

Research Article

Roadmap of Food Literacy and Nutrition Literacy: A Bibliometric Analysis

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Abstract

Objectives: This bibliometric study aimed to highlight the growing importance of food and nutrition literacy for public health by examining the number of publications, authors, country collaborations, most favored journals, and most cited articles.

Methods: As of January 21, 2024, excluding reviews, editorial letters, book chapters, perspective articles, articles without Web of Science (WoS) abstracts, and other types of documents, 547 articles meeting the criteria were identified using "food literacy" and "nutrition literacy" in the title from the WoS database between January 2000 and December 2023. SPSS and Joinpoint statistical software were used to analyze the results.

Results: The average annual growth rate was 34.46 articles. The top country in terms of productivity was the USA (107 articles, 19.5%). The top country by average citations was Australia (17.9). The most frequently used keyword was "health" (16.6%), followed by "knowledge" (14.8%) and "health literacy" (14.2%). Heather D. Gibbs from the University of Kansas Medical Center, USA, had the highest number of publications with 14 articles.

Conclusion: This study is the first to quantify the increasing trend in articles on food literacy and nutrition literacy using Joinpoint regression analysis. It emphasizes the need for more research on intervention programs to improve dietary habits and public health outcomes.

Keywords: Bibliometric analysis, Food literacy, Nutrition literacy, Nutrition, Public health

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The importance of the role of nutrition in health protection and preventing chronic diseases is reinforced by new literature evidence.^[1] Investigating the nutritional habits of society and improving nutrition in the direction of health protection and the prevention of chronic diseases is a leading field of study in public health.^[2] Efforts to examine and favorably improve dietary habits require a comprehensive investigation of food and nutrition literacy concepts.^[3]

In fact, the concepts of food literacy and nutrition literacy were developed from the concept of health literacy.^[4,5] However, food literacy and nutrition literacy are not commonly accepted concepts.^[5] Krause et al.^[2] state that food and nutrition literacy are different but intersecting concepts. Therefore, nutritional literacy has been stated as an essential prerequisite for food literacy.^[2]

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Theoretical Background

The concept of food literacy emerged in the early 1990s.^[5,6] Food literacy includes various types of knowledge, skills, and practices for defining food, understanding the interaction between food and the human body, and managing, purchasing, preparing, and consuming food.^[2,3,7] In addition, considering social, environmental, cultural, and economic variables together in evaluating food literacy offers opportunities for structuring health policies to improve individual and community health.^[3,4]

Food literacy has been reconceptualized as 11 components organized under four domains, based on the perspectives of experts and young people, providing individuals with the capacity to maintain diet quality. These four domains are planning and managing, choosing, preparing, and consuming.^[8] Skills in these areas conceptualized for food literacy increase freedom of food choice and strengthen individuals' skills related to food selection and consumption.^[9,10] On the other hand, insufficient food literacy indicates a lack of knowledge about purchasing, storing, preparing, and serving food.^[9]

The term nutritional literacy is included as a prerequisite for food literacy.^[11] The term nutritional literacy is defined as "having the ability to acquire, process, and understand the nutritional knowledge and skills necessary to make appropriate nutritional decisions".^[3] Referring to the tripartite model proposed by Nutbeam,^[12] nutrition literacy can be defined as the capacity to access, understand, and apply nutrition information at three different levels: functional, interactive, and critical nutrition literacies. Functional nutrition literacy refers to the skills and abilities of individuals to acquire, understand, and apply nutrition information, while interactive nutrition literacy refers to the ability of individuals to participate in the communication of dietary information and to share and discuss it. Critical nutrition literacy refers to the consumer's ability to evaluate nutrition information and understand the relationship between food and the environment.^[13]

Literature Review

Difficulties in using information on food labels and inadequate health literacy skills among individuals expose them to poorer health outcomes.^[13,14] Individuals' low levels of food and nutrition literacy imply an inability to adopt positive attitudes and perceptions toward food, as well as an inability to manage information about food selection and consumption.^[4] In particular, it is very important to improve adequate, balanced, and healthy nutrition knowledge and behaviors in order to reverse the increasing trend of non-communicable diseases worldwide, reduce their incidence, and improve the quality of life of individuals.^[15]

The adequacy of individuals' food literacy and nutrition literacy is essential for individual health and well-being, as well as for reducing the risk of chronic diseases, ensuring food security, and creating a sustainable future.^[9] In fact, the majority of sustainable development goals support the promotion of food literacy and nutrition literacy.^[16]

The aim of this bibliometric analysis using quantitative techniques was to map the developmental trend of food literacy and nutrition literacy research topics over time and to identify a potential future research agenda. The following research questions were addressed in this study:

- **RQ1.** How has research on the concepts of food literacy and nutrition literacy developed historically?
- **RQ2.** Who were the pioneering authors on food literacy and nutrition literacy concepts?
- **RQ3.** Which journals and countries have the most influential resources on food literacy and nutrition literacy concepts?
- **RQ4.** What are the suggested future research agendas related to food literacy and nutrition literacy concepts?

Methods

The initial stage entailed selecting the database for analysis. As widely recognized, the Web of Science (WoS) stands out for its extensive coverage compared to other databases. Subsequently, the focus shifted toward identifying keywords conducive to conducting a comprehensive search within this domain. This necessitated pinpointing commonly utilized terminology in the field. Consequently, "nutrition literacy" and "food literacy" were designated as the keywords facilitating the broadest search scope.

The Web of Science (WoS) database was searched on January 21, 2024. The search terms "food literacy" and "nutrition literacy" were searched in the article title field for the period between January 2000 and December 2023. A similar methodology has been used in previous bibliometric studies.^[17-19]

Following the literature search, articles that did not meet the inclusion criteria or were considered irrelevant were identified and excluded. To achieve this, the search results were archived in a Web of Science file for a comprehensive review. Over a span of 10 days, meticulous scrutiny was applied to the titles and abstracts of the retrieved articles. Consequently, certain articles were excluded from further consideration based on their alignment with the specified criteria. Only original research articles were included in the study. Reviews, conference publications, editorial materials, book chapters, perspective articles, non-WoS abstracts, and other document types were excluded. Only articles

written in English were included, and all non-English articles were excluded. Off-topic articles were also identified and excluded from the study. In total, 160 of the 707 articles identified were excluded. The remaining 547 eligible articles were saved and prepared for bibliometric analysis.

Finally, the appropriate bibliometric tools were selected and the analyses were performed. The Biblioshiny software was chosen for its capability in network visualization and comprehensive bibliometric analysis. This selection was made due to its proven reliability in effectively processing and synthesizing bibliographic data.^[20] In addition, the h-index and g-index values were generated using the "Local Impact" module in Biblioshiny. The h-index was defined as the number of publications that received at least h citations, whereas the g-index was calculated based on the distribution of citations in which the top g publications collectively received at least g^2 citations.

Country-based analyses were determined by the affiliation of the corresponding author, and countries that produced more than 1% of the articles within the date range of the study were grouped as the main active countries.^[21] For this analysis, the formula "number of articles per country / total number of articles" was used.^[22] Population size and gross domestic product (GDP) data for each main active country were extracted from the CIA World Factbook website (<https://www.cia.gov/the-world-factbook/>), and the number of articles was evaluated accordingly. According to the World Bank, countries are divided into four main income categories: low, middle, upper-middle, and high income.^[23] The analysis of the obtained data was carried out using the VOSviewer software (Version 1.6.17), which visualizes collaboration networks in bibliometric studies.

Statistical analysis

Data were analyzed using the SPSS 20.0 (SPSS Inc., Chicago, IL) software package and the Joinpoint statistical software program (Version 5.1). Values were expressed as frequencies and percentages, and the change in the number of published articles over the years was evaluated using Joinpoint regression analysis. A p-value of less than 0.05 ($p < 0.05$) was considered statistically significant.

Results

A total of 707 articles were listed. Based on the inclusion criteria, 547 articles, all in English, were retrieved and analyzed after excluding some publications due to inappropriate document type (140 articles), inappropriate language (12 articles), duplicate records (1 article), the absence of WoS abstracts (6 articles), and an inappropriate topic (1 article). The flowchart of the bibliometric analysis is presented in Figure 1.

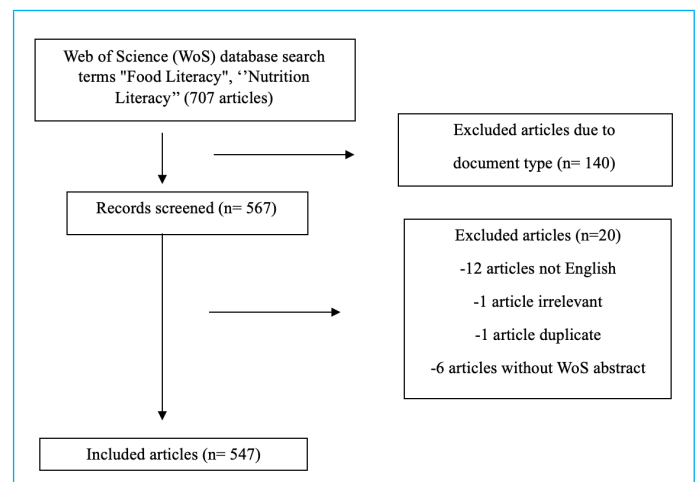


Figure 1. The flow chart of the bibliometric analysis.

Although we started the search from 2000, the first articles on food literacy and nutrition literacy were found in 2006. The distribution of published articles by year is presented in Figure 2. It was determined that the number of articles increased gradually, and this increase was found to be statistically significant in the Joinpoint regression analysis ($p < 0.05$). The average annual number of published articles was 34.46 (Fig. 2).

In this study, 19 countries were identified in the main active country category. Except for Türkiye, China, Brazil (upper-middle income), India, and Iran (lower-middle income), all countries belong to the high-income category. The top three most productive countries in terms of food literacy and nutrition literacy were the United States (107 articles, 19.5%), Australia (88 articles, 16.0%), and Canada (55 articles, 10.0%), while the top three countries in terms of the mean number of citations were Australia (1,576 citations, 17.9%), the United States (1,813 citations, 16.9%), and Norway (156 citations, 14.2%) (Table 1).

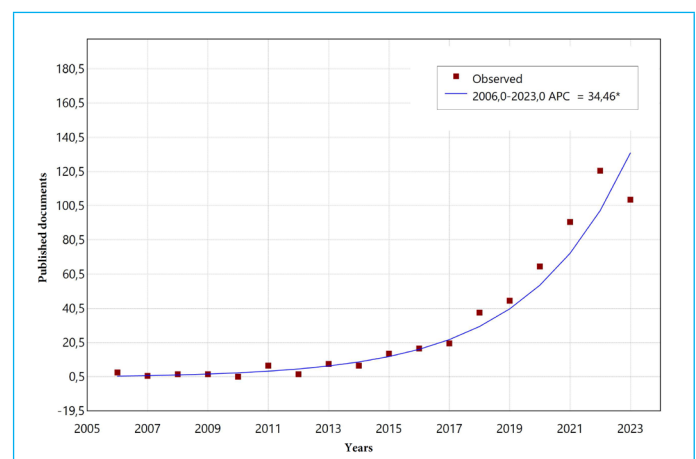


Figure 2. The distribution of published articles according to years.

Table 1. Main active country on food literacy and nutrition literacy articles

Rank	Country	Publications n (%)	Total citation	Citation per Article	h-index
1	United States	(19.5) 107	1813	16,9	22
2	Australia	(16.0) 88	1576	17,9	20
3	Canada	(10.0) 55	640	11,6	15
4	China	(7.1) 39	217	5,6	6
5	Iran	(4.9) 27	231	8,6	8
6	Portugal	(2.9) 16	98	6,1	6
7	United Kingdom	(2.7) 15	76	5,1	6
8	Italy	(2.5) 14	189	13,5	9
9	Belgium	(2.0) 11	112	10,2	6
10	Germany	(2.0) 11	37	3,4	6
11	Netherlands	(2.0) 11	135	12,3	8
12	Norway	(2.0) 11	156	14,2	7
13	Turkey	(2.0) 11	130	11,8	6
14	India	(1.8) 10	76	7,6	6
15	Korea	(1.8) 10	59	5,9	5
16	Greece	(1.6) 9	44	4,9	4
17	Denmark	(1.4) 8	44	5,5	4
18	Brazil	(1.2) 7	15	2.1	4
19	Spain	(1.1) 6	37	6,2	3

h-index values represent the number of publications that received at least h citations and were calculated using the "Local Impact" module in Biblioshiny.

The author with the highest number of citations for a single article was Helen Vidgen from Australia's Queensland University of Technology, with her article "Defining food literacy and its components" published in the journal *Appetite* in 2014 (Table 2). The author with the most articles was Heather D. Gibbs (h-index: 7) with 14 papers from the University of Kansas Medical Center in the United States, followed by Anthony Worsley (h-index: 7) with 12 papers from Deakin University in Australia, Andrea Begley (h-index: 6) from Curtin University in Australia, and Amanda Devine (h-index: 7) from Edith Cowan University in Australia with 11 papers each. The graph showing the number of articles of the top 10 authors is shown in Figure 3. The co-authorship network visualization maps of 46 countries with a minimum of 3 articles and 50 authors with a minimum of 3 articles are presented in Figures 4 and 5.

The top 10 most frequently used keywords were as follows: "Health" with 16.6%, followed by "Knowledge" with 14.8%, "Health literacy" with 14.2%, "Obesity" with 12.9%, "Children" with 11.5%, "Education" with 11.5%, "Adolescents" with 10.7%, "Nutrition" with 9.5%, "Consumption" with

9.1%, and "Impact" with 8.9%. In our study, a map was used to show the keywords and the links between them; Figure 6 shows the visualization map of 50 keywords based on the selection of keywords used in Biblioshiny at least 3 times.

In our study, it was found that the most active journals related to food literacy and nutrition literacy were *Nutrients* (57 articles, 553 citations), *International Journal of Environmental Research and Public Health* (34 articles, 207 citations), and *Journal of Nutrition Education and Behavior* (24 articles, 554 citations). The journal *Appetite* had the highest total number of citations and mean citations (715 citations, 42.0 mean citations) (Table 3). The publication graph of the top 5 journals with the highest number of publications by year is shown in Figure 7.

The top 10 institutions with the highest number of articles in food literacy and nutrition literacy research were as follows: The University of Kansas, United States, held 15.5% of all articles, followed by Shahid Beheshti University of Medical Sciences, Iran (6.9%), KU Leuven University, Belgium (5.8%), Edith Cowan University, Australia (5.8%), Deakin University, Australia (4.3%), University of Western Ontario,

Table 2. The top 10 cited publications on food literacy and nutrition literacy.

Rank	Author	Article title	Journal title	Year	Citation	Citation/Year
1	Vidgen HA. et al. ^[8]	Defining food literacy and its components	Appetite	2014	382	34,72
2	Block LG. et al. ^[24]	From nutrients to nurturance: A conceptual introduction to food well-being	Journal of Public Policy and Marketing	2011	299	21,35
3	Farr-Wharton G. et al. ^[25]	Identifying factors that promote consumer behaviors causing expired domestic food waste	Journal of Consumer Behavior	2014	213	19,36
4	Silk KJ. et al. ^[26]	Increasing nutrition literacy: testing the effectiveness of print, web site, and game modalities	Journal of Nutrition Education and Behavior	2008	140	8,23
5	Blitstein JL. et al. ^[27]	Use of nutrition facts panels among adults who make household food purchasing decisions	Journal of Nutrition Education and Behavior	2006	95	5
6	Larson N. et al. ^[28]	Food insecurity, diet quality, home food availability, and health risk behaviors among emerging adults: findings from the EAT 2010–2018 study	American Journal of Public Health	2020	89	17,8
7	Zoellner J. et al. ^[29]	Peer reviewed: nutrition literacy status and preferred nutrition communication channels among adults in the lower Mississippi Delta	Preventing Chronic Disease	2009	86	5,37
8	Slater J. ^[30]	Is cooking dead? The state of Home Economics Food and Nutrition education in a Canadian province	International Journal of Consumer Studies	2013	80	6,66
9	Poellman MP. et al. ^[31]	Towards the measurement of food literacy with respect to healthy eating: the development and validation of the self-perceived food literacy scale among an adult sample in the Netherlands.	International Journal of Behavioral Nutrition and Physical Activity	2018	79	11,28
10	Ronto R. et al. ^[32]	Adolescents' perspectives on food literacy and its impact on their dietary behaviors	Appetite	2016	78	8,66

Canada (4.2%), University of Sydney, Australia (3.4%), Tehran University of Medical Sciences, Iran (2.7%), Griffith University, Australia (2.5%), and Chongqing Medical University, China (2.0%). The network visualization map of the top publishing organizations in the food literacy and nutrition literacy literature worldwide is shown in Figure 8.

Discussion

The general upward trend in bibliometric studies is also evident in the field of medicine. The increase in bibliometric articles in medicine has surpassed the growth rate of other types of medical articles.^[33] There is also a positive correlation between the number of studies in a field and the num-

ber of bibliometric studies in that field.^[33] This situation was also reflected in our study; although it is a relatively new topic, there are bibliometric analysis studies on food literacy.^[4] and bibliometric analysis studies.^[3] that evaluate the terms “food literacy” and “nutrition literacy” together. Similar to our research, these studies have identified an increasing trend in articles on food literacy and nutrition literacy.

However, our study distinguishes itself as the only one that quantitatively demonstrates this trend using Joinpoint regression analysis. In addition, according to our literature review, it is the first study to show that Joinpoint regression analysis can be used in this field, and it has the potential to introduce this statistical method to the literature for future

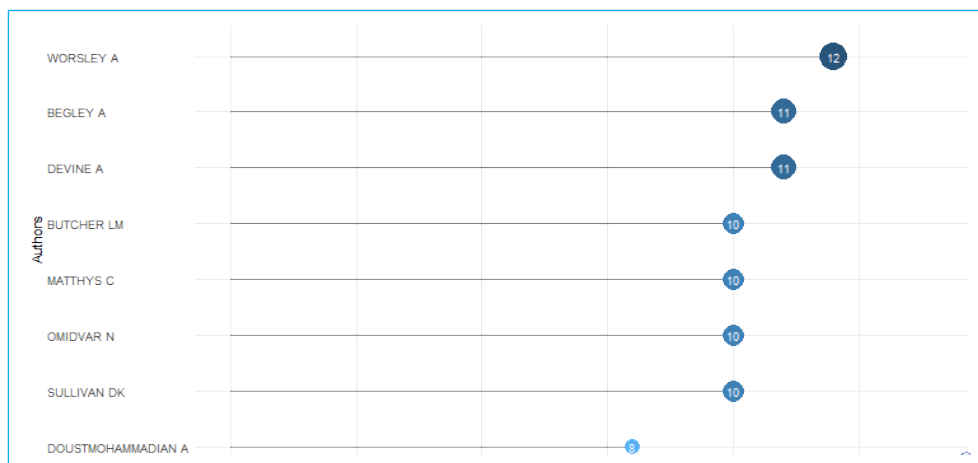


Figure 3. The graph showing the number of articles of the top 10 authors.

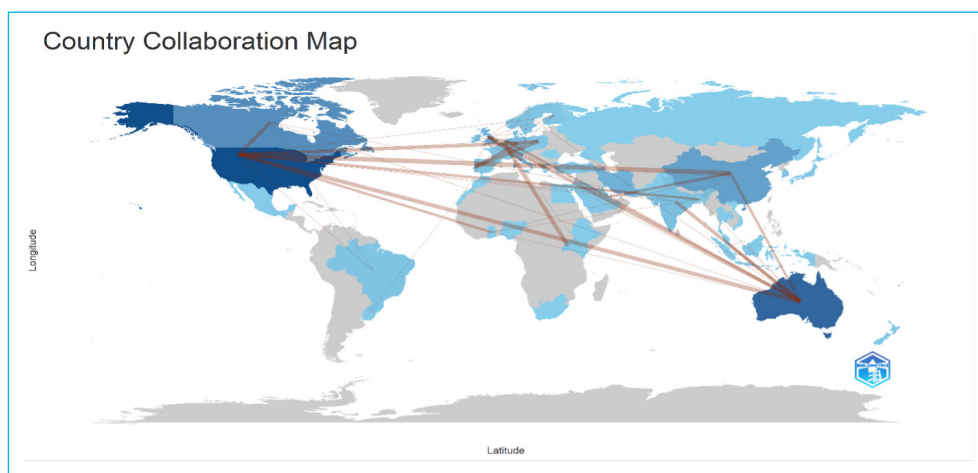


Figure 4. Co-authorship country collaboration map.

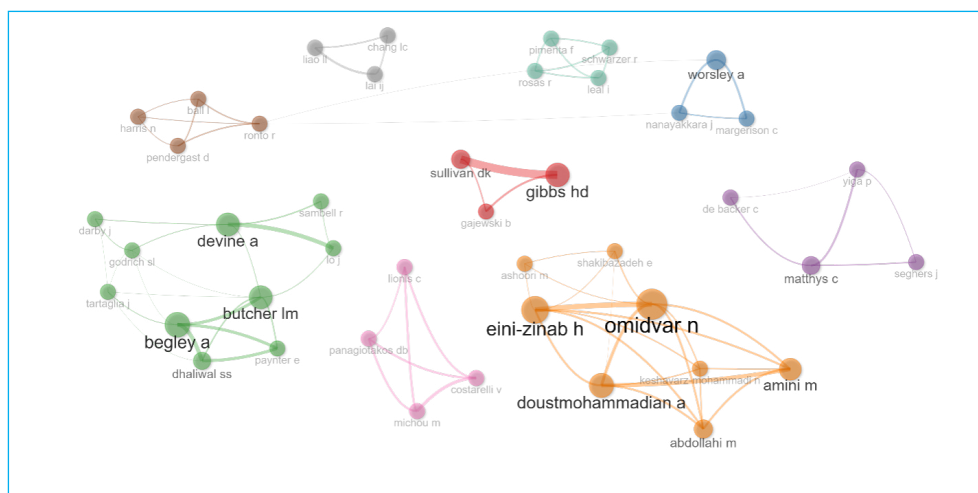


Figure 5. Co-authorship author network visualization map.

studies. Our study aims to identify the characteristics of this increasing trend and thus guide new research. It is a pioneering study that includes both the terms “food literacy”

and “nutrition literacy” together and is the only study that evaluates the research trend of academic articles published exclusively in peer-reviewed journals.

Table 3. Main active journals on food literacy and nutrition literacy articles.

Rank	Journal name	Publications, n	Total citation	Mean citation	Impact factor (2023)	h-index - g-index
1	Nutrients	57	553	9,7	6.706	13-21
2	International Journal of Environmental Research and Public Health	34	207	6,0	4.614	9-11
3	Journal of Nutrition Education and Behavior	24	554	23,0	2.822	11-23
4	Public Health Nutrition	24	335	13,9	4.539	12-18
5	Appetite	17	715	42,0	5.016	10-17
6	BMC Public Health	16	141	8,8	4.135	6-11
7	Frontiers in Nutrition	16	175	10,9	6.59	6-13
8	Health Promotion International	10	150	15,0	3.734	5-10
9	Sustainability	9	43	4,7	3.889	4-6
10	British Food Journal	7	50	7,1	3.224	3-7
11	Frontiers in Public Health	7	9	1,2	6.461	2-2
12	Health Promotion Journal of Australia	7	21	3,0	2.033	2-4
13	International Journal of Consumer Studies	7	196	28,0	7.096	6-7
14	Canadian Journal of Dietetic Practice and Research	6	31	5,1	1.412	2-5
15	Journal of Hunger & Environmental Nutrition	6	39	6,5	ESCI	4-6
16	BMC Nutrition	5	38	7,6	ESCI	2-5
17	Foods	5	29	5,8	5.561	3-5
18	Health Education Journal	5	29	5,8	1.492	3-5
19	European Journal of Marketing	4	60	15,0	5.181	3-4
20	Food Quality and Preference	4	20	5,0	6.345	2-4

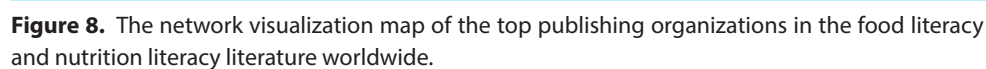
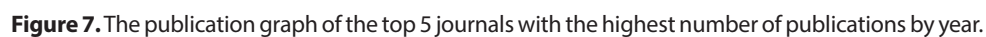
*Journal impact factor score, 2023. h-index values represent the number of publications with at least h citations, whereas g-index values were calculated based on the top g publications collectively receiving at least g² citations, using the "Local Impact" module in Biblioshiny.

Obesity is increasing worldwide; the rate of increase in 70 countries doubled between 1980 and 2015, and the global obesity prevalence increased from 9% in 2000 to 13% in 2017.^[34,35] Due to this increase in obesity, it is expected that the World Health Organization's 2025 obesity targets will be missed, and approximately 1 billion people will be obese by 2030.^[36] Studies have shown that there is a significant relationship between obesity and dietary and nutritional literacy. This may have caused researchers to turn to "nutrition literacy" and "food literacy" as the prevalence of obesity increases, leading to an increased number of studies, as found in our study.^[37,38] As a matter of fact, as seen in Table 3, the fourth most frequently used keyword is "obesity," which provides strong evidence of the connection between obesity and nutrition and food literacy.

Although the increase in COVID-19-related publications

during the pandemic was accompanied by a decrease in publications outside of COVID-19, examining Figure 2 in our study reveals that the increase in the number of studies has accelerated since 2016, reaching the highest number of articles in 2022 with 121 papers.^[39] This is one of the important reasons why the World Health Organization designated non-communicable diseases as the primary target for global disease prevention in the 2016 Global Burden of Disease study.^[40] However, with researchers turning to the fields of food and nutrition, the importance of a healthy diet in both the treatment and prevention of disease during the pandemic has been demonstrated.^[41] All these developments can be attributed to the researchers' focus on food and nutrition literacy.

While the obesity rate in low-income countries is 7%, this rate reaches 25% in high-income countries.^[35] The non-com-



municable disease preparedness index shows that the 30 most prepared countries are in the high-income group, whereas the 30 least prepared countries are lower-middle and low-income countries.^[36] As seen in Table 1, this situa-

tion also manifested itself in the countries where articles on nutrition literacy and food literacy were written; 14 of the 19 main active countries were in the high-income group, and the top three countries with the highest number of publications and citations were identified as the USA, Australia, and Canada, which have high income levels and high obesity rates.^[42]

The USA and Australia alone have provided more than half of the total number of citations and more than one-third of the total number of publications related to food literacy and nutrition literacy. As can be seen in Figures 4 and 5, these two countries are the main drivers of food and nutrition literacy research. In addition, as seen in Figure 3, the author with the highest number of publications on food literacy and nutrition literacy is Heather D. Gibbs from the USA, while the second, third, and fourth authors with the highest number of publications are scientists from Australia.

Funding support appears to be an obstacle to publishing in developing countries and contributes to the dominance of developed countries in a large proportion of publications.

^[43] As a matter of fact, the motivating effect of authors receiving funding prior to publishing showed itself in China in our study. Research indicates that 80% of SCI-E articles in China receive science funding—the highest funding rate in the world—and China was identified as the fourth country with the highest number of publications in our study.^[44]

The majority of publications in all international journals originate from economically and scientifically developed countries, and these countries are also the main citing countries for journals. Both developed and low-income countries tend to cite high-quality journals rather than low-quality journals. However, the acceptance rates of publications from non-high-income countries in journals are increasing, which is an indication of a reduction in publishing inequalities. A large number of publications in high-quality journals have been published through domestic collaboration, and publications from less developed countries in leading journals are likely to be written in collaboration with developed countries. For researchers in less developed countries, research collaboration is a bridge to publishing in the highest-impact journals.^[45]

As a matter of fact, although Iran, which is a lower-middle economic class country, has not demonstrated a visible success in the total number of citations, it was identified as the fifth country with the highest number of publications on food and nutrition literacy, as seen in Table 1. As seen in Figure 4 and Figure 8, it is thought that intensive domestic cooperation and international cooperation with Australia—one of the main conducting countries of food and nutrition literacy—have a major impact.

High-impact-factor journals are perceived as journals that are legitimized by experts in a particular field. The best journals that make research results and articles visible are often defined by the journal impact factor, and publications in these journals, as well as articles citing these journals, are valued more.^[46,47] This situation also manifested itself in our research, and the journal with the highest number of publications was *Nutrients* (indexed in Q1 with an impact factor of 6.706), while the highest-cited journal was *Appetite* (indexed in Q1 with an impact factor of 5.016). In addition, the fact that 9 of the 20 journals with the highest number of publications are related to public health, which is considered among the most effective and productive clinical fields, is important in terms of showing the strong relationship between food literacy, nutrition literacy, and public health.^[33]

Factors such as the accessibility and visibility of an article, the quality of the journal and the article itself, and the novelty of the subject matter affect the number of citations it receives.^[48] The most cited publication is the article titled “Defining food literacy and its components,” published in the journal *Appetite*; defining food literacy and determining its components are key factors that contributed to this article achieving the highest number of citations. The second most cited article is “From nutrients to nurturance: A conceptual introduction to food well-being,” published in the *Journal of Public Policy & Marketing*, which has an impact factor of 6.343. The third most cited article is “Identifying factors that promote consumer behaviors causing expired domestic food waste,” published in the *Journal of Consumer Behaviour*, which has an impact factor of 3.199. The increase in publications on sustainability and the growing importance of the issue are also major factors in the high citation rate of this article; as a matter of fact, the journal *Sustainability*, which was identified as the ninth journal with the highest number of publications, highlights the importance of this topic.^[49]

While older studies show a close relationship between the open-access status of a journal and its number of citations, recent studies show that open-access status has a very low relationship, or no relationship at all, with citations.^[50] As a matter of fact, in our study, as seen in Table 3, three of the five journals with the highest number of publications were found to be open-access, while *Nutrients*, which has the highest number of publications, ranked third in the citation ranking and eighth in the average citation ranking despite being open-access.

Appetite, which ranks fifth in terms of the highest number of publications, is a hybrid journal and has the highest total number of citations and average number of citations. The

journal with the second highest number of citations and the third highest average number of citations was the *Journal of Nutrition Education and Behavior*, which is a hybrid journal and also holds the distinction of being the journal with the third highest number of publications. The journal with the second highest average number of citations was determined to be the *International Journal of Consumer Studies*, which is also a hybrid journal.

Keywords are chosen to reflect the focus of the entire research project. The results of analyses regarding the most frequently used keywords can be effective in helping researchers determine the areas in which they will develop their future research articles. As a result of the evaluation of food and nutrition literacy as distinct types of health literacy, as seen in Table 3, the third most frequently used keyword is “health literacy”.^[2] The fact that food and nutrition literacy are terms that encompass how foods affect health, while also indicating the degree of basic dietetic knowledge, makes the words “health” and “knowledge” the top two most frequently used keywords.^[2]

However, the critical nature of childhood in terms of developing lifelong eating habits, and the adoption by researchers of the idea that investing in good eating habits during this period can improve overall health and well-being by contributing to the prevention of nutrition-related diseases, have made “children” and “adolescents” the fifth and seventh most frequently used keywords, respectively.^[3]

This research has several limitations. The first limitation is that only the Web of Science (WoS) database was used. In fact, many bibliometric studies prefer this database. Other databases, such as PubMed, Google Scholar, and Scopus, offer wider content coverage than WoS. Despite this, WoS was preferred because it provides more reliable results, especially in citation analyses, and indexes journal articles with high impact factors. The second limitation is that due to the preference for articles written in English, which was one of the strict inclusion criteria, articles published in local languages were not included in the study, thereby limiting the inclusion of articles from outside developed countries.

Conclusion

In recent years, there has been a remarkable increase in studies focusing on the concepts of food literacy and nutrition literacy. This increase shows that the importance of both concepts is being increasingly recognized. In this study, an upward trend in articles on food literacy and nutrition literacy was quantitatively demonstrated for the first time using the Joinpoint regression analysis method. In our study, the fact that approximately half of the journals with the highest number of publications related to food litera-

cy and nutrition literacy are fields associated with public health emphasizes the strong relationship between food literacy, nutrition literacy, and public health.

However, we believe that it is crucial to conduct more studies on food literacy and nutrition literacy intervention programs. This is because the limited practical application of food literacy and nutrition literacy points to a restricted impact on improving eating habits and public health outcomes. Without rigorous study designs and intervention programs that require long-term follow-up, it will remain difficult to develop effective interventions that cover diverse populations and settings. As a result of such effective interventions, it will be possible to make progress toward fostering positive changes in individuals' eating behaviors through the policies and practices to be developed in the future.

Disclosure

Ethics Committee Approval: Ethics committee approval was not required for data accessible to the entire public. Our study did not involve any human or animal participants.

Conflict of Interest: The authors have no conflicts of interest to declare.

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