

## ORIGINAL ARTICLE

# Analysis of the scientific production of a Peruvian pediatric specialized institute: a bibliometric approach

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## ABSTRACT

**Introduction:** Scientific research in Peruvian institutions has experienced significant progress, with the Instituto Nacional de Salud del Niño San Borja standing out for its noteworthy contributions. This hospital is a high-complexity hospital that prioritizes pediatric care and was established in 2013.

**Objective:** This study aims to analyze the scientific output of the Instituto Nacional de Salud del Niño San Borja using data from the Scopus database up to 2023.

**Methods:** An observational and descriptive study employing a bibliometric approach was undertaken, focusing on publications authored by at least one individual affiliated with the institute and published in Scopus until December 2023.

**Results:** A total of 128 articles published since 2015 were identified, with 2021 marking the peak year of publication. Out of the total number of publications, 79.69 % were available under gold open access, with 39.06 % being observational studies. Furthermore, 41.41 % of the articles had an author or corresponding author affiliated with the Instituto Nacional de Salud del Niño San Borja, while only one article received funding from the institution.

**Conclusion:** The Instituto Nacional de Salud del Niño San Borja has experienced significant growth in its publications indexed in Scopus, with observational studies and case reports being the most frequently published. However, there is a low representation in terms of primary or corresponding authorship, as well as in article funding.

**Keywords:** Research; Health Facilities; Bibliometrics; Almetrics (Source: MeSH)

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## Análisis de la producción científica de un instituto especializado pediátrico peruano, un enfoque bibliométrico

## RESUMEN

**Introducción:** La investigación científica en instituciones del Perú ha experimentado un avance significativo, siendo notable la contribución del Instituto Nacional de Salud del Niño San Borja, hospital de alta complejidad en la población pediátrica y creado en el año 2013.

**Objetivo:** Analizar las características de la producción científica del Instituto Nacional de Salud del Niño San Borja en la base de datos Scopus hasta el año 2023.

**Métodos:** Se realizó un estudio observacional y descriptivo con enfoque bibliométrico de publicaciones que contaron con al menos un autor con filiación al instituto y que fueron publicados en Scopus hasta diciembre del 2023.

**Resultados:** Se identificaron un total de 128 artículos publicados desde el año 2015, destacándose el año 2021 como el de mayor producción. Del total de publicaciones, el 79,69 % fueron de acceso abierto de oro, siendo el 39,06 % estudios observacionales. El 41,41 % de artículos tuvo afiliación del autor y/o autor corresponsal al Instituto, y solamente 1 artículo recibió financiamiento de dicha institución.

**Conclusión:** El Instituto Nacional de Salud del Niño San Borja ha experimentado un crecimiento notable en sus publicaciones indexadas en Scopus, siendo los estudios observacionales y los reportes de casos los más frecuentemente publicados. No obstante, se observa una baja representatividad en cuanto a la autoría principal o corresponsal, así como en el financiamiento de los artículos.

**Palabras clave:** Investigación; Instituciones de Salud; Bibliometría; Indicadores de Producción Científica (Fuente: DeCS)

## INTRODUCTION

Scientific publication is one way researchers and institutions manifest the results of research, which can be read, criticized, and replicated worldwide (1). Also, scientific publication reflects the work, dedication, and investment of resources designated to the search for new knowledge, making them an essential indicator of the quality of a researcher, institution, or even a country (2). Institutions dedicated to research, such as universities, hospitals, laboratories, or specialized institutes, have the duty to promote research by providing their workers with the necessary opportunities to carry it out (3). Indicators such as the number of articles published in indexed databases or registered patents are used to evaluate the quality and productivity of research institutions, and institutions with high indicators in both areas enhance their work and prestige (4).

In Peru, scientific activity has steadily grown in the last decade, mainly in academic-focused institutions such as universities and specialized health institutes (5,6). One of the recently created specialized health institutes in Peru is the Instituto Nacional de Salud del Niño San Borja (INSN-SB), created in 2013 and considered a high-complexity hospital center aimed at the pediatric population with emphasis on surgical aspects (7). As an institute, INSN-SB not only has the function of providing highly specialized health services but also leads the development of scientific research and innovation in Peru. The scientific production of the INSN-SB team can be reflected in Scopus, which is recognized as one of the most important databases for its wide coverage of publications (8).

It is necessary to know the number of INSN-SB publications in Scopus and analyze the international collaboration network, types of scientific papers and the nature of the research. This is important as it reveals the impact and depth of the scientific contribution, facilitating a comprehensive assessment of its scope and relevance. This study aims to analyze the scientific output of INSN-SB through a bibliometric approach on the manuscripts published in the Scopus database up to 2023.

## MATERIALS AND METHODS

### Study design and unit of analysis

This is an observational and descriptive study. The analysis had a bibliometric approach and the analysis unit was the publications with at least one author with an INSN-SB affiliation.

### Sources of information and data collection period

Documents were collected from the Scopus database historically up to the year 2023. The period was determined due to the date of creation of the INSN-SB, in 2013.

### Search strategy

A search was made in Scopus using the identifier (AF-ID (60112690)) and the name of the institution (AFFILORG (“Instituto Nacional de Salud del Niño San Borja”). The collection of documents was carried out on February 2, 2024.

### Inclusion and exclusion criteria

The total number of existing publications with at least one author affiliated with the Instituto Nacional de Salud del Niño San Borja was included. Research projects and protocols were excluded. Incomplete bibliographic information and lack of access to publications were also grounds for exclusion (Figure 1).

### Data analysis

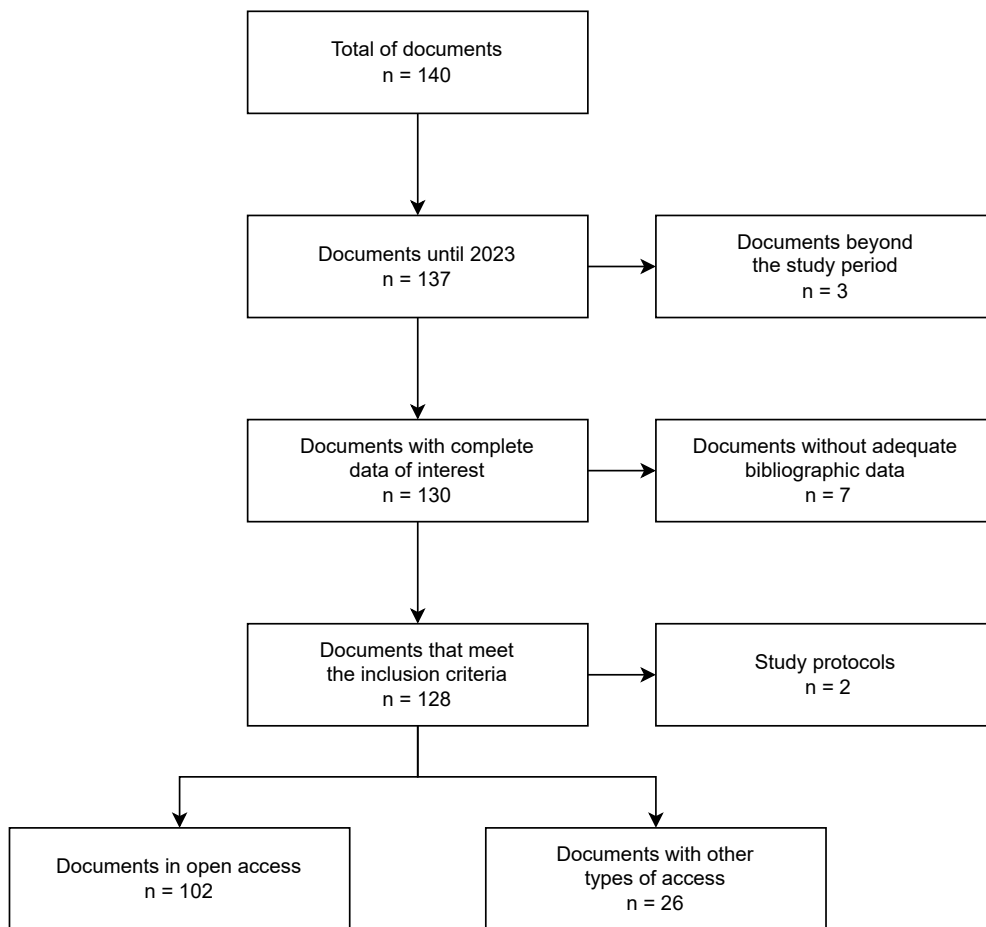
The analysis was performed using descriptive statistics, and the publications were examined in structure and content. For the analysis of structure, meticulous attention was paid to bibliographic elements, presenting absolute frequencies and percentages pertaining to the author with the highest volume of publications, author information, the most cited document, citation counts, and the journals of publication. A trend analysis was undertaken to discern patterns in publication frequency over time, and the coefficient of determination ( $R^2$ ) was derived via Spearman's correlation between the number of publications per year and time. Furthermore, a visualization of the co-occurrence of author keywords and international collaborative efforts was meticulously crafted.

Regarding the content, each document was individually reviewed to describe the type of document (narrative review, systematic review, clinical trial, observational study, case report and others), and whether the first author and corresponding author were from the institution. In addition, we conducted an analysis of its financing, including the source of funding. Additionally, we investigated whether the publications were available through open access (validated via non-institutional search methods). The analysis was carried out using RStudio software (R version 4.3.2), the “bibliometrix” library was used through the “biblioshiny” web application, and the VosViewer program (version 1.6.20, Ness Van Erck & Ludo Waltman) was used to generate the cooccurrence and network graphs.

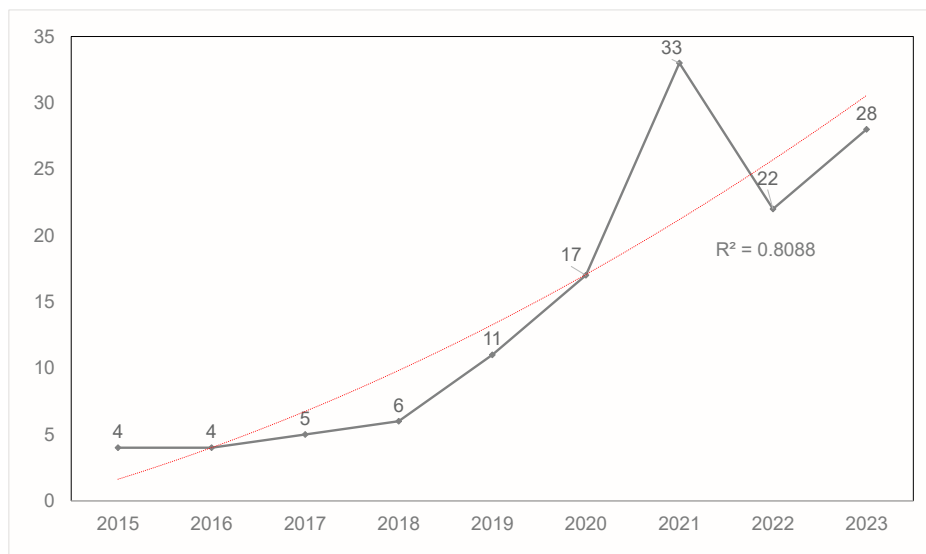
## RESULTS

A total of 128 publications were analyzed (see supplementary material). The earliest recorded publication dates back to 2015, with four studies published in the same year. A progressive increase in the number of publications was observed until December 2023 (coefficient of determination of 0.8088), with a total of 28 publications being published in that year alone. The year with the highest number of published studies was 2021 with 33 publications (Figure 2).

Among the most cited publications is the study entitled “Thoracic imaging of coronavirus disease 2019 (COVID-19) in children: a series of 91 cases” whose lead author is Pablo Caro-Dominguez (Hospital Universitario Virgen del Rocío),



**Figure 1.** Flowchart of the selection of documents for the final analysis.



**Figure 2.** Number of publications in the Scopus database of the Instituto Nacional de Salud del Niño.

published in 2020 in the journal "Pediatric Radiology" which, at the time of the search, has 56 citations. The next most cited article is "Dynamics of cough frequency in adults undergoing treatment for pulmonary tuberculosis" whose lead author is Alvaro Proaño (Universidad Peruana Cayetano Heredia) published in 2017 in the journal "Clinical Infectious Diseases", with 42 citations (Table 1).

**Table 1.** The ten most cited articles with at least one author with INSN - SB affiliation in Scopus until 2023.

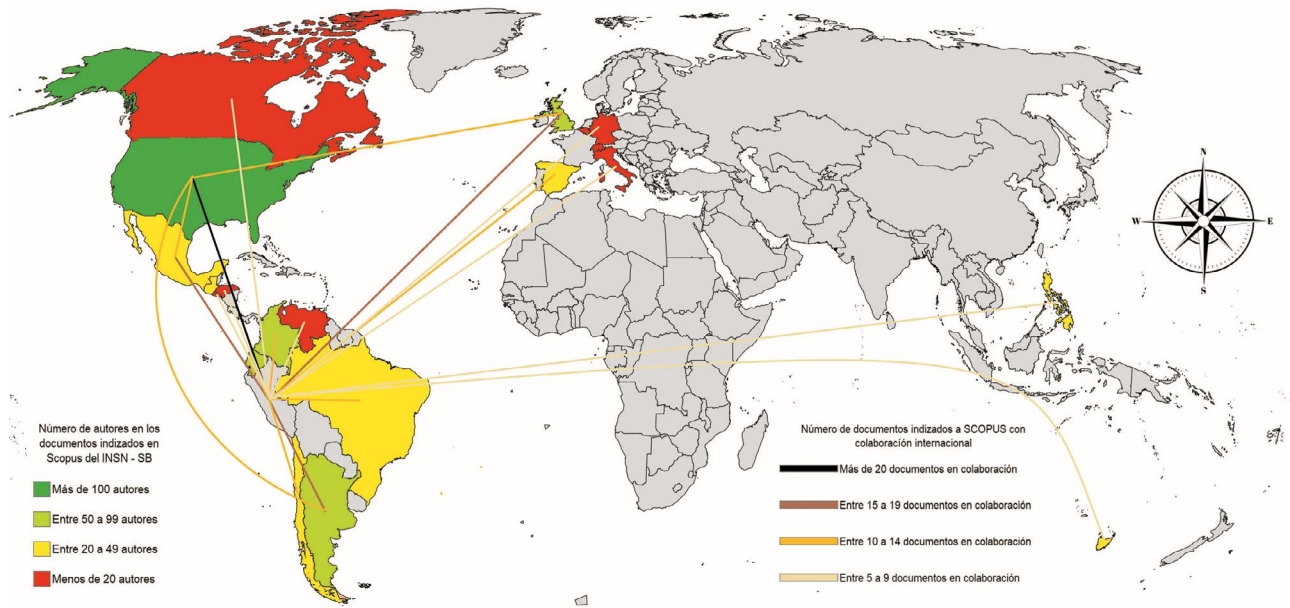
Title	Journal	Year	Main autor	Affiliation	Total citations	Citations per year*
Thoracic imaging of coronavirus disease 2019 (COVID-19) in children: a series of 91 cases	Pediatric Radiology	2020	Pablo Caro-Dominguez	Hospital Universitario Virgen del Rocío	56	11.2
Dynamics of Cough Frequency in Adults Undergoing Treatment for Pulmonary Tuberculosis	Clinical Infectious Diseases	2017	Alvaro Proaño	Universidad Peruana Cayetano Heredia	42	5.25
Association between convalescent plasma treatment and mortality in COVID-19: a collaborative systematic review and meta-analysis of randomized clinical trials	BMC Infectious Diseases	2021	Cathrine Axfors	Stanford University	39	9.75
Latin America: the next region for haematopoietic transplant progress	Bone marrow transplantation	2017	Gregorio Jaimovich	Hospital Universitario Fundacion Favalaro	35	4.38
Evaluation of the INECO Frontal Screening and the Frontal Assessment Battery in Peruvian patients with Alzheimer's disease and behavioral variant Frontotemporal dementia	eNeurologicalSci	2016	Nilton Custodio	Instituto Peruano de Neurociencias	31	3.44
Genetic variants and source of introduction of SARS-CoV-2 in South America	Journal of Medical Virology	2020	Julio A Porterico	Instituto Nacional de Salud del Niño-San Borja	30	6
Clinical characteristics, risk factors and outcomes in patients with severe COVID-19 registered in the International Severe Acute Respiratory and Emerging Infection Consortium WHO clinical characterization protocol: a prospective, multinational, multi centre, observational study	ERJ Open Research	2021	Luis Felipe Reyes	Universidad de La Sabana	28	9.33
COVID-19 in pediatric cancer patients in a resource-limited setting: National data from Peru	Pediatric Blood & Cancer	2020	Jacqueline Montoya	Instituto Nacional de Enfermedades Neoplásica	28	7
Imaging findings of multisystem inflammatory syndrome in children associated with COVID-19	Pediatric Radiology	2021	Pablo Caro-Dominguez	Hospital Universitario Virgen del Rocío	24	6
Latin America: Situation and preparedness facing the multi-country human monkeypox outbreak	The Lancet Regional Health-Americas	2022	Alfonso J. Rodriguez-Morales	Fundación Universitaria Autónoma de las Américas, Pereira	23	7.67

In terms of international collaboration, 203 authors were identified, with the most extensive partnerships seen with the United States (over 20 publications). Significant collaborations were also noted with Colombia, Ecuador, Argentina, and the United Kingdom (15-19 collaborations each, Figure 3). Julio Maquera-Afaray leads with 13 publications, followed by Jose W. Lopez-Revilla with 10, showcasing their substantial contributions and collaborative networks. A cluster of collaboration between the two authors and an integrated work network was identified (Figure 4).

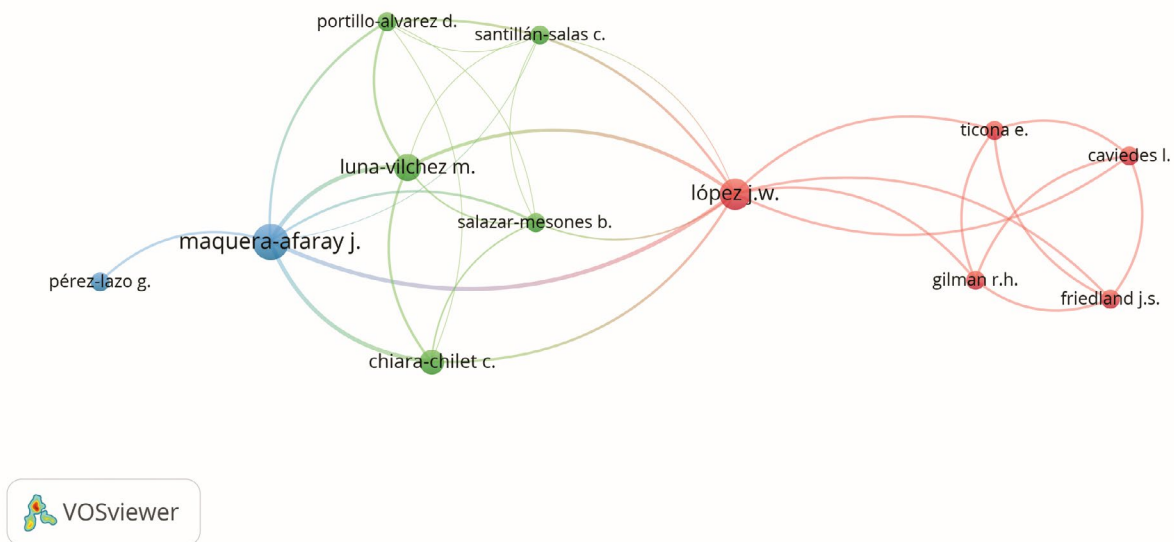
A more detailed analysis of the publications indicates that the keywords varied over time, with the terms "children", "Peru", "child" and "covid-19" being the most frequently used

in the publications collected, as well as the terms "computed tomography", "systemic lupus erythematosus", "tuberculosis" and "burns", although less frequently. A cluster of keyword usage is also shown around "Covid-19" with "imaging" and "hearth" (Figure 5). Keyword usage trends and their yearly evolution can be seen in the supplementary material

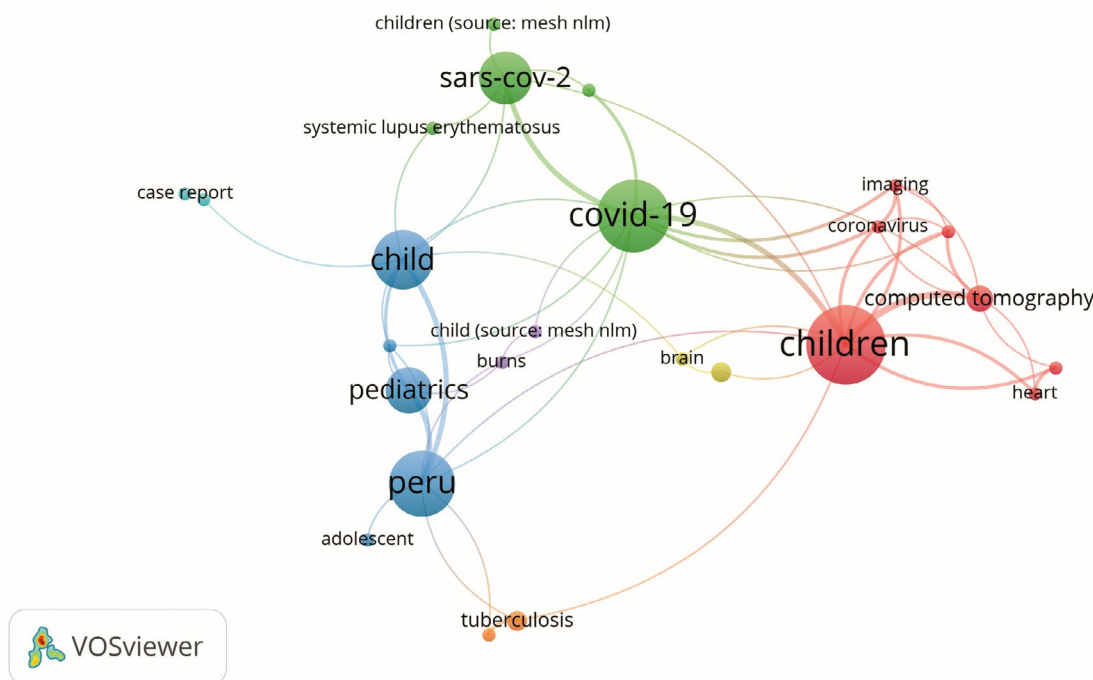
Of the total number of documents collected, 102 were open access, 39.06 % were observational studies, and 35.94 % were case reports. Only 27.34 % of the documents were funded by an institution, and only 1 document shows funding received by the INSN- SB. The main or corresponding author of 41.41% of the documents was someone working at the institution (Table 2).



**Figure 3.** Authors by country and number of documents in Scopus in collaboration with the Instituto Nacional de Salud del Niño San Borja.



**Figure 4.** Collaborative networks between authors who have at least two documents in common. The diameter of the circle per author determines the number of documents (larger diameter, more documents) and the opacity of the lines determines the number of documents in collaboration (higher opacity, fewer documents in collaboration).



**Figure 5.** Cooccurrence of keywords by author, the diameter of the circle determines the number of times the word was used (greater diameter, greater use) the opacity of the line determines the cooccurrence between two keywords (the greater the opacity, the lower the cooccurrence).

**Table 2.** Characteristics of INSN-SB papers in the Scopus database up to 2023

Characteristics	Total n=128		Open access n = 102		Other type of access* n = 26	
	n	%	n	%	n	%
<b>Type of study</b>						
Observational	50	39.06	36	72	14	28
Case report or case series	46	35.94	39	84.78	7	15.22
Narrative review	7	5.47	7	100	0	0
Systematic review	4	3.13	3	75	1	25
Experimental	3	2.34	3	100	0	0
Others**	18	14.06	14	77.78	4	22.22
<b>Received funding†</b>						
Yes	35	27.34	30	85.71	5	14.29
No	93	72.66	98	14.29	123	85.71
<b>INSN-SB author</b>						
Yes	53	41.41	41	77.36	12	22.64
No	75	58.59	61	81.33	14	18.67

\* Bronze and green.

\*\* Comments, notes, editorials, letters to the editor, and rebuttals are included.

† Only one document was funded by INSN-SB.

INSN-SB: Instituto Nacional de Salud del Niño San Borja.

## DISCUSSION

The results of this research show the scientific production of INSN-SB and its evolution over the years. It also shows important aspects such as international collaboration, frequently addressed topics and specific aspects of the publications. The findings of this study indicate that the scientific production of INSN-SB with respect to publications indexed in Scopus has had a remarkable growth mainly during the period 2020 and 2021. This has already been reported, and evidence mentions that several Peruvian institutions have also improved their indicators with respect to publications indexed in the Scopus database (9-11). This growth may be due to the need to demonstrate, by means of a scientific publication, the health situation with respect to the COVID-19 pandemic (12,13). However, the number of publications is still lower than that of other health facilities in Peru, such as the Instituto Nacional de Enfermedades Neoplásicas or the Instituto Nacional de Salud del Niño de Breña, which have 347 and 228 publications, respectively (8,14). The INSN-SB is a relatively new institution, with 10 years since its creation (7). Despite this, there has been a steady growth in the total number of publications over the years.

The publication with the most citations and at least one author with an INSN-SB affiliation is a paper covering aspects of COVID-19 (15). The COVID-19 pandemic allowed

academics to publish aspects of the disease (16) quickly, and various agencies and other researchers required the information to formulate hypotheses. Hence, the papers published in that period had a high citation rate very quickly. It is inevitable to mention that the COVID-19 pandemic brought an important growth in the number of research in that period (17); the INSN-SB, had, among its most cited articles, five papers that addressed that topic, all with more than 20 citations up to the time of the search.

The other lines of research need to be strengthened through the research priorities of the institution and the country. Such is the example of the second most cited publication that addresses tuberculosis (18). The research findings suggest an interest in exploring topics that could provide a consolidated line of research. For instance, the case of "burns" could be studied to address epidemiological, clinical, and treatment aspects. Similarly, "imaging" related to other diseases of national importance, like tuberculosis (as mentioned before), could also be researched. Both these topics are increasing worldwide (19,20). Another crucial aspect is engaging researchers in the development of original studies with sufficient sample sizes. While the abundance of case reports isn't inherently negative, prioritizing larger studies is essential for generating more reliable and accurate data (21).

Another evaluated aspect is the article's availability in Golden Open Access (available to the entire public). It is noteworthy that 80 % of the publications are in this open-access format rather than other types like green or bronze (accessible through institutions, repositories, or journal subscriptions). Promoting open access, especially in public institutions, is crucial to increase the visibility of research. By covering the costs of publication in journals that demand it, these institutions make scientific findings accessible to all those interested in consulting, evaluating, or applying the results in clinical practice. However, they face the challenge of the high cost of article processing (APC), which increases yearly, representing a significant financial barrier to disseminating scientific knowledge (22-25). Regarding the financing of the study for its development, only 27 % were financed by some entity or organization, and among them, only one was directly funded by the INSN-SB. Strengthening, encouraging and financing research generates a rapid growth in publications (26,27). However, ethical aspects must be considered in order to access these funds since the financing of a study may cover not only the development of the study but also the article processing charges. This weak point could lead to bad practices in research, as in cases where monetary incentives are offered for publication (28,29). Researchers should be encouraged and adequately supervised by a scientific integrity committee so that research can be carried out within ethical standards.

Finally, leadership was also evaluated through the authorship order (first authorship) or its correspondence. In the scientific community, the primary author is typically the individual who conceived the idea and guided the research team to ensure optimal study development (30). Also, the corresponding author handles direct communication with the journal's editorial team at the time of submission and is responsible for responding to the comments and suggestions of the peer reviewers at the time of evaluation (31). INSN-SB investigators

may not always lead studies, as their role is often integrated into multicenter research, both national and international, originating from other institutions. However, it is crucial that INSN-SB staff drive leadership in these collaborations to ensure access to available institutional support, thus reinforcing the position of the health institute as a reference in the field.

### Strengths and limitations

The study results facilitate the identification of indicators for measuring the advancement of scientific activities, utilizing a database with rigorous inclusion standards for its journals. Another significant aspect is the evaluation of variables such as open access, study type, and authorship, which are often overlooked in bibliometric analyses. The study period spans from the inception of INSN-SB's operation until 2023, ensuring the retrieval of all publications properly indexed within this timeframe. This approach extends beyond the publication month of the latest journal issue.

It is important to note some significant limitations of this study. Although an important and wide-ranging database such as Scopus was used, publications found in the Scielo database, a multidisciplinary repository of scientific papers from Latin America, the Caribbean, Spain, and Portugal, were not included. Since INSN-SB is an institution located in a Latin American country, authors might prefer to publish in more local journals. Another limitation corresponds to the analysis of the collaboration network between institutions. We have not been able to describe or analyze the dynamics between different organizations or entities collaborating on a manuscript. However, we understand that some authors could have multiple affiliations and thus generate a biased view of collaboration, so we preferred not to study it.

Despite the aforementioned limitations, the results of this research can serve as a basis for implementing policies to improve scientific production at INSN-SB.

### Conclusion

The Instituto Nacional de Salud del Niño San Borja has had a sustained growth in scientific production in Scopus. The publications correspond mainly to original articles (observational, experimental studies and systematic reviews as a whole) and case reports. There is still a low role of institutional researchers as main or corresponding authors, as well as little funding to carry out the studies, with only one document financed by the INSN-SB. Our results show that more support is needed for researchers from this institution, as well as a greater leading role in the studies carried out.

### Author's contribution

Conceptualization: VRL; data collection, management and curation: VRL, DMT, MSC; data analysis: VRL, DMT, MSC; visualization: VRL, DMT, MSC; original version's redaction: VRL, DMT, MSC; results interpretation: VRL, DMT, MSC; final version's review and redaction: VRL, DMT, MSC.

### Funding

The present study was self-financed.

## Ethical aspects

Not applicable. This study relied on publicly available publications, and confidential data that have not been published for purely academic purposes are not presented.

## Interests' conflicts

The authors have no conflict of interest associated with the material presented in the manuscript.

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