

BENEFIT AND ECONOMIC IMPACT OF FOOD SECURITY IN ECUADOR

¹GABRIEL DE JESÚS NEIRA-VERA, ²RAUL RUPERTO SILVA-IDROVO, ³CARMEN ANDRADE-GARÓFALO, ⁴FERNANDO XAVIER CARRILLO-PÉREZ, ⁵PEDRO ALEXANDER AVILÉS-ALMEIDA, ⁶GUIDO HOMERO POVEDA-BURGOS

¹Docente de la universidad de Guayaquil, gabriel.neirav@ug.edu.ec

²Docente de la Universidad de Guayaquil, raul.silvai@ug.edu.ec

³Docente de la Universidad de Guayaquil, carmen.andradegar@ug.edu.ec

⁴Docente de la universidad de Guayaquil, carrillopf@ug.edu.ec

⁵Docente de la Universidad de Guayaquil, pedro.avilesal@ug.edu.ec

⁶Docente de la Universidad de Guayaquil, guido.povedabu@ug.edu.ec

Abstract

A documentary review was carried out on the production and publication of research papers related to the study of the variables Food Security, Economic Impact, to determine the benefits and impacts in the country of Ecuador. The purpose of the bibliometric analysis proposed in this document was to know the main characteristics of the volume of publications registered in the Scopus database during the period 2017-2022, achieving the identification of 256 publications. The information provided by this platform was organized through graphs and figures categorizing the information by Year of Publication, Country of Origin, Area of Knowledge and Type of Publication. Once these characteristics have been described, the position of different authors towards the proposed theme is referenced through a qualitative analysis. Among the main findings made through this research, it is found that Brazil, with 109 publications, was the country with the highest scientific production registered in the name of authors affiliated with institutions in that country. The Area of Knowledge that made the greatest contribution to the construction of bibliographic material referring to the study of Food Security, Economic Impact, was Agricultural and Biological Sciences with 121 published documents, and the Type of Publication most used during the period indicated above was the Articles with 76% of the total scientific production.

Keywords: food security, economic impact

1. INTRODUCTION

The search for Food Security, is one of the most significant items and of great importance when establishing the axes of work and priorities of any government plan, these plans must be focused on the service of the community and the processes of fighting poverty (León, Martínez, Espíndola, & Schejtman, 2004). The concept of Food Security, born in the mid-70s, in response to the food crisis of the time and that bases its objective precisely on the mitigation of this problem, (Aldrich & Whetten, 1981) however, in response to events of important relevance in the following decades, such as the African famine and the World Food Summit (WFS) of 1996 (Loma-Ossorio & Lahoz, 2006), where its meaning and application take on great relevance and importance for nations in general, thus establishing efforts that will be materialized in the reduction of numbers of people and families who are in precarious conditions of poverty and famine.

These assessments are based on safeguarding the fundamental rights of the human being and in the spirit of the social states of law to seek to protect legal rights such as the dignified life, health and integrity of those who make it up; Ensured compliance with these principles is the pillars of one of the cross-cutting elements of the 17 SDGs of the 2030 Agenda for Sustainable Development (FAO; OPS; WFP; UNICEF, 2018).

In the particular case and in the study of the variables object of analysis of this document, it is intended to establish which are the policies that are promoted from the own and foreign institutions in the Ecuadorian country, in relation to the reduction of rates of chronic malnutrition and establish what is the access to food to the most vulnerable populations of the same. from the point of view of the constitutional, legal and political framework of that country (Ayaviri, Quispe, Romero, & Fierro, 2016)

For this reason, this article seeks to describe the main characteristics of the compendium of publications indexed in the Scopus database related to the variables Food Security, Economic Impact, as well as the description of the position of certain authors affiliated with institutions, during the period between 2017 and 2022.

2. GENERAL OBJECTIVE

Analyze from a bibliometric and bibliographic perspective, the elaboration of works on the variables Food Security, Economic Impact published in high impact journals indexed in Scopus database during the period 2017-2022.

3. METHODOLOGY

This article is carried out through a mixed orientation research that combines the quantitative and qualitative method.

On the one hand, a quantitative analysis of the information selected in Scopus is carried out under a bibliometric approach of the scientific production corresponding to the study of Food Security, Economic Impact.

On the other hand, examples of some research works published in the area of study indicated above are analyzed from a qualitative perspective, starting from a bibliographic approach that allows describing the position of different authors against the proposed topic. It is important to note that the entire search was performed through Scopus, managing to establish the parameters referenced in *Figure 1*.

3.1. METHODOLOGICAL DESIGN

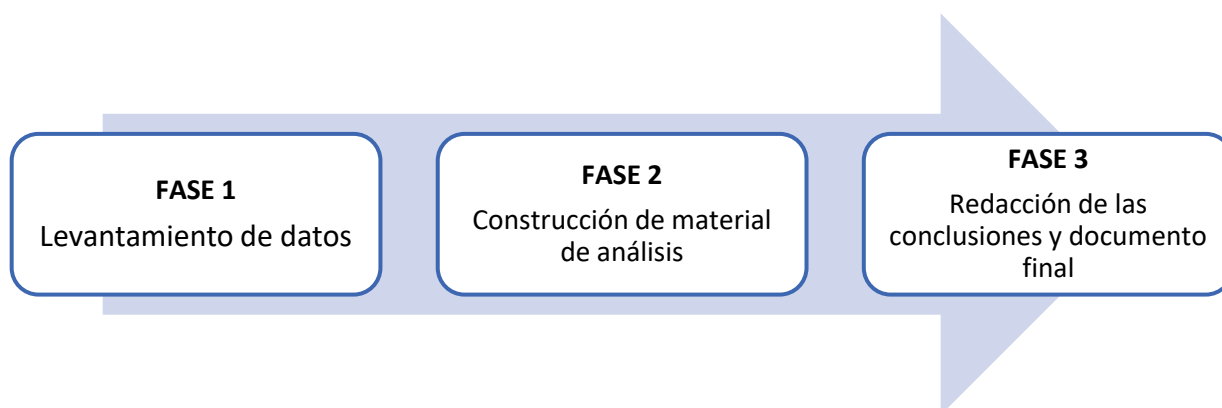


Figure 1. Methodological design
Source: Authors.

3.1.1 PHASE 1: DATA COLLECTION

Data collection was executed from the Search tool on the Scopus website, where 256 publications were obtained from the choice of the following filters:

- TITLE-ABS-KEY (food AND security, AND economic AND impact) AND (LIMIT-TO (PUBYEAR , 2022) OR LIMIT-TO (PUBYEAR , 2021) OR LIMIT-TO (PUBYEAR , 2020) OR LIMIT-TO (PUBYEAR , 2019) OR LIMIT-TO (PUBYEAR , 2018) OR LIMIT-TO (PUBYEAR , 2017)) AND (LIMIT-TO (AFFILCOUNTRY , "Brazil") OR LIMIT-TO (AFFILCOUNTRY , "Mexico") OR LIMIT-TO (AFFILCOUNTRY , "Colombia") OR LIMIT-TO (AFFILCOUNTRY , "Chile") OR LIMIT-TO (AFFILCOUNTRY , "Peru") OR LIMIT-TO (AFFILCOUNTRY , "Argentina") OR LIMIT-TO (AFFILCOUNTRY , "Costa Rica") OR LIMIT-TO (AFFILCOUNTRY , "Ecuador") OR LIMIT-TO (AFFILCOUNTRY , "Venezuela") OR LIMIT-TO (AFFILCOUNTRY , "Cuba") OR LIMIT-

TO (AFFILCOUNTRY , "El Salvador") OR LIMIT-TO (AFFILCOUNTRY , "Bolivia") OR LIMIT-TO (AFFILCOUNTRY , "Uruguay") OR LIMIT-TO (AFFILCOUNTRY , "Panama") OR LIMIT-TO (AFFILCOUNTRY , "Puerto Rico"))

- Published documents whose study variables are related to the study of Food Security, Economic Impact.
- Limited to years 2017-2022.
- Without distinction of country of origin.
- Without distinction of area of knowledge.
- Regardless of type of publication.

3.1.2 PHASE 2: CONSTRUCTION OF ANALYSIS MATERIAL

The information collected in Scopus during the previous phase is organized and subsequently classified by graphs, figures and tables as follows:

- Co-occurrence of words.
- Year of publication.
- Country of origin of the publication.
- Area of knowledge.
- Type of publication.

3.1.3 PHASE 3: DRAFTING OF CONCLUSIONS AND OUTCOME DOCUMENT

In this phase, we proceed with the analysis of the results previously yielded resulting in the determination of conclusions and, consequently, the obtaining of the final document.

4. RESULTS

4.1 CO-OCCURRENCE OF WORDS

Figure 2 shows the co-occurrence of keywords found in the publications identified in the Scopus database.

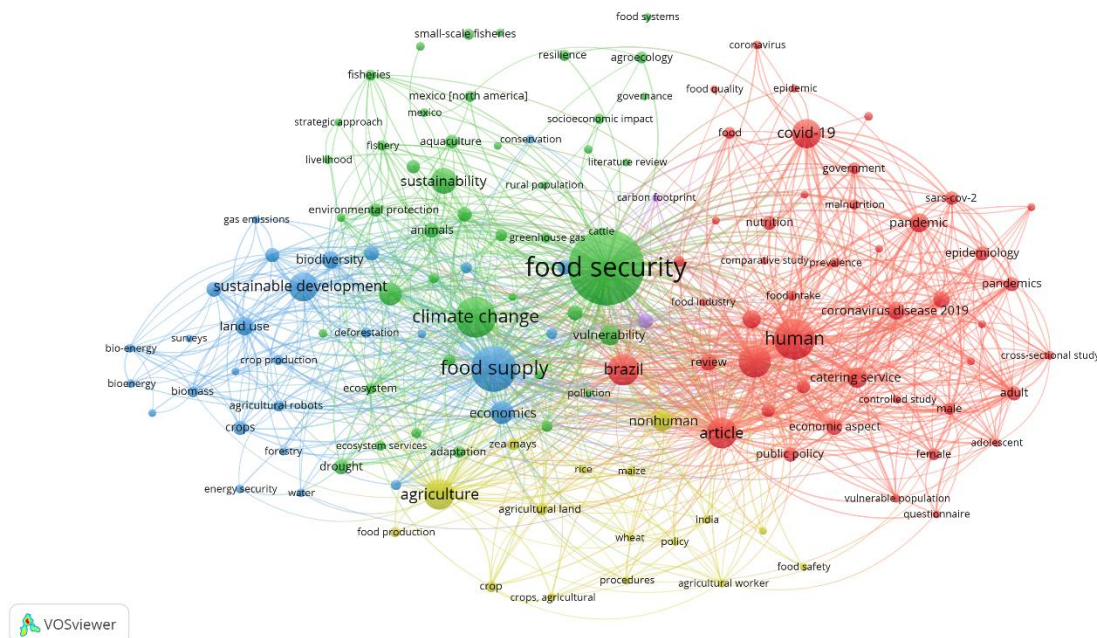


Figure 2. Co-occurrence of words

Source: Own elaboration (2023); based on data exported from Scopus.

The data in Figure 2, exported from Scopus, shows us our variables and their relationship with other terms which we will explain below.

Guaranteeing access to food for the world population, finds its limitations under the observance of multiple aspects of different nature and character, it is for this reason that, as shown in Figure 2, Food Security is the word that has the greatest connotation, followed by words such as Human, Vulnerability and Climate Change, however, the human being as a species, is the one who finds his development and integrity affected by this problem, which among other things can be caused by natural factors as common as Climate Change or even by the emergence of health emergencies of global impact such as COVID-19, who is also shown with a strong presence in the graph.

On the other hand, they complement words such as Economy, Public Policies and Rural Population, establishing in every way that the scope of the variables of this research covers a problem that requires the development and approaches of economic, social and even cultural policies for the mitigation of the risks generated by this scourge.

4.2 DISTRIBUTION OF SCIENTIFIC PRODUCTION BY YEAR OF PUBLICATION

Figure 3 shows how scientific production is distributed according to the year of publication.

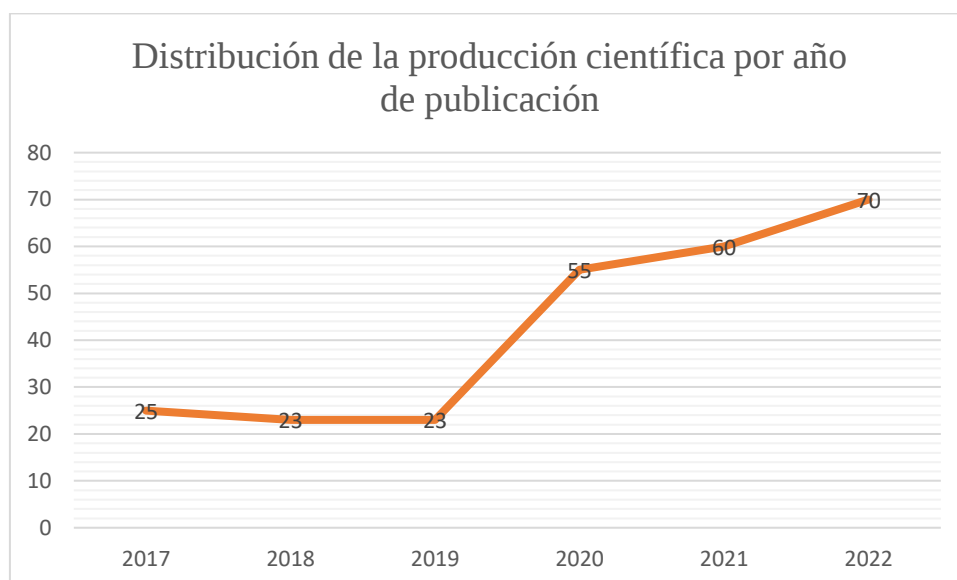


Figure 3. Distribution of scientific production by year of publication.

Source: Own elaboration (2023); based on data exported from Scopus

In Figure 3, it is observed that the study of the variables of the documents thrown by the Scopus Database, during the period between 2017 - 2022, has a considerable and significant volume of contributions, having in the validity of 2017 a production of 25 documents and culminating in the period of 2022 with a total of 70 documents, A considerable difference, however, between this period the growth line was decreased between the periods of 2018 and 2019, finding the increase again in 2020, compared to the first year.

It is for this reason that, it is important to highlight the article of validity of 2022 that is entitled "Soy in Ecuador: importance and alternatives of sustainable production with economic profitability", (Oyarvide-Ramírez, Arce-Olivo, Loo-Reasco, & Quiñónez Monrroy, 2022) whose objective was to determine what treatment would be more appropriate for the cultivation of soy as a primary food for the Food Security of the Ecuadorian country, For the above, the research based its search, in attention to the analysis of a documentary research and statistical sources, in order to establish the

value chain of said product in the local economy and as a food source, for which it was concluded based on the findings thrown by the comparative analysis, that the application of the most favorable technique for its cultivation and which also contributes to the environment, is the supply of nitrogen-fixing bacteria (*Rhizobium*, *Azorhizobium* and *Bradyrhizobium*). That is why from the preparation of this scientific document and its knowledge, we can obtain information of special importance for the application of techniques that contribute to the favoring of crops in the different economies, that allow the fulfillment of the main objective of the policies related to Food Security and that of course generate a favorable economic impact, subject to figures and data on famine and poverty.

4.3 DISTRIBUTION OF SCIENTIFIC PRODUCTION BY COUNTRY OF ORIGIN

Figure 4 shows how scientific production is distributed according to the nationality of the authors.

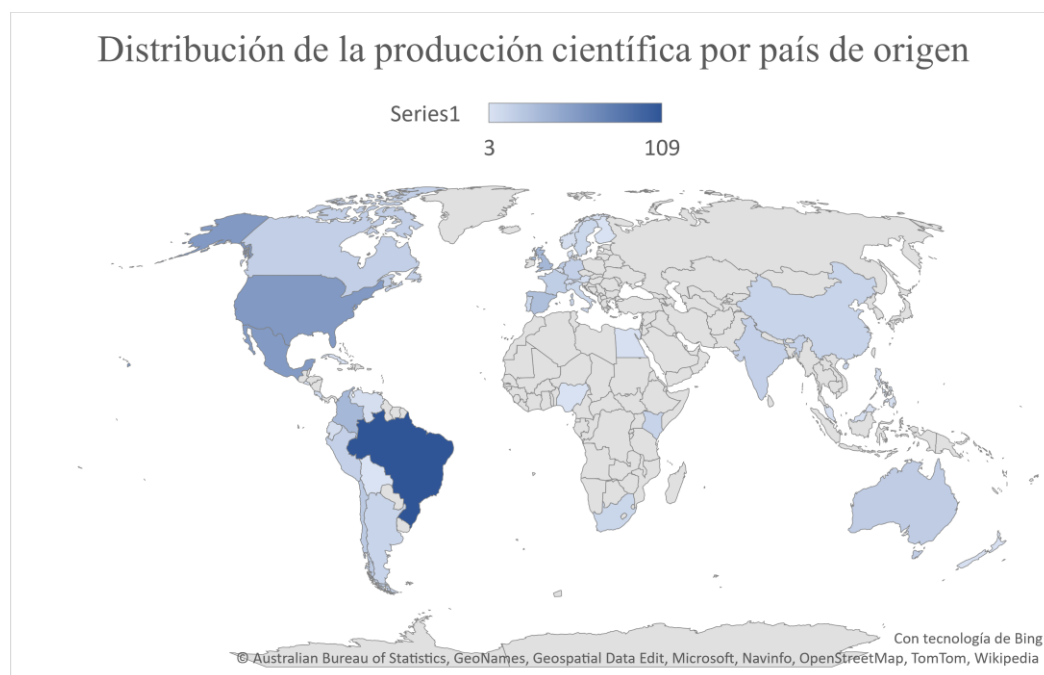


Figure 4. *Distribution of scientific production by country of origin.*

Source: Own elaboration (2023); based on data provided by Scopus.

In the study of the analysis of the proposed variables and as evidenced in Figure 4, Brazil is the country with the highest number of publications indexed to the Scopus Database with 109 documents, followed by the United States with a total of 58 and in third place Mexico with 57 publications.

The analysis of the variables proposed in this scientific document is developed by hundreds of authors affiliated with different institutions around the world, since the implications of their knowledge, analysis and interpretation are of vital importance to trace the paths that lead to social equity, population economic well-being and humanize public policies. It is for this reason that it is important to highlight the article by authors affiliated with Brazilian institutions entitled "Food insecurity and malnutrition in older adults of the Family Health Strategy of the Brazilian Northeast", (Pereira, et al., 2022) whose purpose was to determine the relationship between the levels of malnutrition, typical of weak policies in the insufficiency food of the elderly community and the Family Health Strategies that govern the territory of the municipality of Barreiras, in Bahia, Brazil in the period between 2017 and 2018, for which demographic, social-economic, health conditions, lifestyle and food consumption data were collected. , a binary logistic regression was applied to these data to verify the relationship between the two initial variables object of this research. This

study concluded that older adults in situations of advanced food insufficiency are more likely to suffer from malnutrition than older adults governed by the policies of Family Health Strategies and that cover the postulates of Food Security as measures established by the government entities of the described territory. It is for this reason that the study of this debt is very useful and contributes to the standardization of processes in the study of these variables. On the other hand, it is preponderant to emphasize the article of authors affiliated with institutions of the Ecuadorian country called "Influencia of the sociocultural factors in the nutritional status in children from three to ten years, users of the centers of child development of the municipality of Ambato", (Sánchez Garrido, Peñafiel Salazar, & Montes de Oca Navas, 2022) which annulled its efforts in establishing adequate nutrition for the development of the child population in the Ecuadorian context, for which its study was based on the analysis and interpretation of the transformations in the Ecuadorian environment in the last 5 years and the observance of the comprehensive programs designed for the corresponding stages and the precedents originated therein. Of which the fact of the difficulties in accessing food with positive nutritional values and culturally appropriate for the integral development of children is highlighted, it is also concluded that the various organizations had the will to establish the fight against inequality, poverty, food insufficiency and their contribution to reduce this negative impact on society. They also have great contributions to the analysis of these variables, authors affiliated with the countries of the United Kingdom, Colombia and Spain.

4.4 DISTRIBUTION OF SCIENTIFIC PRODUCTION BY AREA OF KNOWLEDGE

Figure 5 shows the distribution of the elaboration of scientific publications from the area of knowledge through which the different research methodologies are implemented.

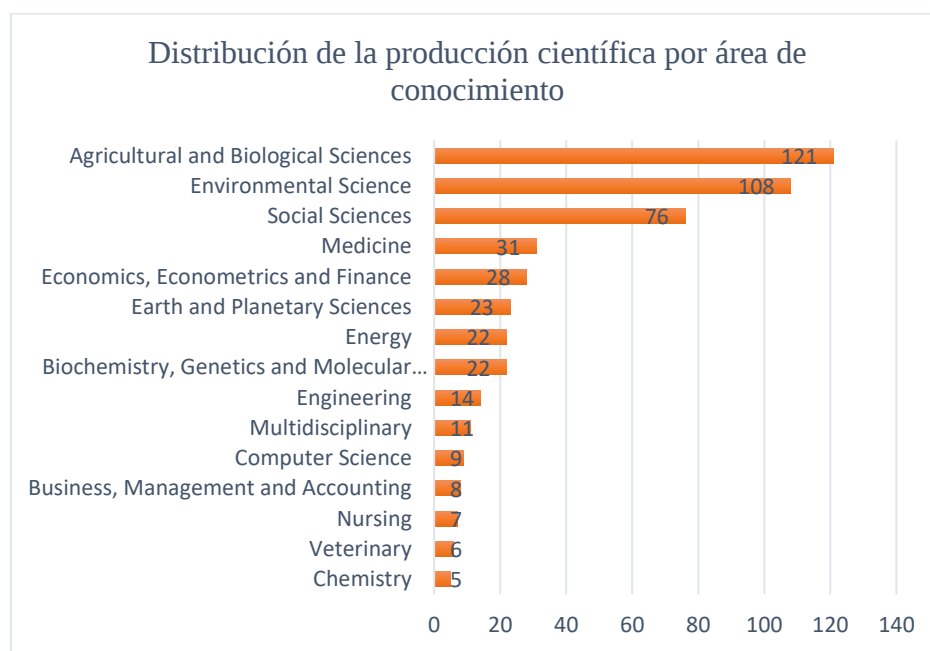


Figure 5. Distribution of scientific production by area of knowledge.

Source: Own elaboration (2023); based on data provided by Scopus.

It is necessary to study the different areas of knowledge through the different documentary reviews; Establish a critical analysis of the different food security strategies from the unique perspective of each area of knowledge, with the ultimate goal of establishing items and procedures that allow the optimization of macro policies for the execution of Food Security plans according to the needs of nations. It is for this reason that areas of knowledge such as Agricultural and Biological Science, have the largest contribution of publications registered in Scopus Database, with a total of 121 indexed documents, in second place Environmental Science, taking into account that for the achievement of food this area is key contributes a total of 108 registered documents,

likewise, the area of Social Sciences as a humanizing component registers a total of 76 documents, as shown in Figure 5 and in third place respectively.

Because of the above, it is important to highlight the article in the area of Economics, Econometrics and Finance, which also contributes significantly to the study of the variables with a contribution of 28 documents, which is entitled "The economic diversification of small-scale fishers and their contributions to the objectives of the 2030 Agenda" (Armenta Cisneros, de la Peña, Marín Monroy, & Trejo, 2022), whose objective was to establish the relevance, importance and usefulness of artisanal fishing, as a strategy in economic diversification and contribution to the measures adopted by the Food Security plan, in addition to its contribution to the objectives of the 2030 agenda of the SDG, for the same a bibliometric analysis of publications with a similar purpose was carried out in the period from 2017 to 2022, finding that the processes carried out in attention to artisanal fishing, are executed in different ways, in attention to local customs, knowledge and cultures of the different regions, despite being a global activity, on the other hand, it is indicated that the intervention of the State for this practice results as an incentive and generating factor of opportunities where it is applied, while, in markets managed by wholesalers, it weakens economic markets and therefore governance from Food Security, however the results are inconclusive.

4.5 TYPE OF PUBLICATION

In the following graph, you will observe the distribution of the bibliographic finding according to the type of publication made by each of the authors found in Scopus.

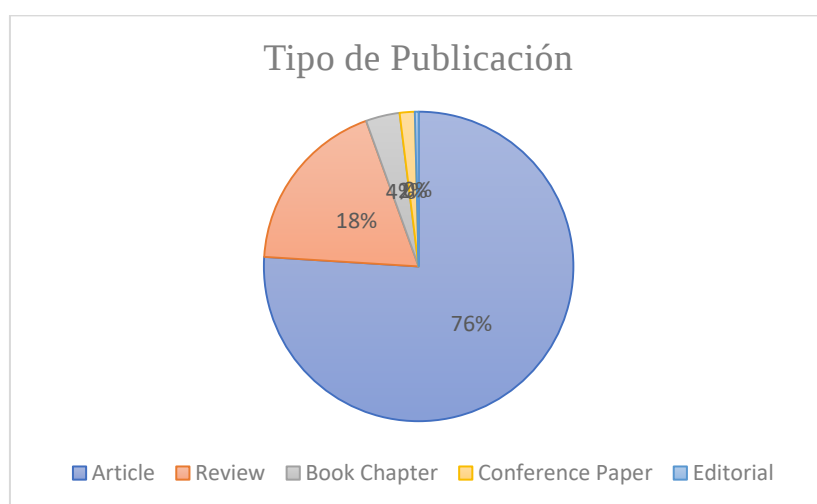


Figure 6. Type of publication.

Source: Own elaboration (2023); based on data provided by Scopus.

In order to find new knowledge, study, analyze and interpret them, the different authors have different methodologies and types that are used as vehicles for the transmission of such knowledge, in observance of Figure 6, we find that the Article is the Type of Publication most used by the different authors with 76% of the total within which the Latin American writing called "Women's autonomy and food security: connecting the dots from the perspective of indigenous women in rural areas of Colombia", (Sinclair, et al., 2022) which as its title states, its objective was to determine the relationship between women's will versus the assumptions of what Food Security requires in the population of Nariño, Colombia, to carry out various discussion forums were implemented to 24 women in the area, finding that the generalized machismo of the Colombian rural population prevented from every point of view that women as a fundamental element in families provide a nutritional diet of their own to their homes, since their role as women was limited in the remuneration of the proposed work. The limitation in the reception of education and labor

discrimination in the agricultural area, are fundamental factors that limit the application of autonomy in this population group, the above in view of the low political participation of women in this area of very important relevance when intervening in processes of a legal nature, economic, social and cultural, so it is concluded that stereotyped gender roles are presented as a premise of the causes that generate inequality.

It is important to highlight the use also of the Reviews as Type of publication analyzed in this document with 18% and Chapters of Books and Conference Articles with participation in less use, but with equal importance in the method used.

5. CONCLUSIONS

From the bibliometric analysis carried out in the present research work, it was established that Brazil and the United States were the countries with the highest number of records published in relation to the variables Food Security, Economic Impact with 109 and 58 publications respectively, according to the Scopus database during the period 2017 -2022 and that the area of knowledge with the greatest contribution was the Agricultural and Biological Sciences of 121 texts.

It is then, that once reviewed the bibliometric analysis proposed in this scientific document in front of the study of the variables, we can conclude that; Food insecurity finds its causes in the limitations in access to quality nutrition, at a general level in the world population, however this fact is not alien to the situations presented in the political-social context of the Ecuadorian country, and that although improvements have been implemented from legislation and legal system, Since food security for the State and its institutions is established as a principle, non-governmental organizations and private legal entities are not in tune with the will of the Government and the entities belonging to the United Nations organization FAO, directly affecting the mitigation of the figures that show the high rates of food insecurity and the negative impact on the local economy.

It is in this order of ideas, the feasible solution is the strengthening of these policies by the state and the turning of the private sector to the contribution of this letter, to achieve the proposed goals of the Food Organization of the United Nations and comply with the legal premises of the defense of the constitutional rights of any social state of Law. . Achieving the objectives leads to improving the quality of life of the world population, improving their health conditions and prolonging life expectancy.

REFERENCES

- [1] Aldrich, H., & Whetten, A. (1981). Organizationsets, action-sets and networks: making the most out of simplicity. P.C. Nystrom y W.H. Starbuck (eds), 385-408.
- [2] Armenta Cisneros, M., de la Peña, M., Marín Monroy, E., & Trejo, V. (2022). The economic diversification of small-scale fishers and their contributions to the goals of the 2030 Agenda. *Revista Mexicana de Economía y Finanzas Nueva Época*.
- [3] Ayaviri, D., Quispe, G., Romero, M., & Fierro, P. (2016). Progress and progress of food security policies and strategies in Ecuador. *Journal of high andean research*.
- [4] FAO; PAHO; WFP; UNICEF. (2018). Overview of Food and Nutrition Security in Latin America and the Caribbean 2018. Santiago: FAO.
- [5] León, A., Martínez, R., Espíndola, E., & Schejtman, A. (2004). Poverty, hunger and food security in Central America and Panama. ECLAC.
- [6] Loma-Ossorio, F., & Lahoz, C. (2006). The conceptual framework of food security. FAO.
- [7] Oyarvide-Ramírez, H., Arce-Olivo, T., Llor-Reasco, W., & Quiñónez Monroy, G. (2022). Soy in Ecuador: importance and alternatives for sustainable production with economic profitability. *Agroalimentaria*.
- [8] Pereira, M., Pereira, M., Teles, B., dos Santos Pereira, D., De Campos, G., & Del Carmen Bisi Molina, M. (2022). Food insecurity and malnutrition in older adults from the Family Health Strategy in the Northeast of Brazil. *Archivos Latinoamericanos de Nutricion*, 274-284.

- 
- [9] Sánchez Garrido, A., Peñafiel Salazar, A., & Montes de Oca Navas, C. (2022). INFLUENCE OF SOCIOCULTURAL FACTORS ON THE NUTRITIONAL STATUS OF CHILDREN FROM THREE TO TEN YEARS OF AGE, USERS OF THE CHILD DEVELOPMENT CENTERS OF THE MUNICIPALITY OF AMBATO. *Universidad y Sociedad*.
 - [10] Sinclair, K., Thompson-Colón, T., Bastidas-Granja, A., Bastidas-Granja, A., Olaya, E., & Melgar-Quinonez, H. (2022). Women's autonomy and food security: Connecting the dots from the perspective of Indigenous women in rural Colombia. *SSM - Qualitative Research in Health*.
 - [11] Abeldaño Zuñiga, R. A., Lima, G. N., & González Villoria, A. M. (2021). Impact of slow-onset events related to climate change on food security in latin america and the caribbean. *Current Opinion in Environmental Sustainability*, 50, 215-224. doi:10.1016/j.cosust.2021.04.011
 - [12] Aceves-Bueno, E., Read, A. J., & Cisneros-Mata, M. A. (2021). Illegal fisheries, environmental crime, and the conservation of marine resources. *Conservation Biology*, 35(4), 1120-1129. doi:10.1111/cobi.13674
 - [13] Aggarwal, P., Vyas, S., Thornton, P., & Campbell, B. M. (2019). How much does climate change add to the challenge of feeding the planet this century? *Environmental Research Letters*, 14(4) doi:10.1088/1748-9326/aafa3e
 - [14] Alcántara-de la Cruz, R., Cruz-Hipolito, H. E., Domínguez-Valenzuela, J. A., & De Prado, R. (2021). Glyphosate ban in mexico: Potential impacts on agriculture and weed management. *Pest Management Science*, 77(9), 3820-3831. doi:10.1002/ps.6362
 - [15] Aldaco, R., Hoehn, D., Laso, J., Margallo, M., Ruiz-Salmón, J., Cristobal, J., . . . Vazquez-Rowe, I. (2020). Food waste management during the COVID-19 outbreak: A holistic climate, economic and nutritional approach. *Science of the Total Environment*, 742 doi:10.1016/j.scitotenv.2020.140524
 - [16] Almagro, A., Oliveira, P. T. S., Nearing, M. A., & Hagemann, S. (2017). Projected climate change impacts in rainfall erosivity over brazil. *Scientific Reports*, 7(1) doi:10.1038/s41598-017-08298-y
 - [17] Anghinoni, G., Anghinoni, F. B. G., Tormena, C. A., Braccini, A. L., de Carvalho Mendes, I., Zancanaro, L., & Lal, R. (2021). Conservation agriculture strengthen sustainability of brazilian grain production and food security. *Land use Policy*, 108 doi:10.1016/j.landusepol.2021.105591
 - [18] Angulo-Valdes, J., Pina-Amargos, F., Figueredo-Martin, T., Fujita, R., Haukebo, S., Miller, V., . . . Whittle, D. (2022). Managing marine recreational fisheries in cuba for sustainability and economic development with emphasis on the tourism sector. *Marine Policy*, 145 doi:10.1016/j.marpol.2022.105254
 - [19] Aparicio-González, E., Gerritsen, P. R. W., Borges, I., Campos-López, M., Carrillo-Aldape, Z., Castorena-Pérez, A., . . . Rojas-Hernández, L. (2019). Where do our foods come from? An analysis of food security in the municipality of autlán de navarro, jalisco state, western mexico. [Where does our food come from? Analysis of food security in the Municipality of Autlán de Navarro, state of Jalisco, Mexico] *Agroalimentaria*, 25(48), 135-154. Retrieved from www.scopus.com
 - [20] Arantes, C. C., Laufer, J., Pinto, M. D. D. S., Moran, E., Lopez, M. C., Dutka-Gianelli, J., . . . Doria, C. (2022). Functional responses of fisheries to hydropower dams in the amazonian floodplain of the madeira river. *Journal of Applied Ecology*, 59(3), 680-692. doi:10.1111/1365-2664.14082
 - [21] Araújo, B. D., Maia, R., Arantes-Garcia, L., Oki, Y., Negreiros, D., de Assis, I. R., & Fernandes, G. W. (2022). Aftershocks of the samarco disaster: Diminished growth and increased metal content of raphanus sativus cultivated in soil with mining tailings. *Acta Scientiarum - Biological Sciences*, 44 doi:10.4025/actascibiols.v44i1.59175
 - [22] Arias-Pacheco, C., Lucas, J. R., Rodríguez, A., Córdoba, D., & Lux-Hoppe, E. G. (2020). Economic impact of the liver condemnation of cattle infected with fasciola hepatica in the peruvian andes. *Tropical Animal Health and Production*, 52(4), 1927-1932. doi:10.1007/s11250-020-02211-y

- 
- [23] Armenta Cisneros, M. H., de la Peña, M. Á. O. R., Marín Monroy, E. A., & Trejo, V. H. (2022). The economic diversification of small-scale fishers and their contributions to the goals of the 2030 agenda. [The economic diversification of small-scale fishers and their contributions to the goals of the 2030 Agenda] *Revista Mexicana De Economía y Finanzas Nueva Época*, 17(4) doi:10.21919/remef.v17i4.799
 - [24] Arnés, E., Astier, M., Marín González, O., & Hernández Díaz-Ambrona, C. G. (2019). Participatory evaluation of food and nutritional security through sustainability indicators in a highland peasant system in Guatemala. *Agroecology and Sustainable Food Systems*, 43(5), 482-513. doi:10.1080/21683565.2018.1510871
 - [25] ARTAXO, P. (2020). The three emergencies facing our society: Health, biodiversity and climate change. *Advanced Studies*, 34(100), 53-66. doi:10.1590/s0103-4014.2020.34100.005
 - [26] Aslam, A. Q., Ahmad, I., Ahmad, S. R., Hussain, Y., Hussain, M. S., Shamshad, J., & Zaidi, S. J. A. (2018). Integrated climate change risk assessment and evaluation of adaptation perspective in southern Punjab, Pakistan. *Science of the Total Environment*, 628-629, 1422-1436. doi:10.1016/j.scitotenv.2018.02.129
 - [27] Aslam, A. Q., Ahmad, S. R., Ahmad, I., Hussain, Y., & Hussain, M. S. (2017). Vulnerability and impact assessment of extreme climatic event: A case study of southern Punjab, Pakistan. *Science of the Total Environment*, 580, 468-481. doi:10.1016/j.scitotenv.2016.11.155
 - [28] Avalos-Rangel, M. A., Campbell, D. E., Reyes-López, D., Rueda-Luna, R., Munguía-Pérez, R., & Huerta-Lara, M. (2021). The environmental-economic performance of a poblano family milpa system: An emergy evaluation. *Sustainability (Switzerland)*, 13(16) doi:10.3390/su13169425
 - [29] Bairagi, S., Mishra, A. K., & Mottaleb, K. A. (2022). Impacts of the COVID-19 pandemic on food prices: Evidence from storable and perishable commodities in India. *PLoS ONE*, 17(3 March) doi:10.1371/journal.pone.0264355
 - [30] Barron, G. C., Laryea-Adjei, G., Vike-Freiberga, V., Abubakar, I., Dakkak, H., Devakumar, D., . . . Karadag, O. (2022). Safeguarding people living in vulnerable conditions in the COVID-19 era through universal health coverage and social protection. *The Lancet Public Health*, 7(1), e86-e92. doi:10.1016/S2468-2667(21)00235-8
 - [31] Bassett, H. R., Lau, J., Giordano, C., Suri, S. K., Advani, S., & Sharan, S. (2021). Preliminary lessons from COVID-19 disruptions of small-scale fishery supply chains. *World Development*, 143 doi:10.1016/j.worlddev.2021.105473
 - [32] Batlles-de-la-Fuente, A., Abad-Segura, E., González-Zamar, M. -, & Cortés-García, F. J. (2022). An evolutionary approach on the framework of circular economy applied to agriculture. *Agronomy*, 12(3) doi:10.3390/agronomy12030620
 - [33] Bauer, A., Garman, E., McDaid, D., Avendano, M., Hessel, P., Díaz, Y., . . . Evans-Lacko, S. (2021). Integrating youth mental health into cash transfer programmes in response to the COVID-19 crisis in low-income and middle-income countries. *The Lancet Psychiatry*, 8(4), 340-346. doi:10.1016/S2215-0366(20)30382-5
 - [34] Belmudes, D., David, F. S., Gonçalves, F. H., & Valenti, W. C. (2021). Sustainability analysis of the production of early stages of the Atlantic forest lamberti (deuterodon iguape) in a public hatchery at a rainforest conservation area. *Sustainability (Switzerland)*, 13(11) doi:10.3390/su13115934
 - [35] Béné, C. (2020). Resilience of local food systems and links to food security - A review of some important concepts in the context of COVID-19 and other shocks. *Food Security*, 12(4), 805-822. doi:10.1007/s12571-020-01076-1
 - [36] Benites Lazaro, L. L., Giatti, L. L., & Puppim de Oliveira, J. A. (2021). Water-energy-food nexus approach at the core of businesses - how businesses in the bioenergy sector in Brazil are responding to integrated challenges? *Journal of Cleaner Production*, 303 doi:10.1016/j.jclepro.2021.127102
 - [37] Bento, C. B., Brandani, C. B., Filoso, S., Martinelli, L. A., & Carmo, J. B. D. (2021). Effects of extensive-to-intensive pasture conversion on soil nitrogen availability and CO₂ and N₂O fluxes in a Brazilian oxisol. *Agriculture, Ecosystems and Environment*, 321 doi:10.1016/j.agee.2021.107633

- 
- [38] Biswal, A. K., Alakonya, A. E., Mottaleb, K. A., Hearne, S. J., Sonder, K., Molnar, T. L., . . . Prasanna, B. M. (2022). Maize lethal necrosis disease: Review of molecular and genetic resistance mechanisms, socio-economic impacts, and mitigation strategies in sub-saharan africa. *BMC Plant Biology*, 22(1) doi:10.1186/s12870-022-03932-y
 - [39] Bof, P. H., Marques, G. F., Tilmant, A., Dalcin, A. P., & Olivares, M. (2021). Water-food-energy nexus tradeoffs in the são marcos river basin. *Water (Switzerland)*, 13(6) doi:10.3390/w13060817
 - [40] Bravo-Olivas, M. L., & Chávez-Dagostino, R. M. (2020). Sustainable fishing? ecological footprint analysis of an artisanal fishing organization. *Open Ecology Journal*, 13(1), 1-10. doi:10.2174/1874213002013010001
 - [41] Caetano, J. M., Tessarolo, G., De Oliveira, G., da Silva e Souza, K., Felizola Diniz-Filho, J. A., & Nabout, J. C. (2018). Geographical patterns in climate and agricultural technology drive soybean productivity in brazil. *PLoS ONE*, 13(1) doi:10.1371/journal.pone.0191273
 - [42] Calderon-Aguilera, L. E., Fenberg, P. B., Godbold, J. A., Hill, C. T., Hudson, M. D., Hutton, C., . . . Eigenbrod, F. (2022). Research capability gaps hinder understanding of the impact of climate change on ecosystem services in the latin american pacific coast. [Las brechas en la capacidad de investigación dificultan la comprensión del impactodel cambio climático en los servicios ecosistémicos en la costa del Pacífico latinoamericano] *Hidrobiologica*, 32(2), 117-125. doi:10.24275/uam/izt/dcbs/hidro/2022v32n2/Calderon
 - [43] Carhuaricra Huaman, D. E., Luna Espinoza, L. R., Rodríguez Cueva, C. L., Duran Gonzales, C. G., Rosadio Alcántara, R. H., Setubal, J. C., & Maturrano Hernández, L. (2022). Genomic characterization of salmonella typhimurium isolated from guinea pigs with salmonellosis in lima, peru. *Microorganisms*, 10(9) doi:10.3390/microorganisms10091726
 - [44] Carmenta, R., Cammelli, F., Dressler, W., Verbicaro, C., & Zähringer, J. (2021). Between a rock and a hard place: The burdens of uncontrolled fire for smallholders across the tropics. *World Development*, 145 doi:10.1016/j.worlddev.2021.105521
 - [45] Carvalho, A. R., Pennino, M. G., Bellido, J. M., & Olavo, G. (2020). Small-scale shrimp fisheries bycatch: A multi-criteria approach for data-scarce situations. *Marine Policy*, 116 doi:10.1016/j.marpol.2019.103613
 - [46] Carvalho, M. E. A., Gaziola, S. A., Carvalho, L. A., & Azevedo, R. A. (2021). Cadmium effects on plant reproductive organs: Physiological, productive, evolutionary and ecological aspects. *Annals of Applied Biology*, 178(2), 227-243. doi:10.1111/aab.12612
 - [47] Casali, L., Herrera, J. M., & Rubio, G. (2022). Resilient soybean and maize production under a varying climate in the semi-arid and sub-humid chaco. *European Journal of Agronomy*, 135 doi:10.1016/j.eja.2022.126463
 - [48] Castillo, A. S. (2020). Measures to safeguard food security during COVID-19: The experience of the sowing plan in venezuela. Paper presented at the ACM International Conference Proceeding Series, 396-399. doi:10.1145/3428502.3428555 Retrieved from www.scopus.com
 - [49] Cerda, A. A., García, L. Y., Rivera-Arroyo, J., Riquelme, A., Teixeira, J. P., & Jakovljevic, M. (2022). Comparison of the healthcare system of chile and brazil: Strengths, inefficiencies, and expenditures. *Cost Effectiveness and Resource Allocation*, 20(1) doi:10.1186/s12962-022-00405-9
 - [50] Clemente, R. L. A. (2022). Action track 5 for food systems transformation: Building resilience to vulnerabilities, shocks, impacts and stresses. [Action Line 5 for Food Systems Transformation: Building Resilience to Vulnerabilities, Shocks, Impacts and Stresses] *Agroalimentaria*, 28(55), 139-168. Retrieved from www.scopus.com
 - [51] Corrêa, C. J. P., Tonello, K. C., Nnadi, E., & Rosa, A. G. (2020). Seeding the city: History and current affairs of urban agriculture. *Ambiente e Sociedade*, 23 doi:10.1590/1809-4422ASOC20180075R1VU2020L1AO
 - [52] Costa, C. G. F. (2021). Increased vulnerability of family farming in the context of a weakened FNS agenda due to austerity measures in brazil. [The increasing vulnerability of family farming in the context of a food security agenda weakened by austerity measures in Brazil] *Agrarian Economics and Natural Resources*, 22(1), 103-134. doi:10.7201/EARN.2021.01.05

- 
- [53] Crespin, S. J., & Simonetti, J. A. (2021). Traversing the food-biodiversity nexus towards coexistence by manipulating social-ecological system parameters. *Conservation Letters*, 14(3) doi:10.1111/conl.12779
 - [54] Crosswell, J. R., Bravo, F., Pérez-Santos, I., Carlin, G., Cherukuru, N., Schwanger, C., . . . Steven, A. D. L. (2022). Geophysical controls on metabolic cycling in three patagonian fjords. *Progress in Oceanography*, 207 doi:10.1016/j.pocean.2022.102866
 - [55] Cuéllar-Gálvez, D., Aranda-Camacho, Y., & Mosquera-Vásquez, T. (2018). A model to promote sustainable social change based on the scaling up of a high-impact technical innovation. *Sustainability (Switzerland)*, 10(12) doi:10.3390/su10124532
 - [56] Cunha, A. P. M. A., Zeri, M., Leal, K. D., Costa, L., Cuartas, L. A., Marengo, J. A., . . . Ribeiro-Neto, G. (2019). Extreme drought events over brazil from 2011 to 2019. *Atmosphere*, 10(11) doi:10.3390/atmos10110642
 - [57] da Silva Gemaque, A. M., Beltrão, N. E. S., Mesquita, M. O. B., & Filho, H. R. F. (2017). Farmer's quality of life family and its relationship with oil palm: Study a rural community in moju municipality, pa. [Quality of life of family farmers and their relationship with oil palm plantations: A study of a rural community in the municipality of Moju, Pa] *Brazilian Journal of Management and Regional Development*, 13(1), 174-197. Retrieved from www.scopus.com
 - [58] da Silva, L. R. C., Pessoa, V. M., Carneiro, F. F., Andrade, N. S. M., & Meireles, A. J. A. (2021). Oil spill on the brazilian coast: (in)visibility of knowledges and disregard for the life of shellfisherwomen. [Derramamento de petróleo no litoral brasileiro: (in)visibilidade de saberes e descaso com a vida de marisqueiras] *Ciencia e Saude Coletiva*, 26(12), 6026-6036. doi:10.1590/1413-812320212612.15172021
 - [59] Dal Moro, L., Maculan, L. S., Neckel, A., de Vargas Mores, G., Pivoto, D., Bodah, E. T., . . . Oliveira, M. L. S. (2021). Geotechnologies applied to the analysis of buildings involved in the production of poultry and swine to the integrated food safety system and environment. *Journal of Environmental Chemical Engineering*, 9(6) doi:10.1016/j.jece.2021.106475
 - [60] de Amorim, W. S., Valduga, I. B., Ribeiro, J. M. P., Williamson, V. G., Krauser, G. E., Magtoto, M. K., & de Andrade Guerra, J. B. S. O. (2018). The nexus between water, energy, and food in the context of the global risks: An analysis of the interactions between food, water, and energy security. *Environmental Impact Assessment Review*, 72, 1-11. doi:10.1016/j.eiar.2018.05.002
 - [61] de Andrade, E. C., Girardi, E. A., Stuchi, E. S., Moreira, A. S., Freitas-Astua, J., Fancelli, M., . . . Laranjeira, F. F. (2021). CITRUS HUANGLONGBING (HLB) AND THE BRAZILIAN EFFORTS TO OVERCOME THE DISEASE. *Outlooks on Pest Management*, 32(5), 189-194. doi:10.1564/v32_oct_02
 - [62] de Brito, Y. M. A., Rufino, I. A. A., Braga, C. F. C., & Mulligan, K. (2021). The brazilian drought monitoring in a multi-annual perspective. *Environmental Monitoring and Assessment*, 193(1) doi:10.1007/s10661-020-08839-5