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# Analysis of Scientific production aligned with the Food and Nutrition Security Strategy of Portuguese-Speaking African Institutions: a systematic scoping review

*Análise da produção científica alinhada com a Estratégia de Segurança Alimentar e Nutricional das Instituições Africanas de Língua Portuguesa: uma revisão sistemática de escopo*

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## ABSTRACT

This systematic scoping review aimed to map and characterize the scientific production of researchers from Portuguese-speaking African institutions that align with the Food and Nutrition Security Strategy of the Community of Portuguese-Speaking Countries. The literature search was conducted using six electronic databases (PubMed, EMBASE, Virtual Health Library, Scientific Electronic Library Online, Scopus, and Web of Science), with no restrictions on the year of publication nor language. Through the search strategy, 10,061 records were identified, of which 502 documents and 654 researchers were selected by Food and Nutrition Security specialists along three axes: 1) Policy governance; 2) Access to food; 3) Availability of food. Institutional researchers from Mozambique (66.9%), Guinea-Bissau (15.9%), and Angola (11.4%)

presented the most publications and international collaborations. Researchers from Cape Verde, Sao Tome and Principe, and Equatorial Guinea institutions added only 5.8% of the total production. A greater number of publications (61%) was related to axis two of the Food and Nutrition Security Strategy of the Community of Portuguese-Speaking Countries. The most studied themes were sustainable development, child malnutrition, and agricultural production for the first, second, and third axis, respectively. In general, scientific publications have shown limitations in their approaches due to the challenge imposed by the complexity of the food system. However, there has been a quantitative evolution in publications in the last decade, with a greater participation of researchers from Portuguese-speaking African institutions.

**Keywords:** Authorship and co-authorship in scientific publications. Food insecurity. Human rights.

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## RESUMO

*Esta revisão sistemática de escopo teve como objetivo mapear e caracterizar a produção científica de pesquisadores de instituições africanas de língua portuguesa que se alinham com a Estratégia de Segurança Alimentar e Nutricional da Comunidade dos Países de Língua Portuguesa. A busca das literaturas foi realizada em seis bases de dados eletrônicas (PubMed, EMBASE, Biblioteca Virtual em Saúde, Scientific Electronic Library Online, Scopus e Web of Science), sem restrição quanto ao ano de publicação e ao idioma. Por meio da estratégia de busca, foram identificados 10.061 registros, dos quais 502 documentos e 654 pesquisadores foram selecionados por especialistas em Segurança Alimentar e Nutricional em três eixos: 1) Governança de políticas; 2) Acesso à alimentação; 3) Disponibilidade de alimentos. Pesquisadores de instituições de Moçambique (66,9%), Guiné-Bissau (15,9%) e Angola (11,4%) foram os que apresentaram o maior número de publicações e colaborações internacionais. No entanto, os pesquisadores das instituições de Cabo Verde, São Tomé e Príncipe e Guiné Equatorial somaram apenas 5,8% da produção total. Foi observado maior número de publicações (61%) relacionadas com o eixo dois da Estratégia de Segurança Alimentar e Nutricional da Comunidade dos Países de Língua Portuguesa. As temáticas mais estudadas foram desenvolvimento sustentável, desnutrição infantil e produção agrícola para o primeiro, segundo e terceiro eixo, respectivamente. De forma geral, as publicações científicas mostraram limitações em suas abordagens frente ao desafio imposto pela complexidade do sistema alimentar. Todavia, houve uma evolução quantitativa nas publicações na última década; além disso, maior participação de pesquisadores de instituições africanas de língua portuguesa pode ser vislumbrada.*

**Palavras-chave:** Autoria e coautoria em publicações científicas. Insegurança alimentar. Direitos humanos.

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## INTRODUCTION

In the Universal Declaration of Human Rights, food and nutrition are stated as fundamental rights and are considered basic requirements for protecting and promoting human health. The statement “Everyone has the right to a standard of living adequate for the health and well-being of himself and of his family, including food, clothing, housing, and medical care, and necessary social services [...]” is published in United Nations Art. 25 [1].

In this sense, the concept of Food and Nutrition Security (FNS) translates into the idea of the human right to regular access to quality food, in sufficient quantities, without compromising access to other essential needs. It is a dynamic concept that presents a continuous construction process according to the progress of civilization, as is the case with the constant changes facing society, given the social, economic, and political crises of recent times [2,3].

Since it involves multiple dimensions related to food and nutritional aspects, the progression of the FNS concept led to a new intersectional approach, the objective of which was to improve the efficiency and effectiveness of public management. To fully guarantee this approach, the union of competent entities (government and civil society) was required to confront the violation of the Human Right to Adequate Food (HRtAF) [4].

In the last decade, the *Comunidade dos Países de Língua Portuguesa* (CPLP, Community of Portuguese Speaking Countries) has played an increasingly important role in political and diplomatic

coordination between its member states (Angola, Brazil, Cape Verde, Equatorial Guinea, Guinea-Bissau, Mozambique, Portugal, São Tomé and Príncipe, and East Timor). With the support of the Food and Agriculture Organization of the United Nations, the *Estratégia de Segurança Alimentar e Nutricional-CPLP* (ESAN-CPLP, Food and Nutrition Security Strategy) was developed and is considered an essential political instrument to guarantee HRTAF [5].

These strategies were based on an intersectoral approach, with the participation of civil society, universities, and the private and governmental sectors of each member country. However, FNS is a complex concept, and the CPLP proposed three strategic axes to overcome the challenge. Axis 1 is called “Strengthening FNS governance” and aims to strengthen mechanisms to facilitate social participation in national and regional government bodies. Axis 2 is referred to as “Promoting access and use of food to improve the ways of life of the most vulnerable groups” and focuses on implementing social protection policies that include support networks for the most vulnerable groups, providing them with access to food and nutrition and essential services. Axis 3 is described as “Increasing food availability based on sustainable production, processing, and distribution models” and aims to increase food availability to meet dietary needs by strengthening domestic production based on family farmers [5].

The FNS is one of the most urgent challenges, especially in sub-Saharan Africa, where the level of moderate-to-severe food insecurity is alarming, and the causes of the problem are historical and linked to the Portuguese-speaking African Countries (PALOP – Angola, Cabo Verde, Equatorial Guinea, Guinea Bissau, Mozambique, and São Tomé and Príncipe), having an economic dependence that relies mainly on commodities [6]. In this way, the food systems of these countries must undergo significant transformations to guarantee healthy and sustainable diets for all citizens. This transformation needs to be multidimensional, intersectoral, and interdisciplinary, and for that purpose, the academic community must be part of this process, both as a pillar of science, technical, and educational support, and as a learning center. Supporting research in PALOP is essential to provide evidence on local challenges and develop public policies based on scientific evidence. Therefore, the current study aimed to conduct a systematic scoping review to map and classify the scientific production of researchers from PALOP institutions that have some relationship and could contribute to each of the three strategic axes included in the ESAN-CPLP.

## METHODS

The current study was developed following the Joanna Briggs Institute statement guidelines [7]. The study process was carried out in five stages: (I) research question; (II) search strategy; (III) selection of studies; (IV) data extraction; (V) summary of results.

The formulation of the research question followed the PCC structure (population, concept, and context) as follows: What are the academic contributions of researchers linked to Portuguese-speaking African institutions (population) on the three axes of the ESAN-CPLP (concept) in the countries Angola, Cabo Verde, Equatorial Guinea, Guinea-Bissau, Mozambique, and Sao Tome and Principe (context)?

The ESAN-CPLP axes are characterized in the following order: 1) “Strengthening FNS governance”; 2) “Promoting access and use of food to improve the ways of life of the most vulnerable groups”; and 3) “Increasing food availability based on sustainable production, processing, and distribution models”.

Regarding the search strategy, six electronic databases (PubMed, Virtual Health Library, Scientific Electronic Library Online (SciELO), EMBASE, Web of Science, and Scopus) were consulted without restrictions on language, document category, and year of publication to ensure a broad coverage. The descriptor selection process was elaborated on the three axes of the ESAN-CPLP [8]. Considering the scope and complexity of the FNS concept, the work involved CPLP researchers and specialists who acted as ad hoc collaborators to elaborate and validate the search strategy. The invited specialists are representatives of the CPLP countries in the coordination committee of the mechanisms to facilitate the participation of Universities in the FNS.

For the study selection process, the searches of each database were saved (CSV format) and loaded into an online tool (Rayyan - Intelligent Systematic Review) that ensured the exclusion of duplicate records. The first phase of the selection process involved reading the titles and abstracts to identify relevant records related to the study topic by three independent reviewers. After the initial screening process, blinding was revealed, and cases of conflict over the inclusion or exclusion of a particular record were resolved by consensus of the reviewers.

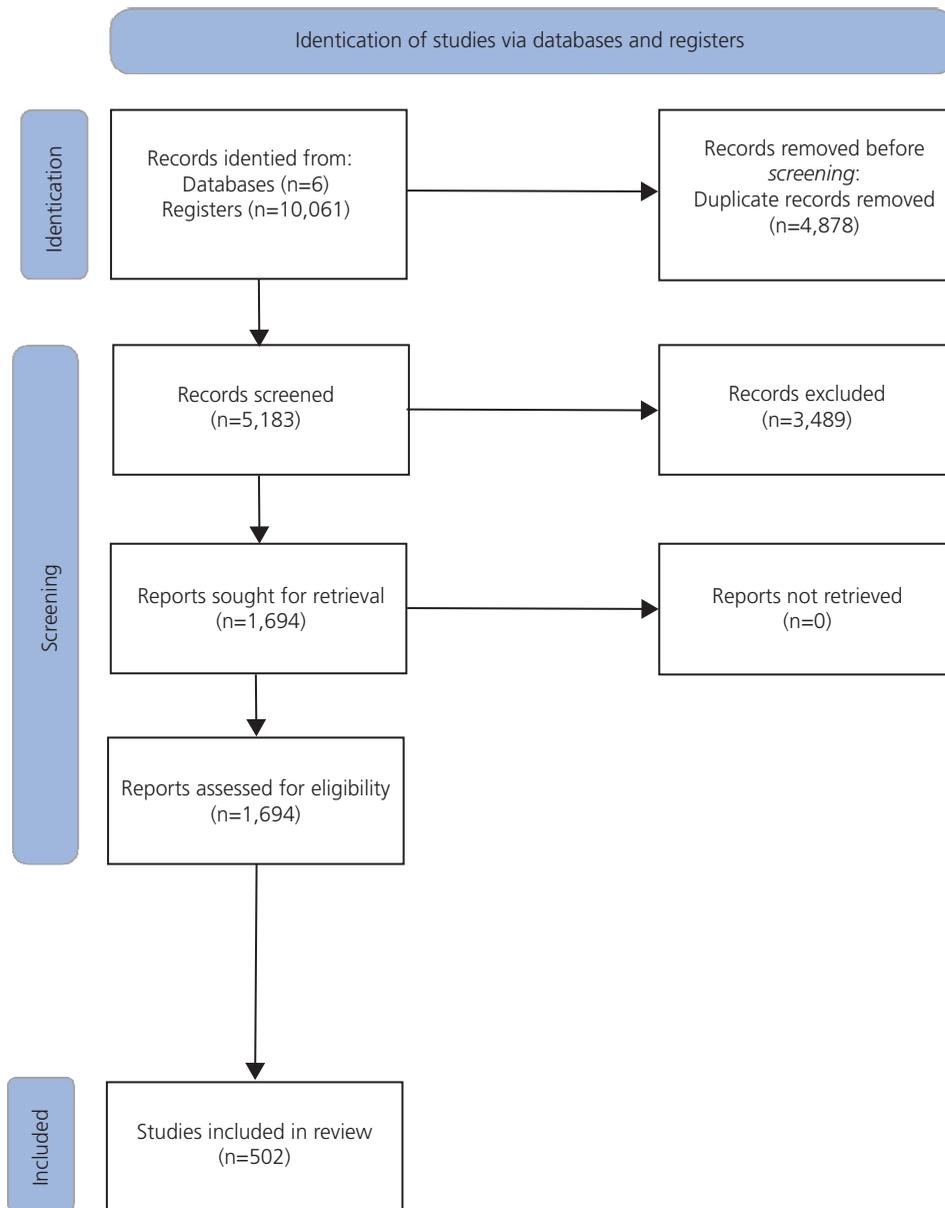
The second phase of the selection process involved full access to documents and the reading of selected studies. This process was carried out by two reviewers (experts in FNS) who participated in the first phase and who selected the studies based on the following criteria: (a) studies and documents that could contribute to one of the three axes of the ESAN-CPLP; (b) held in the following countries: Angola, Cabo Verde, Equatorial Guinea, Guinea-Bissau, Mozambique, and São Tomé and Príncipe; and (c) had the participation of at least one researcher linked to an African Portuguese-speaking institution. Studies conducted in animal models and laboratory food analysis were excluded. Disagreements between experts were resolved by debate and consensus with the research team.

For data extraction, the researchers developed a table to determine which variables were to be extracted to address the research question. The first author performed the extraction process, and subsequently, it was reviewed by the research team. The extracted variables were: (a) author(s); (b) year of publication; (c) number of researchers from an African Portuguese-speaking institution; (d) name of institution(s); (e) country; (f) study title; (g) study objective; (h) study type; (i) presence as the first author; (j) presence as the last author; (k) journal name; (l) language of documents; (m) keywords; (n) presence of foreign researchers. The classification of the studies according to each ESAN-CPLP axes was carried out by the same reviewers and also received support from CPLP researchers. Quantitative data analysis and figures were performed using R version 4.2.0 (R Foundation for Statistical Computing, Vienna, Austria).

## RESULTS

Figure 1 shows the flow chart of selected studies for the systematic scoping review. The search strategy identified 10,061 records (PubMed n=1,513, Embase n=2,679, Virtual Health Library n=1,623, SciELO n=116, Scopus n=2581, and Web of Science n=1,549), of which 4,876 were duplicate records and were excluded. After reading the titles and abstracts, 3,489 records not relevant to the study topic were also excluded. A total of 1,694 studies were selected for full-text analysis. At the end of the process, 502 studies published between 1982 and 2020 were selected.

Figure 2 illustrates the growth of publications on the three axes of the ESAN-CPLP and the respective countries. Axis two had the highest number of publications (332 documents, 66.1% of the total), with the sharpest increase observed from 2007 onward. Axis three is second in the number of publications (118 documents, 23.5% of the total), followed by axis one, which had the lowest number of publications (52 documents, 10.4% of the total).



**Figure 1** - Flowchart of study selection process.

Concerning countries, researchers from Mozambique institutions have the highest number of publications (336 documents, 66.9% of the total), with a sharp increase from 2010. Researchers from Guinea-Bissau appear in second place (80 documents, 15.9% of the total), followed by researchers from Angola (57 documents, 11.4% of the total). Researchers from Cape Verde (15 documents), Sao Tome and Principe (8 documents), and Equatorial Guinea (6 documents) account for only 5.8% of the total production on ESAN-CPLP. The participation of researchers from African and Portuguese-speaking institutions as the first author was 50% for axis one, 43% for axis two, and 39% for axis three [8].

Collaboration with researchers from 79 countries was identified, with emphasis on the United States (105 collaborations), Portugal (84 collaborations), Denmark (62 collaborations), the United Kingdom (61 collaborations), and Spain (49 collaborations) (Figure 3).

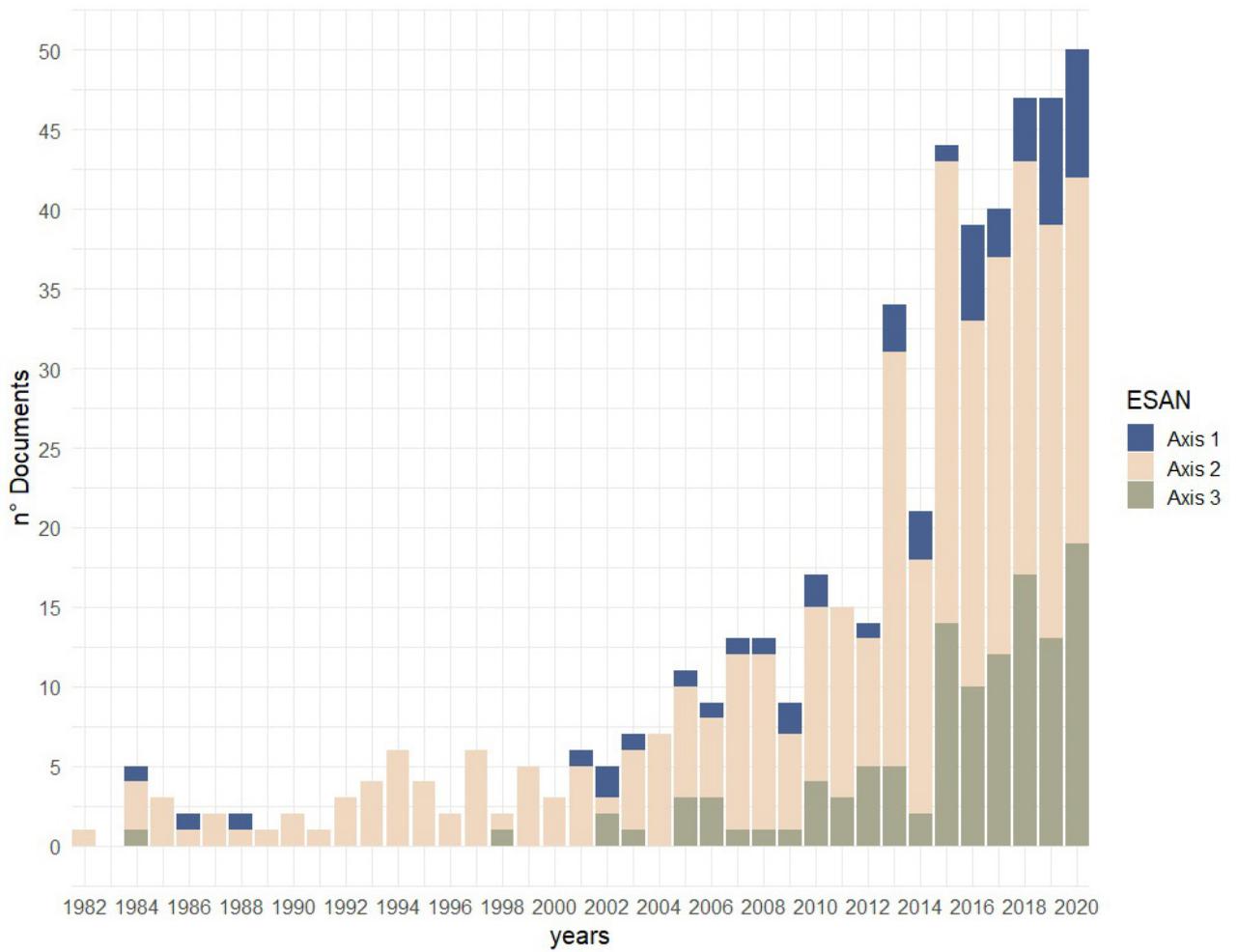


Figure 2 - Publications involving the three axes of the Community of Portuguese-Speaking Countries Food and Nutrition Security Strategy by year.

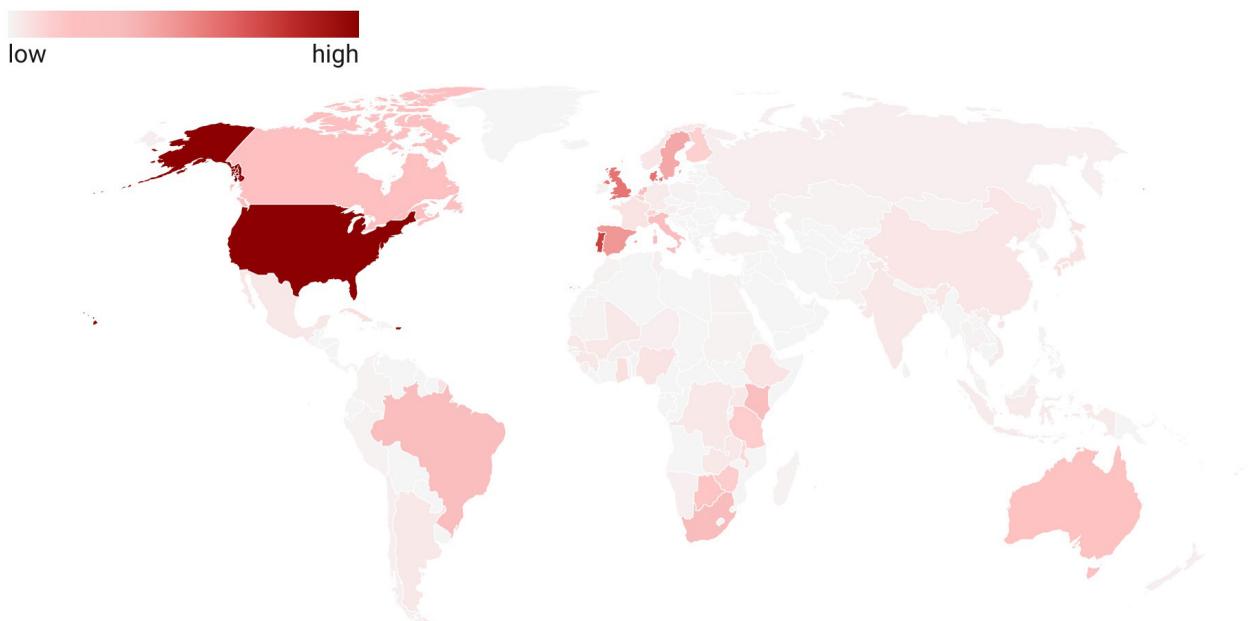


Figure 3 - Foreign collaboration with researchers from Portuguese-speaking African institutions. Dark red represents a high level of collaboration.

Mozambican researchers have the highest number of collaborations (63 countries), followed by Guinea-Bissau (31 countries), Angola (19 countries), and Cape Verde (20 countries). On the other hand, researchers from São Tomé and Príncipe and Equatorial Guinea only collaborated with two and three countries, respectively.

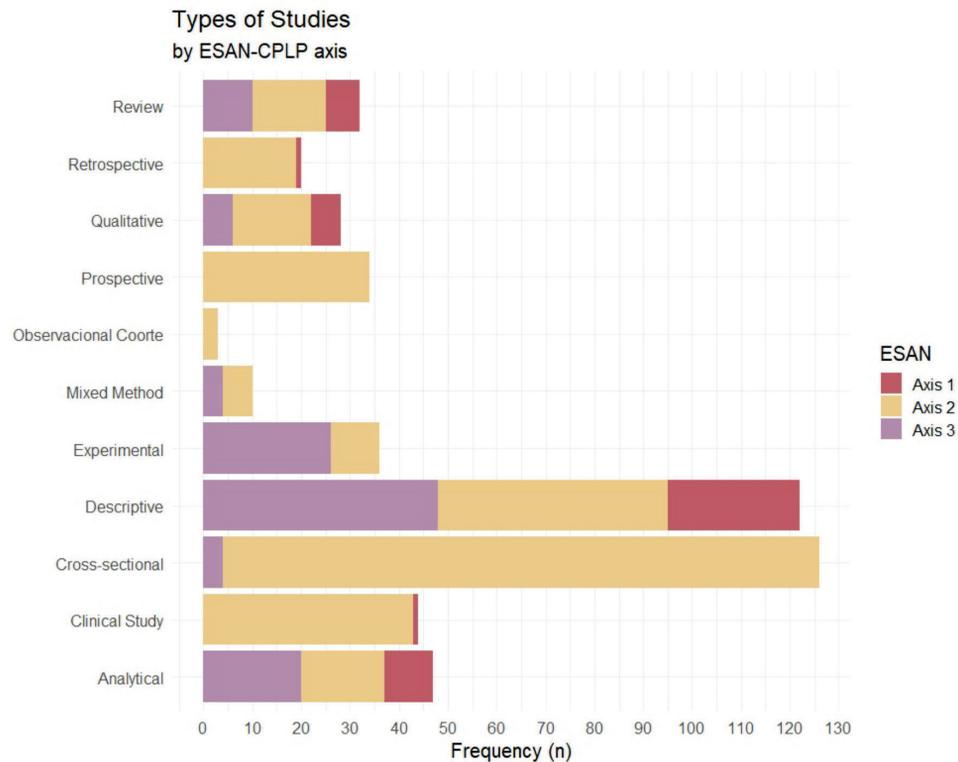
The categorization of the studies carried out by the FNS specialists is presented in Figure 4 as word clouds. For the ESAN-CPLP axis one, the studies were classified into 18 categories, the most frequent being: Sustainable Development (14 documents), Poverty (8 documents), Social Participation (6 documents), Health Policy (3 documents), and Nutrition Program (3 documents) (Figure 4A). On the ESAN-CPLP axis two, the studies were classified into 42 categories, the most frequent being: Child Malnutrition (43 documents), Child Mortality (32 documents), Nutritional Status (24 documents), Food Supplementation (21 documents), and Food Consumption/Food Safety (19 documents) (Figure 4B). On ESAN-CPLP axis three, the studies were classified into 30 categories, the most frequent being: Agricultural Production (39 documents), Sustainable Development (13 documents), Ecosystem Services (8 documents), Ethnobotany (7 documents), and Water (7 documents) (Figure 4C).

The FNS specialists classified the documents into 16 types (Figure 5) according to the methodological approach of the research. On the ESAN-CPLP axis one, the predominance was the descriptive type (27 documents), analytical (10 documents), review (7 documents), and qualitative studies (6 documents).



**Figure 4** – Word cloud analysis based on term frequency. A) categorization of studies present in axis one; B) categorization of studies present in axis two; C) categorization of studies present in axis three.

On the second ESAN-CPLP axis, study predominance was cross-sectional (122 documents), descriptive (47 documents), clinical (43 documents), and prospective (34 documents). In ESAN-CPLP axis three, the predominant type was descriptive (48 documents), experimental (26 documents), analytical (20 documents), and review studies (10 documents).



**Figure 5** – The proportion of studies classified by experts in Food and Nutrition Security involves the three axes of the Food and Nutrition Security Strategy Community of Portuguese-Speaking Countries.

Note: ESAN-CPLP: Food and Nutrition Security Strategy of the Community of Portuguese-Speaking Countries.

## DISCUSSION

To the best of our knowledge, this is the first study to analyze the scientific production of researchers from Portuguese-speaking African institutions that converge with ESAN-CPLP. It was an intensive task (screening 5,183 registers), but we can consider that 502 scientific publications involving 654 researchers in six countries were relatively low. Our findings indicated that most of the available evidence is related to axis two of the ESAN-CPLP, and studies by institutional researchers from Mozambique, Guinea-Bissau, and Angola concentrate the largest number of peer-reviewed publications. Although the results of their research present some contributions to the topic, the authors do not present an in-depth discussion of the problems faced by local research on the issue of Food and Nutrition Insecurity. In other words, scientific publications have shown limitations in their approaches to the challenge imposed by the complexity of the food system.

These results must be put into perspective given the countries' stages of the reconstruction as independent nations. Africa is the least developed continent in terms of higher education institutions and enrollment, especially in the sub-Saharan region [9]. Consequently, the low availability and difficulty of access to higher education institutions reflect the low rate of training of local researchers.

However, it should also be noted that 60% of the analyzed studies were published in the last five years, which is promising for understanding the development of the research area.

Among the studies analyzed, we observed a wide network of international collaborations with PALOP researchers with great potential to advance the knowledge about FSN indicators over the next decade. It is recognized that the level of international collaboration affects the scientific impact of published papers [10], which partly explains the better performance of researchers from Mozambican institutions. Mozambique, the second-largest in terms of geographic and population size, stood out in collaboration with foreign researchers and production quantity, surpassing Angola, which ranked third in publications. Another important point is that Mozambique's scientific production had a better relative distribution on the three ESAN-CPLP axes.

As another example that can highlight the importance of international collaboration, the Bandim Health Project emerged in partnership with the Swedish Agency for Research Cooperation with Developing Countries in 1978 to investigate the high mortality rate in children in Guinea-Bissau. Coordinated by Dr. Peter Aaby, extensive population surveillance studies investigated maternal and infant mortality, malnutrition, breastfeeding, vitamin A supplementation, real effects of vaccines, and other related topics [11]. However, on the one hand, international collaboration can facilitate the scientific advancement of a developing country; on the other hand, the disproportionately high dependence on international collaboration reflects that a country does not have the necessary resources to be independent [12]. Eighty-eight percent of research that has at least one author from Guinea-Bissau institutions is concentrated on axis two of the ESAN-CPLP, and other partnerships must be designed to better understand the complexity of FNS and support for local public policies. In addition, most studies included in axis two were cross-sectional and descriptive and played an essential role in denouncing HRtAF violations [13,14]. However, few have been sufficiently in-depth to generate evidence for decision-making or outline action strategies to combat poverty, and it is necessary to invest in research that can generate more contextualized evidence to face local levels of food and nutrition insecurity.

The first ESAN-CPLP axis (strengthening food security governance) was the least productive, accounting for only 10% of the research from PALOP institutions. We note that there are some specific relevant topics for FNS policy, but none of the studies addressed FNS governance as an intersectoral policy, and few went deeper into the analysis of public policies [15-17]. In other words, studies investigating FNS governance are deficient, given the complexity of the subject, as defined in the ESAN-CPLP, where mechanisms for social participation and other governance structures are foreseen. Today, almost all CPLP member countries have frameworks that regulate FNS policies, and there may be studies by international agencies and local governments to evaluate these policies; however, they have not yet become the subject of studies by researchers from CPLP countries [5]. Research in this area is essential for policy evaluation and coherence when dealing with global, regional, and national interests and goals.

Regarding ESAN-CPLP axis three (increasing the availability of food based on small producers), we also note that most of the available evidence comes from descriptive studies and some experimental and analytical studies. Descriptive studies are necessary to generate research questions and communicate successful local experiences [18-21]. However, the predominance of this type of study probably reflects the lack of resources for more robust and planned work to respond to emerging issues in the communities of these countries. The impression after reviewing the studies is that there is much to be done to provide local evidence that contributes to promoting food production and access.

In general, it should be noted that the lack of access to research resources and the dependence on external funding may explain the characteristics of these studies. Furthermore, most Portuguese-speaking African researchers are dependent on international partnerships, making it challenging to develop endogenous research. In other words, cutting-edge research is compromised due to low national funding levels, and African research institutions are highly dependent on international aid, private donors, and philanthropists to develop local science [22]. Coordinated action is necessary to trace the research paths that are genuinely appropriate to promote access to food and provide agencies of these countries with adequate research independence, especially in Equatorial Guinea, Cape Verde, and Sao Tome and Principe, which have a low level of scientific production. As a limitation of the study, we can highlight that the current study analysis does not include documents from non-indexed sources and may be underestimating the volume of scientific publications from PALOP institutions. Furthermore, although we used a broad search strategy focusing on different dimensions of FNS, some missing keywords/terms remain a possibility. However, we searched six databases to ensure the maximum amplitude of the scientific production from PALOP institutions.

## CONCLUSION

Our analysis of the scientific production of researchers from Portuguese-speaking African institutions indicated that the number of peer-reviewed publications with the potential to contribute to ESAN-CPLP is low, but with great growth potential, as observed over the past five years. However, most of the available evidence comes from researchers from Mozambican institutions and focuses mainly on axis two. Thus, based on the panorama presented in the current scoping review, African Portuguese-speaking institutions must further investigate the complexity of the food system and its integration with the ESAN-CPLP domains. Moving forward, local researchers should focus their efforts to fill this research gap, and funding agencies must provide more support and independence to boost the broad knowledge related to the FNS.

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## CONTRIBUTORS

AM MIQUITAIO was responsible for the conceptualization, data curation, analysis, and writing the first draft. AH CRISP was responsible for the conceptualization, data curation, and analysis. DQ ZULIANI contributed to the conceptualization and data curation. AP MOURA contributed to the conceptualization and data curation. MRM OLIVEIRA contributed to the conceptualization, data curation, and project administration. All authors interpreted the data and participated in its critical revision and final approval.