

Cleft Lip and Palate Research in Low- and Middle-income Countries: A Scientometric Analysis

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Background: Cleft lip and palate (CLP) comprise over 90% of the world's congenital anomalies and cause significant disability worldwide, while disproportionately burdening low- and middle-income countries (LMICs). Research can help inform strategies that reduce disparities in accessing CLP care. We performed a scientometric analysis of CLP research in LMICs to identify influential contributors and themes.

Methods: The authors searched seven citation databases accessed via Web of Science, from inception to March 2, 2021. Social network analysis was done using VOSviewer. The Kruskal-Wallis test and linear regression were used.

Results: In total, 1561 articles authored by 6414 researchers affiliated with 2113 organizations in 119 countries were included. Most authors (n = 6387, 99.6%) had published two or more articles. The USA (454 articles), Brazil (211 articles), China (175 articles), and India (127 articles) published the most. The most prolific institutions were the University of Sao Paulo (94 articles), the University of Pittsburgh (57 articles), and the University of Iowa (55 articles). Marazita ML (33 articles), Shi B (27 articles), and Murray JC (22 articles) had the highest number of publications. An estimated 510 articles (32.7%) were focused on epidemiology, 240 (15.4%) on management, and 54 (3.5%) on global plastic surgery for CLP.

Conclusions: LMICs are disproportionately burdened by CLP, but research is limited and often produced by high-income countries. This study elucidates partnership and health system strengthening opportunities to improve LMIC research capacity and ultimately informs the management and outcomes for patients with CLP. (*Plast Reconstr Surg Glob Open* 2022;10:e4122; doi: [10.1097/GOX.0000000000004122](https://doi.org/10.1097/GOX.0000000000004122); Published online 15 February 2022.)

INTRODUCTION

Cleft lip and palate (CLP) cause significant disability, economic hardship, and psychosocial stress worldwide.¹⁻⁴ Disease incidence varies between 3.4 and 22.9 per 10,000 births, and low- and middle-income countries (LMICs) register the majority of CLP cases.⁵ Paradoxically, LMICs

lack the human resources, infrastructure, health policies, funding, and information needed to meet local CLP treatment needs.⁶⁻⁹ For example, many LMICs do not have access to specialist plastic surgeons who perform CLP repair; most plastic surgeons work in urban/suburban areas,¹⁰ forcing rural patients to travel long distances to receive specialist care, at great financial costs.¹¹⁻¹³ The majority of LMIC CLP cases remain unrepaired, and the unmet need is often addressed by non-governmental surgical organizations. Recent studies report the median unrepaired CLP rate in LMICs as 10.7 per 100,000 population, which is expected to increase as a result of cancellation of elective surgeries due to the COVID-19 pandemic.^{14,15}

A holistic approach is needed to address the global backlog of patients with CLP and support their ongoing healthcare needs. Such an approach will integrate interventions that strengthen all components of the surgical

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Received for publication September 14, 2021; accepted December 14, 2021.

Presented at Plastic Surgery The Meeting 2021.

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DOI: [10.1097/GOX.0000000000004122](https://doi.org/10.1097/GOX.0000000000004122)

Disclosure: The authors have no financial interest to declare in relation to the content of this article.

Related Digital Media are available in the full-text version of the article on www.PRSGlobalOpen.com.

healthcare system (ie, workforce, service delivery, infrastructure, leadership and governance, funding, and information) and will be adapted to each high-burden region.¹⁶ The adaptation of health systems strengthening initiatives to the local context depends on the accuracy and precision of information.¹⁷ Accurate and precise information can be obtained from local stakeholders, grey literature (eg, government and multinational civil society organization websites and documents), and peer-reviewed articles. Unfortunately, most information in LMICs are unavailable, outdated, or imprecise as a result of underdeveloped surveillance and information systems.¹⁸

The poor quality of information has negatively impacted CLP disease burden and unmet need estimates negatively, with most mathematical models underestimating the burden of CLP in LMICs.¹⁷ The discrepancy between estimates and actual global burden values in LMICs have been attributed to numerous factors, including the absence of genetic testing (OR = 1.22, 95% CI [1.22, 1.22]), undiagnosed CLPs in stillbirths (OR = 1.22, 95% CI [1.22, 1.22]), underreporting (OR = 0.97, 95% CI [0.88, 1.00]), and non-recording (OR = 0.83, 95% CI [0.15, 6.63]).¹ In addition, LMIC plastic surgery researchers face multiple barriers, including a lack of training, funding, and institutional support.¹⁹ The shortage of high-quality research on CLP in LMIC populations hinders the development of contextualized patient management guidelines.

LMIC researchers and stakeholders have partnered with LMIC and high-income country (HIC) institutions to improve the quantity and quality of global plastic surgery research.²⁰ Their contributions to global CLP research (ie, research on CLP epidemiology, education, advocacy, health policy, and service delivery in LMICs) and the interactions between LMIC and HIC researchers have not been studied before. This study focused on research done on CLP in an LMIC, whether it was done by an LMIC or HIC. We used scientometrics to quantify scholarly output, identify the themes, and map out individual and institutional contributors of LMIC CLP research. Also, we visualized collaborations between authors and institutions to identify prolific and influential research networks. These techniques have been used to identify influential authors and describe the relationships within global surgery research communities.^{21,22} The study findings should inform a global plastic surgery – CLP research priority setting and encourage collaboration between more-experienced and less-experienced institutions.

METHODS

Definition of Terms

We defined LMIC CLP research as research on CLP epidemiology, education, advocacy, health policy, and service delivery in LMICs. We did not discriminate by author affiliations. Hence, if an article studied CLP practice in one or multiple LMICs, it was included even if all the authors were affiliated with HIC institutions. We chose this definition to quantify the contributions of

Takeaways

Question: Who are the contributors of research on cleft lip and palate (CLP) surgery in low- and middle-income countries (LMICs)?

Findings: LMICs are disproportionately burdened by CLP, but LMIC-derived CLP research is limited and often produced by high- and upper-middle income countries. American institutions and researchers were the most prolific and influential contributors. Brazil, China, and India equally contributed significantly to the LMIC-oriented CLP literature.

Meaning: Global plastic surgery research facilitates collaboration between institutions in academic and humanitarian contexts. This collaboration could be harnessed to increase LMIC research capacity and productivity to ultimately inform CLP evidence-based practice in low-resource settings.

HIC institutions to LMIC CLP research and highlight the need for HIC institutions to collaborate with LMIC institutions when studying a phenomenon that occurs in an LMIC.

Scientometrics is a subfield of bibliometrics that analyzes peer-reviewed literature quantitatively and qualitatively using publication and citation metrics.²³ Scientometrics also uses social network analysis to map out the interactions between items which can be articles, authors, institutions, or themes.^{23,24} The visual representation of items and their relationships is called a network or graph.²⁴ A network is an irregular and nonrandom pattern of pairwise interactions between items.²⁴ Items are visually represented as circular nodes, and the node size is directly proportional to the node's connectivity. The connectivity pattern is used to understand the relationships within the community studied, in this case, the LMIC CLP community.

Nodes are connected by lines called links or edges, and the link length is inversely proportional to the closeness of the linked nodes.²⁵ A group of nodes forms a cluster or community, and clusters are represented visually as nodes with the same color.²⁵ The strength of the link is equally evaluated, and it is directly proportional to a probability P , where P is the probability that two nodes that are not linked to one another but are linked to the same node can have a link between them.²⁵ Practically, this can help predict how likely new collaborations will form between two authors/institutions. For example, if A and B have never worked together, P can predict whether they will work together given that A and B have worked with author/institution C independently.²⁴

By measuring how close cluster items are to each other, we can identify clusters that are more likely to collaborate with other clusters. Clusters that have closely linked nodes are dubbed ego-centered and are less likely to collaborate. The total link strength quantifies collaborations between institutions or authors and can be used as a proxy for collaboration and influence.

Data Extraction and Analysis

We searched seven citation databases (ie, Arabic Citation Index, Russian Science Citation Index, Chinese Science Citation Database, Data Citation Index, BIOSIS Citation Index, SciELO Citation Index, and Web of Science) from inception (1900) to March 2, 2021. The search included synonyms of “cleft lip,” “cleft palate,” and “low- and middle-income countries.” (See **appendix, Supplemental Digital Content 1**, which displays the search strategy. <http://links.lww.com/PRSGO/B938>.) The article metadata (DOI 10.17605/OSF.IO/AB478) was exported as text files and uploaded to VOSviewer (Leiden, the Netherlands), where citation and network visualizations were generated.

Country data were categorized by region (ie, East Asia and Pacific, Europe and Central Asia, Latin America and the Caribbean, Middle and North Africa, North America, South Asia, and Sub-Saharan Africa) and income level (ie, low-income, lower-middle-income, upper-middle-income, and high-income) was based on the World Bank definition.²⁶ Next, the number of publications, citations, and total link strength were compared for each category using the Kruskal-Wallis test. Spearman’s rho was used to evaluate correlations between the total number of publications and the other continuous data (ie, number of citations and total link strength). A *P* value of less than 0.05 was considered statistically significant. Finally, an explanatory linear regression model was developed using the number of citations, total link strength, and the country’s World Bank region, and income category as independent variables and the number of publications as the dependent variable.

RESULTS

The search returned 1561 articles authored by 6414 researchers, published in 504 journals. The majority of journals had published fewer than five articles (n = 449, 89.1%) while 36 (7.1%) had published five to

nine articles, and 19 (3.8%) had published 10 or more articles (Table 1).

The majority of authors had published between two and four articles (n = 816, 52.3%), 115 (7.4%) had published five to nine articles, and 14 (0.9%) had published 10 or more articles. The most prolific authors by scholarly output were Marazita ML (33 articles, 2.1%), Shi B (27 articles, 1.7%), Murray, JC (22 articles, 1.4%), Campbell AC (18 articles, 1.2%), Mossey PA (15 articles, 1.0%), and Castilla EE (15 articles, 1.0%) (Table 2).

Affiliations

The authors were affiliated with 2113 organizations in 119 countries. The mean number of publications per affiliation was 19.1 (95% CI [10.1, 28.1]) articles. Their articles had an average of 313.1 (95% CI [132.1, 494.1]) citations and a mean total link strength of 20.8 (95% CI [12.7, 28.9]). Authors affiliated with institutions in the following countries contributed the most to LMIC CLP research: USA (454 articles, 29.1%), Brazil (211 articles, 13.5%), China (175 articles, 11.2%), and India (127 articles, 8.1%). Within Africa, Nigeria was the most prolific country (51 articles, 3.3%), followed by South Africa (28 articles, 1.8%) and Uganda (22 articles, 1.4%) (Table 3).

The total number of articles published by each country was strongly and positively correlated with the total number of citations (*R* = 0.91, *P* < 0.001) and the total link strength (*R* = 0.87, *P* < 0.001). Authors affiliated with North American institutions published the most articles (mean = 47.0), followed by authors from Latin America and the Caribbean (mean = 40.8 articles), East Asia and Pacific (mean = 23.5 articles), Europe (mean = 17.0 articles), South Asia (mean = 12.8 articles), Middle East and North Africa (mean = 9.4 articles), and Sub-Saharan Africa (mean = 8.0 articles) (*P* = 0.28). There were similar trends in the citation (*P* = 0.16) and total link strength (*P* = 0.05). Authors affiliated with upper-middle-income countries published more articles (mean = 29.6) than high-income

Table 1. Journals that Published 10 or More Research Articles on Cleft Lip and Palate Surgery in Low- and Middle-income Countries

Journal	Articles	Citations	Citations per Article (mean)	Total Link Strength	Total Link Strength per Article
<i>Cleft Palate-Craniofacial Journal</i>	281	3679	13.1	1075	3.8
<i>Journal of Craniofacial Surgery</i>	98	744	7.6	412	4.2
<i>American Journal of Medical Genetics Part A</i>	38	699	18.4	253	6.7
<i>International Journal of Pediatric Otorhinolaryngology</i>	34	204	6.0	158	4.6
<i>Plastic and Reconstructive Surgery</i>	34	604	17.8	227	6.7
<i>World Journal of Surgery</i>	28	644	23.0	227	8.1
<i>Annals of Plastic Surgery</i>	20	123	6.2	114	5.7
<i>Birth Defects Research Part A-Clinical And Molecular Teratology</i>	20	510	25.5	185	9.3
<i>Indian Journal of Plastic Surgery</i>	17	188	11.1	125	7.4
<i>American Journal of Human Genetics</i>	16	392	24.5	73	4.6
<i>Journal of Cranio-Maxillofacial Surgery</i>	14	163	11.6	72	5.1
<i>Plastic and Reconstructive Surgery-Global Open</i>	14	66	4.7	78	5.6
<i>British Journal of Oral & Maxillofacial Surgery</i>	13	211	16.2	90	6.9
<i>Plos One</i>	13	207	15.9	104	8.0
<i>European Journal of Plastic Surgery</i>	12	37	3.1	30	2.5
<i>European Journal of Oral Sciences</i>	10	77	7.7	62	6.2
<i>Journal of Dental Research</i>	10	373	37.3	105	10.5
<i>Journal of Oral and Maxillofacial Surgery</i>	10	148	14.8	74	7.4
<i>Journal of Plastic Reconstructive and Aesthetic Surgery</i>	10	216	21.6	76	7.6

Table 2. Most Prolific Authors of Cleft Lip and Palate Surgery in Low- and Middle-income Countries

Author	Articles	Citations	Citations per Article	Total Link Strength	Total Link Strength per Article
Marazita, ML	33	1073	32.5	178	5.4
Shi, B	27	249	9.2	95	3.5
Murray, JC	22	794	36.1	127	5.8
Campbell, A	18	158	8.8	79	4.4
Mossey, PA	15	926	61.7	61	4.1
Castilla, EE	15	248	16.5	88	5.9
Vieira, AR	14	288	20.6	91	6.5
Cooper, ME	13	426	32.8	59	4.5
Magee, WP III	12	156	13.0	48	4.0
Restrepo, C	12	102	8.5	59	4.9
Costa, B	10	223	22.3	21	2.1
Gomide, MR	10	223	22.3	21	2.1
Orioli, IM	10	191	19.1	69	6.9
Zheng, Q	10	72	7.2	34	3.4
Beaty, TH	9	237	26.3	99	11.0
Butali, A	9	52	5.8	63	7.0
Meara, JG	9	356	39.6	28	3.1
Melnick, M	9	162	18.0	29	3.2
Poenaru, D	9	135	15.0	15	1.7
Wendby, L	9	59	6.6	32	3.6
Gil-Da-Silva-Lopes, VL	8	47	5.9	32	4.0
Klassen, AF	8	190	23.8	50	6.3
Liu, Y	8	179	22.4	36	4.5
Song, T	8	55	6.9	41	5.1
Tsangaris, E	8	190	23.8	50	6.3
Wang, Y	8	65	8.1	30	3.8
Yin, H	8	63	7.9	27	3.4
Ayala, R	7	86	12.3	38	5.4
Czeizel, AE	7	243	34.7	4	0.6
Dalben, GDS	7	49	7.0	8	1.1
Jiao, X	7	56	8.0	27	3.9
Letra, A	7	164	23.4	61	8.7
Ren, A	7	96	13.7	37	5.3
Riff, KQY	7	99	14.1	45	6.4
Rossell-Perry, P	7	29	4.1	4	0.6
Sarma, H	7	91	13.0	40	5.7
Schonmeyer, B	7	40	5.7	28	4.0
Van Lierde, K	7	24	3.4	36	5.1
Vanderburg, R	7	46	6.6	35	5.0
Yao, CA	7	108	15.4	36	5.1
Alam, MK	6	29	4.8	10	1.7
Alonso, N	6	81	13.5	18	3.0
Bruneel, L	6	15	2.5	34	5.7
Coletta, RD	6	92	15.3	30	5.0
Daack-Hirsch, S	6	162	27.0	24	4.0
Deshpande, G	6	49	8.2	41	6.8
Field, LL	6	175	29.2	25	4.2

(mean = 22.4), lower-middle-income (mean = 8.6), and low-income (mean = 7.5) countries ($P = 0.06$). We found statistically similar and significant differences in the number of citations ($P = 0.04$) and total link strength ($P = 0.04$) between the various income categories. The total number of citations was the only variable that showed statistical significance in the explanatory regression model ($\beta = 0.05$, $SE = 0.01$, $P < 0.001$).

Many academic institutions published five or more articles ($n = 144$, 6.8%). The most prolific institutions were the University of Sao Paulo (94 articles), the University of Pittsburgh (57 articles), the University of Iowa (55 articles), and Sichuan University (46 articles). Researchers at the following universities had the most collaborations with colleagues at other institutions: The University of Pittsburgh (151 total link strength), the University of Iowa (137 total link strength), Federal University of Rio de Janeiro (75 total link strength), and Johns Hopkins University (63 total link strength). The social network map of the most prolific organizations (ie, institutions that published five or more articles) revealed

nine clusters, 686 links, and 1366 total link strength (Fig. 1). The most prominent nonacademic institution was Operation Smile Inc. (Fig. 1, Orange Cluster; 27 articles, 20 links, and 45 total link strength). Of note, Operation Smile Inc. was linked with Kwame Nkrumah University (Ghana) and several US institutions, including the University of Southern California, Harvard University, and the University of Washington. There was a general tendency for the clusters to be grouped geographically, with the exception of US institutions that served as links between clusters.

In total, 510 articles (32.7%) were focused on epidemiology, 240 (15.4%) on CLP disease management, and 54 (3.5%) on health systems strengthening for CLP. The social network analysis of keywords with five or more occurrences revealed that there were seven themes, notably epidemiology (blue), service delivery (red), global plastic surgery (yellow-green), and risk factor identification (green) (Fig. 2). In addition, a trend analysis of the keywords revealed that global plastic surgery for CLP is a rapidly emerging theme (Fig. 3).

Table 3. Country Affiliation of Cleft Lip and Palate Surgery Literature in Low- and Middle-income Countries (Only Countries with Five or More Articles Are Shown)

Country	Articles	Citations	Citations per Article	Total Link Strength	Total Link Strength per Article
United States of America	454	9647	21.2	435	1.0
Brazil	211	3410	16.2	119	0.6
China	175	2181	12.5	74	0.4
India	127	1069	8.4	66	0.5
England	89	2336	26.2	116	1.3
Canada	60	2099	35.0	102	1.7
Nigeria	51	416	8.2	46	0.9
Turkey	43	309	7.2	26	0.6
Argentina	41	1088	26.5	73	1.8
Iran	40	271	6.8	7	0.2
Saudi Arabia	36	232	6.4	28	0.8
South Korea	34	371	10.9	22	0.6
Netherlands	33	403	12.2	68	2.1
Chile	31	280	9.0	30	1.0
Australia	30	546	18.2	45	1.5
Colombia	30	814	27.1	45	1.5
Japan	30	680	22.7	36	1.2
Mexico	30	284	9.5	22	0.7
Germany	28	621	22.2	30	1.1
Scotland	28	1328	47.4	64	2.3
South Africa	28	142	5.1	40	1.4
Egypt	25	145	5.8	24	1.0
Malaysia	25	203	8.1	16	0.6
France	24	225	9.4	24	1.0
Thailand	24	115	4.8	7	0.3
Italy	22	331	15.0	37	1.7
Uganda	22	279	12.7	30	1.4
Switzerland	21	397	18.9	48	2.3
Pakistan	20	149	7.5	11	0.6
Sweden	20	409	20.5	47	2.4
Taiwan	17	221	13.0	29	1.7
Hungary	16	467	29.2	13	0.8
Poland	16	118	7.4	15	0.9
Belgium	15	194	12.9	21	1.4
Indonesia	15	79	5.3	19	1.3
Ethiopia	14	106	7.6	42	3.0
Ghana	14	92	6.6	34	2.4
Jordan	14	151	10.8	8	0.6
Russia	14	36	2.6	11	0.8
Norway	13	277	21.3	46	3.5
Peru	13	63	4.8	2	0.2
Philippines	13	779	59.9	28	2.2
Czech Republic	12	163	13.6	18	1.5
Nepal	11	102	9.3	5	0.5
Kenya	10	101	10.1	11	1.1
Spain	10	78	7.8	36	3.6
Singapore	9	205	22.8	25	2.8
Denmark	8	814	101.8	24	3.0
Venezuela	8	428	53.5	6	0.8
Vietnam	8	46	5.8	11	1.4
Democratic Republic of Congo	7	20	2.9	3	0.4
Wales	7	100	14.3	15	2.1
Croatia	6	38	6.3	14	2.3
Estonia	6	27	4.5	5	0.8
Iraq	6	11	1.8	5	0.8
Ireland	6	175	29.2	25	4.2
Portugal	6	7	1.2	9	1.5
Slovakia	6	19	3.2	6	1.0
Honduras	5	71	14.2	10	2.0
Israel	5	252	50.4	4	0.8
Latvia	5	91	18.2	7	1.4
New Zealand	5	63	12.6	7	1.4
Sri Lanka	5	59	11.8	7	1.4
Tanzania	5	52	10.4	5	1.0

DISCUSSION

This study represents the first application of scientometrics to LMIC CLP research. This scientometric analysis is the first to identify contributors of LMIC CLP research. The social network maps give us an insight into who has been collaborating together and helps us predict how likely it is for two institutions to collaborate if they have never worked together. The algorithm uses

the fact that these institutions have had one or more institutions in common to predict the likelihood. This algorithm is similar to the one used by Facebook and other social media to suggest befriending new individuals. Also, Google uses a similar algorithm to suggest landing pages based on past search queries. Therefore the study data can help increase collaborations within the cleft surgery LMIC research space and also help

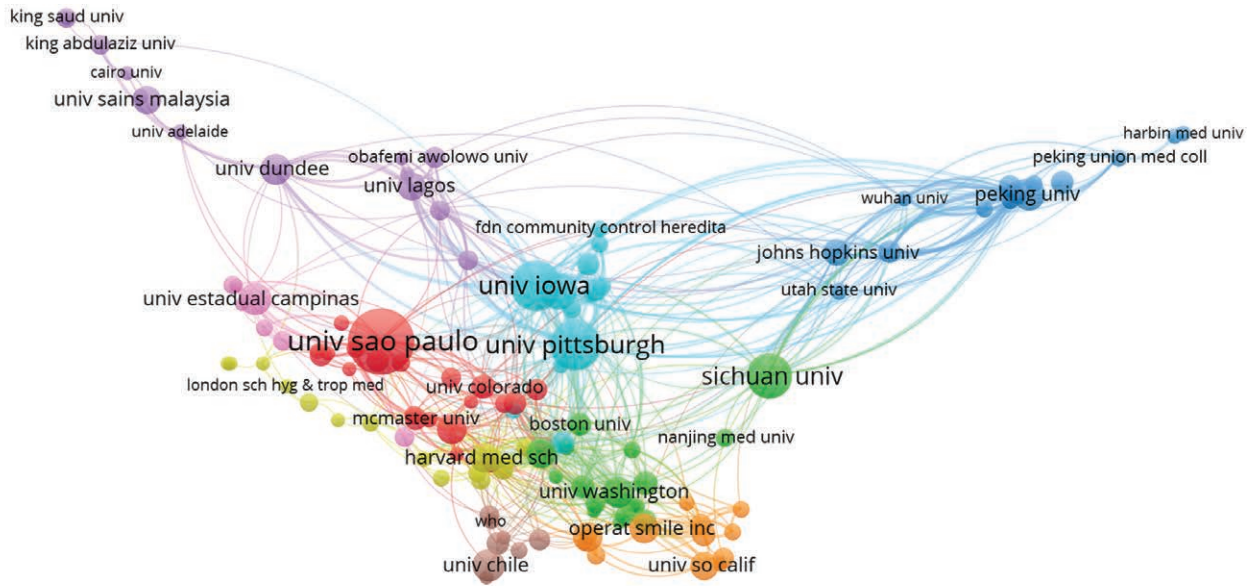


Fig. 1. Co-authorship analysis of low- and middle-income country cleft lip and palate research disaggregated by institutional affiliation. The circles (nodes) represent institutions, and the lines (links) represent collaborations. The circle size is a measure of the institutions' collaboration. The total link strength is a measure of the institutions' collaborations. Influential institutions have larger circles and their names written over circles. Institutions that have regular collaborations share the same color (clusters).

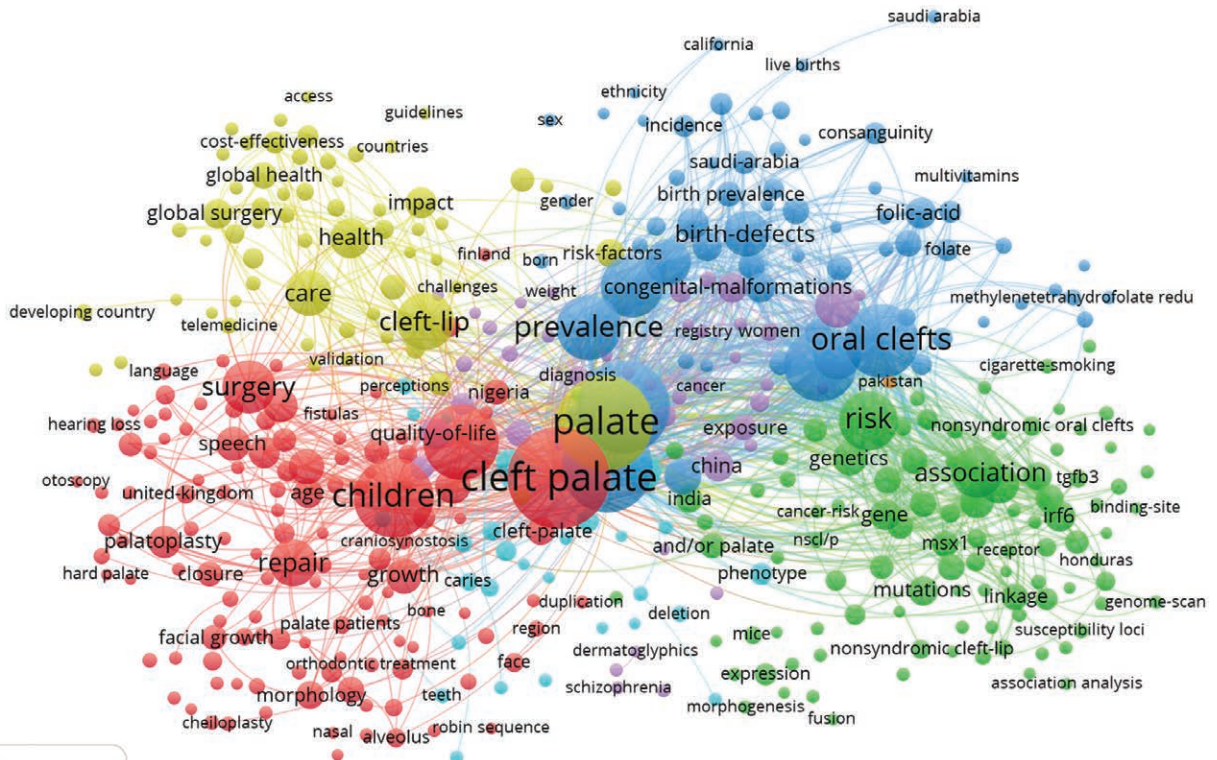


Fig. 2. Analysis of keyword occurrence (ie, titles, abstracts, and author-generated keywords) of low- and middle-income country cleft lip and palate research. The circles (nodes) represent keywords that appeared five times or more, and the lines (links) represent the co-occurrence of two keywords. Thus, the circle size is a measure of the keyword's connectivity. Influential keywords appear as words written over their corresponding circles. Thus, the article themes or clusters are represented by circles having the same color.

and equitable [plastic surgery] care to the world's population, with its core tenets as the issues of need, access, and quality." This aim can be achieved via one or more global plastic surgery pillars: education, policy, advocacy, and research. The academic plastic surgery community can support the growth of global plastic surgery by offering scholarships and fellowships to aspiring global plastic surgeons, creating special sections and sessions in specialty journals and conferences, and creating global plastic surgery interest groups in organized plastic surgery. The global neurosurgery community has done this successfully via the World Federation of Global Neurosurgery's Global Neurosurgery Committee.²² Support of global plastic surgery will equally benefit HICs in the form of frugal and reverse innovations. Frugal innovation is the process of reducing the complexity and cost of a good and its production, whereas reverse innovation is uptake of an innovation in a HIC after this innovation was developed or used first in an LMIC. One such example is the Arbutus drill cover system developed in Uganda to help LMIC surgeons use cheaper commercial drills while preserving patient safety.³² The Arbutus drill cover system has since been used in Canada and the United Kingdom, with satisfactory results. In the same vein, global plastic surgery research could help formulate and confirm hypotheses about the etiology, pathogeny, and management of CLP.

In the analysis by Garas et al,²¹ the most connected institutions were the University of Pittsburgh (USA) and Yonsei University (South Korea). The University of Pittsburgh was equally among the most connected and prolific contributors to LMIC CLP research, and they were centrally located in the network (Fig. 1, light blue cluster). Other influential actors in the network included the University of Sao Paulo (Fig. 1, red cluster) and Sichuan University (Fig. 1, green cluster). Of note, the purple and dark blue clusters in Figure 1 were the most far apart and shared few direct links. Collaborations between these two clusters should be encouraged and can be facilitated by the light blue cluster institutions. Similarly, other institutions can use the network to identify potential collaborations and "matchmaker" organizations.

It is equally important to highlight the role of non-academic institutions like Operation Smile. Operation Smile is a surgical nongovernmental organization with almost four decades of experience in the global plastic surgery space. Like Operation Smile, other surgical nongovernmental organizations are contributing to LMIC CLP research.³³ Through collaboration with LMIC institutions, these organizations can support an increase in local research capacity.

Limitations

Social network analysis relies on interactions between articles, authors, institutions, and themes to make inferences about their influence. For this to work, articles must be indexed in major citation databases like the ones we searched. Unfortunately, most LMIC journals are not indexed in these major citation databases. Although non-citation databases like MedLine are more comprehensive,

they lack citation metadata necessary for a multimodality scientometric analysis. Another limitation inherent to our study design is confounding due to internet connectivity and the use of social media. Social media are known to increase article visibility and citation.^{34,35} Moreover, the income category is associated with internet connectivity; so countries with lower income categories are less likely to communicate their research on social media.³⁶

CONCLUSIONS

LMIC CLP research has the potential to inform patient management guidelines in low-resource settings; however, research productivity in LMICs is low. Our study demonstrates that LMIC CLP research is often generated by high- and upper-middle-income authors and institutions. Increased collaboration between HIC and LMIC authors and institutions should be prioritized on the global plastic surgery agenda. Global plastic surgery research facilitates collaboration between institutions in the academic and humanitarian contexts. This collaboration could be harnessed to increase LMIC research capacity and productivity, and ultimately inform CLP evidence-based practice in low-resource settings.

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