0.554	0.554
1.81.1408 Fertility Preservation		1.008	0.111	0.559
4.61.1124 Rough Sets		0.966	0.589	0.777
6.178.516 Divorce			2.074	2.074
1.100.1284 Fetal Alcohol Syndrome			1.536	1.536
1.104.1770 Pertussis			0.924	0.924
1.104.901 Foot-And-Mouth Disease Virus			1.438	1.438
1.105.1677 Vertebral Artery Dissection		0.978		0.978
1.111.162 Hepatocellular Carcinoma	0.197			0.197
1.117.1309 Acetaminophen		0.178		0.178
1.127.1303 Endothelin		0.810		0.810
1.128.1489 Hysteroscopy			0.287	0.287
1.128.1521 Ectopic Pregnancy			3.365	3.365
1.132.2267 Clubfoot			1.649	1.649
1.132.759 Matrix Metalloproteinases		1.198		1.198
1.136.1749 Down Syndrome			0.225	0.225
1.136.1780 Family Quality Of Life			0.931	0.931
1.136.283 Autism			0.301	0.301
1.14.1293 Emergency Department			0.192	0.192
1.14.1359 Interprofessional Education			0.637	0.637
1.142.1628 Urinary Diversion	0.965			0.965
1.154.1088 Intensive Care			0.144	0.144
1.154.277 Mechanical Ventilation			0.037	0.037
1.155.598 Informed Consent			0.495	0.495
1.158.2138 Porokeratosis			1.291	1.291
1.163.446 Schistosomiasis			2.650	2.650
1.164.1871 Menarche			0.271	0.271
1.168.671 Vascular Access		0.337		0.337
1.179.108 Human Papillomavirus			0.776	0.776
1.184.1030 Erythropoietin	0.056			0.056
1.184.653 Zinc			1.264	1.264
1.186.1008 Nuchal Translucency			1.270	1.270
1.186.948 Digeorge Syndrome			0.070	0.070
1.195.1341 Enteric Nervous System	0.590			0.590
1.199.1048 Pleurodesis	0.857			0.857
1.213.168 Hypothyroidism		0.000		0.000
1.216.2098 Intussusception		0.134		0.134
1.217.1038 Toxoplasma Gondii		0.755		0.755
1.225.1476 Alloimmunization			0.492	0.492
1.225.786 Spectrin			0.000	0.000

			22
1.23.1397 Urinary Tract Infection		0.704	0.704
1.23.714 Neisseria Meningitidis		0.000	0.000
1.231.1650 Thiamine	0.447		0.447
1.235.1617 Deglutition		0.324	0.324
1.236.1155 Capsule Endoscopy	0.325		0.325
1.236.312 Portal Hypertension		0.000	0.000
1.243.1012 Vesicoureteral Reflux	0.621		0.621
1.246.710 Rotavirus	0.620		0.620
1.248.1683 Syphilis	0.597		0.597
1.258.227 Lyme Disease	3.590		3.590
1.26.107 Adiponectin		0.631	0.631
1.26.337 Leptin	0.794		0.794
1.261.596 Trypanosoma Cruzi	0.286		0.286
1.266.1068 Pressure Ulcer		1.124	1.124
1.278.1796 Neuroblastoma	0.057		0.057
1.281.1236 Amyloidosis	0.816		0.816
1.324.2020 Tetanus	0.766		0.766
1.34.1657 Elbow	0.071		0.071
1.36.2059 Retinopathy Of Prematurity		0.599	0.599
1.37.467 Echocardiography	0.380		0.380
1.49.1061 Endodontics		1.046	1.046
1.5.1674 Ketogenic Diet	0.000		0.000
1.5.420 Cortisol		1.267	1.267
1.54.1401 Genome Editing	0.923		0.923
1.54.958 HMGB1	0.784		0.784
1.55.1904 ACE Gene		0.229	0.229
1.6.1437 Common Variable Immunodeficiency	0.349		0.349
1.6.452 Somatic Hypermutation		0.000	0.000
1.6.609 Toll-like Receptors		0.165	0.165
1.65.192 COPD	187.114		187.114
1.66.1615 Aids Dementia Complex		4.164	4.164
1.68.256 Docosahexaenoic Acid		0.625	0.625
1.68.707 Alpha-Tocopherol	1.361		1.361
1.71.2048 Mean Platelet Volume		0.405	0.405
1.72.1710 Postpartum Hemorrhage		0.000	0.000
1.82.1298 Spinal Cord Injury Rehabilitation		3.041	3.041
1.94.1664 VKORC1	0.081		0.081
1.95.387 Helicobacter Pylori		0.466	0.466
1.95.801 Cimetidine	0.233		0.233
3.16.1496 Ethnobotany		0.658	0.658
3.171.1011 Carotenoids		0.531	0.531
3.180.2418 Alginate Lyase		0.425	0.425
3.198.400 Mycotoxins	3.158		3.158
3.91.496 Cadmium		0.000	0.000
6.146.734 Anthropology		2.034	2.034
6.73.2331 Health Locus of Control		2.211	2.211
8.124.1648 Heat Waves		0.666	0.666

Collaboration

Table 5. The number and percentage of articles by type of collaboration and period of publication.

Period	Collaboration					
	DRC (n°)	IRC (n°)	no_coll (n°)	DRC (%)	IRC (%)	no_coll(%)
2000-2019	555	669	26	44.4	53.5	2.1
2000-2004	32	17	6	58.2	30.9	10.9
2005-2009	57	67	1	45.6	53.6	0.8
2010-2014	122	179	11	39.1	57.4	3.5
2015-2019	344	406	8	45.4	53.6	1.1

Period	IRCintra(n°)	IRCinter(n°)	IRCinter_intra (n°)	IRCintra(%)	IRCinter(%)	IRCinter_intra (%)
2000-2019	19	541	109	2.8	80.9	16.3
2000-2004	0	15	2	0.0	88.2	11.8
2005-2009	1	60	6	1.5	89.6	9.0
2010-2014	2	151	26	1.1	84.4	14.5
2015-2019	16	315	75	3.9	77.6	18.5

Table 6. Number of articles with DRC by African country.

Country	Pub (n°)				
	2000-2019	2000-2004	2005-2009	2010-2014	2015-2019
EGYPT	167	2	9	38	118
NIGERIA	116	7	22	32	55
SOUTH AFRICA	107	15	15	19	58
ETHIOPIA	51	0	0	2	49
TUNISIA	18	2	4	4	8
MOROCCO	14	0	0	8	6
CAMEROON	11	0	0	5	6
TANZANIA	11	1	1	3	6
GHANA	11	1	2	0	8
SUDAN	9	1	1	3	4
SENEGAL	7	1	0	2	4
UGANDA	6	0	0	1	5
KENYA	6	1	0	1	4
BENIN	3	0	0	1	2
TOGO	2	0	1	0	1
MALI	2	0	0	2	0
BURKINA FASO	2	0	0	0	2
ZIMBABWE	2	0	0	1	1
MADAGASCAR	2	0	0	0	2
CONGO DEMOCRATIC REPUBLIC	2	0	0	0	2
MALAWI	2	0	1	0	1
ERITREA	1	0	1	0	0
NIGER	1	0	0	0	1
ALGERIA	1	1	0	0	0
GABON	1	0	0	0	1

Table 7. The number of articles with the collaboration of scientists from non-African countries.

Country	Pub (n°)				
	2000-2019	2000-2004	2005-2009	2010-2014	2015-2019
USA	384	8	34	110	232
UK	188	3	22	46	117
India	63	0	5	17	41
Australia	55	2	5	10	38
Switzerland	52	3	4	13	32
Canada	51	0	1	8	42
Pakistan	51	0	2	17	32
France	47	0	7	15	25
The Netherlands	43	0	4	9	30
Norway	42	1	2	13	26
Finland	33	1	0	5	27
Germany	33	1	2	7	23
Brazil	32	0	0	14	18
Sweden	32	2	3	11	16
Belgium	32	1	0	9	22
Spain	24	0	0	5	19
Bangladesh	22	0	3	3	16
Denmark	22	0	0	6	16
China	21	0	0	8	13
Argentina	21	0	1	4	16
Italy	20	0	0	6	14
Saudi Arabia	15	0	0	4	11
Guatemala	15	0	0	3	12
Thailand	13	0	0	4	9
Singapore	10	0	0	2	8
Japan	10	0	1	5	4
Nepal	9	0	0	1	8
Indonesia	8	0	1	0	7
Vietnam	8	0	1	1	6
Austria	8	0	0	2	6
Chile	7	0	0	3	4
Philippines	7	2	0	0	5
Mexico	7	0	0	1	6
New Zealand	7	0	0	1	6
Oman	7	0	0	4	3
Turkey	7	0	0	1	6
Malaysia	6	0	0	1	5
Israel	6	0	1	2	3
Peru	5	0	1	0	4
Ireland	5	0	0	1	4
United Arab Emirates	5	0	0	1	4
Jordan	4	0	0	0	4
Russia	4	0	0	1	3
Colombia	4	0	0	0	4
Lebanon	4	0	1	0	3
South Korea	4	0	0	0	4
Portugal	4	0	0	0	4
Czechia	4	0	2	1	1
Bolivia	4	0	1	1	2

Costa Rica	3	0	0	0	3
Bahrain	3	0	0	0	3
Greece	3	0	0	0	3
Poland	3	0	0	0	3
Iran	3	0	0	0	3
Serbia	3	0	0	0	3
Papua New Guinea	3	1	0	0	2
Romania	3	0	0	0	3
Luxembourg	3	0	0	0	3
Slovakia	3	0	0	0	3
Uruguay	3	0	0	1	2
Qatar	3	0	0	0	3
Sri Lanka	3	0	0	1	2
Kyrgyzstan	3	0	0	0	3
Croatia	3	0	1	1	1
Lithuania	3	0	0	0	3
Cambodia	3	0	0	1	2
Micronesia	2	0	0	0	2
Iceland	2	0	0	0	2
Iraq	2	0	0	0	2
Estonia	2	0	0	0	2
Ukraine	2	0	0	0	2
Georgia	2	0	0	0	2
Panama	2	0	0	1	1
Slovenia	2	0	0	0	2
Myanmar	1	0	0	0	1
Bhutan	1	0	0	0	1
Yemen	1	0	0	0	1
Kazakhstan	1	0	0	0	1
Jamaica	1	0	0	1	0
Albania	1	0	0	0	1
Malta	1	0	0	0	1
Latvia	1	0	0	0	1
Armenia	1	0	0	0	1
Bosnia and Herzegovina	1	0	0	0	1
North Macedonia	1	0	0	0	1
Montenegro	1	0	0	0	1
Hungary	1	0	0	0	1
Syria	1	0	0	0	1
Haiti	1	0	0	0	1

Table 8. Statistics for the countries in the collaboration network representing the whole period.

Country	Degree	Eigencentality
Algeria	92	0.901
Angola	84	0.836
Benin	93	0.904
Botswana	5	0.038
Burkina Faso	36	0.338
Burundi	76	0.746
Cameroon	92	0.901
Central African Republic	6	0.059

Chad	11	0.106
Congo	5	0.051
Cote Ivoire	87	0.844
Democratic Republic of the Congo	82	0.776
Egypt	101	0.935
Ethiopia	93	0.906
Gabon	29	0.276
Gambia	89	0.852
Ghana	112	0.986
Guinea-Bissau	28	0.267
Kenya	101	0.932
Liberia	1	0.011
Libya	29	0.270
Madagascar	5	0.034
Malawi	47	0.423
Mali	8	0.077
Morocco	85	0.844
Mozambique	82	0.799
Niger	2	0.021
Nigeria	113	0.987
Rwanda	99	0.923
Senegal	25	0.219
Sierra Leone	27	0.250
South Africa	115	0.983
South Sudan	5	0.047
Sudan	49	0.439
Tanzania	103	0.944
Togo	84	0.836
Tunisia	84	0.836
Uganda	100	0.928
Zambia	101	0.934
Zimbabwe	92	0.873
Albania	47	0.433
Argentina	100	0.916
Armenia	47	0.433
Australia	112	0.981
Austria	87	0.848
Bahrain	103	0.955
Bangladesh	108	0.956
Belgium	112	0.983
Bhutan	74	0.736
Bolivia	45	0.425
Bosnia and Herzegovina	47	0.433
Brazil	111	0.975
Cambodia	5	0.033
Canada	114	0.992
Chile	104	0.960
China	114	0.992
Colombia	92	0.901
Costa Rica	103	0.955
Croatia	48	0.443
Czechia	11	0.113

Denmark	101	0.936
Estonia	92	0.901
Finland	107	0.969
France	104	0.929
Georgia	96	0.898
Germany	109	0.977
Greece	103	0.955
Guatemala	10	0.099
Haiti	4	0.028
Hungary	27	0.258
Iceland	92	0.901
India	117	0.996
Indonesia	101	0.931
Iran	103	0.955
Iraq	92	0.901
Ireland	104	0.960
Israel	100	0.921
Italy	108	0.973
Jamaica	4	0.042
Japan	104	0.960
Jordan	108	0.973
Kazakhstan	74	0.736
Kyrgyzstan	89	0.829
Latvia	47	0.433
Lebanon	92	0.901
Lithuania	60	0.524
Luxembourg	92	0.901
Malaysia	99	0.928
Malta	47	0.433
Mexico	112	0.986
Micronesia	92	0.901
Montenegro	47	0.433
Myanmar	84	0.836
Nepal	87	0.820
Netherlands	113	0.985
New Zealand	93	0.906
North Macedonia	47	0.433
Norway	97	0.922
Oman	84	0.836
Pakistan	116	0.994
Panama	87	0.857
Papua New Guinea	92	0.901
Peru	92	0.901
Philippines	93	0.907
Poland	103	0.955
Portugal	93	0.904
Qatar	85	0.837
Romania	98	0.925
Russia	104	0.960
Saudi Arabia	105	0.964
Serbia	103	0.955
Singapore	109	0.977

Slovakia	92	0.901
Slovenia	48	0.442
South Korea	94	0.907
Spain	112	0.982
Sri Lanka	88	0.863
Sweden	105	0.945
Switzerland	112	0.981
Syria	27	0.250
Thailand	64	0.559
Turkey	106	0.943
UK	119	0.997
Ukraine	92	0.901
United Arab Emirates	94	0.909
Uruguay	88	0.858
USA	125	1.000
Vietnam	94	0.908
Yemen	74	0.736

Table 9. Number of universities by country for the whole period.

Country	Universities (n°)	Country	Universities (n°)
USA	116	Serbia	3
UK	30	Singapore	3
Australia	26	United Arab Emirates	3
Nigeria	23	Algeria	2
China	21	Burkina Faso	2
Ethiopia	20	Cameroon	2
Canada	19	Cote Ivoire	2
Egypt	16	Guatemala	2
India	16	Indonesia	2
Iran	16	Ireland	2
Germany	15	Jordan	2
Italy	15	Lebanon	2
Brazil	14	Lithuania	2
France	12	Malawi	2
South Africa	12	Nepal	2
Saudi Arabia	11	Romania	2
Japan	10	Slovakia	2
Spain	10	Sri Lanka	2
Kenya	9	Zambia	2
Netherlands	9	Albania	1
Tanzania	9	Bahrain	1
Malaysia	7	Benin	1
Sweden	7	Botswana	1
Belgium	6	Costa Rica	1
Pakistan	6	Croatia	1
South Korea	6	Czechia	1
Sudan	6	Estonia	1
Ghana	5	Gabon	1
Philippines	5	Georgia	1
Portugal	5	Greece	1
Switzerland	5	Iceland	1

Turkey	5	Israel	1
Uganda	5	Jamaica	1
Vietnam	5	Kazakhstan	1
Bangladesh	4	Latvia	1
Chile	4	Madagascar	1
Colombia	4	Mali	1
Denmark	4	Mexico	1
Finland	4	Morocco	1
New Zealand	4	Mozambique	1
Norway	4	Papua New Guinea	1
Thailand	4	Qatar	1
Tunisia	4	Rwanda	1
Austria	3	Sierra Leone	1
Dem. Republic of the Congo	3	Slovenia	1
Iraq	3	Syria	1
Libya	3	Togo	1
Poland	3	Uruguay	1
Russia	3	Zimbabwe	1

Table 10. The total number of universities by region, period and respective representativity given the total number of universities in each period.

Period	African (n°)	Non-African (n°)	African (%)	Non-African (%)
2000-2019	138	489	22	78
2000-2004	8	11	42	58
2005-2009	25	52	32	68
2010-2014	60	161	27	73
2015-2019	126	446	22	78

Collaboration networks

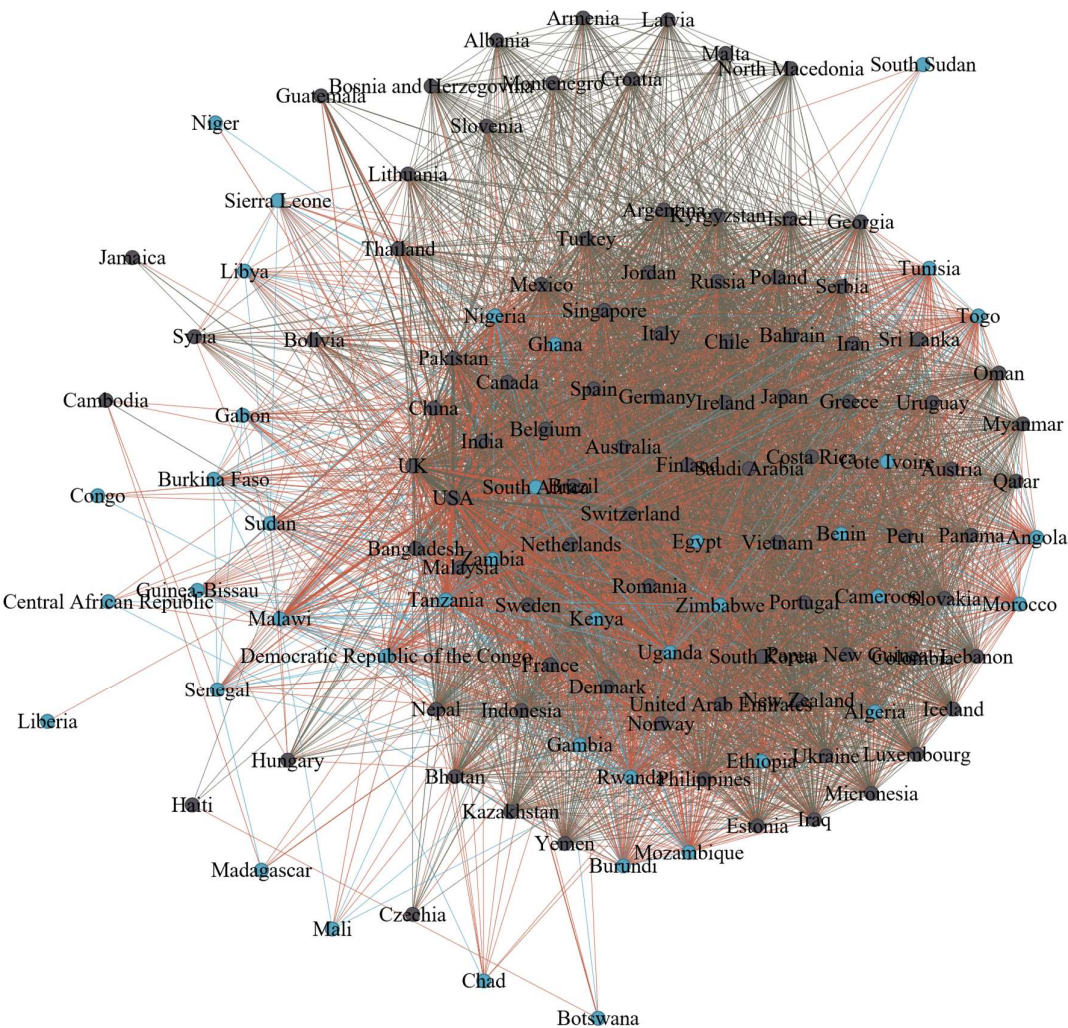


Figure 5. Collaboration network given the countries involved in IRC representing the whole period. Blue nodes represent African countries and grey non-African countries. This network has 129 nodes and 5059 links. The grey links represent publications between non-African countries, the pink links between African and non-African countries, and the blue links between African countries.

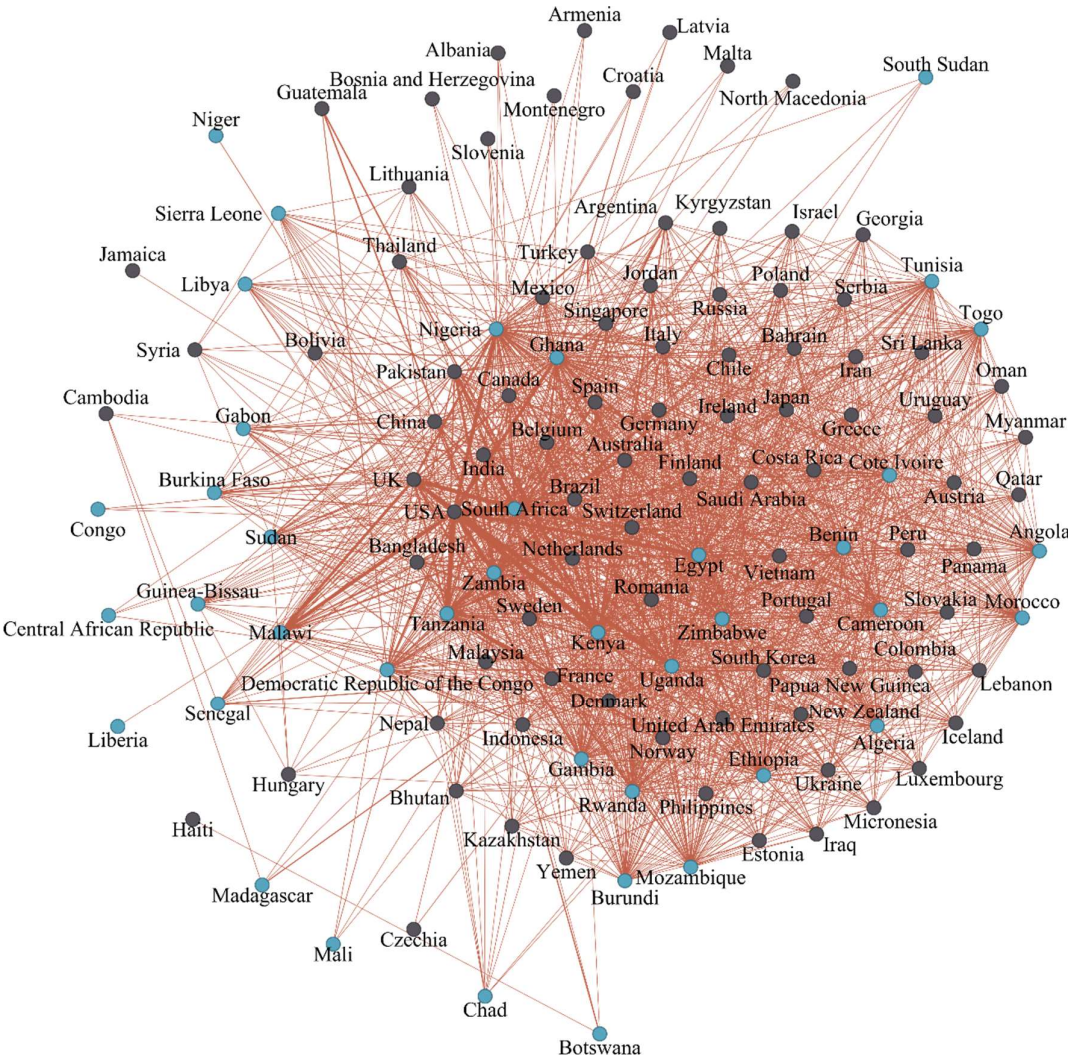


Figure 6. Collaboration subnetwork between African and non-African countries in 2000-2019 (the subnetwork derived from Figure 5). Blue nodes represent African countries and grey non-African countries. This network has 129 nodes and 1834 links.

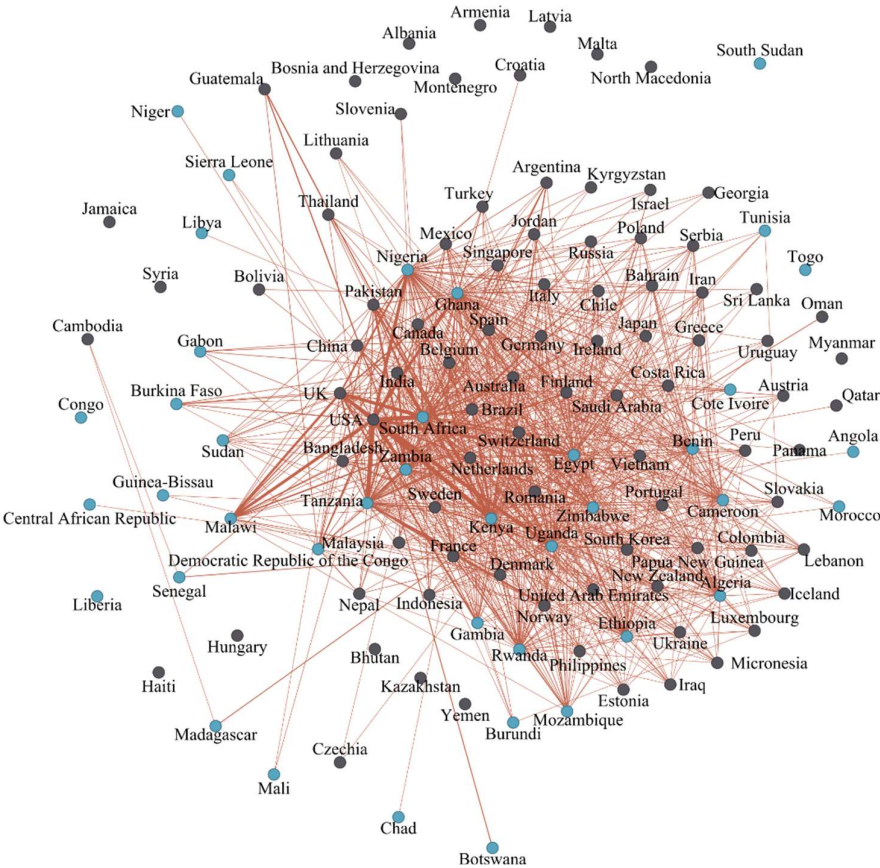


Figure 7. Collaboration subnetwork between African and non-African countries where each link represents two or more publications (the subnetwork derived from Figure 5). Blue nodes represent African countries and grey non-African countries. This network has 129 nodes and 942 links.

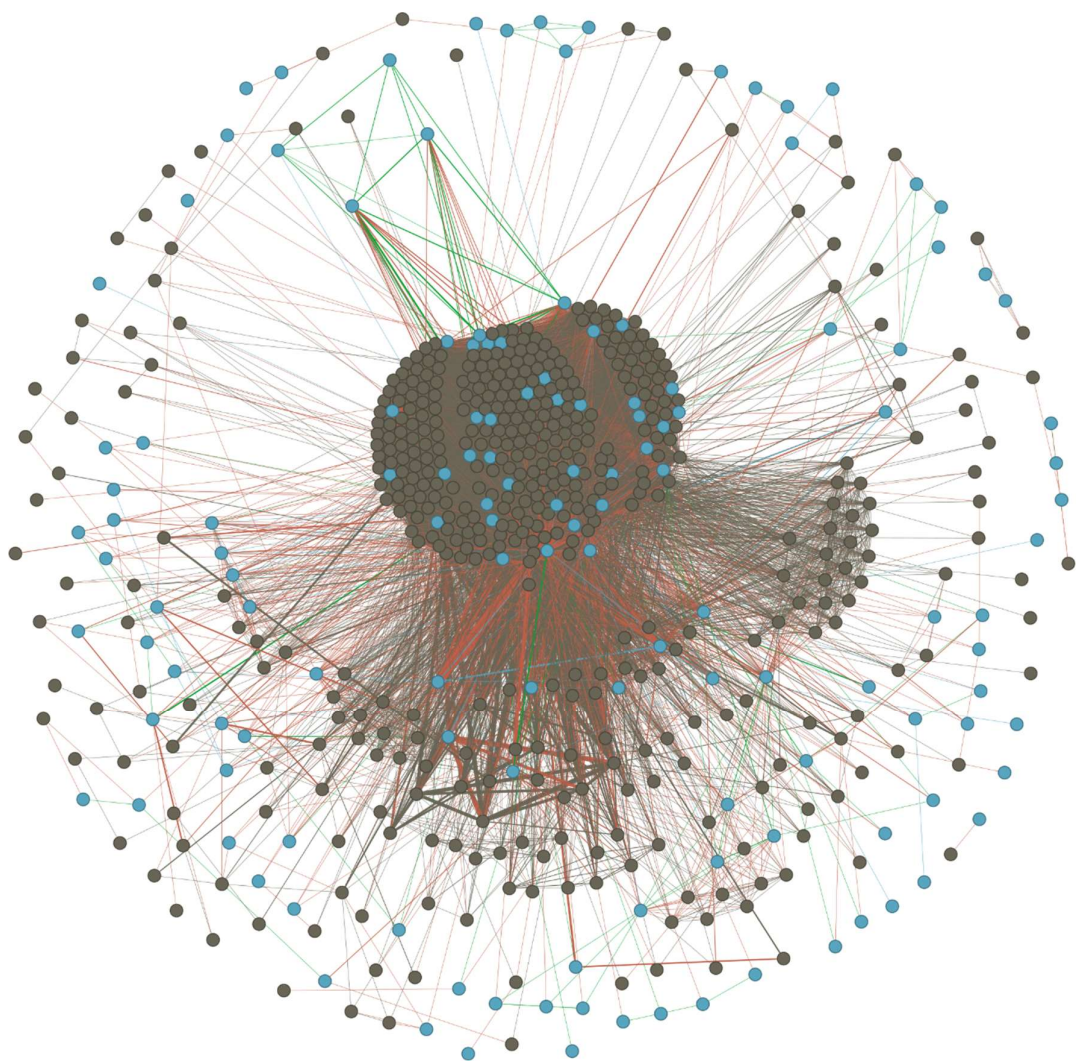


Figure 8. Collaboration network between universities representing the whole period. The high number of universities does not allow organizing the network in a way that it is possible to identify the university represented in each node. Therefore, the universities are not labelled. Blue nodes represent African universities and grey non-African universities. This network has 627 nodes and 48468 links. The grey links represent publications between non-African universities, the pink links between African and non-African universities, and the blue and green links between African universities.

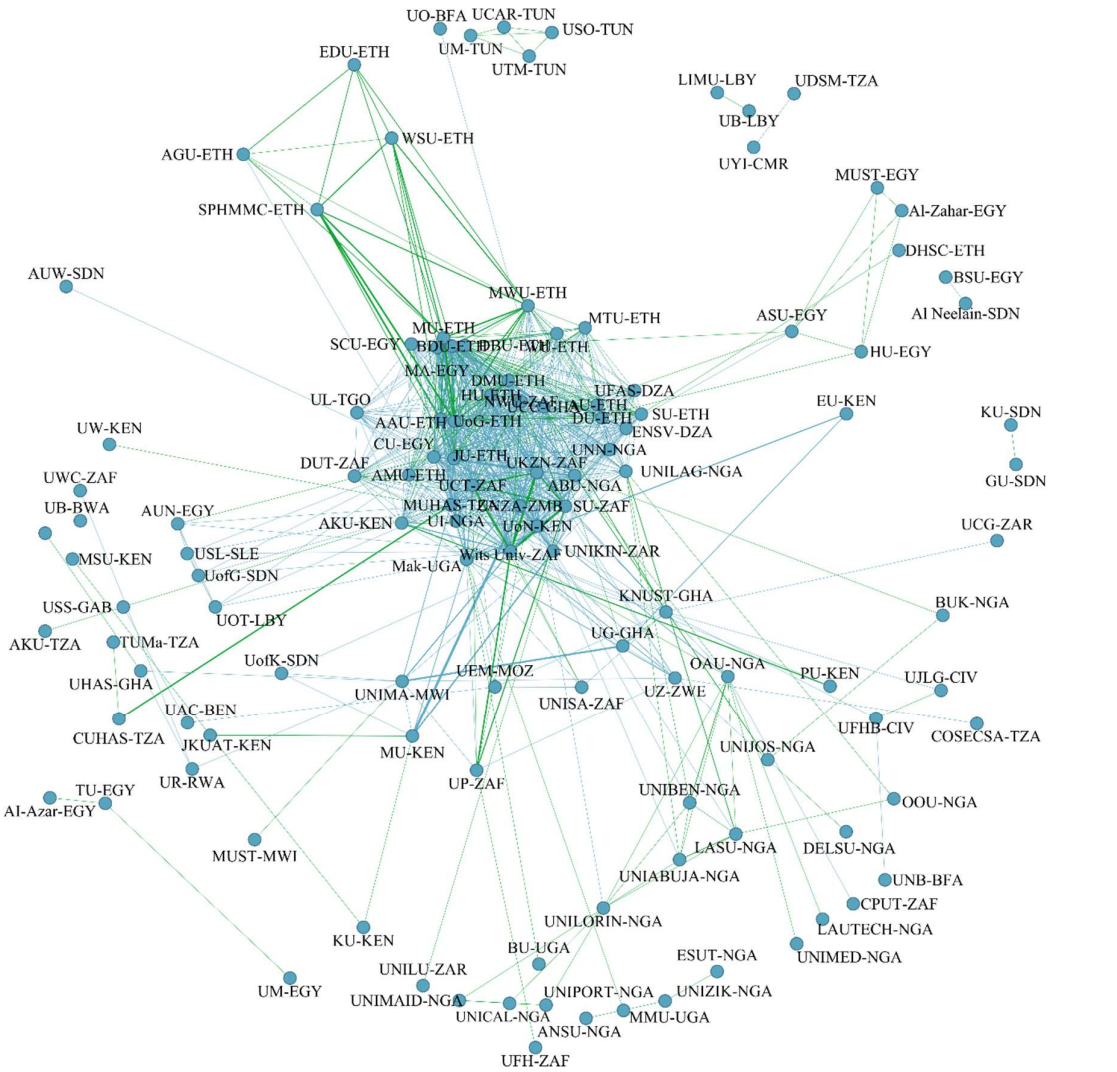


Figure 9. Collaboration subnetwork between African universities (the subnetwork derived from Figure 8). The subnetwork has 138 nodes and 804 links.

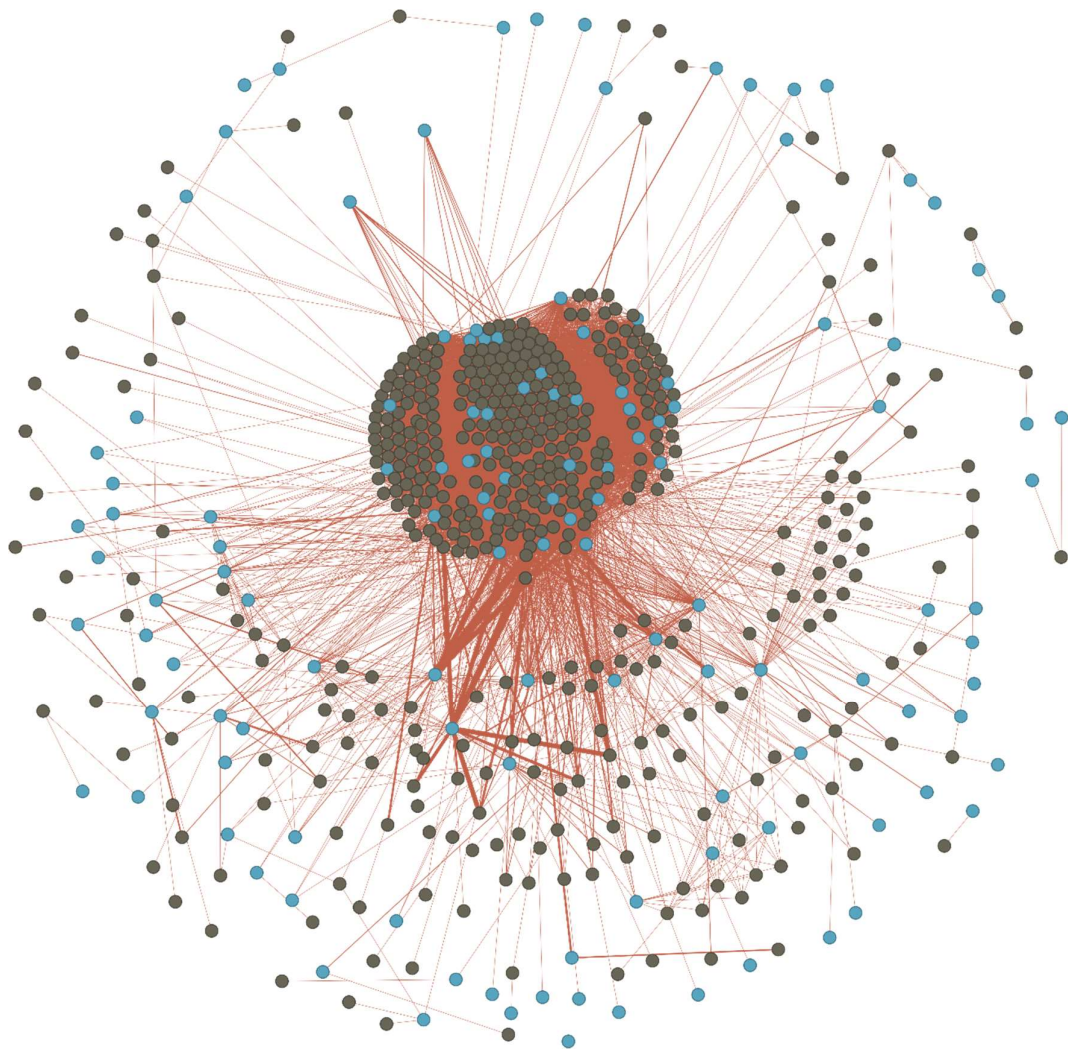


Figure 10. Collaboration subnetwork between African and non-African universities (the subnetwork derived from Figure 8). The subnetwork has 627 nodes and 10409 links.

Table 11. Statistics for the universities in the collaboration network for the whole period.

University	Degree	Eigencentrality
AAU-DNK	316	0.969
AAU-ETH	319	0.970
ABU-NGA	346	0.978
ABZUMS-IRN	316	0.969
ACU-AUS	258	0.828
AGU-BHR	316	0.969
AGU-ETH	6	0.009
Al-Azar-EGY	2	0.000
AKU-KEN	267	0.833
AKU-PAK	324	0.850
AKU-TZA	3	0.006
Al Neelain-SDN	3	0.000
ALEPUNIV-SYR	22	0.046
Al-Zahar-EGY	4	0.000
AMU-ETH	258	0.828

ANSU-NGA	2	0.003
ANU-AUS	316	0.969
ARU-GBR	316	0.969
ASE-ROM	221	0.695
ASU-EGY	15	0.027
ASU-JOR	41	0.059
ASU-System-USA	258	0.828
Ateneo-PHL	316	0.969
ATSU-USA	221	0.695
AU-AUS	318	0.970
AU-DNK	221	0.695
AU-EGY	4	0.007
AU-ETH	221	0.695
AU-IND	41	0.059
AUMS-IRN	258	0.828
AUN-EGY	24	0.046
AU-SAU	316	0.969
AUT-NZL	331	0.978
AUW-SDN	1	0.003
AYBU-TUR	36	0.065
BCMS-IRQ	258	0.828
BCM-USA	335	0.979
BDU-ETH	318	0.970
BFUHS-IND	258	0.828
BHU-IND	258	0.828
BLDE Univ-IND	16	0.012
BMSU-IRN	316	0.969
BSMMU-BGD	16	0.012
BSMS-GBR	318	0.970
BSU-EGY	3	0.000
BSU-FRA	2	0.004
BSU-USA	221	0.695
BU-EGY	1	0.000
BU-GBR	27	0.053
BU-IND	2	0.004
BUK-NGA	4	0.007
BU-MLI	4	0.007
BU-NGA	1	0.000
BU-UGA	3	0.007
BU-USA	287	0.854
BYU-USA	278	0.850
Cal State-USA	1	0.003
CAM-GBR	270	0.830
CCMU-CHN	127	0.243
CDartmouth-USA	326	0.972
CDU-AUS	60	0.148
CDU-USA	258	0.828
CEU-UCH-ESP	316	0.969
CMU-CHN	9	0.017
CMU-THA	3	0.007
COSECSA-TZA	1	0.000
CPUT-ZAF	1	0.000

CQMU-CHN	41	0.059
CSPH-PAK	316	0.969
CSU-CHN	258	0.828
CTUMP-VNM	1	0.003
CU-CZE	15	0.025
CU-EGY	339	0.973
CUHAS-TZA	9	0.013
CUNY-USA	258	0.828
CUSM-USA	15	0.025
CU-System-USA	273	0.834
CU-THA	41	0.059
CU-USA	366	0.987
CWRU-USA	318	0.970
Dal-CAN	282	0.843
DBU-ETH	316	0.969
DELSU-NGA	3	0.004
DHSC-ETH	1	0.002
DKU-CHN	258	0.828
DMU-ETH	316	0.969
DTU-VNM	316	0.969
DU-AUS	246	0.734
DU-BGD	50	0.070
DU-ETH	221	0.695
DU-GBR	3	0.010
DU-IND	321	0.971
Duke-NUS-SGP	260	0.829
DU-SWE	316	0.969
DUT-ZAF	258	0.828
DU-USA	7	0.011
ECU-AUS	39	0.069
EDU-ETH	5	0.006
Einstein-USA	267	0.830
ENS-ESP	221	0.695
ENSV-DZA	221	0.695
ESUT-NGA	2	0.003
EU-GBR	3	0.004
EU-KEN	10	0.021
EUR-NLD	331	0.978
EU-USA	343	0.982
EVMS-USA	15	0.025
FDU-CHN	342	0.977
FHU-JPN	3	0.004
FOM-DEU	258	0.828
FU-AUS	331	0.978
GMU-USA	331	0.978
GOUMS-IRN	316	0.969
GU-AUS	335	0.980
GU-SDN	2	0.000
GU-SWE	316	0.969
GU-USA	320	0.970
GWU-USA	269	0.834
HBMSU-ARE	316	0.969

HHU-DEU	1	0.000
HKU-CHN	278	0.850
HMU-VNM	316	0.969
HSE Univ-RUS	258	0.828
HU-EGY	8	0.011
HU-ETH	316	0.969
HUJI-ISR	60	0.150
HUST-CHN	1	0.003
HU-TUR	258	0.828
HU-USA	382	0.989
HU-VNM	3	0.007
IMU-MYS	316	0.969
ISCSEM-PRT	221	0.695
ISHIK Univ-IRQ	221	0.695
ISMMS-USA	3	0.007
IUMS-AUS	258	0.828
IUMS-IRN	316	0.969
IU-System-USA	20	0.040
JazanU-SAU	316	0.969
JCU-AUS	278	0.850
Jena Univ-DEU	221	0.695
JHU-USA	374	0.984
JKUAT-KEN	9	0.019
JLU-CHN	41	0.059
JLU-DEU	3	0.004
JMU-DEU	1	0.000
JMU-JPN	4	0.000
JNU-CHN	50	0.076
JSU-USA	316	0.969
JU-ETH	320	0.970
JU-POL	316	0.969
JU-SAU	2	0.000
JUST-JOR	316	0.969
KAU-SAU	3	0.007
KazNMU-KAZ	221	0.695
KBU-TUR	258	0.828
KGMU-IND	258	0.828
KHU-KOR	221	0.695
KI-SWE	345	0.978
KKU-THA	54	0.090
KLE Univ-IND	40	0.056
KMU-IRN	258	0.828
KNUST-GHA	72	0.167
KSAU-HS-SAU	3	0.000
KSU-SAU	319	0.970
KU Leuven-BEL	20	0.031
KU-KEN	4	0.007
KU-KOR	316	0.969
KUMS-IRN	258	0.828
KU-NPL	36	0.065
KU-SDN	2	0.000
KU-TUR	22	0.046

KU-USA	221	0.695
Kyoto U-JPN	221	0.695
LAMU-ZMB	3	0.006
LASU-NGA	18	0.014
LaTrobeU-AUS	223	0.696
LAUTECH-NGA	2	0.000
Lboro-GBR	1	0.004
LCWU-PAK	258	0.828
LEI-NLD	6	0.017
LIMU-LBY	4	0.006
LIU-JPN	221	0.695
Ljubliana UMC-SVN	41	0.059
LMU Munich-DEU	287	0.843
LSMU-LTU	6	0.014
LSU-system-USA	25	0.052
LUC-USA	57	0.147
LU-GBR	3	0.006
LU-SWE	323	0.971
MA-EGY	320	0.970
Mak-UGA	292	0.852
Marburg Univ-DEU	2	0.000
MazUMS-IRN	221	0.695
McGill-CAN	292	0.840
McMaster-CAN	258	0.828
MedUni Vienna-AUT	13	0.022
Minia-EGY	1	0.000
MLU-DEU	221	0.695
MMU-UGA	1	0.003
Mohammed V-MAR	3	0.004
MQ-AUS	4	0.008
MSM-USA	3	0.004
MSU-KEN	5	0.012
MSUMD-RUS	57	0.147
MSU-USA	58	0.147
MTU-ETH	221	0.695
MU-ETH	321	0.970
MUHAS-TZA	343	0.976
MUHS-IND	33	0.059
MU-KEN	54	0.093
MUK-IRN	342	0.977
MUL-POL	41	0.059
MUMS-IRN	221	0.695
MUST-EGY	4	0.000
MUST-MWI	6	0.011
MUST-UGA	3	0.004
MWU-ETH	226	0.699
NCU-JPN	3	0.004
NEU-USA	316	0.969
Newcastle Univ-GBR	258	0.828
NIAID-USA	2	0.000
NJU-CHN	316	0.969
NMCBGK-IND	10	0.014

NMU-JPN	41	0.059
NTU-SGP	221	0.695
NU-GBR	317	0.970
NUIG-IRL	57	0.147
NUS-SGP	357	0.986
NU-System-USA	1	0.001
NU-USA	341	0.981
NWU-ZAF	316	0.969
NYU-USA	262	0.829
OAU-NGA	66	0.084
OHSU-USA	260	0.829
OOU-NGA	3	0.003
OSU-System-USA	265	0.830
OUCRU-VNM	258	0.828
OUHS-IND	16	0.012
OX-GBR	380	0.990
Paris V-FRA	30	0.050
Paris XI-FRA	2	0.000
PHSU-USA	258	0.828
Pitt-USA	316	0.969
PKU-CHN	13	0.031
PolyU-CHN	221	0.695
PSU-USA	9	0.017
PU-IND	1	0.000
PUJ-COL	317	0.970
PU-KEN	6	0.016
Purdue-System-USA	7	0.015
PU-USA	2	0.007
Qom MS-IRN	258	0.828
QU-CAN	2	0.003
QUMS-IRN	221	0.695
QU-SAU	1	0.000
QUT-AUS	316	0.969
Rennes-FRA	4	0.004
RGU-IND	16	0.012
RUDN-RUS	41	0.059
RUG-NLD	322	0.970
RU-ISL	316	0.969
RU-NLD	5	0.010
RUSM-USA	1	0.004
RU-System-USA	17	0.049
RU-USA	9	0.017
Sapienza-ITA	342	0.977
SAUT-TZA	1	0.003
SBUMS-IRN	316	0.969
SCU-EGY	259	0.828
SDU-CHN	41	0.059
SDU-DNK	38	0.069
SFU-CAN	258	0.828
SJSM-GBR	258	0.828
SJTU-CHN	273	0.747
SJU-USA	4	0.000

SKKU-KOR	258	0.828
SLC-CAN	2	0.003
SLU-USA	36	0.065
SMU-BGD	16	0.012
SMU-JPN	7	0.014
SNU-KOR	316	0.969
Southern UC-MYS	258	0.828
SPHMMC-ETH	19	0.050
SRU-IND	316	0.969
St Andrews-GBR	7	0.018
StOlaf-USA	2	0.003
SUE-IRQ	316	0.969
SU-ETH	222	0.695
SUNY-USA	261	0.829
SUSF -USA	321	0.970
SUST-BGD	16	0.012
SU-SWE	259	0.828
SU-USA	266	0.832
SU-ZAF	356	0.979
SUZA-TZA	3	0.004
SYSU-CHN	321	0.970
SZU-CHN	9	0.017
TaibahU-SAU	1	0.003
TAU-FIN	327	0.973
TCNJ-USA	5	0.014
TJU-USA	12	0.029
TNMGRMU-IND	325	0.972
Tor Vergata-ITA	19	0.029
Touro-System-USA	258	0.828
TSMU-GEO	41	0.059
TSU-CHN	3	0.002
TTU-System-USA	3	0.010
TU-EGY	4	0.003
TUMa-TZA	8	0.014
TUMS-IRN	316	0.969
TU-NPL	7	0.013
TUOS-GBR	317	0.970
TU-SAU	3	0.000
TU-SVK	316	0.969
TU-USA	24	0.047
UAB-LBN	8	0.023
UAb-PRT	316	0.969
UAC-BEN	15	0.018
UAEU-ARE	224	0.696
UAlberta-CAN	282	0.838
UAM-ESP	316	0.969
UAM-MEX	227	0.700
UANDES-CHL	18	0.048
UAntwerp-BEL	46	0.068
UA-System-USA	362	0.986
Uautonoma-CHL	258	0.828
UBath-GBR	258	0.828

UB-BWA	5	0.012
UBC-CAN	337	0.979
UB-CHE	362	0.982
UB-ESP	327	0.971
UB-FRA	221	0.695
UB-GBR	9	0.018
UB-LBY	4	0.006
UBordeaux-FRA	6	0.017
UBrandeis-USA	258	0.828
UBrown-USA	285	0.852
UB-SRB	316	0.969
UB-USA	24	0.046
UC Chile-CHL	255	0.714
UCalgary-CAN	338	0.976
UCAR-TUN	4	0.004
UC-AUS	316	0.969
UCC-GHA	321	0.971
UCC-IRL	316	0.969
UCG-ZAR	1	0.001
UChicago-USA	61	0.159
UCLan-GBR	5	0.013
UCM-ESP	12	0.021
UC-NZL	258	0.828
UColgate-USA	258	0.828
UCPEL-BRA	31	0.075
UCPH-DNK	340	0.975
UCP-PRT	221	0.695
UCR-CRI	316	0.969
UC-System-USA	380	0.988
UCT-ZAF	337	0.980
UC-USA	263	0.828
UCU-UGA	3	0.007
UDCA-COL	258	0.828
Udelar-URY	258	0.828
UdeM-CAN	330	0.972
UDESC-BRA	258	0.828
UD-GBR	4	0.000
UDla-CMR	1	0.000
UDOM-TZA	3	0.004
UDP-CHL	4	0.010
UDS-GHA	5	0.007
UDSM-TZA	2	0.000
UD-USA	62	0.161
UDUS-NGA	2	0.000
UEA-GBR	221	0.695
UEF-FIN	3	0.004
UEM-MOZ	66	0.165
UERMMMC-PHL	258	0.828
UEX-ESP	258	0.828
UFAS-DZA	221	0.695
UFBA-BRA	20	0.049
UFC-BRA	7	0.013

UFHB-CIV	6	0.011
UFH-ZAF	1	0.000
UFMG-BRA	319	0.970
UFM-GTM	10	0.014
UFPeI-BRA	70	0.143
UFRGS-BRA	316	0.969
UFS-BRA	316	0.969
UFSC-BRA	316	0.969
UGent-BEL	357	0.981
UG-GHA	60	0.121
UG-System-USA	40	0.076
UHAS-GHA	7	0.012
Uhasselt-BEL	18	0.029
UH-FIN	342	0.977
UHoward-USA	333	0.979
UHS Lahore	16	0.012
UHS Lahore-PAK	221	0.695
UH-System-USA	4	0.007
UiB-NOR	349	0.979
UIC-ESP	3	0.004
UIdaho-USA	9	0.018
UI-IDN	20	0.052
UImperial-GBR	360	0.985
UI-NGA	273	0.836
UiO-NOR	321	0.970
UIowa-USA	259	0.828
UiS-NOR	4	0.010
UI-System-USA	258	0.828
UiTM-MYS	2	0.000
UiT-NOR	316	0.969
UJLG-CIV	3	0.004
UKCS-SRB	41	0.059
UKF-SVK	3	0.003
UK-KOR	316	0.969
UKM-MYS	327	0.972
UK-SRB	316	0.969
UKY-USA	6	0.014
UKZN-ZAF	324	0.972
ULancaster-GBR	221	0.695
ULB-BEL	1	0.000
ULeeds-GBR	5	0.017
UL-FRA	316	0.969
UL-GBR	258	0.828
ULisboa-PRT	221	0.695
UL-LVA	41	0.059
Ulm-DEU	316	0.969
UL-TGO	258	0.828
UManitoba-CAN	316	0.969
UMass-System-USA	318	0.970
UM-AUS	253	0.741
UMDNJ-USA	17	0.029
UM-EGY	3	0.000

UMFCD-ROM	316	0.969
UMGA-MDG	1	0.000
UM-GBR	41	0.076
UMG-USA	15	0.025
UMiami-USA	57	0.147
UMich-System-USA	30	0.064
UMIT TIROL-AUT	258	0.828
UM-MYS	6	0.007
UM-NLD	5	0.007
UMontpellier-FRA	4	0.004
UMSHA-IRN	221	0.695
UM-System-USA	278	0.850
UMT-ALB	41	0.059
UM-THA	32	0.079
UMT-PAK	316	0.969
UM-TUN	5	0.004
UM-TUR	20	0.049
UM-USA	316	0.969
UMU-SWE	3	0.010
UNAL-COL	316	0.969
UNB-BFA	1	0.000
UnB-BRA	258	0.828
UNC-System-USA	367	0.984
Uni Bielefeld-DEU	316	0.969
Uni Freiburg-DEU	44	0.060
Uni Heidelberg-DEU	319	0.970
Uni Hohenheim-DEU	318	0.970
Uni Tübingen-DEU	43	0.073
UNIABUJA-NGA	17	0.014
UniBa-ITA	316	0.969
UNIBEN-NGA	21	0.023
UNIBO-ITA	316	0.969
UNICA-ITA	18	0.029
UNICAL-NGA	4	0.004
UNICAMP-BRA	36	0.065
UNICARTAGENA-COL	316	0.969
UNIFESP-BRA	49	0.086
UNIFI-ITA	31	0.067
UNIFR-CHE	2	0.000
UNIGE-CHE	3	0.003
UNIJOS-NGA	12	0.017
UNIKIN-ZAR	254	0.721
UNILAG-NGA	228	0.702
UNIL-CHE	18	0.029
UNILIM-FRA	2	0.000
UNILORIN-NGA	20	0.015
UNILU-ZAR	3	0.003
UNIMAID-NGA	4	0.004
UNIMA-MWI	85	0.161
UNIMED-NGA	2	0.000
UniME-ITA	18	0.029
UNIMELB-AUS	339	0.980

UNIMI-ITA	353	0.979
UniofExter-GBR	2	0.004
UniOulu -FIN	3	0.007
UniPD-ITA	3	0.010
UNIPG-ITA	41	0.059
UNIPORT-NGA	4	0.004
UNIPR-ITA	18	0.029
UNIPV-ITA	22	0.046
UniSA-AUS	261	0.831
UNISA-ITA	316	0.969
UNISA-ZAF	57	0.147
UNIST-HRV	6	0.014
UNISTRA-FRA	2	0.000
UNISUL-BRA	258	0.828
UniTo-ITA	30	0.056
UniTS-ITA	1	0.003
UNIVEN-ZAF	7	0.013
UNIZIK-NGA	3	0.004
UNM-USA	323	0.971
UNNES-IDN	221	0.695
UNN-NGA	225	0.702
UNSW-AUS	333	0.978
UNZA-ZMB	325	0.971
UoA-NZL	338	0.980
UO-BFA	1	0.003
UOB-LBN	2	0.004
UoC-DEU	1	0.000
UoC-LKA	258	0.828
UOEH-JPN	316	0.969
UofA-System-USA	3	0.003
UofA-USA	318	0.970
UofG-CAN	2	0.006
UofG-SDN	22	0.046
UofK-SDN	37	0.065
UofL-USA	266	0.832
UofM-System-USA	14	0.019
UoG-ETH	319	0.970
UOH-SAU	221	0.695
UoL-GBR	433	1.000
UoN-KEN	335	0.972
UO-NZL	278	0.850
UO-System-USA	336	0.974
UOT-LBY	22	0.046
uOttawa-CAN	317	0.969
UOW-AUS	1	0.003
UPenn-USA	285	0.853
UPeradeniya-LKA	278	0.850
UPF-ESP	258	0.828
UPMC-FRA	6	0.004
UPMC-USA	5	0.014
UPM-PHL	221	0.695
UPNG -PNG	316	0.969

UP-PHL	258	0.828
UP-PRT	320	0.971
UP-ZAF	37	0.072
UQ-AUS	337	0.980
UQU-SAU	2	0.000
URC-USA	36	0.065
URI-USA	260	0.829
URochester-USA	4	0.007
UR-RWA	8	0.012
UR-USA	36	0.065
URV-ESP	18	0.029
USAC-GTM	12	0.023
uSask -CAN	221	0.695
USA-USA	15	0.025
USC-PHL	24	0.062
USC-System-USA	7	0.017
US-GBR	348	0.979
USG-USA	3	0.007
USL-SLE	22	0.046
USM-MYS	316	0.969
USM-System-USA	32	0.069
USO-TUN	4	0.004
USP-BRA	352	0.979
USS-GAB	7	0.004
US-USA	221	0.695
USYD-AUS	331	0.978
UTAS-AUS	258	0.828
UTennessee-System-USA	344	0.978
UT-EST	221	0.695
UTH-GRC	248	0.706
UTM-TUN	7	0.007
Utokyo-JPN	246	0.734
UToronto-CAN	352	0.979
UTS-AUS	37	0.065
UT-System-USA	248	0.737
UT-USA	319	0.970
UU-IND	221	0.695
UU-NLD	44	0.080
UU-SWE	323	0.972
UU-USA	258	0.828
UvA-NLD	10	0.011
UVA-USA	333	0.972
UV-ESP	316	0.969
UVSQ-FRA	3	0.000
UW System-USA	2	0.003
UWA-AUS	344	0.981
UWC-ZAF	3	0.006
UWE-GBR	258	0.828
UW-GBR	317	0.970
UWI-JAM	7	0.015
UWK-AUT	258	0.828
UW-KEN	3	0.010

UWO-CAN	258	0.828
UWS-AUS	316	0.969
UW-USA	384	0.990
UYI-CMR	4	0.007
UZ Brussel-BEL	41	0.059
UZH-CHE	269	0.830
UZ-ZWE	33	0.079
Vandy-USA	62	0.157
VCU-USA	316	0.969
Virginia Tech-USA	258	0.828
VU Amsterdam-NLD	25	0.049
VU-CAN	4	0.006
VU-LTU	41	0.059
WAIT-AUS	316	0.969
WaldenU-USA	261	0.829
WCM-Q-QAT	258	0.828
WCRI-CAN	6	0.017
WFU-USA	58	0.151
Wits Univ-ZAF	375	0.988
WKU-USA	6	0.014
WMU-CHN	41	0.059
WMU-POL	316	0.969
WSU-ETH	15	0.040
WSU-System -USA	9	0.018
WSU-USA	261	0.828
WU-ETH	221	0.695
WUR-NLD	316	0.969
WUSTL-USA	221	0.695
WVU System-USA	2	0.003
XJTU-CHN	23	0.059
XMU-MYS	221	0.695
YCU-JPN	221	0.695
York Univ-CAN	3	0.003
York Univ-GBR	260	0.829
YU-KOR	316	0.969
YU-USA	351	0.984
ZJU-CHN	62	0.101
ZU-ARE	2	0.000
ZU-EGY	4	0.000
ZUMS-IRN	221	0.695

Table 12. Impact of the articles according to the type of collaboration and period of publication. Note: for several periods, the number of articles is below 20 (see **Error! Reference source not found.** above).

Period	CNCI (median)		
	DRC	IRC	no_coll
2000-2019	0.504	1.083	0.300
2000-2004	0.467	0.673	0.299
2005-2009	0.468	1.061	0.000
2010-2014	0.514	1.272	0.349
2015-2019	0.500	1.038	0.206

Table 13. Impact of the articles according to the different types of IRC and period of publication. Note: for several periods, the number of articles is below 20.

Period	CNCI (median)		
	IRCI _{intra}	IRCinter	IRCinter_intra
2000-2019	0.724	1.012	1.369
2000-2004	0.000	0.673	1.371
2005-2009	0.264	1.009	1.624
2010-2014	0.479	1.225	1.913
2015-2019	0.783	0.981	1.265

Table 14. The number of articles with research collaboration by topic and period.

Micro-Topic	Pub (n°)				
	2000-2019	2000-2004	2005-2009	2010-2014	2015-2019
1.156.381 Maternal Mortality	191	6	21	57	107
1.23.1757 Group B Streptococcus	125	8	9	28	80
1.117.1389 Bilirubin	91	1	8	24	58
1.72.182 Gestational Diabetes Mellitus	88	3	7	24	54
1.72.924 Preterm Labor	64	2	6	11	45
1.72.531 Preeclampsia	58	3	9	10	36
1.66.11 HIV Prevalence & Prophylaxis	49	1	5	12	31
1.217.59 Malaria	39	1	6	15	17
1.72.922 Fetal Heart Rate	37	0	9	6	22
1.72.1732 Patent Ductus Arteriosus	25	3	1	9	12
1.72.748 Preterm Infants	23	0	1	9	13
1.23.146 Antibiotic Resistance	21	0	1	3	17
1.44.1198 Food Insecurity	19	0	0	9	10
1.216.2287 Gastroschisis	18	1	2	1	14
1.72.808 Breech Presentation	17	1	1	1	14
1.184.573 Iron Overload	13	1	1	4	7
1.248.655 Chlamydia Trachomatis	13	0	2	1	10
1.72.891 Breastfeeding	12	1	2	2	7
1.125.1718 Hepatitis E Virus	11	2	3	1	5
1.72.1072 Postpartum Depression	11	0	1	1	9
1.80.279 Vitamin D	11	0	1	0	10
1.225.2074 Methemoglobinemia	10	0	0	6	4
1.49.468 Oral Health	10	0	0	2	8
1.154.1057 Pulmonary Surfactant	8	0	2	2	4
1.156.2047 Global Surgery	8	0	1	2	5

1.157.728 Biliary Atresia	8	1	1	1	5
1.75.326 Antiphospholipid Syndrome	8	0	1	4	3
1.81.979 Twin-Twin Transfusion Syndrome	7	0	1	3	3
8.124.552 Air Pollution	7	0	0	1	6
1.150.1148 Deaf	6	0	3	0	3
1.55.830 Acute Kidney Injury	6	0	2	0	4
1.120.384 Gut Microbiota	5	0	0	2	3
1.148.94 Candida Albicans	5	0	0	2	3
1.151.222 Laparoscopic Cholecystectomy	5	0	0	0	5
1.225.626 Sickle Cell Disease	5	0	0	1	4
1.103.1225 ITP	4	0	1	3	0
1.104.975 Respiratory Syncytial Virus	4	1	0	1	2
1.137.217 Melatonin	4	0	0	0	4
1.154.360 Procalcitonin	4	0	0	1	3
1.23.173 Staphylococcus Aureus	4	0	0	0	4
1.42.678 Listeria Monocytogenes	4	1	1	0	2
1.82.1066 Cerebral Palsy	4	0	0	3	1
1.104.126 Influenza	3	0	0	1	2
1.125.275 HBV	3	0	0	0	3
1.128.482 Contraception	3	0	0	0	3
1.161.711 Cytomegalovirus	3	0	1	1	1
1.194.273 Mycobacterium Tuberculosis & Leprosy	3	0	0	1	2
1.216.1563 Volvulus	3	0	0	0	3
1.216.1996 Pneumomediastinum	3	0	0	1	2
1.231.432 Homocysteine	3	1	0	1	1
1.248.1317 Mycoplasma	3	0	0	2	1
1.248.2104 Trichomonas Vaginalis	3	1	0	1	1
1.257.983 Hydrocephalus	3	0	0	2	1
1.37.309 Congenital Heart Disease	3	0	0	1	2
1.72.1745 Hyperemesis Gravidarum	3	0	0	2	1
1.95.723 Irritable Bowel Syndrome	3	0	2	1	0
3.91.920 Selenium	3	0	1	0	2
6.24.858 Intimate Partner Violence	3	0	0	1	2
1.125.83 HCV	2	1	1	0	0
1.141.407 Acute Promyelocytic Leukemia	2	1	0	0	1
1.161.315 HSV-1	2	0	0	2	0
1.222.143 Epilepsy	2	0	1	1	0
1.228.994 Ebola Virus	2	0	0	0	2
1.23.1036 Surgical Site Infection	2	1	0	0	1
1.23.422 Gentamicin	2	0	0	1	1
1.235.1679 Foreign Body	2	0	0	0	2
1.258.1958 Leptospirosis	2	0	0	0	2
1.286.845 Complement	2	0	1	0	1
1.42.545 STEC	2	0	0	0	2
1.6.351 Endotoxin	2	0	0	1	1
1.81.1272 HLA-G	2	0	0	0	2
1.81.1408 Fertility Preservation	2	0	0	1	1
4.61.1124 Rough Sets	2	0	0	1	1
6.178.516 Divorce	2	0	0	0	2
1.100.1284 Fetal Alcohol Syndrome	1	0	0	0	1
1.104.1770 Pertussis	1	0	0	0	1

1.104.901 Foot-And-Mouth Disease Virus	1	0	0	0	1
1.105.1677 Vertebral Artery Dissection	1	0	0	1	0
1.111.162 Hepatocellular Carcinoma	1	1	0	0	0
1.117.1309 Acetaminophen	1	0	0	1	0
1.127.1303 Endothelin	1	0	0	1	0
1.128.1489 Hysteroscopy	1	0	0	0	1
1.128.1521 Ectopic Pregnancy	1	0	0	0	1
1.132.2267 Clubfoot	1	0	0	0	1
1.132.759 Matrix Metalloproteinases	1	0	1	0	0
1.136.1749 Down Syndrome	1	0	0	0	1
1.136.1780 Family Quality Of Life	1	0	0	0	1
1.136.283 Autism	1	0	0	0	1
1.14.1293 Emergency Department	1	0	0	0	1
1.14.1359 Interprofessional Education	1	0	0	0	1
1.142.1628 Urinary Diversion	1	1	0	0	0
1.142.832 Fecal Incontinence	1	0	0	0	1
1.154.1088 Intensive Care	1	0	0	0	1
1.154.277 Mechanical Ventilation	1	0	0	0	1
1.155.598 Informed Consent	1	0	0	0	1
1.158.2138 Porokeratosis	1	0	0	0	1
1.163.446 Schistosomiasis	1	0	0	0	1
1.164.1871 Menarche	1	0	0	0	1
1.168.671 Vascular Access	1	0	0	1	0
1.179.108 Human Papillomavirus	1	0	0	0	1
1.184.1030 Erythropoietin	1	1	0	0	0
1.184.653 Zinc	1	0	0	0	1
1.186.1008 Nuchal Translucency	1	0	0	0	1
1.186.948 Digeorge Syndrome	1	0	0	0	1
1.195.1341 Enteric Nervous System	1	1	0	0	0
1.199.1048 Pleurodesis	1	1	0	0	0
1.213.168 Hypothyroidism	1	0	0	1	0
1.216.2098 Intussusception	1	0	1	0	0
1.217.1038 Toxoplasma Gondii	1	0	0	1	0
1.225.1476 Alloimmunization	1	0	0	0	1
1.225.786 Spectrin	1	0	0	0	1
1.228.200 Dengue	1	0	0	0	1
1.23.1397 Urinary Tract Infection	1	0	0	0	1
1.23.714 Neisseria Meningitidis	1	0	0	0	1
1.235.1617 Deglutition	1	0	0	0	1
1.236.1155 Capsule Endoscopy	1	0	0	1	0
1.236.312 Portal Hypertension	1	0	0	0	1
1.243.1012 Vesicoureteral Reflux	1	0	0	1	0
1.246.710 Rotavirus	1	1	0	0	0
1.258.227 Lyme Disease	1	0	0	1	0
1.26.107 Adiponectin	1	0	0	0	1
1.26.337 Leptin	1	0	1	0	0
1.261.596 Trypanosoma Cruzi	1	0	1	0	0
1.266.1068 Pressure Ulcer	1	0	0	0	1
1.278.1796 Neuroblastoma	1	0	0	1	0
1.281.1236 Amyloidosis	1	0	0	1	0
1.324.2020 Tetanus	1	0	1	0	0
1.34.1657 Elbow	1	0	0	1	0

1.36.2059 Retinopathy Of Prematurity	1	0	0	0	1
1.37.467 Echocardiography	1	0	0	1	0
1.49.1061 Endodontics	1	0	0	0	1
1.5.1674 Ketogenic Diet	1	0	1	0	0
1.5.420 Cortisol	1	0	0	0	1
1.54.1401 Genome Editing	1	0	0	1	0
1.54.958 HMGB1	1	0	1	0	0
1.55.1904 ACE Gene	1	0	0	0	1
1.6.452 Somatic Hypermutation	1	0	0	0	1
1.6.609 Toll-like Receptors	1	0	0	0	1
1.65.192 COPD	1	0	0	1	0
1.66.1615 Aids Dementia Complex	1	0	0	0	1
1.68.256 Docosahexaenoic Acid	1	0	0	0	1
1.68.707 Alpha-Tocopherol	1	0	1	0	0
1.71.2048 Mean Platelet Volume	1	0	0	0	1
1.72.1710 Postpartum Hemorrhage	1	0	0	0	1
1.82.1298 Spinal Cord Injury Rehabilitation	1	0	0	0	1
1.94.1664 VKORC1	1	1	0	0	0
1.95.387 Helicobacter Pylori	1	0	0	0	1
1.95.801 Cimetidine	1	0	0	1	0
3.16.1496 Ethnobotany	1	0	0	0	1
3.171.1011 Carotenoids	1	0	0	0	1
3.180.2418 Alginate Lyase	1	0	0	0	1
3.198.400 Mycotoxins	1	0	0	1	0
3.91.496 Cadmium	1	0	0	0	1
6.146.734 Anthropology	1	0	0	0	1
6.73.2331 Health Locus of Control	1	0	0	0	1
8.124.1648 Heat Waves	1	0	0	0	1

Table 15. The number of articles by topic and type of collaboration for the whole period.

Micro-Topic	Collaboration	Pub (n°)	Micro-Topic	Collaboration	Pub (n°)
1.100.1284 Fetal Alcohol Syndrome	DRC	1	1.231.1650 Thiamine	no_coll	1
1.103.1225 ITP	DRC	2	1.231.432 Homocysteine	DRC	1
1.103.1225 ITP	IRC	2	1.231.432 Homocysteine	IRC	2
1.104.126 Influenza	DRC	1	1.235.1617 Deglutition	DRC	1
1.104.126 Influenza	IRC	2	1.235.1679 Foreign Body	IRC	2
1.104.1770 Pertussis	IRC	1	1.236.1155 Capsule Endoscopy	DRC	1
1.104.901 Foot-And-Mouth Disease Virus	IRC	1	1.236.312 Portal Hypertension	DRC	1
1.104.975 Respiratory Syncytial Virus	DRC	1	1.243.1012 Vesicoureteral Reflux	DRC	1
1.104.975 Respiratory Syncytial Virus	IRC	3	1.246.710 Rotavirus	DRC	1
1.105.1677 Vertebral Artery Dissection	DRC	1	1.248.1317 Mycoplasma	DRC	2
1.111.162 Hepatocellular Carcinoma	DRC	1	1.248.1317 Mycoplasma	IRC	1
1.117.1309 Acetaminophen	DRC	1	1.248.1683 Syphilis	no_coll	1
1.117.1389 Bilirubin	DRC	57	1.248.2104 Trichomonas Vaginalis	IRC	3

1.117.1389 Bilirubin	IRC	34	1.248.655 Chlamydia Trachomatis	DRC	4
1.120.384 Gut Microbiota	DRC	2	1.248.655 Chlamydia Trachomatis	IRC	9
1.120.384 Gut Microbiota	IRC	3	1.257.983 Hydrocephalus	IRC	3
1.120.384 Gut Microbiota	no_coll	1	1.258.1958 Leptospirosis	IRC	2
1.125.1718 Hepatitis E Virus	DRC	2	1.258.227 Lyme Disease	IRC	1
1.125.1718 Hepatitis E Virus	IRC	9	1.26.107 Adiponectin	DRC	1
1.125.275 HBV	DRC	2	1.26.337 Leptin	DRC	1
1.125.275 HBV	IRC	1	1.261.596 Trypanosoma Cruzi	DRC	1
1.125.83 HCV	DRC	1	1.266.1068 Pressure Ulcer	IRC	1
1.125.83 HCV	IRC	1	1.278.1796 Neuroblastoma	DRC	1
1.127.1303 Endothelin	IRC	1	1.281.1236 Amyloidosis	IRC	1
1.128.1489 Hysteroscopy	DRC	1	1.286.845 Complement	DRC	1
1.128.1521 Ectopic Pregnancy	DRC	1	1.286.845 Complement	IRC	1
1.128.482 Contraception	DRC	1	1.324.2020 Tetanus	DRC	1
1.128.482 Contraception	IRC	2	1.34.1657 Elbow	DRC	1
1.132.2267 Clubfoot	IRC	1	1.36.2059 Retinopathy Of Prematurity	DRC	1
1.132.759 Matrix Metalloproteinases	DRC	1	1.37.309 Congenital Heart Disease	DRC	1
1.136.1749 Down Syndrome	DRC	1	1.37.309 Congenital Heart Disease	IRC	2
1.136.1780 Family Quality Of Life	IRC	1	1.37.467 Echocardiography	DRC	1
1.136.283 Autism	DRC	1	1.42.545 STEC	DRC	1
1.137.217 Melatonin	DRC	3	1.42.545 STEC	IRC	1
1.137.217 Melatonin	IRC	1	1.42.678 Listeria Monocytogenes	DRC	3
1.14.1293 Emergency Department	IRC	1	1.42.678 Listeria Monocytogenes	IRC	1
1.14.1359 Interprofessional Education	DRC	1	1.44.1198 Food Insecurity	DRC	1
1.141.407 Acute Promyelocytic Leukemia	DRC	1	1.44.1198 Food Insecurity	IRC	18
1.141.407 Acute Promyelocytic Leukemia	IRC	1	1.49.1061 Endodontics	IRC	1
1.142.1628 Urinary Diversion	DRC	1	1.49.468 Oral Health	DRC	5
1.142.832 Fecal Incontinence	DRC	1	1.49.468 Oral Health	IRC	5
1.142.832 Fecal Incontinence	no_coll	1	1.5.1674 Ketogenic Diet	DRC	1
1.148.94 Candida Albicans	DRC	4	1.5.420 Cortisol	IRC	1
1.148.94 Candida Albicans	IRC	1	1.54.1401 Genome Editing	IRC	1
1.150.1148 Deaf	DRC	5	1.54.958 HMGB1	IRC	1
1.150.1148 Deaf	IRC	1	1.55.1904 ACE Gene	DRC	1
1.150.1148 Deaf	no_coll	2	1.55.830 Acute Kidney Injury	DRC	6
1.151.222 Laparoscopic Cholecystectomy	DRC	4	1.6.1437 Common Variable Immunodeficiency	no_coll	1
1.151.222 Laparoscopic Cholecystectomy	IRC	1	1.6.351 Endotoxin	DRC	1
1.154.1057 Pulmonary Surfactant	DRC	2	1.6.351 Endotoxin	IRC	1
1.154.1057 Pulmonary Surfactant	IRC	6	1.6.452 Somatic Hypermutation	DRC	1
1.154.1057 Pulmonary Surfactant	no_coll	1	1.6.609 Toll-like Receptors	DRC	1
1.154.1088 Intensive Care	DRC	1	1.65.192 COPD	IRC	1
1.154.277 Mechanical Ventilation	DRC	1	1.66.11 HIV Prevalence & Prophylaxis	DRC	12

1.154.360 Procalcitonin	DRC	1	1.66.11 HIV Prevalence & Prophylaxis	IRC	37
1.154.360 Procalcitonin	IRC	3	1.66.1615 Aids Dementia Complex	IRC	1
1.155.598 Informed Consent	IRC	1	1.68.256 Docosahexaenoic Acid	DRC	1
1.156.2047 Global Surgery	DRC	1	1.68.707 Alpha-Tocopherol	IRC	1
1.156.2047 Global Surgery	IRC	7	1.71.2048 Mean Platelet Volume	DRC	1
1.156.381 Maternal Mortality	DRC	47	1.72.1072 Postpartum Depression	DRC	2
1.156.381 Maternal Mortality	IRC	144	1.72.1072 Postpartum Depression	IRC	9
1.156.381 Maternal Mortality	no_coll	3	1.72.1710 Postpartum Hemorrhage	DRC	1
1.157.728 Biliary Atresia	DRC	8	1.72.1732 Patent Ductus Arteriosus	DRC	21
1.158.2138 Porokeratosis	DRC	1	1.72.1732 Patent Ductus Arteriosus	IRC	4
1.161.315 HSV-1	IRC	2	1.72.1745 Hyperemesis Gravidarum	DRC	2
1.161.711 Cytomegalovirus	DRC	2	1.72.1745 Hyperemesis Gravidarum	IRC	1
1.161.711 Cytomegalovirus	IRC	1	1.72.182 Gestational Diabetes Mellitus	DRC	23
1.161.711 Cytomegalovirus	no_coll	1	1.72.182 Gestational Diabetes Mellitus	IRC	65
1.163.446 Schistosomiasis	IRC	1	1.72.182 Gestational Diabetes Mellitus	no_coll	2
1.164.1871 Menarche	DRC	1	1.72.531 Preeclampsia	DRC	36
1.168.671 Vascular Access	DRC	1	1.72.531 Preeclampsia	IRC	22
1.179.108 Human Papillomavirus	IRC	1	1.72.531 Preeclampsia	no_coll	2
1.184.1030 Erythropoietin	DRC	1	1.72.748 Preterm Infants	DRC	10
1.184.573 Iron Overload	IRC	13	1.72.748 Preterm Infants	IRC	13
1.184.653 Zinc	DRC	1	1.72.808 Breech Presentation	DRC	9
1.186.1008 Nuchal Translucency	DRC	1	1.72.808 Breech Presentation	IRC	8
1.186.948 Digeorge Syndrome	DRC	1	1.72.891 Breastfeeding	DRC	7
1.194.273 Mycobacterium Tuberculosis & Leprosy	DRC	1	1.72.891 Breastfeeding	IRC	5
1.194.273 Mycobacterium Tuberculosis & Leprosy	IRC	2	1.72.922 Fetal Heart Rate	DRC	18
1.195.1341 Enteric Nervous System	DRC	1	1.72.922 Fetal Heart Rate	IRC	19
1.199.1048 Pleurodesis	DRC	1	1.72.922 Fetal Heart Rate	no_coll	1
1.213.168 Hypothyroidism	DRC	1	1.72.924 Preterm Labor	DRC	34
1.216.1563 Volvulus	DRC	1	1.72.924 Preterm Labor	IRC	30
1.216.1563 Volvulus	IRC	2	1.75.326 Antiphospholipid Syndrome	DRC	7
1.216.1996 Pneumomediastinum	DRC	3	1.75.326 Antiphospholipid Syndrome	IRC	1
1.216.2098 Intussusception	DRC	1	1.80.279 Vitamin D	DRC	6
1.216.2287 Gastroschisis	DRC	12	1.80.279 Vitamin D	IRC	5
1.216.2287 Gastroschisis	IRC	6	1.81.1272 HLA-G	DRC	2
1.216.2287 Gastroschisis	no_coll	2	1.81.1408 Fertility Preservation	DRC	2

1.217.1038 Toxoplasma Gondii	IRC	1	1.81.979 Twin-Twin Transfusion Syndrome	DRC	5
1.217.59 Malaria	DRC	11	1.81.979 Twin-Twin Transfusion Syndrome	IRC	2
1.217.59 Malaria	IRC	28	1.81.979 Twin-Twin Transfusion Syndrome	no_coll	1
1.217.59 Malaria	no_coll	1	1.82.1066 Cerebral Palsy	DRC	3
1.222.143 Epilepsy	IRC	2	1.82.1066 Cerebral Palsy	IRC	1
1.222.143 Epilepsy	no_coll	1	1.82.1298 Spinal Cord Injury Rehabilitation	IRC	1
1.225.1476 Alloimmunization	DRC	1	1.94.1664 VKORC1	DRC	1
1.225.2074 Methemoglobinemia	DRC	5	1.95.387 Helicobacter Pylori	DRC	1
1.225.2074 Methemoglobinemia	IRC	5	1.95.723 Irritable Bowel Syndrome	DRC	2
1.225.626 Sickle Cell Disease	DRC	4	1.95.723 Irritable Bowel Syndrome	IRC	1
1.225.626 Sickle Cell Disease	IRC	1	1.95.801 Cimetidine	IRC	1
1.225.786 Spectrin	DRC	1	3.16.1496 Ethnobotany	DRC	1
1.228.200 Dengue	DRC	1	3.171.1011 Carotenoids	DRC	1
1.228.200 Dengue	no_coll	1	3.180.2418 Alginate Lyase	DRC	1
1.228.994 Ebola Virus	DRC	1	3.198.400 Mycotoxins	IRC	1
1.228.994 Ebola Virus	IRC	1	3.91.496 Cadmium	DRC	1
1.23.1036 Surgical Site Infection	DRC	2	3.91.920 Selenium	DRC	1
1.23.1397 Urinary Tract Infection	DRC	1	3.91.920 Selenium	IRC	2
1.23.146 Antibiotic Resistance	DRC	5	4.61.1124 Rough Sets	IRC	2
1.23.146 Antibiotic Resistance	IRC	16	6.146.734 Anthropology	IRC	1
1.23.173 Staphylococcus Aureus	DRC	1	6.178.516 Divorce	IRC	2
1.23.173 Staphylococcus Aureus	IRC	3	6.24.858 Intimate Partner Violence	DRC	1
1.23.1757 Group B Streptococcus	DRC	72	6.24.858 Intimate Partner Violence	IRC	2
1.23.1757 Group B Streptococcus	IRC	53	6.73.2331 Health Locus of Control	IRC	1
1.23.1757 Group B Streptococcus	no_coll	3	8.124.1648 Heat Waves	IRC	1
1.23.422 Gentamicin	DRC	1	8.124.552 Air Pollution	DRC	4
1.23.422 Gentamicin	IRC	1	8.124.552 Air Pollution	IRC	3
1.23.714 Neisseria Meningitidis	DRC	1			

Table 16. Impact of the articles by topic and type of collaboration for the full period. Note: For various topics, the total number of articles is below 20.

Topic	Collaboration	CNCI (median)
1.100.1284 Fetal Alcohol Syndrome	DRC	1.536
1.103.1225 ITP	DRC	0.318
1.103.1225 ITP	IRC	0.227
1.104.126 Influenza	DRC	0.225
1.104.126 Influenza	IRC	4.503
1.104.1770 Pertussis	IRC	0.924
1.104.901 Foot-And-Mouth Disease Virus	IRC	1.438
1.104.975 Respiratory Syncytial Virus	DRC	0.000
1.104.975 Respiratory Syncytial Virus	IRC	1.675

1.105.1677 Vertebral Artery Dissection	DRC	0.978
1.111.162 Hepatocellular Carcinoma	DRC	0.197
1.117.1309 Acetaminophen	DRC	0.178
1.117.1389 Bilirubin	DRC	0.554
1.117.1389 Bilirubin	IRC	1.561
1.120.384 Gut Microbiota	DRC	0.224
1.120.384 Gut Microbiota	IRC	1.265
1.125.1718 Hepatitis E Virus	DRC	0.384
1.125.1718 Hepatitis E Virus	IRC	1.062
1.125.275 HBV	DRC	0.129
1.125.275 HBV	IRC	0.000
1.125.83 HCV	DRC	0.546
1.125.83 HCV	IRC	1.320
1.127.1303 Endothelin	IRC	0.810
1.128.1489 Hysteroscopy	DRC	0.287
1.128.1521 Ectopic Pregnancy	DRC	3.365
1.128.482 Contraception	DRC	0.315
1.128.482 Contraception	IRC	0.204
1.132.2267 Clubfoot	IRC	1.649
1.132.759 Matrix Metalloproteinases	DRC	1.198
1.136.1749 Down Syndrome	DRC	0.225
1.136.1780 Family Quality Of Life	IRC	0.931
1.136.283 Autism	DRC	0.301
1.137.217 Melatonin	DRC	0.799
1.137.217 Melatonin	IRC	0.253
1.14.1293 Emergency Department	IRC	0.192
1.14.1359 Interprofessional Education	DRC	0.637
1.141.407 Acute Promyelocytic Leukemia	DRC	2.227
1.141.407 Acute Promyelocytic Leukemia	IRC	0.278
1.142.1628 Urinary Diversion	DRC	0.965
1.142.832 Fecal Incontinence	DRC	2.110
1.148.94 Candida Albicans	DRC	0.736
1.148.94 Candida Albicans	IRC	1.067
1.150.1148 Deaf	DRC	0.848
1.150.1148 Deaf	IRC	0.854
1.151.222 Laparoscopic Cholecystectomy	DRC	0.029
1.151.222 Laparoscopic Cholecystectomy	IRC	0.193
1.154.1057 Pulmonary Surfactant	DRC	0.138
1.154.1057 Pulmonary Surfactant	IRC	0.548
1.154.1088 Intensive Care	DRC	0.144
1.154.277 Mechanical Ventilation	DRC	0.037
1.154.360 Procalcitonin	DRC	1.875
1.154.360 Procalcitonin	IRC	0.656
1.155.598 Informed Consent	IRC	0.495
1.156.2047 Global Surgery	DRC	0.409
1.156.2047 Global Surgery	IRC	1.760
1.156.381 Maternal Mortality	DRC	0.518
1.156.381 Maternal Mortality	IRC	1.059
1.157.728 Biliary Atresia	DRC	0.279
1.158.2138 Porokeratosis	DRC	1.291
1.161.315 HSV-1	IRC	0.625
1.161.711 Cytomegalovirus	DRC	0.095

1.161.711 Cytomegalovirus	IRC	2.382
1.163.446 Schistosomiasis	IRC	2.650
1.164.1871 Menarche	DRC	0.271
1.168.671 Vascular Access	DRC	0.337
1.179.108 Human Papillomavirus	IRC	0.776
1.184.1030 Erythropoietin	DRC	0.056
1.184.573 Iron Overload	IRC	1.267
1.184.653 Zinc	DRC	1.264
1.186.1008 Nuchal Translucency	DRC	1.270
1.186.948 Digeorge Syndrome	DRC	0.070
1.194.273 Mycobacterium Tuberculosis & Leprosy	DRC	0.757
1.194.273 Mycobacterium Tuberculosis & Leprosy	IRC	7.416
1.195.1341 Enteric Nervous System	DRC	0.590
1.199.1048 Pleurodesis	DRC	0.857
1.213.168 Hypothyroidism	DRC	0.000
1.216.1563 Volvulus	DRC	1.147
1.216.1563 Volvulus	IRC	0.895
1.216.1996 Pneumomediastinum	DRC	0.266
1.216.2098 Intussusception	DRC	0.134
1.216.2287 Gastroschisis	DRC	0.546
1.216.2287 Gastroschisis	IRC	1.876
1.217.1038 Toxoplasma Gondii	IRC	0.755
1.217.59 Malaria	DRC	0.491
1.217.59 Malaria	IRC	1.331
1.222.143 Epilepsy	IRC	1.278
1.225.1476 Alloimmunization	DRC	0.492
1.225.2074 Methemoglobinemia	DRC	0.851
1.225.2074 Methemoglobinemia	IRC	1.007
1.225.626 Sickle Cell Disease	DRC	0.330
1.225.626 Sickle Cell Disease	IRC	1.752
1.225.786 Spectrin	DRC	0.000
1.228.200 Dengue	DRC	1.134
1.228.994 Ebola Virus	DRC	0.165
1.228.994 Ebola Virus	IRC	0.495
1.23.1036 Surgical Site Infection	DRC	0.355
1.23.1397 Urinary Tract Infection	DRC	0.704
1.23.146 Antibiotic Resistance	DRC	0.621
1.23.146 Antibiotic Resistance	IRC	1.050
1.23.173 Staphylococcus Aureus	DRC	0.223
1.23.173 Staphylococcus Aureus	IRC	0.521
1.23.1757 Group B Streptococcus	DRC	0.790
1.23.1757 Group B Streptococcus	IRC	0.878
1.23.422 Gentamicin	DRC	0.628
1.23.422 Gentamicin	IRC	0.401
1.23.714 Neisseria Meningitidis	DRC	0.000
1.231.432 Homocysteine	DRC	0.625
1.231.432 Homocysteine	IRC	1.080
1.235.1617 Deglutition	DRC	0.324
1.235.1679 Foreign Body	IRC	0.471
1.236.1155 Capsule Endoscopy	DRC	0.325
1.236.312 Portal Hypertension	DRC	0.000
1.243.1012 Vesicoureteral Reflux	DRC	0.621

1.246.710 Rotavirus	DRC	0.620
1.248.1317 Mycoplasma	DRC	0.468
1.248.1317 Mycoplasma	IRC	1.670
1.248.2104 Trichomonas Vaginalis	IRC	0.983
1.248.655 Chlamydia Trachomatis	DRC	0.772
1.248.655 Chlamydia Trachomatis	IRC	1.343
1.257.983 Hydrocephalus	IRC	1.570
1.258.1958 Leptospirosis	IRC	0.373
1.258.227 Lyme Disease	IRC	3.590
1.26.107 Adiponectin	DRC	0.631
1.26.337 Leptin	DRC	0.794
1.261.596 Trypanosoma Cruzi	DRC	0.286
1.266.1068 Pressure Ulcer	IRC	1.124
1.278.1796 Neuroblastoma	DRC	0.057
1.281.1236 Amyloidosis	IRC	0.816
1.286.845 Complement	DRC	0.384
1.286.845 Complement	IRC	0.193
1.324.2020 Tetanus	DRC	0.766
1.34.1657 Elbow	DRC	0.071
1.36.2059 Retinopathy Of Prematurity	DRC	0.599
1.37.309 Congenital Heart Disease	DRC	0.720
1.37.309 Congenital Heart Disease	IRC	2.058
1.37.467 Echocardiography	DRC	0.380
1.42.545 STEC	DRC	0.000
1.42.545 STEC	IRC	1.210
1.42.678 Listeria Monocytogenes	DRC	0.331
1.42.678 Listeria Monocytogenes	IRC	0.163
1.44.1198 Food Insecurity	DRC	0.025
1.44.1198 Food Insecurity	IRC	1.269
1.49.1061 Endodontics	IRC	1.046
1.49.468 Oral Health	DRC	1.001
1.49.468 Oral Health	IRC	1.425
1.5.1674 Ketogenic Diet	DRC	0.000
1.5.420 Cortisol	IRC	1.267
1.54.1401 Genome Editing	IRC	0.923
1.54.958 HMGB1	IRC	0.784
1.55.1904 ACE Gene	DRC	0.229
1.55.830 Acute Kidney Injury	DRC	0.213
1.6.351 Endotoxin	DRC	0.890
1.6.351 Endotoxin	IRC	0.936
1.6.452 Somatic Hypermutation	DRC	0.000
1.6.609 Toll-like Receptors	DRC	0.165
1.65.192 COPD	IRC	187.114
1.66.11 HIV Prevalence & Prophylaxis	DRC	0.346
1.66.11 HIV Prevalence & Prophylaxis	IRC	1.884
1.66.1615 Aids Dementia Complex	IRC	4.164
1.68.256 Docosahexaenoic Acid	DRC	0.625
1.68.707 Alpha-Tocopherol	IRC	1.361
1.71.2048 Mean Platelet Volume	DRC	0.405
1.72.1072 Postpartum Depression	DRC	2.411
1.72.1072 Postpartum Depression	IRC	0.953
1.72.1710 Postpartum Hemorrhage	DRC	0.000

1.72.1732 Patent Ductus Arteriosus	DRC	0.586
1.72.1732 Patent Ductus Arteriosus	IRC	0.571
1.72.1745 Hyperemesis Gravidarum	DRC	0.295
1.72.1745 Hyperemesis Gravidarum	IRC	0.731
1.72.182 Gestational Diabetes Mellitus	DRC	0.799
1.72.182 Gestational Diabetes Mellitus	IRC	0.927
1.72.531 Preeclampsia	DRC	0.402
1.72.531 Preeclampsia	IRC	1.026
1.72.748 Preterm Infants	DRC	0.183
1.72.748 Preterm Infants	IRC	0.918
1.72.808 Breech Presentation	DRC	0.428
1.72.808 Breech Presentation	IRC	1.143
1.72.891 Breastfeeding	DRC	0.643
1.72.891 Breastfeeding	IRC	1.024
1.72.922 Fetal Heart Rate	DRC	0.555
1.72.922 Fetal Heart Rate	IRC	0.883
1.72.924 Preterm Labor	DRC	0.552
1.72.924 Preterm Labor	IRC	1.029
1.75.326 Antiphospholipid Syndrome	DRC	0.904
1.75.326 Antiphospholipid Syndrome	IRC	0.297
1.80.279 Vitamin D	DRC	0.669
1.80.279 Vitamin D	IRC	0.611
1.81.1272 HLA-G	DRC	0.554
1.81.1408 Fertility Preservation	DRC	0.559
1.81.979 Twin-Twin Transfusion Syndrome	DRC	0.260
1.81.979 Twin-Twin Transfusion Syndrome	IRC	2.834
1.82.1066 Cerebral Palsy	DRC	0.667
1.82.1066 Cerebral Palsy	IRC	0.741
1.82.1298 Spinal Cord Injury Rehabilitation	IRC	3.041
1.94.1664 VKORC1	DRC	0.081
1.95.387 Helicobacter Pylori	DRC	0.466
1.95.723 Irritable Bowel Syndrome	DRC	0.531
1.95.723 Irritable Bowel Syndrome	IRC	0.721
1.95.801 Cimetidine	IRC	0.233
3.16.1496 Ethnobotany	DRC	0.658
3.171.1011 Carotenoids	DRC	0.531
3.180.2418 Alginate Lyase	DRC	0.425
3.198.400 Mycotoxins	IRC	3.158
3.91.496 Cadmium	DRC	0.000
3.91.920 Selenium	DRC	0.119
3.91.920 Selenium	IRC	0.425
4.61.1124 Rough Sets	IRC	0.777
6.146.734 Anthropology	IRC	2.034
6.178.516 Divorce	IRC	2.074
6.24.858 Intimate Partner Violence	DRC	7.091
6.24.858 Intimate Partner Violence	IRC	3.483
6.73.2331 Health Locus of Control	IRC	2.211
8.124.1648 Heat Waves	IRC	0.666
8.124.552 Air Pollution	DRC	0.126
8.124.552 Air Pollution	IRC	0.631

Acronyms- Universities

University	Acronyms	University	Acronyms
A.T. Still Univ	ATSU-USA	Ljubljana Univ Medical Centre	Ljubliana UMC-SVN
Aalborg Univ	AAU-DNK	Lome Univ	UL-TGO
Aarhus Univ	AU-DNK	London Univ	UoL-GBR
Aberta Univ	UAb-PRT	Lorraine Univ	UL-FRA
Abomey Calavi Univ	UAC-BEN	Los Andes Univ	UANDES-CHL
Abuja Univ	UNIABUJA-NGA	Loughborough Univ	Lboro-GBR
Addis Ababa Univ	AAU-ETH	Louisiana State Univ	LSU-system-USA
Adelaid Univ	AU-AUS	Louisville Univ	UofL-USA
Adigrat Univ	AGU-ETH	Loyola Univ Chicago	LUC-USA
Aga Khan Univ	AKU-KEN	Lubumbashi Univ	UNILU-ZAR
Aga Khan Univ	AKU-PAK	Ludwig Maximilians Univ Munich	LMU Munich-DEU
Aga Khan Univ	AKU-TZA	Lund Univ	LU-SWE
Ahfad Univ for Women	AUW-SDN	Lusaka Apex Medical Univ	LAMU-ZMB
Ahmadu Bello Univ	ABU-NGA	Maastricht Univ	UM-NLD
Ain Shams Univ	ASU-EGY	Macquarie Univ	MQ-AUS
Al Azhar Univ	Al-Zahar-EGY	Madda Walabu Univ	MWU-ETH
Al Neelain Univ	Al Neelain-SDN	Mahajanga Univ	UMGA-MDG
Alabama Univ	UA-System-USA	Maharashtra Univ of Health Sciences	MUHS-IND
Alazar Univ	AI-Azar-EGY	Mahidol Univ	UM-THA
Albert Einstein College of Medicine	Einstein-USA	Maiduguri Univ	UNIMAID-NGA
Alberta Univ	UAlberta-CAN	Makerere Univ	Mak-UGA
Alborz Univ of Medical Sciences	ABZUMS-IRN	Malawi Univ	UNIMA-MWI
Aleppo Univ	ALEPUNIV-SYR	Malawi Univ of Science and Technology	MUST-MWI
Alexandria Univ	AU-EGY	Malaya Univ	UM-MYS
Alfaisal Univ	AU-SAU	Management & Technology Univ	UMT-PAK
Ambo Univ	AU-ETH	Manchester Univ	UM-GBR
Amer Univ Beirut	UAB-LBN	Manitoba Univ	UManitoba-CAN
Amrita Univ	AU-IND	Mansoura Univ	MA-EGY
Amsterdam Univ	UvA-NLD	MARA Technological Univ	UiTM-MYS
Anglia Ruskin Univ	ARU-GBR	Maragheh Univ of Medical Sciences	MUMS-IRN
Ankara Yıldırım Beyazıt Univ	AYBU-TUR	Marmara Univ	UM-TUR
Antwerp Univ	UAntwerp-BEL	Marshall Univ	UM-USA
Applied Science Private Univ	ASU-JOR	Martin Luther Univ Halle-Wittenberg	MLU-DEU
Arabian Gulf Univ	AGU-BHR	Maseno Univ	MSU-KEN
Arak Univ of Medical Sciences	AUMS-IRN	Massachusetts Univ	UMass-System-USA
Arba Minch Univ	AMU-ETH	Mazandaran Univ of Medical Sciences	MazUMS-IRN
Arizona Univ	UofA-USA	Mbarara Univ of Science & Technology	MUST-UGA
Arkansas State Univ	ASU-System-USA	McGill Univ	McGill-CAN
Arkansas Univ	UofA-System-USA	McMaster Univ	McMaster-CAN
Assiut Univ	AUN-EGY	Medical Sciences Univ	UNIMED-NGA
Ateneo de Manila Univ	Ateneo-PHL	Medical Univ of Lodz	MUL-POL
Auckland Univ	UoA-NZL	Medical Univ Vienna	MedUni Vienna-AUT
Auckland Univ of Technology	AUT-NZL	Mekelle Univ	MU-ETH
Australian Catholic Univ	ACU-AUS	Melbourne Univ	UNIMELB-AUS
Australian National Univ	ANU-AUS	Menoufia Univ	UM-EGY
Autonoma Chile univ	Uautonoma-CHL	Messina Univ	UniME-ITA

Autonomous Univ of Madrid	UAM-ESP	Metropolitan Autonomous Univ	UAM-MEX
Baba Farid Univ of Health Sciences	BFUHS-IND	Miami Univ	UMiami-USA
Baghdad College of Medical Sciences	BCMS-IRQ	Michigan State Univ	MSU-USA
Bahir Dar Univ	BDU-ETH	Michigan Univ	UMich-System-USA
Balamand Univ	UOB-LBN	Milan Univ	UNIMI-ITA
Ball State Univ	BSU-USA	Minia Univ	Minia-EGY
Bamako Univ	BU-MLI	Minnesota Univ	UofM-System-USA
Banaras Hindu Univ	BHU-IND	Misr Univ for Science and Technology	MUST-EGY
Bangabandhu Sheikh Mujib Medical Univ	BSMMU-BGD	Missouri Univ	UM-System-USA
Baqiyatallah Univ of Medical Sciences	BMSU-IRN	Mizan Tepi Univ	MTU-ETH
Barcelona Univ	UB-ESP	Mohammed V Univ	Mohammed V-MAR
Bari Univ	UniBa-ITA	Moi Univ	MU-KEN
Basel Univ	UB-CHE	Monash Univ	UM-AUS
Bath Univ	UBath-GBR	Monastir Univ	UM-TUN
Bayero Univ	BUK-NGA	Montpellier Univ	UMontpellier-FRA
Baylor College Medicine	BCM-USA	Montreal Univ	UdeM-CAN
Baylor Univ	UB-USA	Morehouse School of Medicine	MSM-USA
Belgrade Univ	UB-SRB	Moscow State Univ of Medicine and Dentistry	MSUMD-RUS
Benghazi Univ	UB-LBY	Mountains of the Moon Univ	MMU-UGA
Benha Univ	BU-EGY	Muhimbili Univ of Health and Allied Sciences	MUHAS-TZA
Beni Suef Univ	BSU-EGY	Nacional de Colombia Univ	UNAL-COL
Benin Univ	UNIBEN-NGA	Nagoya City Univ	NCU-JPN
Bergen Univ	UiB-NOR	Nairobi Univ	UoN-KEN
Bhaikaka Univ	BU-IND	Nanjing Univ	NJU-CHN
Bielefeld Univ	Uni Bielefeld-DEU	Nanyang Technological Univ	NTU-SGP
Birmingham Univ	BU-GBR	Nara Medical Univ	NMU-JPN
BLDE Univ	BLDE Univ-IND	National Research Univ Higher School of Economics	HSE Univ-RUS
Bologna Univ	UNIBO-ITA	National School of Public Health of Spain	ENS-ESP
Bordeaux Segalen Univ	BSU-FRA	National Univ of Malaysia	UKM-MYS
Bordeaux Univ	UBordeaux-FRA	National Univ of Singapore	NUS-SGP
Boston Univ	BU-USA	Nazi Boni Univ	UNB-BFA
Botswana Univ	UB-BWA	Nebraska Univ	NU-System-USA
Bowen Univ	BU-NGA	New Mexico Univ	UNM-USA
Brandeis Univ	UBrandeis-USA	New South Wales Univ	UNSW-AUS
Brasilia Univ	UnB-BRA	New York Univ	NYU-USA
Brigham Young Univ	BYU-USA	Newcastle Univ	Newcastle Univ-GBR
Brighton and Sussex Medical School	BSMS-GBR	Nigeria Univ	UNN-NGA
Bristol Univ	UB-GBR	Nnamdi Azikiwe Univ	UNIZIK-NGA
British Columbia Univ	UBC-CAN	North Carolina Univ	UNC-System-USA
Brown Univ	UBrown-USA	Northeastern Univ	NEU-USA
Bucharest Univ of Economic Studies	ASE-ROM	Northumbria Univ	NU-GBR
Burgundy Univ	UB-FRA	North-West Univ	NWU-ZAF

Busitema Univ	BU-UGA	Northwestern Univ	NU-USA
Cagliari Univ	UNICA-ITA	Obafemi Awolowo Univ	OAU-NGA
Cairo Univ	CU-EGY	Occupational and Environmental Health Univ	UOEH-JPN
Calabar Univ	UNICAL-NGA	Odisha Univ of Health Science	OUHS-IND
Calgary Univ	UCalgary-CAN	Oklahoma State Univ System	OSU-System-USA
California State Univ	Cal State-USA	Olabisi Onabanjo Univ	OOU-NGA
California Univ	UC-System-USA	Oregon Health & Science Univ	OHSU-USA
California Univ of Science and Medicine	CUSM-USA	Oslo Univ	UiO-NOR
Cambridge Univ	CAM-GBR	Otago Univ	UO-NZL
Can Tho Univ of Medicine and Pharmacy	CTUMP-VNM	Ottawa Univ	uOttawa-CAN
Canberra Univ	UC-AUS	Ouagadougou Univ	UO-BFA
Canterbury Univ	UC-NZL	Oulu Univ	UniOulu -FIN
Cape Coast Univ	UCC-GHA	Oxford Univ	OX-GBR
Cape Peninsula Univ of Technology	CPUT-ZAF	Oxford Univ Clinical Research Unit in Vietnam	OUCRU-VNM
Cape Town Univ	UCT-ZAF	Padua Univ	UniPD-ITA
Capital Medical Univ	CCMU-CHN	Papua New Guinea Univ	UPNG -PNG
Carol Davila Univ of Medicine and Pharmacy	UMFCD-ROM	Paris 05 Univ	Paris V-FRA
Cartagena Univ	UNICARTAGENA-COL	Paris 06 Univ	UPMC-FRA
Carthage Univ	UCAR-TUN	Paris 11 Univ	Paris XI-FRA
Case Western Reserve Univ	CWRU-USA	Parma Univ	UNIPR-ITA
Catholic Univ of Graben	UCG-ZAR	Pavia Univ	UNIPV-ITA
Catholic Univ of Health and Allied Sciences	CUHAS-TZA	Peking Univ	PKU-CHN
Catholic Univ Portugal	UCP-PRT	Pennsylvania State Univ	PSU-USA
Catolica de Pelotas Univ	UCPEL-BRA	Pennsylvania Univ	UPenn-USA
Central Lancashire Univ	UCLan-GBR	Peoples Friendship Univ of Russia	RUDN-RUS
Central South Univ	CSU-CHN	Peradeniya Univ	UPeradeniya-LKA
CEU Cardenal Herrera Univ	CEU-UCH-ESP	Periyar Univ	PU-IND
Charles Darwin Univ	CDU-AUS	Perugia Univ	UNIPG-ITA
Charles R Drew Univ of Medicine & Science	CDU-USA	Philippines Manila Univ	UPM-PHL
Charles Univ	CU-CZE	Philippines Univ	UP-PHL
Chiang Mai Univ	CMU-THA	Philipps Univ of Marburg	Marburg Univ-DEU
Chicago Univ	UChicago-USA	Pittsburgh Univ	Pitt-USA
China Medical Univ	CMU-CHN	Pompeu Fabra Univ	UPF-ESP
Chongqing Medical Univ	CQMU-CHN	Ponce Health Sciences Univ	PHSU-USA
Chukwuemeka Odumegwu Ojukwu Univ	ANSU-NGA	Pontificia Univ Catolica de Chile	UC Chile-CHL
Chulalongkorn Univ	CU-THA	Pontificia Univ Javeriana	PUJ-COL
Ciencias Aplicadas y Ambientales Univ	UDCA-COL	Port Harcourt Univ	UNIPOINT-NGA
City Univ of New York	CUNY-USA	Porto Univ	UP-PRT
Clinical Centre of Serbia Univ	UKCS-SRB	Pretoria Univ	UP-ZAF

Colgate Univ	UColgate-USA	Princeton Univ	PU-USA
College Cork Univ	UCC-IRL	Purdue Univ	Purdue-System-USA
College of Surgeons of East, Central and Southern Africa	COSECSA-TZA	Pwani Univ	PU-KEN
Cologne Univ	UoC-DEU	Qassim Univ	QU-SAU
Colombo Univ	UoC-LKA	Qazvin Univ of Medical Sciences	QUMS-IRN
Colorado Univ	CU-System-USA	Qom Univ of Medical Science	Qom MS-IRN
Columbia Univ	CU-USA	Queens Univ	QU-CAN
Complutense de Madrid Univ	UCM-ESP	Queensland Univ	UQ-AUS
Constantine the Philosopher Univ in Nitra	UKF-SVK	Queensland Univ Technology	QUT-AUS
Contech School of Public Health	CSPH-PAK	Radboud Univ	RU-NLD
Copenhagen Univ	UCPH-DNK	Rajiv Gandhi Univ	RGU-IND
Cornell Univ	UC-USA	Rennes Univ	Rennes-FRA
Costa Rica Univ	UCR-CRI	Republic Univ	Udelar-URY
Curtin Univ	WAIT-AUS	Reykjavik Univ	RU-ISL
Dalarna Univ	DU-SWE	Rhode Island Univ	URI-USA
Dalhousie Univ	Dal-CAN	Rice Univ	UR-USA
Danube Univ Krems	UWK-AUT	Rochester Univ	URochester-USA
Dar es Salaam Univ	UDSM-TZA	Roma La Sapienza Univ	Sapienza-ITA
Dartmouth College	CDartmouth-USA	Ross Univ School of Medicine	RUSM-USA
Deakin Univ	DU-AUS	Rovira i Virgili Univ	URV-ESP
Debre Berhan Univ	DBU-ETH	Rush Univ	RU-USA
Debre Markos Univ	DMU-ETH	Rutgers Univ	RU-System-USA
Delhi Univ	DU-IND	Rwanda Univ	UR-RWA
Delta State Univ	DELSU-NGA	S Nijalingappa Medical College and Hosp	NMCBGK-IND
Dessie Health Science College	DHSC-ETH	Saint James School of Medicine	SJSM-GBR
Development Studies Univ	UDS-GHA	Saint Joseph Univ	SJU-USA
Dhaka Univ	DU-BGD	Saint Louis Univ	SLU-USA
Diego Portales Univ	UDP-CHL	Saitama Medical Univ	SMU-JPN
Dilla Univ	DU-ETH	Salahaddin Univ-Erbil	SUE-IRQ
Dodoma Univ	UDOM-TZA	Salerno Univ	UNISA-ITA
Douala Univ	UDla-CMR	Samara Univ	SU-ETH
Drexel Univ	UD-USA	San Carlos de Guatemala Univ	USAC-GTM
Duke Kunshan Univ	DKU-CHN	San Carlos Univ	USC-PHL
Duke Univ	DU-USA	Sao Paulo Univ	USP-BRA
Duke-NUS Medical School	Duke-NUS-SGP	Saskatchewan Univ	uSask -CAN
Dundee Univ	UD-GBR	School of Medicine at Mount Sinai	ISMMS-USA
Durban Univ of Technology	DUT-ZAF	Science Univ of Malaysia	USM-MYS
Durham Univ	DU-GBR	Sciences de la Sante Univ	USS-GAB
Dusseldorf Univ	HHU-DEU	Seoul National Univ	SNU-KOR
Duy Tan Univ	DTU-VNM	Shahid Beheshti Univ of Medical Sciences	SBUMS-IRN
East Anglia Univ	UEA-GBR	Shahjalal Univ of Science and Technology	SUST-BGD
Eastern Finland Univ	UEF-FIN	Shandong Univ	SDU-CHN
Eastern Virginia Medical School	EVMS-USA	Shanghai Jiao Tong Univ	SJTU-CHN
Edinburgh Univ	EU-GBR	Sheffield Univ	TUOS-GBR
Edith Cowan Univ	ECU-AUS	Shenzhen Univ	SZU-CHN
Eduardo Mondlane Univ	UEM-MOZ	Sierra Leone Univ	USL-SLE
Egas Moniz School of Health and Science	ISCSEM-PRT	Simmons Univ	US-USA

Egerton Univ	EU-KEN	Simon Fraser Univ	SFU-CAN
Emory Univ	EU-USA	Sousse Univ	USO-TUN
Enugu State Univ of Science and Technology	ESUT-NGA	South Africa Univ	UNISA-ZAF
Erasmus Univ Rotterdam	EUR-NLD	South Alabama Univ	USA-USA
Estado Santa Catarina Univ	UDESC-BRA	South Australia Univ	UniSA-AUS
Estadual Campinas Univ	UNICAMP-BRA	South Carolina Univ	USC-System-USA
Ethiopian Defence Univ	EDU-ETH	Southampton Univ	US-GBR
Exeter Univ	UniofExter-GBR	Southern Denmark Univ	SDU-DNK
Extremadura Univ	UEX-ESP	Southern Univ College	Southern UC-MYS
Federal da Bahia Univ	UFBA-BRA	Split Univ	UNIST-HRV
Federal de Sao Paulo Univ	UNIFESP-BRA	Sri Ramachandra Univ	SRU-IND
Federal do Ceara Univ	UFC-BRA	St Andrews Univ	St Andrews-GBR
Federal Minas Gerais Univ	UFMG-BRA	St Augustine Univ of Tanzania	SAUT-TZA
Federal Rio Grande do Sul Univ	UFRGS-BRA	St Luke International Univ	LIU-JPN
Federal Santa Catarina Univ	UFSC-BRA	St Olaf College	StOlaf-USA
Federal Sergipe Univ	UFS-BRA	St. Lawrence College	SLC-CAN
Federal de Pelotas Univ	UFFel-BRA	St. Paul Hosp Millennium Medical College	SPHMMC-ETH
Felix Houphouet-Boigny Univ	UFHB-CIV	Stanford Univ	SU-USA
Ferhat Abbas Univ	UFAS-DZA	State Univ of Florida	SUSF -USA
Flinders Univ	FU-AUS	State Univ of New York	SUNY-USA
Florence Univ	UNIFI-ITA	State Univ of Semarang	UNNES-IDN
FOM Univ	FOM-DEU	State Univ of Zanzibar	SUZA-TZA
Fort Hare Univ	UFH-ZAF	Stavanger Univ	UiS-NOR
Francisco Marroquin Univ	UFM-GTM	Stellenbosch Univ	SU-ZAF
Freiburg Univ	Uni Freiburg-DEU	Stockholm Univ	SU-SWE
Fribourg Univ	UNIFR-CHE	Strasbourg Univ	UNISTRA-FRA
Friedrich Schiller de Jena Univ	Jena Univ-DEU	Suez Canal Univ	SCU-EGY
Fudan Univ	FDU-CHN	Sul de Santa Catarina Univ	UNISUL-BRA
Fujita Health Univ	FHU-JPN	Sun Yat Sen Univ	SYSU-CHN
Gadarif Univ	GU-SDN	Sungkyunkwan Univ	SKKU-KOR
Galway Univ	NUIG-IRL	Sydney Univ	USYD-AUS
Geneve Univ	UNIGE-CHE	Sylhet Medical Univ	SMU-BGD
George Mason Univ	GMU-USA	Taibah Univ	TaibahU-SAU
George Washington Univ	GWU-USA	Taif Univ	TU-SAU
Georgetown Univ	GU-USA	Taishan Medical Univ	TSU-CHN
Georgia Univ	UG-System-USA	Tamil Nadu Dr. M.G.R. Medical Univ	TNMGRMU-IND
Gezira Univ	UofG-SDN	Tampere Univ	TAU-FIN
Ghana Univ	UG-GHA	Tanta Univ	TU-EGY
Ghent Univ	UGent-BEL	Tartu Univ	UT-EST
Golestan Univ of Medical Sciences	GOUMS-IRN	Tasmania Univ	UTAS-AUS
Gondar Univ	UoG-ETH	Tbilisi State Medical Univ	TSMU-GEO
Gothenburg Univ	GU-SWE	Technology Sydney Univ	UTS-AUS
Griffith Univ	GU-AUS	Tehran Univ of Medical Sciences	TUMS-IRN
Groningen Univ	RUG-NLD	Tennessee Univ	UTennessee-System-USA
Guelph Univ	UofG-CAN	Texas Tech Univ	TTU-System-USA
Hacettepe Univ	HU-TUR	Texas Univ	UT-System-USA

Hail Univ	UOH-SAU	The College of New Jersey	TCNJ-USA
Hamadan Univ of Medical Sciences and Health Services	UMSHA-IRN	Thessaly Univ	UTH-GRC
Hamdan Bin Mohammed Smart Univ	HBMSU-ARE	Thomas Jefferson Univ	TJU-USA
Hanoi Medical Univ	HMU-VNM	Tokyo Univ	Utokyo-JPN
Haramaya Univ	HU-ETH	Tor Vergata Univ of Rome	Tor Vergata-ITA
Harvard Univ	HU-USA	Toronto Univ	UToronto-CAN
Hasselt Univ	Uhasselt-BEL	Touro Univ System	Touro-System-USA
Hawaii Univ	UH-System-USA	Tribhuvan Univ	TU-NPL
Health Sciences Univ	UHS Lahore	Trieste Univ	UniTS-ITA
Health Sciences Univ	UHS Lahore-PAK	Tripoli Univ	UOT-LBY
Hebrew Univ of Jerusalem	HUJI-ISR	Trnava Univ	TU-SVK
Heidelberg Univ	Uni Heidelberg-DEU	Tromso Univ	UiT-NOR
Helsinki Univ	UH-FIN	Tubingen Univ	Uni Tubingen-DEU
Helwan Univ	HU-EGY	Tufts Univ	UT-USA
Higher National Veterinary School	ENSV-DZA	Tulane Univ	TU-USA
Hohenheim Univ	Uni Hohenheim-DEU	Tumaini Univ Makumira	TUMa-TZA
Hong Kong Polytechnic Univ	PolyU-CHN	Tunis El Manar Univ	UTM-TUN
Hong Kong Univ	HKU-CHN	Turin Univ	UniTo-ITA
Howard Univ	UHoward-USA	Tyrolean Private Univ	UMIT TIROL-AUT
Huazhong Univ of Science and Technology	HUST-CHN	Uganda Christian Univ	UCU-UGA
Hue Univ	HU-VNM	Ulm Univ	Ulm-DEU
Ibadan Univ	UI-NGA	Umea Univ	UMU-SWE
Idaho Univ	UIIdaho-USA	Umm Al-Qura Univ	UQU-SAU
Illinois Univ	UI-System-USA	Union Univ	UU-USA
Ilorin Univ	UNILORIN-NGA	United Arab Emirates Univ	UAEU-ARE
Imperial College London	UImperial-GBR	Univ Internacional de Catalunya	UIC-ESP
Indiana Univ	IU-System-USA	Univ Medical Group	UMG-USA
Indonesia Univ	UI-IDN	Univ of Health and Allied Sciences	UHAS-GHA
International Medical Univ	IMU-MYS	Univ of Medicine and Dentistry of New Jersey	UMDNJ-USA
Iowa Univ	UIowa-USA	Univ of Medicine Tirana	UMT-ALB
Iran Univ of Medical Sciences	IUMS-AUS	Univ of Pittsburgh Medical Center	UPMC-USA
Iran Univ of Medical Sciences	IUMS-IRN	Univ of the East Ramon Magsaysay Memorial Medical Center	UERMMMC-PHL
ISHIK Univ	ISHIK Univ-IRQ	Univ Research Co LLC	URC-USA
Jackson State Univ	JSU-USA	Univ System of Georgia	USG-USA
Jagiellonian Univ	JU-POL	Univ System of Maryland	NIAID-USA
James Cook Univ	JCU-AUS	Univ System of Maryland	USM-System-USA
Jazan Univ	JazanU-SAU	Univ System of Ohio	UO-System-USA
Jean Lorougnon Guede Univ	UJLG-CIV	Uppsala Univ	UU-SWE
Jichi Medical Univ	JMU-JPN	Usmanu Danfodiyo Univ	UDUS-NGA
Jilin Univ	JLU-CHN	Utkal Univ	UU-IND
Jimma Univ	JU-ETH	Utrecht Univ	UU-NLD
Jinan Univ	JNU-CHN	Valencia Univ	UV-ESP

Johns Hopkins Univ	JHU-USA	Vanderbilt Univ	Vandy-USA
Jomo Kenyatta Univ of Agriculture and Technology	JKUAT-KEN	Venda Univ	UNIVEN-ZAF
Jordan Univ of Science and Technology	JUST-JOR	Versailles – Saint-Quentin-en-Yvelines Univ	UVSQ-FRA
Jos Univ	UNIJOS-NGA	Victoria Univ	VU-CAN
Jouf Univ	JU-SAU	Vilnius Univ	VU-LTU
Julius Maximilian Univ of Wurzburg	JMU-DEU	Virginia Commonwealth Univ	VCU-USA
Justus Liebig Univ Giessen	JLU-DEU	Virginia Polytechnic Institute and State Univ	Virginia Tech-USA
Kansas Univ	KU-USA	Virginia Univ	UVA-USA
Karabuk Univ	KBU-TUR	Vrije Univ Amsterdam	VU Amsterdam-NLD
Karolinska Institute	KI-SWE	Wageningen Univ & Research	WUR-NLD
Kassala Univ	KU-SDN	Wake Forest Univ	WFU-USA
Kathmandu Univ	KU-NPL	Walden Univ	WaldenU-USA
Katholieke Univ Leuven	KU Leuven-BEL	Warwick Univ	UW-GBR
Kazakh National Medical Univ	KazNMU-KAZ	Washington Kenya Univ	UW-KEN
Kentucky Univ	UKY-USA	Washington State Univ	WSU-System - USA
Kenyatta Univ	KU-KEN	Washington Univ	UW-USA
Kerman Univ of Medical Sciences	KMU-IRN	Washington Univ in St Louis	WUSTL-USA
Kermanshah Univ of Medical Sciences	KUMS-IRN	Wayne State Univ	WSU-USA
Khartoum Univ	UofK-SDN	Weill Cornell Medical College	WCM-Q-QAT
Khon Kaen Univ	KKU-THA	Wenzhou Medical Univ	WMU-CHN
King Abdulaziz Univ	KAU-SAU	West Indies Univ	UWI-JAM
King George Medical Univ	KGMU-IND	West of England Univ	UWE-GBR
King Saud bin Abdulaziz Univ for Health Sciences	KSAU-HS-SAU	West Virginia Univ	WVU System-USA
King Saud Univ	KSU-SAU	Western Australia Univ	UWA-AUS
Kinshasa Univ	UNIKIN-ZAR	Western Cape Univ	UWC-ZAF
KLE Univ	KLE Univ-IND	Western Kentucky Univ	WKU-USA
Koc Univ	KU-TUR	Western Ontario Univ	UWO-CAN
Korea Univ	KU-KOR	Western Sydney Univ	UWS-AUS
Kosin Univ	UK-KOR	Wisconsin Univ	UW System-USA
Kragujevac Univ	UK-SRB	Witwatersrand Univ	Wits Univ-ZAF
Kurdistan Univ of Medical Sciences	MUK-IRN	Wolaita Sodo Univ	WSU-ETH
Kwame Nkrumah Univ of Science and Technology	KNUST-GHA	Wollega Univ	WU-ETH
KwaZulu-Natal Univ	UKZN-ZAF	Wollongong Univ	UOW-AUS
Kyoto Univ	Kyoto U-JPN	Women College Research Institute	WCRI-CAN
Kyung Hee Univ	KHU-KOR	Wroclaw Medical Univ	WMU-POL
La Trobe Univ	LaTrobeU-AUS	Xi an Jiaotong Univ	XJTU-CHN
Ladoke Akintola Univ of Technology	LAUTECH-NGA	Xiamen Univ	XMU-MYS
Lagos State Univ	LASU-NGA	Yale Univ	YU-USA
Lagos Univ	UNILAG-NGA	Yaounde I Univ	UYI-CMR
Lahore College for Women Univ	LCWU-PAK	Yokohama City Univ	YCU-JPN
Lancaster Univ	ULancaster-GBR	Yonsei Univ	YU-KOR
Latvia Univ	UL-LVA	York Univ	York Univ-CAN
Lausanne Univ	UNIL-CHE	York Univ	York Univ-GBR
Leeds Univ	ULeeds-GBR	Zagazig Univ	ZU-EGY
Leicester Univ	UL-GBR	Zahedan Univ Medical Sciences	ZUMS-IRN

Leiden Univ	LEI-NLD	Zambia Univ	UNZA-ZMB
Libre Bruxelles Univ	ULB-BEL	Zayed Univ	ZU-ARE
Libyan International Medical Univ	LIMU-LBY	Zhejiang Univ	ZJU-CHN
Limoges Univ	UNILIM-FRA	Ziekenhuis Brussel Univ	UZ Brussel-BEL
Lincoln Univ	LU-GBR	Zimbabwe Univ	UZ-ZWE
Lisbon Univ	ULisboa-PRT	Zurich Univ	UZH-CHE
Lithuanian Univ of Health Sciences	LSMU-LTU		

References

- Atal, I., Trinquart, L., Ravaud, P., & Porcher, R. (2018). A mapping of 115,000 randomized trials revealed a mismatch between research effort and health needs in non high-income regions. *Journal of Clinical Epidemiology*, 98, 123-132. doi:10.1016/j.jclinepi.2018.01.006
- Cerdeira, J., Mesquita, J., & Vieira, E. S. (2023). International research collaboration: is Africa different? A cross-country panel data analysis. *Scientometrics*, 128(4), 2145-2174. doi:10.1007/s11192-023-04659-9
- Cherven, K. (2015). *Mastering Gephi network visualization : produce advanced network graphs in Gephi and gain valuable insights into your network datasets*. Birmingham, UK Packt Publishing, 2015.
- Clarivate. (2021). *InCites Indicators Handbook*. Retrieved from <https://incites.help.clarivate.com/Content/Indicators-Handbook/ih-about.htm>
- Confraria, H., & Wang, L. (2020). Medical research versus disease burden in Africa. *Research Policy*, 49(3). doi:10.1016/j.respol.2019.103916
- Evans, J. A., Shim, J. M., & Ioannidis, J. P. A. (2014). Attention to Local Health Burden and the Global Disparity of Health Research. *Plos One*, 9(4). doi:10.1371/journal.pone.0090147
- Liu, L., Johnson, H. L., Cousens, S., Perin, J., Scott, S., Lawn, J. E., . . . Unicef. (2012). Global, regional, and national causes of child mortality: an updated systematic analysis for 2010 with time trends since 2000. *Lancet*, 379(9832), 2151-2161. doi:10.1016/s0140-6736(12)60560-1
- Mouton, J., & Blanckenberg, J. (2018). African science: A bibliometric analysis. In C. Beaudry, M. J., & H. Prozesky (Eds.), *The Next Generation of Scientists in Africa*. Cape Town: African Minds.
- Newman, M. E. J. (2001). Clustering and preferential attachment in growing networks. *Physical Review E*, 64(2). doi:10.1103/PhysRevE.64.025102
- Nieuwoudt, L., Mackay, C. A., & Mda, S. (2022). Causes of and Modifiable Factors Contributing to Neonatal Deaths at Dora Nginza Hospital in the Eastern Cape, South Africa. *Global Pediatric Health*, 9. doi:10.1177/2333794x221139413
- Ou, Z. J., Yu, D. F., Liang, Y. H., He, H., He, W. Q., Li, Y. Z., . . . Chen, Q. (2022). Global trends in incidence and death of neonatal disorders and its specific causes in 204 countries/territories during 1990-2019. *Bmc Public Health*, 22(1). doi:10.1186/s12889-022-12765-1
- Owusu-Nimo, F., & Boshoff, N. (2017). Research collaboration in Ghana: patterns, motives and roles. *Scientometrics*, 110(3), 1099-1121. doi:10.1007/s11192-016-2221-x
- Potter, I. (2020). Introducing Citation Topics in InCites. Retrieved from <https://clarivate.com/blog/introducing-citation-topics/>
- Sooryamoorthy, R. (2021). Science in Africa: Contemporary Trends in Research. *Journal of Scientometric Research*, 10(3), 366-372. doi:10.5530/jscires.10.3.54
- Stefanoudis, P. V., Licuanan, W. Y., Morrison, T. H., Talma, S., Veitayaki, J., & Woodall, L. C. (2021). Turning the tide of parachute science. *Current Biology*, 31(4), R184-R185. doi:10.1016/j.cub.2020.12.025.#mm6z
- UN. (2022). *The Sustainable Development Goals Report 2022*. Retrieved from <https://unstats.un.org/sdgs/report/2022/The-Sustainable-Development-Goals-Report-2022.pdf>
- UN. (2024). Newborn mortality. Retrieved from <https://www.who.int/news-room/fact-sheets/detail/newborn-mortality>
- Vieira, E. S. (2023). The influence of research collaboration on citation impact: the countries in the European Innovation Scoreboard. *Scientometrics*, 128(6), 3555-3579. doi:10.1007/s11192-023-04715-4
- Vieira, E. S., & Cerdeira, J. (2022). The integration of African countries in international research networks. *Scientometrics*, 127(4), 1995-2021. doi:10.1007/s11192-022-04297-7
- Vieira, E. S., & Gomes, J. (2010). Citations to scientific articles: Its distribution and dependence on the article features. *Journal of Informetrics*, 4(1), 1-13. doi:10.1016/j.joi.2009.06.002
- Waltman, L. (2016). A review of the literature on citation impact indicators. *Journal of Informetrics*, 10(2), 365-391. doi:https://doi.org/10.1016/j.joi.2016.02.007
- Wang, H. D., Liddell, C. A., Coates, M. M., Mooney, M. D., Levitz, C. E., Schumacher, A. E., . . . Murray, C. J. L. (2014). Global, regional, and national levels of neonatal, infant, and under-5 mortality during 1990-2013: a systematic analysis for the Global Burden of Disease Study 2013. *Lancet*, 384(9947), 957-979. doi:10.1016/s0140-6736(14)60497-9
- WHO. (2019). A heavy burden: The productivity cost of illness in Africa.

Disclaimer/Publisher's Note: The statements, opinions and data contained in all publications are solely those of the individual author(s) and contributor(s) and not of MDPI and/or the editor(s). MDPI and/or the editor(s) disclaim responsibility for any injury to people or property resulting from any ideas, methods, instructions or products referred to in the content.