

ORIGINAL ARTICLE

Scientific production in primary health care in Latin American and Caribbean Countries (1980–2024): A web of science perspective



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KEYWORDS

Primary health care;
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Abstract

Objectives: To analyze the scientific production of primary care research in Latin American and Caribbean (LAC) countries from 1980 to 2024 and to provide recommendations for improvement.

Design: Observational, machine learning-based bibliometric study.

Data sources: Review and research articles indexed in the Web of Science database.

Selection of studies: Bibliometric analysis was performed on data from 33 LAC countries, retrieved from the Web of Science as of April 15, 2024.

Data extraction: For each record, data on the journal, year of publication, article title, abstract, keywords, authors, affiliations, countries, cited sources, cited first authors, and references were extracted for bibliometric and text mining analyses. We used a form of machine learning, Latent Dirichlet Allocation topic modeling, to identify the key topics of research.

Results: LAC countries contributed only 0.83% of the global literature on primary health care, with just 0.98% of this output comprising research and review articles. The majority of research originated from Brazil, Mexico, Colombia, and Chile, while many LAC countries produced little to no output. LAC countries frequently collaborated with the United States, Spain, Canada, and England. Research topics in the region predominantly focused on cancer, obesity, COVID-19, nutritional disorders, and food safety within the primary health care field.

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PALABRAS CLAVE

Atención primaria de salud;
Bibliometría;
América Latina;
Aprendizaje automático;
Evaluación de la investigación en salud

Conclusions: The findings highlight significant potential for growth in primary health care research in LAC countries. Strengthening individual and collective strategies to build research capacity and fostering collaborations with global academic networks are recommended to enhance research output and impact.

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Producción científica en la atención primaria de salud en los países de América Latina y el Caribe (1980-2024): una perspectiva de Web of Science

Resumen

Objetivos: Describir la producción científica en atención primaria de los países de América Latina y el Caribe (ALC) durante el período de 1980 a 2024, y proporcionar las recomendaciones para su mejora.

Diseño: Estudio observacional bibliométrico basado en el aprendizaje automatizado.

Fuentes de datos: Artículos de revisión e investigación indexados en la base de datos Web of Science.

Selección de estudios: Se realizó un análisis bibliométrico de datos de 33 países de ALC, recuperados de Web of Science al 15 de abril de 2024.

Extracción de datos: Para cada registro, se extrajeron datos sobre la revista, el año de publicación, el título del artículo, el resumen, las palabras clave, los autores, las afiliaciones, los países, las fuentes citadas, los primeros autores citados y las referencias para los análisis bibliométricos y de minería de textos. Utilizamos una forma de aprendizaje automático, el modelado de temas de asignación latente de Dirichlet, para identificar los temas clave de investigación.

Resultados: Los países de ALC contribuyen solo con un 0,83% de la literatura global sobre atención primaria de salud, siendo un 0,98% de ella en forma de artículos y artículos de revisión. Encontramos que los mayores resultados en investigación sobre atención primaria de salud provienen de Brasil, México, Colombia y Chile, mientras que muchos países de ALC tienen una producción investigativa escasa o nula. Los países de ALC colaboran intensamente con EE. UU., España, Canadá e Inglaterra. Además, se ha observado que los países de la región investigan principalmente temas como el cáncer, la obesidad, la COVID-19, los trastornos nutricionales y la seguridad alimentaria en el campo de la atención primaria de salud.

Conclusiones: Los hallazgos sugieren que hay espacio para el desarrollo en el campo de la investigación de la atención primaria de salud en los países de ALC. Se recomienda que los países de ALC desarrollen estrategias individuales y colectivas para desarrollar la capacidad de investigación en atención primaria de salud, en colaboración con redes académicas de todo el mundo.

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Introduction

The recent Astana Declaration emphasized the need to strengthen primary health care systems.¹ Also, one of the most prominent points during the COVID-19 pandemic is the significance of primary health care (PHC) research. PHC has been recognized as a fundamental strategy of universal coverage policies in the health system reform in Latin America since the late 20th century.² The fragmented and divided nature of the health system in Latin America and the Caribbean (LAC) countries poses significant challenges to achieving equality levels in healthcare and overall health care quality within the Latin American society.³

The LAC region encompasses a vast geographical area that has evolved over time as a reflection of its

variable colonial past, unequal power dynamics with more developed nation-states, and intra-regional struggles for cultural identity.⁴ In many LAC countries, health services are distinctly segmented, with various organizational niches operating under differing rules and service offerings. This fragmentation and segmentation can be understood through the different models present in the Latin American health systems: the unified public model (e.g., Cuba and Costa Rica), the public contract model (e.g., Brazil), the segmented model (e.g., Chile), and the privately fragmented model (typically found in other LAC countries). Despite the diversity and unique differences among the nations in the region, all countries are similarly affected by interconnected challenges such as public health.⁵ It seems insufficient for one country or a few countries to come

together in the face of pandemics or global disasters. Global unity and collective action are now crucial in combating global crises like global warming or COVID-19. Additionally, such disasters and pandemics have shown that geographical unity is also critical in facing such disasters before global unity. This study derives its value from here. Our study aims to comprehensively assess the scientific productivity in the field of primary health care, focusing on LAC countries, using bibliometric methods and machine learning techniques by analyzing the Web of Science database. This will enable the evaluation of the scientific performance of LAC countries in the field of primary health care research, conduct a situational analysis to identify areas of concern, and provide recommendations for improvement. A literature review reveals various topics within the primary health care domain discussed across different regional or selected countries in Latin America and the Caribbean.⁶⁻⁸ For example, main challenges of primary health care in five Latin American Countries,⁷ abortion policy implementation in Latin America,⁶ breast cancer screening programs in the LAC region,⁸ are among the prominent studies. However, a similar study has not been conducted in the literature such as scientific productivity primary health care research area and provides an evaluation for better collaboration.

Materials and methods

Data sources

In our study, data were obtained from the Web of Science (WoS) Core Collection on April 15, 2024, in Plain Text and Excel formats. We filtered 103,914 documents in the PHC research area across 33 different countries within WoS categories, resulting in 602 research and review articles at the final stage in our dataset for bibliometric and machine learning analysis. The utilization of bibliometrics as tools for science mapping and decision-making is experiencing significant growth across various fields such as management, public health, sustainability, and medicine.⁹ Additionally, bibliometrics and WoS bibliometric databases are essential tools for assessing the development of PHC services in LAC countries. The WoS stands as the oldest, most extensively utilized, and esteemed database for academic research publications and citations globally.

Currently, WoS provides access to approximately 34,000 leading journals in various fields, also supports a wide range of use cases from daily searches conducted by researchers worldwide to providing analytical datasets and granting access to raw data.¹⁰ Thomson Reuters WoS first announced the “Primary Health Care” subject category in 2011, and 13 journals were indexed in this category that year. This subject category facilitates a better understanding of scientific output in primary healthcare services and family medicine.¹¹ This does not imply that the 13 journals in question ceased their publication activities prior to 2011. On the contrary, these journals were already indexed in the Web of Science. They were included in the newly established Web of Science category, “Primary Health Care,” as they were deemed relevant to the PHC field. Consequently, it has become possible to examine the PHC research field from 1980 to the present. Over the years, the number of journals associated with

this field has increased. This is the primary reason why we selected WoS as the bibliometric data source to demonstrate the development of the PHC research field in LAC countries, instead of Scopus or PubMed. Furthermore, there are currently 33 different journals indexed in the Emerging Sources Citation Index (ESCI), Science Citation Index Expanded (SCI-Expanded), and Social Science Citation Index (SSCI) under the relevant research category. These journals are widely accepted by researchers in the field and play a significant role in shaping the direction of the field.

Many researchers associate the term “health literature” in LAC countries with the Latin American and Caribbean Health Sciences Literature (LILACS) (see: <https://lilacs.bvsalud.org/>). LILACS is the most significant and comprehensive database in the LAC region, containing over one million records of peer-reviewed journals, theses, dissertations, government documents, congress proceedings, and books published across 30 countries in the region.¹² However, this data source does not encompass the entirety of global health literature, nor does it specifically cover the literature on “Primary Health Care” comprehensively. Therefore, to assess the scientific output of LAC countries in the PHC domain and compare it with other countries worldwide, the bibliometric database WoS was selected as the primary source.

Study design and tools

The tools utilized for the analysis include Microsoft Office Excel, Oracle Database, SQL Queries, Python Libraries, R Bibliometrix Biblioshiny, and VOSviewer. Our analysis was conducted using data obtained from the bibliometric data source of WoS in Plain Text and Excel formats. Additionally, we made use of reporting tools such as WoS and Incites. The data acquisition process involved successive filtration steps as indicated in Fig. 1, and in the final stage, the dataset corresponding to query number six was extracted. Furthermore, detailed information regarding the analyzed data was provided on the figure, including explanations of the tools and techniques used.

Latent dirichlet allocation (LDA) topic modeling

The dataset was first subjected to data preprocessing to prepare it for topic modeling using LDA. Python was utilized during the preprocessing stage. Initially, the texts were cleaned and made ready for analysis. Tokenization was performed to split the text into words, and lemmatization was applied to merge similar meaningful words using the Natural Language Toolkit library. Additionally, stop words, which are words without significant meaning, were removed from the text. After the data preprocessing steps were completed, the dataset was split into training and validation subsets using the Scikit-learn machine learning library in Python. Subsequently, the LDA model was applied to conduct topic modeling. For visualization purposes, the Matplotlib and Wordcloud libraries were employed.

To measure the success of the LDA method in topic modeling, perplexity¹³ and coherence score¹⁴ metrics were utilized. These metrics are among the most commonly preferred metrics for assessing LDA performance. In our

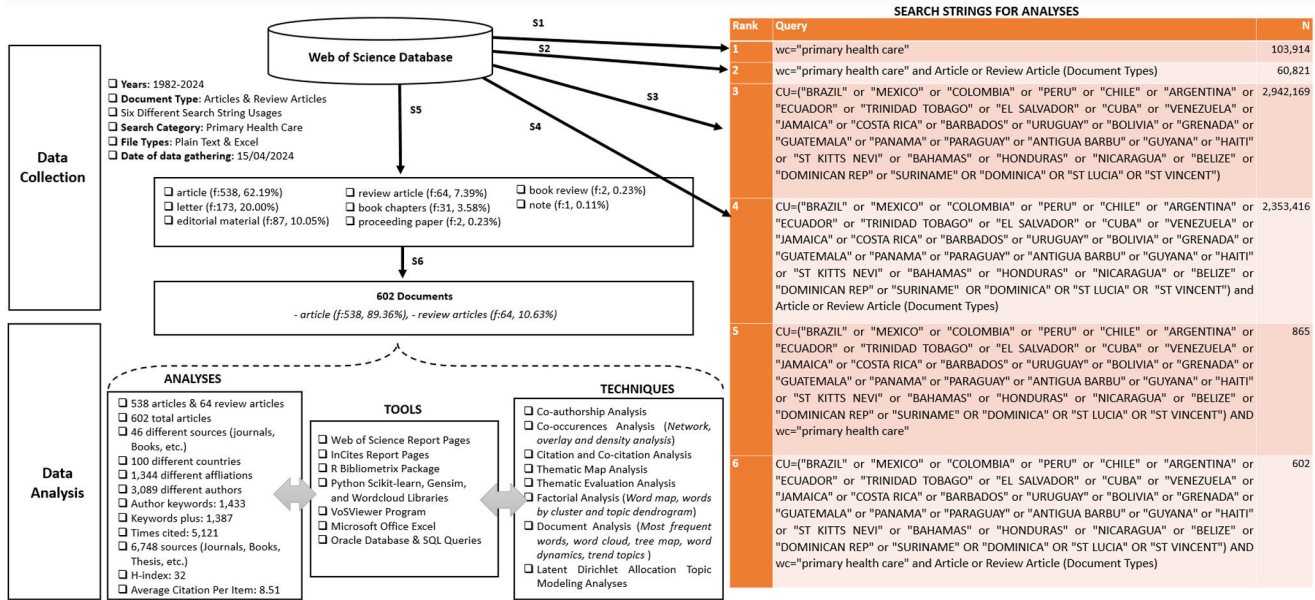


Figure 1 Study design and research methodology.

analysis, 30% of the data in our dataset was used for training, while 70% was used for testing.

Results

We identified 602 research and review articles from LAC countries in the area of primary health care. The articles were published between 1982 and 2024, with an annual growth rate of 7.52%. The most productive years were 2022 with 84 articles and 2021 with 69 articles. Overall, productivity has increased over the years in the region. The average citation per published study was 8.51.

Affiliations and countries

The 602 articles were produced by 3089 different researchers from 1344 different institutions across 100 different countries (Fig. 2, Table 1). When examining the profile of researchers in the relevant countries, the prominent researchers are as follows: Jorge Elias Junior (Brazil, Universidade de São Paulo, n : 12, 1.99%), Richard C. Semelka (Brazil, Universidade de São Paulo, n : 12, 1.99%), Jacksaint Saintila (Peru, Universidad Peruana Union, n : 10, 1.66%), Robertino M. Mera (Ecuador, Universidad De Especialidades Espiritu Santo, n : 9, 1.49%).

As seen in Table 1, Brazil and Mexico stand out among LAC countries in the field of PHC. LAC countries are seen to have intensive collaborations with the USA (n : 132), Spain (n : 71), Canada (n : 47), and England (n : 40) according to the density order. When the articles are evaluated according to institutions, the prominent institutions are as follows: Universidade De Sao Paulo (n : 55), Instituto Mexicano Del Seguro Social (n : 35), Pontificia Universidad Catolica De Chile (n : 28), University West Indies Mona Jamaica (n : 33), and University of Toronto (n : 22). Outside LAC countries, the University of Toronto is prominent in the PHC field. When the

first 30 institutions are examined according to their countries, the distribution is as follows: USA (n : 6), Brazil (n : 6), Mexico (n : 4), Trinidad Tobago (n : 2), Peru (n : 2), Spain (n : 2), Colombia (n : 2), Chile (n : 1), Canada (n : 1), Ecuador (n : 1), El Salvador (n : 1), Argentina (n : 1), and England (n : 1).

Document, reference and citation analyses

The top ten journals where publications in the primary health care field are most prolific in LAC countries are: Atencion Primaria (SCIE, n : 112), Primary Care Diabetes (SCIE, n : 76), Journal of Primary Care and Community Health (ESCI, n : 58), Family Practice (SCIE, n : 54), Medicina De Familia Semergen (ESCI, n : 31), BMC Family Practice (SCIE, n : 28), Physician and Sportsmedicine (SCIE, n : 26), Primary Health Care Research and Development (SCIE, n : 23), Journal of Family Medicine and Primary Care (ESCI, n : 20), and Family Medicine (SCIE, n : 17). The most cited ten journals are Lancet, Diabetes Care, The New England Journal of Medicine, JAMA-Journal of The American Medical Association, Plos One, BMJ: British Medical Journal, Diabetes Research and Clinical Practice, Circulation, Radiology, Ciência & Saúde Coletiva. When the top 100 most cited publications of researchers in LAC countries were examined, it was seen that the relevant publications were mostly published in Family Practice (n : 20), BMC Family Practice (n : 15), Primary Care Diabetes (n : 14), Atencion Primaria (n : 8), Canadian Family Physician (n : 5), Annals of Family Medicine (n : 5), Journal of Primary Care and Community Health (n : 4), NPJ Primary Care Respiratory Medicine (n : 4).

Bradford's Law, proposed in 1948, classifies journals in each subject area into three tiers. The top tier (first zone or core) includes journals that receive the highest number of citations and are thus of primary interest to researchers in that field. The middle tier (second zone) features journals with a moderate citation rate. The bottom tier (third zone or tail) consists of journals that are cited infrequently

Table 1 LAC countries' scientific production map.

Rank	Countries	Population	Article	Review article	Editorial material	Letter	Book chapters	Proceeding paper	News item	Book review	Total
1	Antigua and Barbuda	99,509	4	0	0	0	0	0	0	0	4
2	Argentina	46,010,234	34	2	6	10	1	0	0	0	52
3	Bahamas	400,516	1	0	1	0	0	0	0	0	2
4	Barbados	288,023	8	1	0	0	0	0	0	0	9
5	Belize	412,190	1	0	0	0	0	0	0	0	1
6	Bolivia	11,992,656	4	0	0	2	0	0	0	0	6
7	Brazil	215,353,593	176	17	25	31	18	1	0	2	251
8	Chile	19,250,195	51	7	8	14	3	0	0	0	80
9	Colombia	51,512,762	68	10	7	12	4	0	0	0	97
10	Costa Rica	5,182,354	7	0	1	2	0	0	0	0	10
11	Cuba	11,305,652	8	0	2	7	0	0	0	0	17
12	Dominica	72,344	0	0	0	0	0	0	0	0	0
13	Dominican Republic	11,056,370	0	0	1	0	0	0	0	0	1
14	Ecuador	18,113,361	23	4	1	4	1	0	0	0	32
15	El Salvador	6,550,389	11	0	4	4	0	0	0	0	19
16	Grenada	113,475	3	1	2	0	0	0	0	0	6
17	Guatemala	18,584,039	6	0	0	0	0	0	0	0	6
18	Guyana	794,045	4	0	0	0	0	0	0	0	4
19	Haiti	11,680,283	1	0	3	0	0	0	0	0	4
20	Honduras	10,221,247	1	0	0	1	0	0	0	0	2
21	Jamaica	2,985,094	8	1	2	1	0	0	0	0	12
22	Mexico	131,562,772	96	12	12	45	3	1	0	0	166
23	Nicaragua	6,779,100	2	0	0	0	0	0	0	0	2
24	Panama	4,446,964	2	0	1	2	0	0	0	0	5
25	Paraguay	7,305,843	4	0	0	1	1	0	0	0	5
26	Peru	33,684,208	33	4	11	45	0	0	0	0	93
27	Saint Kitts and Nevis	53,871	2	1	0	0	0	0	0	0	3
28	Saint Lucia	185,113	0	0	0	0	0	0	0	0	0
29	Saint Vincent and the Grenadines	111,551	1	0	0	0	0	0	0	0	1
30	Suriname	596,831	1	0	0	0	0	0	0	0	1
31	Trinidad and Tobago	1,406,585	20	2	2	0	0	0	0	0	24
32	Uruguay	3,496,016	6	2	0	0	0	0	0	0	8
33	Venezuela	29,266,991	11	0	0	4	0	0	0	0	15
-	Total	660,874,176	538	64	87	173	31	2	0	2	865

^a Some documents may have multiple document types.



Figure 3 Latent dirichlet allocation topic modeling analysis (fields: abstracts and titles).

and are regarded as having limited significance within the subject area.¹⁵ According to Bradford's Law, the journals in the first zone include *Atencion Primaria*, *Primary Care Diabetes*, and *Journal of Primary Care and Community Health*. Journals in the second zone include *Family Practice*, *Medicina De Familia-Semergen*, *BMC Family Practice*, *Physician and Sportsmedicine*, and *Primary Health Care Research and Development*.

When the distribution of publications produced by LAC countries is examined according to funding agencies, the top five institutions are as follows: Conselho Nacional De Desenvolvimento Cientifico E Tecnologico/CNPQ (Brazil, n : 23, 3.82%), Coordenacao De Aperfeicoamento De Pessoal De Nivel Superior/CAPEs (Brazil, n : 21, 3.48%), National Institutes of Health (USA, n : 15, 2.49%), United States Department of Health Human Services (USA, n : 15, 2.49%), Universidad Espiritu Santo (Ecuador, n : 9, 1.49%). It is observed that Brazil stands out among the institutions that provide the most support to publications. However, it is also evident that research institutions from the USA and Canada contribute to academic research in the primary health care field in the region.

Research areas, articles title, abstract, and keywords analyses

LAC countries' articles in the primary health care field are strongly associated with other fields as follows: general internal medicine ($n: 297, 49.33\%$), endocrinology metabolism ($n: 76, 12.62\%$), orthopedics ($n: 26, 4.31\%$), sport sciences ($n: 26, 4.31\%$), radiology nuclear medicine medical imaging ($n: 16, 2.65\%$), health policy services ($n: 15, 2.49\%$), respiratory system ($n: 13, 2.15\%$), health care sciences services ($n: 5, 0.83\%$), pediatrics ($n: 4, 0.66\%$), public environmental occupational health ($n: 4, 0.66\%$), urology and nephrology ($n: 4, 0.66\%$), experimental medicine research ($n: 2, 0.33\%$), psychiatry ($n: 2, 0.33\%$), and surgery ($n: 2, 0.33\%$).

In our study, text data from articles of researchers in the primary health care field in LAC countries were analyzed using LDA topic modeling analysis to identify specific topics and themes. This facilitated the meaningful grouping of data and extraction of significant information. The themes obtained from this analysis are shown on six different word clouds in [Fig. 3](#).

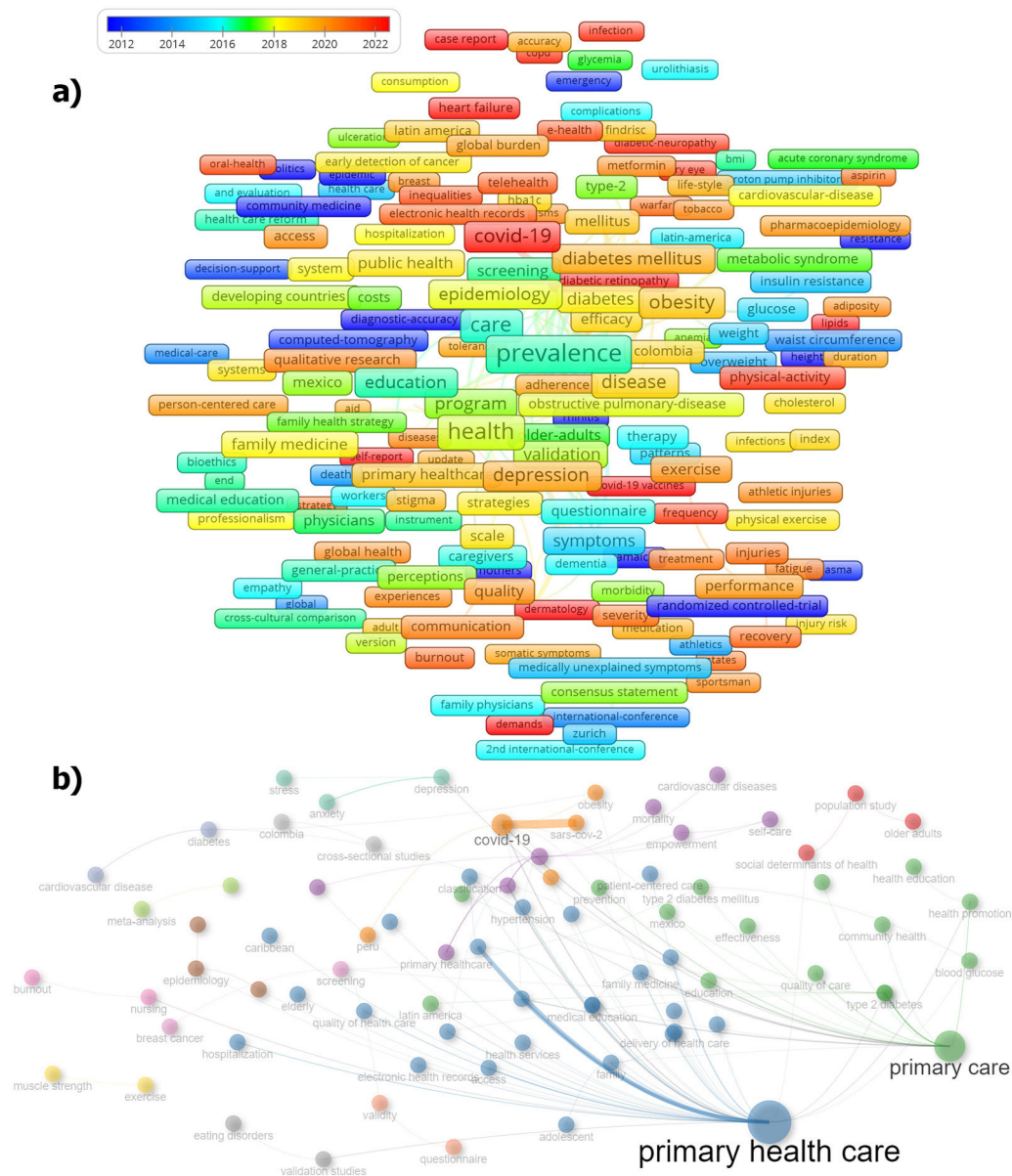


Figure 4 Co-occurrence keywords and thematic evolution analysis for LAC countries in primary health care research area (a. overlay visualization, b. network visualization).

When the keywords in the works of researchers in LAC countries are analyzed, the table shown in Fig. 4 is obtained. In the primary health care field of LAC region, researchers have intensively studied the following topic headings: Primary care, COVID-19, diabetes, obesity, public health, screening, depression, family medicine, family practice, epidemiology, education and medical education, hypertension, mental health, patient-centered care, cardiovascular disease, health promotion, exercise, prevalence, prevention, qualitative research, quality of life and quality of care, adolescent, caregivers, delivery of health care, insulin resistance, pregnancy, social determinants of health, aging, asthma, breast cancer, community health, health services, nursing, palliative care, physical activity, and anxiety and burnout. These have been the prominent topic headings researched intensively by researchers in the region.

Discussion

The declaration signed in Alma-Ata in 1978 characterized primary health care as the central function and primary focus of a country's health system. Adequate primary health care has been seen as the key to ensuring equitable universal care.¹⁶ In fact, there are even stronger motivations to pursue primary health care research in developing countries, where there is a greater potential for enhancing health outcomes. Research in primary care is crucial for advancing health systems and crafting more effective health policies.¹⁷ In terms of scientific productivity, the primary health care sector in LAC countries has emerged as an area open to development compared to other countries. LAC countries have produced 0.83% of the entire primary health care literature on the world's WoS database, while they have contributed 0.98% in

the article and review article types. However, LAC countries have a total population of over 660 million people, representing about 8.25% of the world population. Additionally, it has been observed that countries in the region are actively researching topics such as cancer, obesity, nutritional disorders, food safety, and COVID-19 in the relevant field. It's evident that countries like the USA, Canada, and England are more collaborative in the primary health care field. Some LAC countries have very few research outputs in the area of public health, which is critical for developing and underdeveloped countries.

Considerable challenges arise when addressing the unmet needs for developing effective primary healthcare services in resource-poor countries, where the overall funding available for medical research is quite limited.¹⁷ Van der Zee et al.¹⁸ have identified several key conditions required to support successful primary healthcare research initiatives. These include: having a scientific association, access to peer-reviewed journals, a system that connects primary care with other health services, general practitioner programs at universities, the integration of education and research centers, clinicians working in group practices or health centers, some level of independence from government influence, and financial support for clinicians to engage in research. Various initiatives have been undertaken by the Ibero-American Confederation of Family Medicine (IBIMEFA) in the region to promote the development of primary healthcare services and foster regional collaboration.¹⁹ However, upon examining both funding information and journals with high publication rates, no specific journal, institution, university, department, research center, or regional agency providing funding for research aimed at developing primary healthcare services in LAC countries has been identified. This indicates that the region can be characterized as an area open to development and a priority for more effective development of primary healthcare services. IBIMEFA has highlighted the need for the expansion and enhancement of primary care and family medicine in the region over the past decade. They have emphasized the lack of research funding for primary care and the necessity for appropriate training for primary care professionals to develop more research skills. Additionally, they have underscored the importance of strengthening the regional research network and reinforcing family medicine as an academic discipline in universities within the region.

Another important source of health literature data for LAC countries that should not be overlooked is LILACS. LILACS indexes a total of 917 journals from 21 different countries (the number of indexed journals by country, listed alphabetically, is as follows: Argentina:129, Bolivia:13, Brazil:314, Chile:65, Colombia:128, Costa Rica:14, Cuba:46, Dominican Republic:1, Ecuador:11, El Salvador:1, Guatemala:10, Honduras:5, Jamaica:1, Mexico:51, Panama:4, Paraguay:12, Peru:41, Puerto Rico:1, United States:1, Uruguay:12, Venezuela:57). However, it is evident that, considering the countries of these journals, it does not encompass all countries worldwide.¹² LILACS undoubtedly provides a high-quality and significant service for the region. However, indexing journals in internationally recognized databases such as WoS and Scopus is believed to contribute to the global literature by regional journals.

It is also thought to enhance the international visibility of institutions and researchers in LAC countries, as well as increase international collaboration among researchers. Being indexed in WoS or Scopus requires institutions to undergo specific accreditation processes.^{20,21} It should also be noted that World University Rankings systems, such as Times Higher Education (THE), Academic Ranking of World Universities (ARWU), and Quacquarelli Symonds (QS), take into account publications in journals indexed in the relevant databases.^{22,23} The team managing LILACS's publishing activities in the health field could also facilitate the indexing of its journals in Scopus and WoS. It could provide consultancy to help ensure that the indexed journals are also indexed in these international databases. It should be noted that not all journals under LILACS can be indexed in these international databases. Therefore, institutions and organizations responsible for health policies in LAC countries could strategically improve the number of journals indexed in international databases and international publishing activities through selective short- and long-term plans. Systematic and more result-oriented progress can be achieved in the accreditation processes for selected journals. Additionally, policies could be developed to make LILACS's own index international, similar to Scopus and WoS. A well-functioning regional publishing service could thereby also achieve better global impact and activity.

According to Becerra-Posada et al.,²⁴ scientific and technological activities necessitate political backing via specific and achievable policies and strategies. Researchers argue that it is urgent to strategically think about supporting research for improving health policies for LAC countries and to encourage broader discussions. Gialdini et al.⁶ emphasized the need for implementing policies at the national level to address health issues and collectively combat public health problems. They argued that academia should influence policy areas through national and international publications. Emmelhainz et al.²⁵ highlight that collaborative knowledge production has become an important method for closing the gap between knowledge and action, and for generating more evidence in the realm of public health policy and practice. Furthermore, the Pan American Health Organization (PAHO) and the World Health Organization (WHO) encourage countries in LAC to include interprofessional education and collaborative practice (IPECP) in health workforce policies and to expand policymakers' usage. PAHO recommends that countries promote the development of interprofessional teams through interprofessional education and collaborative practice in integrated health service networks.²⁶ For example, Pastrana et al.,²⁷ in their assessment of health reform in Colombia, found that universities have a significant responsibility in adopting current national policies. However, literature shows that there is very low collaboration in the field of primary health care research. In fact, establishing a Consortium for Health Research in the Americas with funding support from PAHO for research institutions in multiple countries would increase international collaboration in healthcare on the continent. Research institutes led by the leading countries in the region, regular congresses, regular publication activities, and article calls addressing health issues in the region could be highly effective in increasing regional collaboration.

The majority of LAC countries are composed of underdeveloped and developing nations. In some countries, despite the presence of LILACS, it can be observed that there is not even a journal operating in the health sector.¹² Another crucial aspect that should not be overlooked is the necessity of an academic institution for academic publishing activities. Additionally, international publishing activities may incur certain costs. Moreover, they may require journals to operate under specific rules. The relevant indexes essentially accredit these journals, which will necessitate the continuation of publishing activities of a certain quality.^{20,21} Therefore, this will create a cost. Considering the dynamics of LAC countries, institutions such as IBIMEFA, focusing on PAHO or Primary Health Care, could develop constructive policies in this regard. Furthermore, journals do not pay any fees to be indexed in WoS or Scopus. However, higher education institutions in LAC countries do pay subscription fees to access journals indexed in these databases. Therefore, higher education institutions may need to set pricing according to national dynamics or facilitate subscription fees based on the country's conditions. This approach should not be overlooked as it will enable these countries to make greater contributions to the international literature and follow global literature and developments more easily.

Everyone needs universal access to healthcare and universal health coverage to achieve good health.¹⁶ However, rural communities face various access barriers.²⁸ This is particularly crucial for many developing countries, including those in the LAC region. Moreover, analyses have shown that numerous studies have been conducted on nutrition disorders among LAC countries. Nutrition emerges as a critical public health problem, especially in the southern part of the continent.²⁹ The studies by Poirier et al.³⁰ support this statement. Researchers have noted that although the LAC region has achieved the largest global decrease in malnutrition over the past decade, it remains the region with the highest prevalence of overweight individuals worldwide.

In our study, it has been observed that cancer is a heavily researched topic within the field of primary health care in LAC countries. Also breast cancer and cervical cancer are the first and third leading causes of cancer deaths in women.^{8,31} Delays in diagnosis and treatment contribute to high and consistently increasing cancer mortality rates in Latin America.^{31,32} Furthermore, the fragmentation of health services, which is the main cause of delays in cancer diagnosis and treatment, contributes to high mortality rates, especially among disadvantaged groups in Latin America.³³ It has been observed that many countries are attempting to reduce these mortality rates through primary health care screenings and by producing guidelines within the primary health care field. Rojas-Torres & Herrera⁷ have emphasized that effective primary care requires professionals to work effectively and develop the necessary skills and abilities to ensure effective primary care strategies. Therefore, collaboration with countries that have strong primary healthcare services like Canada and the United States, as well as countries with strong higher education institutions, is believed to increase the region's qualified human resources. Peixoto et al.³⁴ have observed that recent research highlights the most significant factor related to quality is the enhanced

training and competence of professionals. Troya et al.³⁵ have mentioned that in the last decade, many countries in Latin America have made efforts at the state level in the primary health care field. Despite the presence of new health laws in Chile and Colombia, which have established community centers to provide specialized care in primary healthcare services since 2015, there has not been a collective progress in all regional countries.

The main reasons for this are cited as political instability and inadequate economic resources. According to Rojas-Torres & Herrera,⁷ when we analyze the integrated primary healthcare service strategies implemented in Argentina, Chile, Colombia, Cuba, and Mexico, it is clear that all these countries prioritize primary healthcare services as a mechanism to improve health quality and access. Such collaboration, especially from countries with strong institutions and researchers in primary healthcare policies, can accelerate the learning process for researchers and institutions in the respective countries, opening the way for cancer control from primary healthcare levels in LAC countries.

The COVID-19 pandemic has demonstrated that global pandemics cannot be addressed through individual or regional initiatives alone, but rather necessitate a more collective approach. In our research, COVID-19 has emerged as a heavily studied topic. At this point, the most important and strategic knowledge workers are academics. Da Costa et al.³⁶ found that the response of the scientific communities in Argentina, Brazil, Chile, Colombia, and Mexico to COVID-19 has been quite limited. In May 2020, the WHO labeled Latin America as the epicenter of the worldwide COVID-19 pandemic.³⁷ Martinez-Valle,³⁸ in his study examining the COVID-19 process in six Latin American countries, stated that Argentina, Chile, and Colombia implemented more rapid and stringent public information campaigns, which resulted in greater reduction in mobility; on the other hand, Brazil and Mexico did not. The researcher emphasized the need for governments to produce reliable and useful information so that people can take appropriate mitigating measures to protect themselves from the pandemic. At this point, decisions taken from a strong public health union for the LAC region or the entire American continent could have guided policymakers to formulate more directive policies, preventing the severity of the situation. This would have allowed for more effective policies and strategies to be developed by leveraging the expertise of specialists.

Strengths and limitations

Researchers in LAC countries have numerous publications in the field of primary health care. Not incorporating all of these publications may be seen as a limitation to our research. Researchers in LAC countries predominantly prefer to publish in over 900 journals indexed in the LILACS health literature database.¹² Future studies could also focus on this data source. However, it has been deemed a correct strategy to directly track publications in leading and international journals focusing on the "Primary Health Care" field on WoS, encompassing over thirty journals. This approach is considered appropriate for demonstrating the

development of primary health care in LAC countries and facilitating scientific benchmarking.

Conclusions and recommendations

In our study, it has been observed that LAC countries contribute to only 0.83% of the global primary health care literature in WoS database. This can be considered quite low for a vast geographic area comprising 33 countries. The contribution of some countries to the international literature is almost negligible. Therefore, developing an effective primary healthcare research infrastructure is an open area for LAC countries. However, as primary healthcare services encompass basic health services that all citizens should have access to, as stated in the Alma-Ata declaration, establishing a strong primary healthcare system in the region is essential. To achieve this, regional countries can collaborate among themselves, address similar problems more effectively, and utilize scientific thinking more efficiently in these solutions. It would be advisable to consider launching journals in the field of primary health care that shape the landscape of the field, indexed by WoS and Scopus, and organizing regional conferences among LAC countries. Journals do not pay any fees to be indexed in WoS and Scopus. These types of institutions generally generate income from database subscription fees obtained from higher education institutions. Therefore, for LAC countries, among journals indexed in LILACS, those that have been conducting publishing activities for many years in a high-quality manner and have created an impact in the field could initiate the necessary processes for applying to and obtaining inclusion in the relevant indexes through short- and long-term strategic planning.

It is undoubtedly crucial for researchers in LAC countries to have access to journals indexed in international databases such as WoS and Scopus. In this context, it is recommended to consider the subscription fees, taking into account the dynamics of LAC countries. Science is a global phenomenon. By making these journals more accessible, researchers in LAC countries will be able to engage more easily with WoS and Scopus indexed journals. This will enable not only PHC researchers in our study but also all researchers in the LAC region to contribute more effectively to the global literature. Another important point is that LAC countries are predominantly Spanish- and Portuguese-speaking nations. Therefore, alongside enhancing publishing activities in these countries, academic language translation centers could be established within universities to facilitate the publication processes for researchers. Journals like *Atención Primaria* can accept publications in English, and such a service would not only benefit the PHC or health field but also contribute to the internationalization of all research areas in LAC countries. Consequently, the region can benefit from a more qualified workforce, more effective healthcare systems, and health policies. Collaboration with leading countries in primary healthcare services worldwide can be pursued to train future primary healthcare professionals, establish research centers for the development of primary healthcare services in LAC countries, and provide funding support to these institutions through regional cooperation.

What is already known on the topic

- Prominent studies include analyses of primary health care challenges in five Latin American countries, abortion policy implementation across Latin America, and breast cancer screening programs in the Latin American and Caribbean (LAC) region. However, a comprehensive study evaluating scientific productivity in primary health care research, with an aim to enhance collaboration, has not yet been conducted.

What does this study contribute

- Our study provides a comprehensive assessment of scientific productivity in primary health care across LAC countries using bibliometric methods and machine learning techniques. This approach enables an evaluation of the scientific performance of LAC countries in primary health care research, a situational analysis to identify key areas of concern, and actionable recommendations for improvement. Establishing a robust primary health care research infrastructure remains an open area for LAC countries to develop.

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Not applicable.

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Conflicts of interest

The authors have no competing interests to declare.

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