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Original article

Scientific production on the riverside population's health in Brazilian territory: a bibliometric study

Produção científica sobre a saúde da população ribeirinha no território brasileiro: estudo bibliométrico

Producción científica sobre la salud de la población ribereña en territorio brasileño: estudio bibliométrico

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Abstract

Objective: to measure scientific production on the riverside population's health in Brazilian territory. **Method:** a bibliometric study, with data collected in March and April 2023, using different databases, via the Virtual Health Library, PubMed, Coordination for the Improvement of Higher Education Personnel Journal Portal and the online scientific library. Search strategies were developed with descriptors and keywords. Descriptive statistical analysis was performed, and Bradford's, Lotka's and Zipf's bibliometric laws were applied. **Results:** the sample consisted of 35 documents, predominantly quantitative original articles, published in English and Portuguese, in from 2019 to 2022. Due to their publication numbers, five authors and four Brazilian institutions were highlighted. Four most influential journals, four most representative keywords and the main terms used in writing the objectives of selected studies were identified. **Conclusion:** it was evident that scientific production has increased in recent years, but it is necessary to strengthen the volume of studies on the topic.

Descriptors: Rural Population; Health; Brazil; Bibliometrics; Scientific Publication Indicators

Resumo

Objetivo: mensurar a produção científica sobre a saúde da população ribeirinha no território brasileiro. **Método:** estudo bibliométrico, com dados coletados em março e abril/2023, utilizando diferentes bases, via Biblioteca Virtual em Saúde, PubMed, Portal de Periódicos da Coordenação de Aperfeiçoamento de Pessoal de Nível Superior e biblioteca científica *online*. Foram elaboradas estratégias de busca com descritores e

palavras-chave. Realizou-se análise estatística descritiva, e aplicaram-se as leis bibliométricas de Bradford, Lotka e Zipf. **Resultados:** a amostra foi constituída por 35 documentos, predominando artigos originais quantitativos, publicados em inglês e português, nos anos de 2019 a 2022. Por seus números de publicação, foram destacados cinco autores e quatro instituições brasileiras. Identificaram-se quatro periódicos mais influentes, quatro palavras-chave mais representativas e os principais termos utilizados na redação dos objetivos dos estudos selecionados. **Conclusão:** evidenciou-se que a produção científica aumentou nos últimos anos, mas é necessário robustecer o volume de estudos sobre o tema.
Descritores: População Rural; Saúde; Brasil; Bibliometria; Indicadores de Produção Científica

Resumen

Objetivo: medir la producción científica sobre la salud de la población ribereña en territorio brasileño. **Método:** estudio bibliométrico, con datos recolectados en marzo y abril de 2023, utilizando diferentes bases de datos, a través de la Biblioteca Virtual en Salud, PubMed, Portal de Revistas de la Coordinación de Perfeccionamiento del Personal de Educación Superior y la biblioteca científica en línea. Se desarrollaron estrategias de búsqueda con descriptores y palabras clave. Se realizó análisis estadístico descriptivo y se aplicaron las leyes bibliométricas de Bradford, Lotka y Zipf. **Resultados:** la muestra estuvo compuesta por 35 documentos, predominantemente artículos originales cuantitativos, publicados en inglés y portugués, en los años 2019 a 2022. Por su número de publicaciones, se destacaron cinco autores y cuatro instituciones brasileñas. Se identificaron cuatro revistas más influyentes, cuatro palabras clave más representativas y los principales términos utilizados en la redacción de los objetivos de los estudios seleccionados. **Conclusión:** se evidenció que la producción científica ha aumentado en los últimos años, pero es necesario fortalecer el volumen de estudios sobre el tema.
Descriptores: Población Rural; Salud; Brasil; Bibliometría; Indicadores de Producción Científica

Introduction

Riverside people live in rural areas known as floodplains, which are located close to rivers, with their daily lives governed by water dynamics (floods and ebbs). Other relevant characteristics correspond to their economic activities, carried out through fishing and plant extraction, and the shape of their houses, known as "stilts", built entirely with wood.[1]

This population's geographical peculiarities constitute a relevant aspect in the formation of their sociocultural identity. In this regard, rivers represent the main route of mobility and means of family support, contributing to these communities' physical and social isolation, which makes it difficult to meet their individual and collective health needs.[2]

From a cultural perspective, riverside residents have a strong heritage from indigenous peoples, especially regarding health issues, easily seen in the use of medicinal plants. However, traditional knowledge and practices are often devalued on a daily basis, hurting the way of life and religiosity of this population, as many practices are associated with prayers. This fact constitutes another aspect that distances riverside residents from health services.[3]

According to the 1988 Federal Constitution, access to health is the right of Brazilian citizens and the State's duty, a context in which the principles of universality, comprehensiveness and equity are important attributes of the Brazilian Health System (SUS – *Sistema Único de Saúde*). Even though it appears as a constitutional right, access to health still has limitations and inequalities to be effectively guaranteed in the social reality of many Brazilians. In the case of the riverside population, this can result in obstacles in going to health units and/or in scheduling routine appointments or specialized appointments.[4]

To reduce these limitations and inequalities, the Brazilian National Policy for Comprehensive Health of Rural, Forest and Water Populations (*Política Nacional de Saúde Integral das Populações do Campo, da Floresta e das Águas*) was established in 2011, with the aim of meeting populations' needs and facilitating access to health actions and services, in addition to reducing risks and problems arising from work processes and agricultural technologies, and improving health indicators. This policy is the result of extensive debate with various representatives of civil society in the construction of better living and health conditions for traditional communities.[5]

In the riverside context, access problems not only affect their quality of life, but also impede the effectiveness and adequate assessment of public policies.[3] Although health professionals understand the organization policies of Primary Health Care (PHC), a study shows that it is still necessary to strengthen knowledge about specific policies aimed at the riverside population. Therefore, it is necessary to organize care actions through this knowledge and understand the resources associated with its implementation, as strengthening PHC expands the possibilities for improving quality of life.[5]

Understanding riverside residents' health conditions is fundamental to understanding their particularities and, in this way, contributing to providing comprehensive and equitable care. With this in mind, it is important to measure what has been produced about the Brazilian riverside population's health nationally and internationally so that the characteristics of available studies can be identified. From this perspective, through bibliometrics, it is possible to highlight scientific production metric indicators, with the aim of understanding and disseminating knowledge,[6-7] as demonstrated in a study, developed by European authors, which mapped and analyzed the overview of research on job insecurity in nursing.[8]

Historically, bibliometrics was created by the need to investigate and characterize

publications, in the academic field, using statistical and mathematical resources, which is why it was adopted in several areas of knowledge to objectively assess their scientific productions.[9] Thus, given the relevance of the topic, this study aims to measure scientific production on the riverside population's health in Brazilian territory.

Method

A bibliometric, quantitative and descriptive study was developed, considering the possibilities that bibliometrics offers to identify trends in authors' and journals' scientific production, in addition to measuring the dissemination of information and contributing to the formulation and implementation of policies in a given area of knowledge.[10]

The guiding question was constructed based on the PICo strategy,[11] with the following elements: P (population: riverside people in Brazil); I (phenomenon of interest: overview of scientific production); and Co (context: health). Associating them to guide the study, the question was formulated: what is the overview of scientific production on the riverside population's health in Brazilian territory?

It was decided to collect data in March and April 2023 on the Virtual Health Library (VHL) research portal, considering the databases Latin American and Caribbean Literature in Health Sciences (LILACS) and Nursing Database (BDENF). Databases as follows were also used: Medical Literature Analysis and Retrieval System Online (MEDLINE), via PubMed, a search tool from the United States National Library of Medicine (NLM); Cumulative Index to Nursing and Allied Health Literature (CINAHL) and Web of Science (WoS), through Coordination for the Improvement of Higher Education Personnel (CAPES - *Coordenação de Aperfeiçoamento de Pessoal de Nível Superior*) Journal Portal; and the Scientific Electronic Library Online (SciELO) library.

In developing the search strategies for the different databases, the descriptor "Health" and its corresponding words in Portuguese and Spanish ("*Saúde*" and "*Salud*"), registered on the Health Sciences Descriptors (DeCS) website, which is integrated with the Medical Subject Headings (MeSH). The keywords "Riverside Population" and "Riverside Populations" and their variations in Portuguese and Spanish were also used. To associate these terms, the Boolean operators AND and OR were used.

Thus, for VHL and SciELO, the strategy was developed: ("*População Ribeirinha*" OR "*Populações Ribeirinhas*" OR "Riverside Population" OR "Riparian Populations" OR "*Población Ribereña*" OR "*Poblaciones Ribereñas*") AND (*Saúde* OR Health OR *Salud*). For MEDLINE: (("Riverside

Population"[All Fields]) OR ("Riparian Populations"[All Fields]) AND (Health[MeSH Terms])). For CINAHL: ("Riverside Population" OR "Riparian Populations") AND (Health). For WoS: (ALL=("Riverside Population" OR "Riparian Populations") AND ALL=(Health)).

Study selection was systematized using the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) methodology.[12] Complete studies that addressed the riverside population's health in Brazil were included, without restriction by study design, languages and time frame, in order to find the largest possible number of studies. It was decided to exclude book chapters, and, regarding duplicate materials, only the first occurrence of each material was considered, excluding its duplicates. In order to eliminate duplicates and select studies after reading the title and abstract, the Rayyan software was used. The selected studies were inserted into the Zotero software, version 5.0.96 (2021), whose function is to manage and share references.

A total of 98 studies were found, of which 28 were duplicates, remaining 70. After analyzing titles and abstracts, 30 were excluded, resulting in 40 studies to be read in full. Of these, one was eliminated, as it was a book chapter, and four were excluded, as they did not answer the guiding question, constituting the final sample with 35 documents. According to the PRISMA flowchart,[12] Figure 1 explains the selection steps.

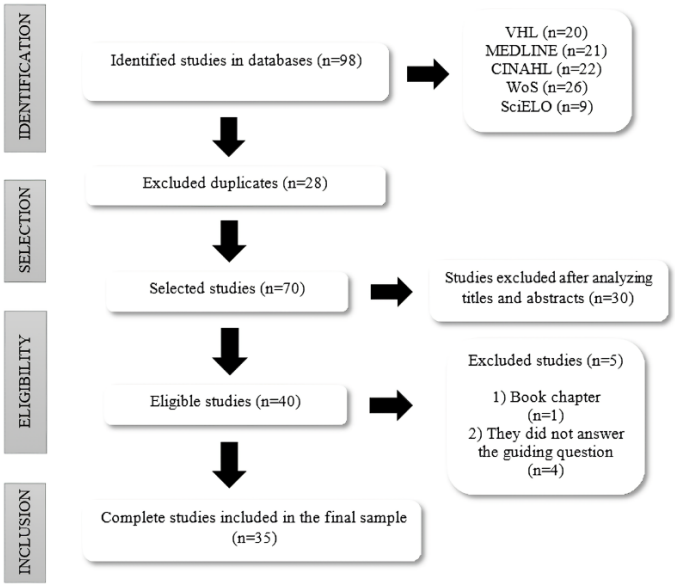

Figure 1 – Study selection process. Belém, PA, Brazil, 2023.

To organize the data, a database was built in Microsoft Office Excel® version 2016, covering different bibliometric indicators: study title; authors; number of authors per study; main authors' institutions and training areas; language and year of publication; journal; study design; research approach (quantitative or qualitative); study objective; and indexing terms (descriptors and

keywords). Aiming for fluidity in writing this study, the generic expression "keywords" was chosen to refer to both indexing terms.

The database was built to enable the descriptive statistical analysis of 10 variables selected among bibliometric indicators, by presenting absolute numbers and percentages, with the aim of measuring scientific production and facilitating the understanding of results. These variables are: authors; number of authors per study; main authors' institutions and training areas; language and year of publication; journal; study design; research approach; and keywords. Additionally, to strengthen the analysis, the three classic laws of bibliometrics were used: Bradford's Law; Lotka's Law; and Zipf's Law.[13-14]

Bradford's Law deals with the dispersion of scientific journals to verify their productivity, making it possible to identify groups that differ by the density of journal scientific production on a specific topic. The number of groups may vary according to the researchers' choice to operationalize the study, but, generally, three groups are chosen, as demonstrated in other publications.[13-15] To form them, journals were arranged in descending order of scientific production, using a spreadsheet built in Microsoft Office Excel® 2016. The number of studies in the final sample (n=35) was divided into three approximately equal parts to compose each group with one third (33.3%) of scientific production.[14-15]

Thus, the first group, called the nucleus or first zone of Bradford, was made up of a small number of journals that, together, bring together this approximate number of publications. The other groups, called the second and third Bradford zones, present greater numbers of journals with lower individual publication frequencies as they move away from the nucleus, although both also account for approximately a third of scientific production.[14-15] Additionally, the Bradford multiplier (Bm) was calculated, dividing the number of journals in a zone (Jn) by the number of journals in the preceding zone (Jn-1), according to the formula Bm = Jn/Jn-1.[16-17]

To characterize the nucleus journals, the Qualis classification was consulted for the four-year period from 2017 to 2020, prepared by CAPES and made publicly available on the Sucupira Platform, with the aim of stratifying them into two areas of knowledge: nursing, as it is the field of activity of the authors of this study, and interdisciplinary, as the topic is of common interest for students and professionals from different fields and acting scenarios. The impact factor (IF) of the 2022 journals was also consulted, a bibliometric indicator indicated in the Journal Citation Reports (JCR), published by Clarivate Analytics, accessed through the CAPES Journals Portal.

Lotka's Law measures the productivity of authors, demonstrating that few produce a significant number of studies and many produce a small number on a given topic in a certain period. This law aims to monitor scientific planning by investigating this productivity, helping to identify more developed research centers and recognizing the solidity of scientific production in a specific area.[18]

To apply the law, the authors were arranged in descending order of scientific production, using a Microsoft Office Excel® 2016 spreadsheet, thus identifying the different publication quantities between them. Subsequently, trend analysis was carried out using the generic formula $An = A_1 \times 1/n^c$, in which An represents the number of authors who produced "n" studies; A_1, the number of authors who published a study; n, the number of studies; and c, a constant with a value equal to two.[18]

In turn, Zipf's Law deals with word frequency (f) and provides analytical models, establishing numerical characteristics about words in a given text.[19] To apply it, we chose to analyze the keywords and objectives of selected studies. The keywords were tabulated in descending order of occurrence, forming three groups: trivial zone, consisting of the smallest number of words with the highest frequencies; and interesting and noise zones, made up of greater quantities of words with lower frequencies, compared to those in the first zone.[15,20]

The objectives were organized in a text *corpus*, processed using the lexical analysis software *Interface de R pour les Analyzes Multidimensionnelles de Textes et de Questionnaires* (IRaMuTeQ), version 0.7, alpha 2, to check the words most frequently,[21] since studies recognize IRaMuTeQ as a tool that enables careful analysis of collected material.[13,19] The *corpus* was constructed in Portuguese, and English words were translated. Among the types of analysis available in the software, the word cloud was used, which groups terms, organizing them graphically according to their frequency.[21]

Considering that the data were collected from publicly accessible sources, this study did not require consideration by the Research Ethics Committee, but meets the ethical requirements of research and scientific dissemination.

Results

General characteristics of scientific production

The 35 documents included in this study were distributed into five designs: 28 (80.0%)

original articles;[1,4-5,22-46] four (11.4%) experience reports;[47-50] one (2.9%) literature review;[2] one (2.9%) critical review;[51] and one (2.9%) letter to the editor.[52] In the type of approach, there was a predominance of quantitative approach (n=20; 57.1%),[1,22-30,33,35-37,39-41,43,45-46] followed by the qualitative approach (n=13; 37.1%),[2,4-5,31-32,34,38,42,44,47-50] and two (5.7%) studies did not declare the type of approach, as they were a critical review[51] and a letter to the editor.[52] Regarding language, 15 (42.9%) were published in English and Portuguese;[2,26,30-31,34,36,38,40-42,44-45,47-48,52] 10 (28.6%) only in English;[22-25,27-29,33,39,43] nine (25.7%) only in Portuguese;[1,4-5,32,35,37,46,49,51] and one (2.9%) in English, Portuguese and Spanish.[50]

After searching the databases, it was identified that the first pertinent study on the riverside population's health in Brazil was published in 2007.[50] There was also an increase in scientific production on the topic in the last four full years (2019 to 2022),[2,4,33-45,47-48,51-52] peaking in 2022[42-45,47-48,52] (n=7; 20.0%), as shown in Figure 2.

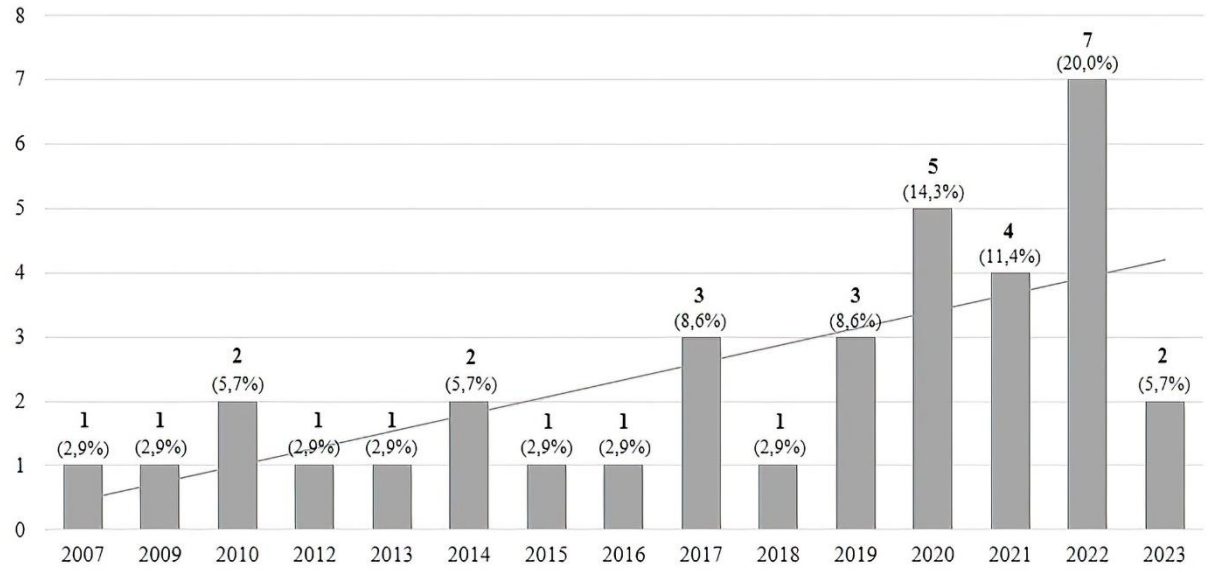

Figure 2 – Distribution of publication frequencies by year. Belém, PA, Brazil, 2023.

Author characterization

The number of authors per study varied from one to 19, with a predominance of six authors, identified in seven (20.0%) studies.[2,26,32,38,41,45,47] Regarding the main authors' institutional affiliation, a total of 20 teaching and research institutions were found, highlighting: *Fundação Oswaldo Cruz* (n=5; 14.3%); *Universidade Federal do Pará* (n=4; 11.4%); *Universidade do Estado do Pará* (n=3; 8.6%); and *Universidade Federal do Rio de Janeiro* (n=3; 8.6%). Regarding the main authors' professional training, 11 areas of knowledge were identified, with nursing (n=17; 48.6%), medicine (n=5; 14.3%) and biological sciences (n=3; 8.6%) prevailing, as shown in Table 1.

Based on Lotka's Law, it was observed that authorship consisted of a total of 123 researchers, of which two produced four studies, three produced two studies, and 118 produced only one study each. Thus, Table 1 highlights the authors who stood out due to the number of published studies. In turn, Figure 3 graphically demonstrates the authors' theoretical production trend line, generated by the application of the generic formula $An = A_1 \times 1/n^c$, and the empirical trend line, according to the results of this study, illustrating the idea that few authors published more frequently than the majority.

Table 1 – Number of authors per study, authors with the highest productivity, main authors' institutions and training areas. Belém, PA, Brazil, 2023.

Variables	Number of studies	%*
Number of authors per study		
1	2	5.7
2	2	5.7
3	5	14.3
4	5	14.3
5	4	11.4
6	7	20.0
7	1	2.9
8	4	11.4
9	3	8.6
11	1	2.9
19	1	2.9
Authors with the highest productivity		
Nogueira LMV	4	11.4
Rodrigues ILA	4	11.4
Gama ASM	2	5.7
Gonçalves ICM	2	5.7
Secoli SR	2	5.7
Another 118 authors, with one study each	1	2.9
Main author's institution		
Fundação Oswaldo Cruz	5	14.3
Universidade Federal do Pará	4	11.4
Universidade do Estado do Pará	3	8.6
Universidade Federal do Rio de Janeiro	3	8.6
Universidade de São Paulo	2	5.7
Universidade do Estado do Amazonas	2	5.7
Universidade Federal da Paraíba	2	5.7
Universidade Federal do Amazonas	2	5.7
Another 12 institutions (eight national and four international), with one study each	1	2.9
Main author's training area		
Nursing	17	48.6
Medicine	5	14.3
Biological sciences	3	8.6
Biomedicine	2	5.7

Pharmacy	2	5.7
Another six areas (law, physiotherapy, speech therapy, geography, history and dentistry), with one study each	1	2.9

*Percentuais em relação à amostra final (n=35).

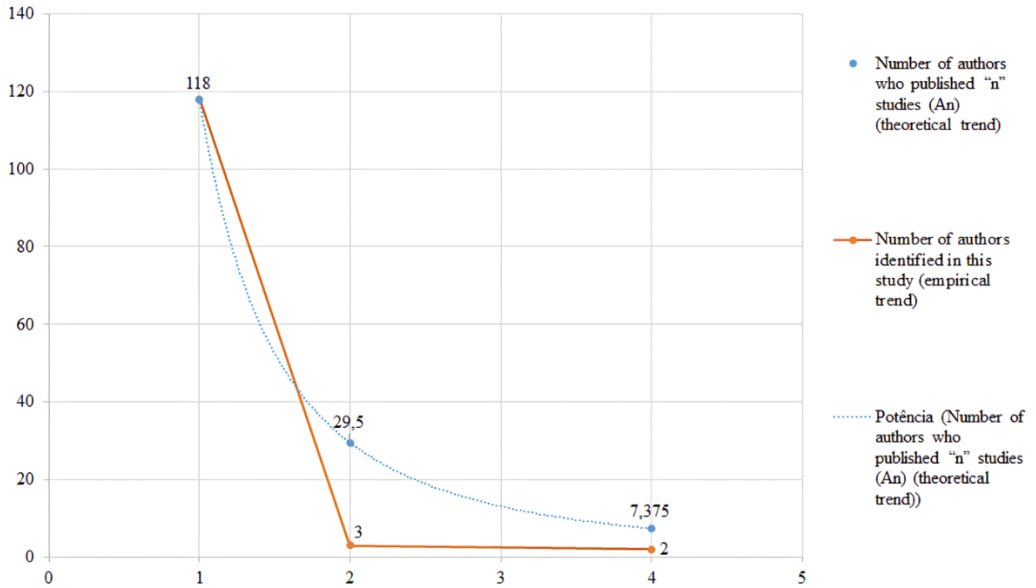

Figure 3 – Theoretical and empirical trend lines of authors' scientific production. Belém, PA, Brazil, 2023.

Dispersion of journals in productivity zones

A total of 27 journals were identified, organized into three groups, according to Bradford's Law: nucleus or first zone, with four (14.8%) journals, totaling 11 (31.4%) studies; second zone, composed of 11 (40.7%) journals, with 12 (34.3%) studies; and third zone, by 12 (44.4%) journals, with one study each, totaling 12 (34.3%) studies. The Bm between the second zone and the nucleus (Jn/Jn-1) is approximately 2.8; in turn, Bm between the third and second zones is approximately 1.1, with an average value of 1.95.

Due to their representativeness, it was considered relevant to highlight the journals from the Bradford nucleus, with their absolute numbers and percentages of scientific production, Qualis/CAPES 2017-2020 strata for nursing and interdisciplinary areas, and their IF for 2022. These journals they are: *Cadernos de Saúde Pública* (n=4; 11.4%; Qualis=A1; IF=2.8); *Revista Brasileira de Enfermagem* (n=3; 8.6%; Qualis=A4; IF=1.3); *Revista da Escola de Enfermagem da USP* (n=2; 5.7%; Qualis=A2; IF=0.9); and Evidence-Based Complementary and Alternative Medicine (n=2; 5.7%; Qualis=A3; IF=0.0).

The journals *Revista da Escola de Enfermagem da USP* (Qualis=A2), Evidence-Based Complementary and Alternative Medicine (Qualis=A3) and *Revista de Enfermagem UFPE Online*

(Qualis=B1) presented the same number of published studies (n=2). As a parameter to define which of them would make up the Bradford nucleus, we chose to consider those with higher Qualis strata and the fact that the journal *Revista de Enfermagem UFPE Online* does not yet present IF, as demonstrated in JCR. Thus, the first two journals were selected.

Word frequency and distribution

Thus, 117 keywords were recorded, with a total frequency of 134 citations in included studies. Applying Zipf's Law and analyzing the descending tabulation of words, according to the frequency in which they occurred, three groups could be defined: trivial zone, consisting of four (3.4%) words and 13 (9.7%) citations; interesting area, by eight (6.8%), with 16 (11.9%) citations; and noise zone, by 105 (89.7%), with one citation each, totaling 105 (78.4%) citations.

Considering that trivial and interesting zones bring together the words with the highest number of citations, when compared to the noise zone, we chose to highlight them. From this perspective, the following terms were identified as words from the trivial zone: "vulnerable populations" (n=4; 3.0%); "Primary Health Care" (n=3; 2.2%); "mercury" (n=3; 2.2%); and "rural population" (n=3; 2.2%). As words from the interesting zone, the terms were identified: "Amazon ecosystem" (n=2; 1.5%); "nursing" (n=2; 1.5%); "Family Health Strategy" (n=2; 1.5%); "hypertension" (n=2; 1.5%); "riverside populations" (n=2; 1.5%); "prevalence" (n=2; 1.5%); "public health" (n=2; 1.5%); and "telemedicine" (n=2; 1.5%).

The text *corpus* of study objectives consisted of 33 texts, considering that two documents (critical review and letter to the editor) did not explain objectives. After processing by IRaMuTeQ, 33 text segments and 738 occurrences (words, forms or vocabulary) were identified.

From the word cloud (Figure 4), a connection can be seen between the most cited inductive terms, "Amazonas" (f=9) and "riverside population" (f=7), which are associated with the terms "Brazil" (f=6), "health" (f=6) and "knowledge" (f=4), and related to the verbs "analyze" (f=11), "assess" (f=7), "describe" (f=4) and "discuss" (f=3). This highlights the interconnection of words so that objective is constructed with clarity and semantic consistency, expanding the possibilities for it to be achieved.

Figure 4 – Word cloud of objectives of included studies. Belém, PA, Brazil, 2023.

Discussion

Publications on the riverside population's health in Brazilian territory covered a period of 16 years (2007 to 2023). During this period, there was an increase in the number of studies published on the topic, with emphasis on the last four years, especially for 2022.

It was found that original articles prevailed in relation to other study design, a result that is associated with the collective investment of researchers and institutions in the production and dissemination of studies of different natures, such as applied research. Studies of this nature aim to grasp new knowledge and are aimed at practical objectives, whether descriptive, exploratory, or explanatory, focusing on aspects and/or phenomena that need to be better understood, as observed in a bibliometric study that analyzed scientific production on the latent tuberculosis infection.[15]

Regarding the approach, quantitative research predominated, similar to the results of other studies.[13-14] This approach is part of the positivist field of mathematical investigation and logic, and is essential for research that seeks to identify and assess levels, rates and other values related to biological or social factors and phenomena. By analyzing data on different variables, quantitative research has the ability to correlate them and identify possible associations, demonstrating patterns and trends.[53] Therefore, it is understood that it is important to develop this and other approaches, in order to contribute to the advancement of knowledge about the riverside population's health.

Regarding languages, it is noteworthy that English predominated among publications, identifying, in the majority, studies available in English and Portuguese, however another portion was only available in English. This predominance is justified by the fact that English is considered a universal language, enabling and enhancing the internationalization of studies, a context in which

researchers have access to published results, communicate, discuss and share information to develop and democratize knowledge. In this sense, internationalization is recognized and encouraged by Brazilian researchers as a strategy that allows expanding the visibility and impact of Brazilian science on the international stage.[54]

The first pertinent study on the topic was published in the *Revista Latino-Americana de Enfermagem* in 2007.[50] Prepared in Brazil by a Canadian author, this study aimed to discuss strategies to better understand how to build health practices in a community environment, based on experimental learning with marginalized human groups and using the history of their experiences as pertinent information to build knowledge that confronts uncontrollable contextual variables.[50]

From this perspective, it became clear that the systematization of personal experiences based on popular culture can be used and analyzed as a way of obtaining and better understanding scientific knowledge. Thus, it is possible to contribute to engendering promising paths in research activities and, above all, developing knowledge about disease prevention and health and care promotion for the community.[50]

It is understood that such reflection gains greater relevance in the face of other studies carried out with riverside populations, considering that, as reiterated in the scientific literature, valuing knowledge and cultural experiences is fundamental to proposing and implementing health care strategies, and leading to the development of public policies that strengthen assistance to these populations.[34,55] In the riverside context, this allows the transformation of individual decision-making processes that have collective impacts, encouraging subjects' leading role to establish relationships between technical-scientific knowledge and popular knowledge.[55]

A total of 123 authors were identified in the sample of 35 documents, a context in which most publications presented more than two authors, demonstrating the academic-scientific community's interest research on the topic, especially in a collaborative way among authors and national and international teaching and research institutions. This expands and consolidates the formation of networks to develop and share knowledge production,[15] expanding the possibilities to improve riverside populations' living and health conditions.

The authors were linked to predominantly Brazilian institutions, with emphasis on those in the North region, since, of the eight institutions with two to five studies each, four were from the North. Bathed by rivers and containing the Amazon Forest, this region has the largest territorial extension in the country, exerting influence on the daily organization of riverside populations, which

is why it is understood that the development of studies in this geographic space can encourage reflections and planning proposals for actions and strategies that improve the health system and improve riverside residents' quality of life.[56] This fact is demonstrated by observing that the *Universidade Federal do Pará* and the *Universidade do Estado do Pará* occupy prominent positions in research.

In the authors' training, nursing, medicine and biological sciences are perceived as areas that have developed the most studies on the topic, with emphasis being placed on nursing, as it is the training area of 17 main authors. In this context, as pointed out in the literature, it is known that nursing professionals are those who often create and strengthen greater bonds with this population in PHC multidisciplinary teams, allowing cultural dialogue.[57]

This conduct favors assistance actions to respond to biopsychosocial needs and operational challenges that emerge in riverside residents' social reality, making it possible to share knowledge and experiences, a fact that also facilitates research activities.[57] However, considering the multiplicity of knowledge necessary to understand riverside residents' sociocultural daily life and intervene in their health problems, it is important to highlight that other areas of training, inherent to health sciences and human/social sciences, have also developed studies on the subject, such as biomedicine, pharmacy, geography, history and dentistry.

It is understood that the application of bibliometric laws strengthened this study, incorporating consistent data in relation to authors' and journals' productivity and word frequency and distribution. To demonstrate the theoretical and empirical trend lines of authors' scientific production with Lotka's Law, initially, the number of authors were calculated depending on the theoretical quantity of published studies, pointing out the mathematical prediction of a significant volume of publications on the topic, given that it reinforces the scientific and social importance of studies on the riverside population's health in Brazil. However, analyzing the empirical trend based on the results of this study, authors' low scientific production became evident, considering the period analyzed, which is why it is necessary to create institutional strategies to foster and encourage this scientific production, especially in the context of research groups.

Despite the number of main authors linked to institutions in the North region, it was observed that Brazilian journals, notable for the number of studies published, are from the Southeast and Central-West regions, as demonstrated in the Bradford nucleus. Leading scientific production, with five publications, the journal *Cadernos de Saúde Pública* (Qualis/CAPES=A1;

IF=2.8), founded in 1985 and administered/edited by the *Escola Nacional de Saúde Pública Sergio Arouca, Fundação Oswaldo Cruz*, in Rio de Janeiro, was identified.[58] From this result, it can be inferred that aspects relating to riverside populations' health are of interest and meet the scope of this journal.

Furthermore, Qualis/CAPES strata assessment showed that all studies from the Bradford nucleus were published in journals classified as Qualis A. From this perspective, despite the limited number of studies, it is important to infer the theoretical and/or methodological robustness of the sample, considering Qualis, the scope and potential contributions of these journals to science and society. It is also important to note that Bm values ranged approximately between 1.1 and 2.8, with an average of 1.95, confirming that there is a difference in productivity among journals,[16-17] considering that the nucleus journals published more frequently than those from the second and third zones.

With Zipf's Law, the most representative terms of scientific production were identified, located in the trivial zone, a group consisting of the keywords "vulnerable populations", "Primary Health Care", "mercury" and "rural population", demonstrating that the riverside populations are rural communities characterized by vulnerable conditions. Among other factors, these conditions materialize due to: operational difficulties, such as geographic barriers, which limit movement and meeting these populations' biopsychosocial needs; lack of care actions and strategies, due to the often reduced configuration of health teams that assist them; and limitations of access to services at the three levels of health care.[59-60]

This reflection is based on the results of a literature review that highlighted the advances and challenges faced in these populations' health[59], as well as in a study carried out by Brazilian authors, published in an international journal, which highlighted barriers to access and organization of PHC services for riverside populations in the Amazon.[60] Furthermore, it is inferred that PHC is an important setting for developing research on the conditions, determinants and health phenomena in riverside residents' sociocultural context. Thus, studies on occurrence/prevalence of biological phenomena, such as diseases and injuries related to exposure to mercury, and on the dynamics of social phenomena, such as individual and collective actions to promote health and prevent illness, stood out.

Finally, by submitting the *corpus* of the objectives of selected studies to lexical analysis with IRaMuTeQ, a word cloud was generated, a consistent and relevant type of analysis, because it

organized and structured the cloud according to word frequency, demonstrating the most emblematic terms, due to their importance in the *corpus* composition, which best represent the scientific production on the topic. This was also evidenced in a bibliometric study, which used IRaMuTeQ to investigate, in light of Zipf's Law, word frequency correlating with titles and abstracts of scientific production on people's vulnerability to the human immunodeficiency virus (HIV).[19]

Thus, when analyzing the frequency of the most used terms, it was found that "Amazonas", "riverside population", "analyze" and "assess" stood out, highlighting their semantic correlation in the writing of objectives. This result illustrates that the Amazon represented a prominent setting for carrying out selected studies so that, for the most part, they analyzed or assessed aspects related to this population's health.

As a limitation, two factors intrinsic to the nature of this study stand out: the first concerns the databases used, which, despite being numerous and comprehensive, may not include/index all pertinent studies; and the second is inherent to the fact that selected studies correspond to peer-reviewed literature published in journals, which is why documents such as monographs, dissertations, theses and institutionally owned files were not included. Therefore, future studies can expand database selection and gray literature inclusion.

This study contributes to valuing and disseminating research on the riverside population's health in Brazil, which still lacks investment by researchers and teaching and research institutions, with the aim of expanding and strengthening health actions in their daily life, given the obstacles to consolidating the SUS principles and guidelines. Furthermore, the methodological design, results, interpretations and inferences of this study can support other research, adding theoretical-reflective and methodological possibilities, especially in bibliometric studies and literature reviews, favoring the construction of knowledge. Thus, it is understood that it can contribute to fostering discussions about the riverside population in the contexts of health care, management, teaching and research.

Conclusion

It was evident that scientific production on the riverside population's health in Brazilian territory has increased in recent years, a scenario in which there is a trend for growth, considering the prominence that riverside populations have received when appearing in these studies. Mostly, scientific production was characterized by original articles, with a quantitative approach, published in English and Portuguese, with strong collaboration among authors linked to Brazilian institutions,

especially from the North region.

When applying Lotka's Law, low scientific production by authors was verified, requiring greater investment to strengthen the volume of studies on the topic. With Bradford's Law, it was demonstrated that the smallest group of journals (Bradford nucleus) stood out for its influence on scientific production, as it published approximately a third of selected studies. In turn, with Zipf's Law, the keywords that best represent the topic and the terms most used in writing the study objectives were identified.

The importance of bibliometric studies is highlighted, pointing out the need to develop them, above all, in the context of human groups in vulnerable situations. Such reflection is anchored in the fact that they can generate or obtain indicators that favor the progress of science, contributing to developing other research, with the aim of strengthening individual and collective actions to promote health and prevent illness.

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