

Research Article/Araştırma Makalesi

# Research Trends on Gluten-Free Products and Food Safety: A Bibliometric Analysis

*Glutensiz Ürünler ve Gıda Güvenliği Üzerine Araştırma Eğilimleri: Bibliyometrik Bir Analiz*

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## Article info

### Keywords:

Celiac disease, gluten, food safety, bibliometric analysis.

### Anahtar Kelimeler:

Çölyak hastalığı, gluten, gıda güvenliği, bibliyometrik analiz.

Received: 23.10.2025

Accepted: : 09.12.2025

E-ISSN: 2979-9511

DOI: 10.58625/jfng-3069

Rabia Bağlayıcı & Burcu İrem Omurtag Korkmaz;  
Research Trends on Gluten-Free Products and Food Sa-  
fety: A Bibliometric Analysis

Available online at <https://jfng.toros.edu.tr>

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## Abstract

**Objective:** The growing demand for gluten-free products items from both clinical necessities, such as celiac disease, and trends toward healthy eating. This has increased the significance of research on food safety and production processes. The present study aimed to identify research trends in gluten-free products and food safety using bibliometric analysis.

**Material and Method:** Articles published between 2000 and 2025 were retrieved from the Web of Science database and analyzed through bibliometric methods. The bibliometrix and Biblioshiny packages in R were used to examine publication trends, authors, journals, and keywords, while author and institutional collaborations were visualized with VOSviewer.

**Results:** A total of 573 articles were identified, showing a steady increase in publications over time. Since 2000, the number of publications has shown an increasing trend over the years, with the United States (n=4558), Italy (n=2143), and Spain (n=1116) identified as the three countries with the highest research output. The leading journals were Nutrients, Foods, and Food Control, and the most prolific authors included Catassi C., Zandonadi R.P., and Colgrave M.L. Keyword analysis revealed that

the dominant research themes were “celiac disease,” “gluten contamination,” “food safety,” and “labeling.”

**Conclusion:** In conclusion, the scientific productivity concerning gluten-free products and food safety is on the rise, necessitating that future studies diversify their methodology and comprehensively focus not only on the nutritional but also the technological and safety aspects of gluten-free foods.

## Özet

**Amaç:** Glutensiz ürünlere yönelik artan talep, hem çölyak hastalığı gibi klinik gereksinimlerden hem de sağlıklı beslenme eğilimlerinden kaynaklanmaktadır. Bu durum, gıda güvenliği ve üretim süreçlerine ilişkin araştırmaların önemini artırmıştır. Bu çalışma, glutensiz ürünler ve gıda güvenliği alanındaki küresel araştırma eğilimlerini belirlemek amacıyla bibliyometrik yöntemle gerçekleştirilmiştir.

**Gereç ve Yöntem:** 2000-2025 yılları arasında glutensiz ürünler ve gıda güvenliği konularında yayınlanan makaleler Web of Science’tan alınarak bibliyometrik yöntemlerle analiz edilmiştir. Yayınlar, R ortamında bibliometrix ve Biblioshiny paketleri kullanılarak küresel yayın trendleri, yazarlar, dergiler ve anahtar kelimeler açısından incelenmiş; yazar ve kurum iş birlikleri VOSviewer ile görselleştirilmiştir.

**Bulgular:** Arama sonucunda toplam 573 makale belirlenmiştir. 2000 yılından itibaren yayın sayısı yıllar içinde artış göstermiştir, ABD (n=4558), İtalya (n=2143) ve İspanya (n=1116) olmak üzere üç ülkenin en yüksek yayın üretimine sahip olduğu gözlenmiştir. En çok yayın yapan dergiler arasında sırasıyla *Nutrients* (n=32), *Foods* (n=21), *Food Control* yer almıştır. Yazarlar arasında Catassi C., Zandonadi R.P., Colgrave M.L. öne çıkmıştır. Anahtar kelime analizi, çalışmaların büyük ölçüde “çölyak hastalığı”, “gluten kontaminasyonu”, “gıda güvenliği” ve “etiketleme” temaları etrafında yoğunlaştığını göstermektedir.

**Sonuç:** Sonuç olarak, glutensiz ürünler ve gıda güvenliği konusundaki bilimsel üretkenlik artmakta olup, gelecekteki çalışmalar metodolojiyi çeşitlendirerek, glutensiz gıdaların yalnızca besinsel değil, aynı zamanda teknolojik ve güvenlik boyutlarına da kapsamlı bir şekilde odaklanması gerekmektedir.

## Introduction

As defined by the Codex Alimentarius, the protein component originating from wheat, rye, barley, oats, or their hybrids and derivatives is identified as gluten. This fraction is characterized by its insolubility in both water and a 0.5 M NaCl

solution and may trigger intolerance in certain individuals (1).

Consumption of gluten proteins in wheat, barley, and rye can lead to various clinical presentations categorized as gluten-related disorders. This spectrum includes autoimmune conditions such as celiac disease, dermatitis herpetiformis, and gluten ataxia, as well as allergic reactions such as wheat allergy. It also comprises non-autoimmune, non-allergic conditions like non-celiac gluten sensitivity, which is considered a separate clinical entity (2–4).

Celiac disease is among the most prevalent worldwide, affecting about 1% of people, especially those of European descent. The overall prevalence of wheat- and gluten-related disorders ranges between 1% and 6% of the global population (4, 5).

Celiac disease and dermatitis herpetiformis are the most thoroughly investigated conditions within the spectrum of gluten-related disorders, with the role of gluten in their pathogenesis being clearly determined. The clinical presentation of celiac disease involves both intestinal and extra-intestinal indicators such as abdominal distress, bloating, and fatigue. While gastrointestinal manifestations are more pronounced in children, the most frequently observed symptoms consist of persistent diarrhea, abdominal pain, and weight loss (4, 6, 7)

The primary foundation for addressing gluten-related disorders involves a rigorous, lifelong exclusion of gluten from the diet. This nutritional approach mandates the absolute non-consumption of gluten-source cereals, including wheat, barley, rye, and, in certain instances, oats. The sole reliable and efficient treatment currently for this condition is the gluten-free diet. Furthermore, the consumption of products free from gluten has expanded beyond medical requirements to include individuals seeking a healthy lifestyle, weight control, and general wellness (2, 6, 8, 9).

The worldwide demand for gluten-free items experienced a growth of roughly 16% between 2018 and 2022, positioning them as one of the contemporary leading food trends (10). The growing trend toward healthy eating and the increasing

prevalence of gluten-related disorders have been key factors driving this growth. This situation has led the food industry to increase its supply of gluten-free products (7).

Upon adequate hydration and mixing of wheat flour, gluten develops a three-dimensional, viscoelastic protein structure that is instrumental in determining dough rheology and the resulting quality of the final product. In the absence of gluten, dough exhibits low cohesion and limited elasticity, which negatively affects the technological attributes of gluten-free products (11, 12).

Despite significant advances in product development, gluten-free products generally exhibit lower quality compared to their gluten-containing counterparts in terms of texture, aroma, taste, and mouthfeel. They also present sensory challenges such as short shelf life, dry mouthfeel, and insufficient flavor. Furthermore, these products are often nutritionally inadequate, lacking essential vitamins and minerals such as folate, thiamine, niacin, riboflavin, and iron, as well as dietary fiber, raising concerns regarding their overall nutritional value (5, 11, 13). Gluten-free labeled products are consumed as alternatives to traditional gluten-containing foods and are typically produced from cereals such as rice, corn, millet, and sorghum, as well as nutrient-rich grains like amaranth, quinoa, and buckwheat (13, 14).

Food safety is a fundamental concept that ensures individuals and populations have continuous access to sufficient, safe, and nutritious food (15). For individuals sensitive to gluten, such as those with celiac disease, gluten-free diets represent a critical component of this safety. However, naturally gluten-free foods (e.g., rice, corn, millet, quinoa) can be exposed to gluten contamination at various stages, from agricultural production to final consumption (16).

Cross-contamination, which poses a substantial danger to individuals with celiac disease, may take place at every stage of the food chain, encompassing domestic settings, restaurants, food processing plants, milling operations, storage, and cultivation. Specific preparation and cooking practices, such as the shared use of kitchen

equipment and cooking surfaces, can particularly increase the degree of contamination in the final products (2, 16). Consequently, the term "gluten-free" is designated for products containing less than 20 ppm of gluten (1), and improper labeling or inadequate production practices can lead to the recurrence of symptoms. National and international regulations aim to protect consumer health by establishing definitions, thresholds, and labeling standards for gluten-free products (2, 17).

Bibliometric analysis is an effective method for examining research trends over time and comparing the contributions of countries, institutions, and journals (18, 19). Investigating trends, geographic distributions, and thematic focuses in the field of gluten-free products and food safety provides valuable insights into research patterns. This, in turn, enables researchers and policymakers to make more informed decisions regarding research directions and resource allocation.

This study aims to examine the literature on gluten-free products and food safety using bibliometric methods to identify publication trends, leading authors, journals, institutions, countries, keywords, and research categories. Additionally, author collaborations and institutional partnerships are analyzed to assess international research networks.

## Material and Method

Bibliometric analysis, a guiding tool within a specific research field, is conducted to examine publication trends by applying mathematical and statistical methods to identify the main patterns and directions within the scientific literature (20).

## Database Selection and Search Protocol

The data used for the bibliometric and visualization analyses were retrieved from the Web of Science database on April 12, 2025, using the refined search query presented in Table 1. This query was developed through

the examination of a mini-review, a narrative review, and a systematic review addressing gluten-free products in relation to food safety (2, 16, 21). The search strategies, author keywords, and conceptually prominent terms within these studies were evaluated to perform a thematic decomposition. Terms representing the most commonly investigated topics in gluten free products, such as celiac disease and product groups including bread, cookies, and cakes, were combined with core food safety concepts such as contamination, cross contamination, and labeling. This thematic analysis resulted in a structured set of keywords. The query was executed by one researcher (R.B.) using AND/OR combinations applied to the title, abstract, author keywords, and Keywords Plus fields, and all retrieved records were independently verified by a second researcher (B.I.O.K.).

A total of 573 records were retrieved from the Web of Science database. Based on predetermined criteria, studies were excluded if they fell outside the 2000 to 2025 time frame ( $n = 39$ ), were not categorized as Article or Review Article ( $n = 23$ ), were not published in English ( $n = 10$ ), or were not indexed in SCIE, SSCI, or ESCI ( $n = 11$ ). After these screening steps, 490 studies were included in the analysis (Figure 1). The post 2000 period was selected because it marks the implementation of international regulatory frameworks, such as Codex 2008 and the FDA 2013 gluten-free labeling standards, which coincided with a substantial increase in scientific output on gluten-free products (22, 23). Additionally, non-English publications were excluded due to inconsistencies in indexing, abstracting, and keyword standards, which may limit conceptual coherence and comparability in bibliometric analyses. Therefore, only literature published in English was included in the study.

## Data Analysis and Visualization

While Bibliometrix facilitates comprehensive scientific data analysis, Biblioshiny provides users with the capacity to generate interactive visual analyses via a web interface (20, 24). VOSviewer represents an additional software tool developed

for the generation and graphical display of bibliometric maps (25). The data were exported from the Web of Science database in “plain.txt” format and imported into the RStudio v.4.4.0 environment using the bibliometrix R package. Analyses related to publication trends, authors, journals, institutions, countries, keywords, and research categories were conducted through the Biblioshiny interface. Co-authorship networks and inter-institutional collaboration patterns were visualized using VOSviewer v.1.6.20. In generating the maps, VOSviewer’s default full counting method was applied, the “association strength” normalization technique was used, and a minimum occurrence threshold of 5 was set for term inclusion in the analysis.

## Results

### Publication Trends

Figure 2, illustrating annual scientific output, displays the volume of publications generated each year. Since 2000, the volume of publications concerning gluten-free products and food safety has consistently risen. The peak scientific output was recorded in 2024, achieving 44 articles, succeeded by 43 articles in 2017 and 38 articles in 2019. Additionally, the annual growth rate, as reported by the Biblioshiny analysis, was 13.75%.

### Assessment of Author Contributions

Table 2 displays the top 10 authors based on their localized research impact. This author ranking, derived from h-indices computed using the volume of topic-specific publications and the citations received from peers within the dataset, serves as an indicator of their regional influence. Catassi C. and Zandonadi R.P. are among the researchers with the highest h-indices in the field. In terms of total citations, Murray J.A. stands out as the most cited author in the literature, with 1879 citations.

Considering the total citation counts in the dataset, information on the top 10 most cited

publications is presented in Table 3. Within this context, the study published by Rubio-Tapia A. in 2013 leads the list with 1180 citations, clearly demonstrating its impact in the literature. Among the most cited publications, the presence of four review articles indicates that these works significantly contribute to the overall scientific knowledge in the field and serve as key reference points in the literature.

Figure 3 illustrates the publications of authors over the years. Each line represents the years in which an author published. The size of the circles indicates the number of articles published by the author in a given year, while the intensity of the color represents the average number of citations received by those articles in that year. The top three authors publishing on “gluten-free products and food safety” are Catassi C. (n = 13), Zandonadi R.P. (n = 10), and Colgrave M.L. (n = 10).

Figure 4 employs a color gradient varying from purple to yellow to denote the publication year. The magnitude of each node corresponds to the document count for author collaborations, while the lines between nodes signify relationships among co-authors. Furthermore, the line weight illustrates the intensity of these collaborative links. Author clusters exhibiting robust connections are prominent within the network, whereas certain authors mainly serve as intermediary bridges between distinct groups. Catassi C. and Govind K. Makharaj serve as central figures connecting different groups, whereas the contributions of Fasano and Murray were more concentrated in earlier years. In recent years, Giulia N. Catassi, Sanders, and Green have assumed more current and active roles in collaborations.

### Most Cited and Prolific Journals

The top 10 most prolific journals were identified as *Nutrients* (n = 32), *Foods* (n = 21), *Food Control* (n = 14), *Food Chemistry* (n = 11), *Journal of Agricultural and Food Chemistry* (n = 11), *Food*

*Additives and Contaminants Part A-Chemistry A* (n = 10), *Frontiers in Nutrition* (n = 10), *EFSA Journal* (n = 9), *Journal of AOAC International* (n = 9), and *European Journal of Gastroenterology & Hepatology* (n = 8). The publication output of these sources over time is presented in Figure 5. When examining trends between 2000 and 2024, the initially limited number of publications began to increase significantly, particularly after 2010. Although *Nutrients* started publishing in 2010, it has rapidly become the most productive source with 32 publications. *Food Control*, which began in 2006, reached 14 publications, showing a steady increase. *Foods* joined the field in 2016 and quickly attained 21 publications, demonstrating strong momentum. *Food Chemistry*, starting in 2011, currently has a more modest output of 11 publications. Overall, all sources experienced a notable rise after 2015, with a particularly sharp increase since 2020, reflecting the growing popularity of the topic within the scientific community.

Table 4 details the ten most influential sources as determined by their localized impact metrics. Of the top 10 most productive journals, *Food Additives and Contaminants Part A-Chemistry A*, *Frontiers in Nutrition*, *EFSA Journal*, and *European Journal of Gastroenterology & Hepatology* did not rank within the top 10 in terms of local impact. Conversely, *Journal of Food Science, Alimentary Pharmacology & Therapeutics*, *Critical Reviews in Food Science and Nutrition*, and *European Food Research and Technology*, although not among the top 10 in productivity, successfully ranked within the top 10 based on local impact.

### Affiliation Productivity and Networks

According to the findings, certain institutions stand out in the inter-institutional collaboration network in terms of productivity. Harvard University contributed the most with a total of 38 articles, followed by the University of Manitoba (24), Harvard Medical Affiliates (23), Marche Polytechnic University (23), and Universidade de Brasilia (21). Additionally, CSIRO (18), Harvard Medical School (18), University of Oslo

(17), Columbia University (16), and Tampere University (16) are also among the institutions with notable publication output.

Figure 6 illustrates the analysis of institutional collaborations. In this visual, the magnitude of each node denotes the quantity of documents on which the respective affiliated institutions have worked together. The lines connecting the nodes signify the relationships between collaborating institutions, and the line thickness indicates the strength of these collaborative links. Considering the collaboration network in Figure 6, institutions with high publication output, such as Harvard University (38 publications), University of Manitoba (24), and Universidade de Brasilia (21), are positioned mostly within their own groups and appear relatively isolated in international collaborations. In contrast, institutions with relatively lower productivity, such as the University of Oslo (17 publications) and Marche Polytechnic University (23 publications), are positioned closer to the center of the network and have established more visible connections. This indicates that institutions with high publication output are not always central in the collaboration network, and some institutions with more limited publication output can play a central role in collaborative structures.

### Geographic Distribution of Production

Table 5 displays the top 10 most cited countries in the current research domain. Analysis of the total citation count reveals that the United States ( $n = 4558$ ), Italy ( $n = 2143$ ), and Spain ( $n = 1116$ ) constitute the top three nations. When ranked by average citations per publication, the top 10 countries are Chile ( $n = 63.30$ ), the Netherlands ( $n = 56.30$ ), Norway ( $n = 55.80$ ), Sweden ( $n = 53.30$ ), Finland ( $n = 46.60$ ), the United States ( $n = 45.10$ ), Switzerland ( $n = 43.50$ ), Canada ( $n = 42.70$ ), Romania ( $n = 41.50$ ), and Belgium ( $n = 36.00$ ).

Figure 7 illustrates international collaborations between countries. Dark blue colors denote countries that exhibit higher degrees of collaboration, while the line weight indicates

the intensity of these cooperative links. In terms of inter-country cooperation, the United States has the most connections, particularly with Canada and Italy, each with 10 collaborative links. Italy also plays a significant bridging role within Europe, establishing six connections with Spain in addition to its ties with the United States. Overall, the United States occupies a central position in the network, directing intercontinental knowledge and research flow (Supplementary Table).

Figure 8 illustrates the ranking of the ten leading countries based on their corresponding authors. National collaboration is shown by Single-Country Publications (SCP), while Multiple-Country Publications (MCP) signify international cooperation. A 50% MCP ratio is established as the benchmark for strong international cooperation, a criterion that Ireland is noted for surpassing. The MCP ratios for the United States, Italy, and Spain are 13.9%, 17.9%, and 20%, respectively.

### Keyword Analysis

The visualization in Figure 9 is a word cloud created from the keywords provided by the authors. Each word's frequency of appearance is indicated by its size. Celiac disease ( $n = 141$ ) and contamination ( $n = 89$ ) emerge as the dominant keywords, leading the top ten list which also includes wheat ( $n = 62$ ), gliadin ( $n = 53$ ), diagnosis ( $n = 43$ ), children ( $n = 42$ ), products ( $n = 42$ ), gluten-free diet ( $n = 40$ ), proteins ( $n = 39$ ), and prevalence ( $n = 36$ ).

The co-occurrence network analysis derived from the authors' keywords is presented in Figure 10. This analysis determines the linkages among key terms and defines the predominant research orientations within the field. The analysis indicates that "celiac disease" occupies the most dominant and central position in the literature. This concept is strongly associated with keywords such as "gluten-free diet," "food safety," "gluten contamination," "allergens," and "food labeling." These connections suggest that most studies focus on safe food production,

labeling practices, and the potential health effects of gluten within the context of celiac disease. Peripheral nodes in the network, including terms such as “buckwheat,” “beer,” and “mycotoxins,” represent more specific and emerging research topics. Overall, the findings highlight the existence of distinct central research clusters related to celiac disease while also revealing the growing academic interest in various gluten-related food components and safety issues.

### Categories

Figure 11 presents the top 15 research categories and their corresponding publication counts related to “gluten-free products and food safety.” The three most productive categories are Food Science & Technology (n = 210), Nutrition & Dietetics (n = 112), and Gastroenterology & Hepatology (n = 71).

### Discussion and Conclusion

In this study, the global distribution, trends, and research gaps in scientific publications on gluten-free products and food safety were examined using a bibliometric approach. Although research on gluten-free diets received limited attention before 2001, a gradual increase in publication output has been observed since then, surpassing 370 publications by 2021 (18). This trend parallels the increasing awareness and diagnosis rate of celiac disease, which has risen markedly since the first epidemiological studies in the 1950s reported a prevalence of 1/8000–1/4000 (26). Similarly, Demir et al. (27) reported that publications on celiac disease increased rapidly after 2000s, exceeding 300 papers per year after 2010. The sharp rise in food safety literature after 2007 also indicates that scientific productivity related to gluten-free products has progressed in parallel with the broader food safety agenda (15). This tendency, driven by the growing interest in celiac disease and gluten-free diets, led to a marked increase in related research fields after 2015.

While Maki, Kaukinen, Green, Ludvigsson, and

Collin have been reported as the most prolific authors in the literature on celiac disease (27), Murray (n = 7 in our study) stands out as a common author appearing among the top 10 in both the literature and our analysis. This discrepancy can be attributed to differences in research focus: Maki and Kaukinen are predominantly recognized for their contributions to clinical and epidemiological studies, whereas our analysis centers on the perspective of gluten-free products and food safety. Similarly, the absence of prolific authors such as Lal, Herrero, and Nord in our findings may stem from the fact that the food safety field often emphasizes sustainability, agricultural production, and global policy issues (15). On the other hand, the prominence of authors such as Catassi, Zandonadi, Colgrave, and Fasano indicates that the literature on gluten-free products and food safety constitutes a distinct research axis.

Our findings indicate that Rubio-Tapia occupies a central position in the field of celiac disease and gluten-free products. Bibliometric analyses conducted by Demir et al. and Xie et al. revealed that the author’s most frequently cited studies focused on the epidemiology, mortality, and treatment response of celiac disease, receiving 258, 333, and 409 citations, respectively (15, 27). In contrast, our analysis highlighted Rubio-Tapia’s publications related to the development and revision of clinical guidelines, which attracted 1180 and 174 citations, respectively. This finding demonstrates that Rubio-Tapia has provided high-impact contributions to the literature by maintaining continuity across his research domains.

Highly cited publications have predominantly centered on the epidemiology and prevalence of celiac disease, in addition to examining adherence to the gluten-free regimen. Nonetheless, the notably restricted literature volume on gluten-free products and food safety underscores the necessity for increased investigation in this domain. Increasing the number of studies in this field would both complement clinical research and strengthen the food safety perspective within the broader context of gluten-free nutrition.

In studies focusing on celiac disease,

publications are predominantly concentrated in clinical journals such as the *Journal of Pediatric Gastroenterology and Nutrition*, *Gut*, and *Gastroenterology* (27). In contrast, research related to the gluten-free diet and food-based investigations are more commonly published in nutrition and food science journals, including *Nutrients*, *LWT-Food Science and Technology*, and *Foods* (18). Similarly, in the present study, *Nutrients*, *Foods*, *Food Chemistry*, and *European Food Research and Technology* were identified as the most productive sources, indicating a shift in research focus from the clinical dimension toward food science and safety. The categorical distribution further supports this finding, revealing that publications are primarily concentrated in the fields of Food Science & Technology (35%), Nutrition & Dietetics (18%), and Gastroenterology & Hepatology (12%). This trend demonstrates that the literature on gluten-free products and food safety has become increasingly interdisciplinary, with nutrition- and food technology-oriented studies emerging as dominant research directions in the field.

Country-level evaluation revealed that research productivity in the field of gluten-free products and food safety is predominantly concentrated in the United States, Italy, and Spain. In terms of citations per publication, Chile, the Netherlands, and Norway stand out, indicating that these countries conduct a smaller number of highly influential studies. Collaboration analysis showed that the United States maintains a central position in intercontinental knowledge flow through strong connections with Canada, Italy, and the United Kingdom. Similarly, previous bibliometric studies have highlighted the leading role of Italy, the United States, and the United Kingdom in celiac disease and gluten-free diet literature (18, 27, 28). Bibliometric analysis in the food safety domain further indicates that the international collaboration network is divided into five clusters, with only some clusters exhibiting intercontinental diversity. Notably, the United Kingdom–Australia and United States–Canada clusters encompass broader and more diverse research topics, whereas other clusters display more limited geographic and thematic coverage (15). These findings suggest

that Western countries continue to play a guiding role in the field, although increasing international collaborations may enhance research diversity in the future.

Keyword analysis indicates that research on gluten-free products and food safety is gradually shifting from a clinical focus centered on celiac disease toward a broader food safety perspective. In our study, the most frequently used keywords, including “celiac disease,” “contamination,” “wheat,” “gliadin,” and “food safety,” highlight an emphasis on safe product production, labeling, and prevention of gluten contamination. This trend represents a continuation of themes emphasized in previous analyses of the gluten-free diet, such as “dietary adherence in celiac disease” and “nutritional and sensory quality of gluten-free products” (27). Moreover, the presence of clinical terms prominent in celiac disease studies, such as “epidemiology,” “autoimmunity,” and “quality of life,” and it is notable that terms related to the gluten-free diet and patient adherence also appear prominently. Adherence to the gluten-free diet is influenced by multiple factors, including education level, perceived self-efficacy, duration of the diet, inadvertent gluten exposure, adequacy of food labeling, cross-contamination risks, and physical and economic access to gluten-free products (29). Alongside frequently observed food safety-related concepts, including “food security,” “nutrition,” and “sustainability,” within the research network, these findings collectively underscore the increasingly interdisciplinary nature of this field. (15, 18).

In this study, research trends on gluten-free products and food safety were evaluated exclusively using the WoS database, which indexes only high-impact journals and includes the oldest publications. This choice represents a primary limitation of the study. Publications indexed in other databases, such as Scopus, PubMed, Dimensions, and Google Scholar, were not included, which may have resulted in an incomplete representation of the global literature. Additionally, restricting the analysis to articles published in English may have excluded potentially valuable studies published

in other languages.

This bibliometric analysis has quantitatively revealed research trends in the field of gluten-free products and food safety. The findings show a continuous increase in publication productivity since the early 2000s, with the topic gaining particularly marked prominence after 2015. Among the most productive countries were the United States, Italy, and Spain, with the United States occupying a central position in the international collaboration network. At the author level, Catassi C., Zandonadi R.P., Colgrave M.L., and Fasano A. emerged as leading researchers, while *Nutrients*, *Foods*, and *Food Chemistry* were identified as the most productive journals. Keyword analysis indicated that the research is largely concentrated around the themes of “celiac disease,” “gluten contamination,” and “food safety.”

Overall, the literature on gluten-free products and food safety is increasingly interdisciplinary, situated at the intersection of food science, nutrition, and public health. However, methodological diversity remains limited relative to the volume of publications. Future studies are recommended to expand the scope by incorporating different databases, novel bibliometric indicators, and thematic analyses, as well as to comprehensively address the nutritional, technological, and safety aspects of gluten-free products.

### Author Contribution

Study design: BİOK, RB; Data analyze: RB; Data curation: BİOK, RB; Formal analysis: RB; Drafting the manuscript: BİOK, RB; Critical review: BİOK; Final approval: BİOK, RB.

### Financial Support

No Financial Support

### Conflict of Interest

The authors declare that they have no conflict of interest

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## Tables and Figures

**Table 1.** Search Strategy

OR		OR
gluten-free gluten-free products gluten-free bakery gluten-free bread gluten-free pasta gluten-free cookies gluten-free cracker gluten-free cake gluten-free muffin gluten-free biscuits  Celiac Disease Coeliac Disease	AND	food safety contamination cross-contamination food contamination equipment contamination labeling

**Table 2.** Top Authors based on local impact scores

Author	h-index	TC	NP	PY start
Catassi C.	8	419	13	2001
Zandonadi R.P.	8	174	10	2014
Colgrave M.L.	7	219	10	2013
Murray J.A.	7	1879	7	2001
Farage P.	6	138	8	2017
Fasano A.	6	452	6	2001
Méndez E.	6	356	6	2001
Sharma G.M.	6	133	6	2012
Byrne K.	5	137	6	2016
Ciclitira P.J.	5	375	5	2001

NP, Number of paper; TC, Total citation; PY start, Publication year start

**Table 3.** Ranking of top 10 cited publications

Author	Year	Title	TC	TC per year
Rubio-Tapia A.	2013	ACG clinical guidelines: diagnosis and management of celiac disease	1180	90.77
Kupper C.	2005	Dietary guidelines and implementation for celiac disease	258	12.29
Abdulkarim A.S.	2002	NA	244	10.17
Saturni L.	2010	The Gluten-Free Diet: Safety and Nutritional Quality	227	14.19
Lundin K.E.A.	2003	Oats induced villous atrophy in coeliac disease	184	8.00
Bascuñán K.A.	2017	Celiac disease: understanding the gluten-free diet	180	20.00
Rubio-Tapia A.	2023	American College of Gastroenterology Guidelines Update: Diagnosis and Management of Celiac Disease	174	58.00
Agostoni C.	2014	Scientific Opinion on the evaluation of allergenic foods and food ingredients for labelling purposes	172	14.33
Niewinski M.M.	2008	Advances in celiac disease and gluten-free diet	166	9.22
Catassi C.	2001	NA	163	6.52

NA, Not available; TC, Total citation

**Table 4.** Assessment of the journal's local influence

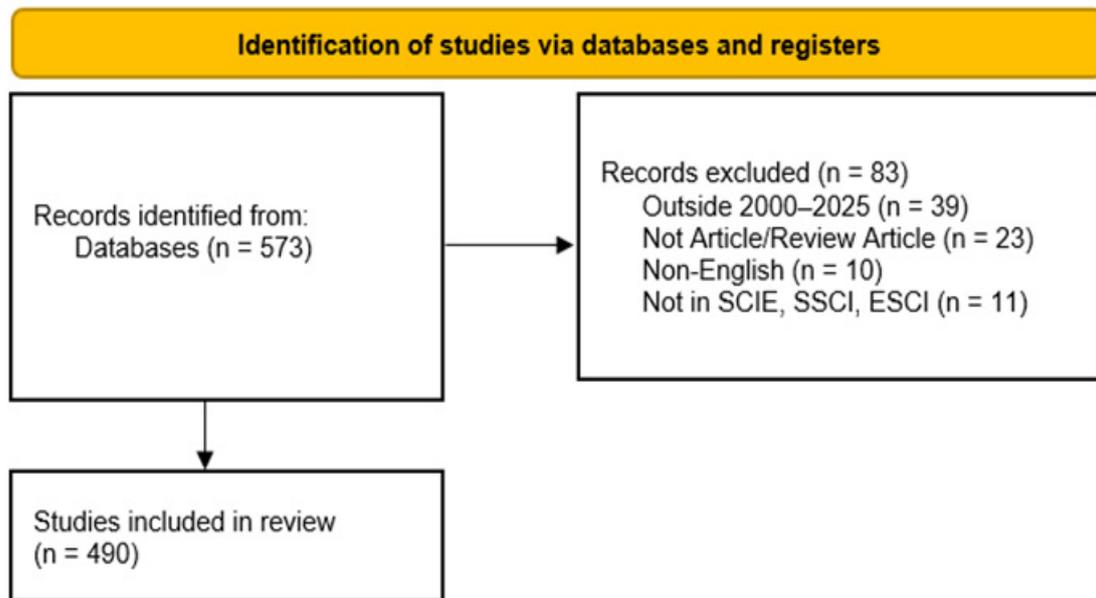
Journal	h-index	TC	NP	PY start
Nutrients	17	874	32	2010
Food Control	10	246	14	2006
Foods	9	247	21	2016
Food Chemistry	8	250	11	2011
Journal of Agricultural and Chemistry	8	281	11	2002
Journal of AOAC International	7	210	9	2011
Journal of Food Science	7	154	7	2010
Alimentary Pharmacology & Therapeutics	6	537	6	2004
Critical Reviews in Food Science and Nutrition	6	328	7	2016
European Food Research and Technology	6	311	6	2001

NP, Number of paper; TC, Total citation; PY start, Publication year start

**Table 5.** Ten most prolific countries contributing to gluten-free products and food safety literature (2000–2025)

Country	TC	Average Article Citations
United States America	4558	45.10
Italy	2143	32.00
Spain	1116	24.80
Canada	983	42.70
Germany	736	30.70
United Kingdom	630	31.50
Brazil	527	26.40
Finland	373	46.60
Netherlands	338	56.30
Australia	324	21.60

TC, Total citation



**Figure 1.** A flow diagram of the included studies

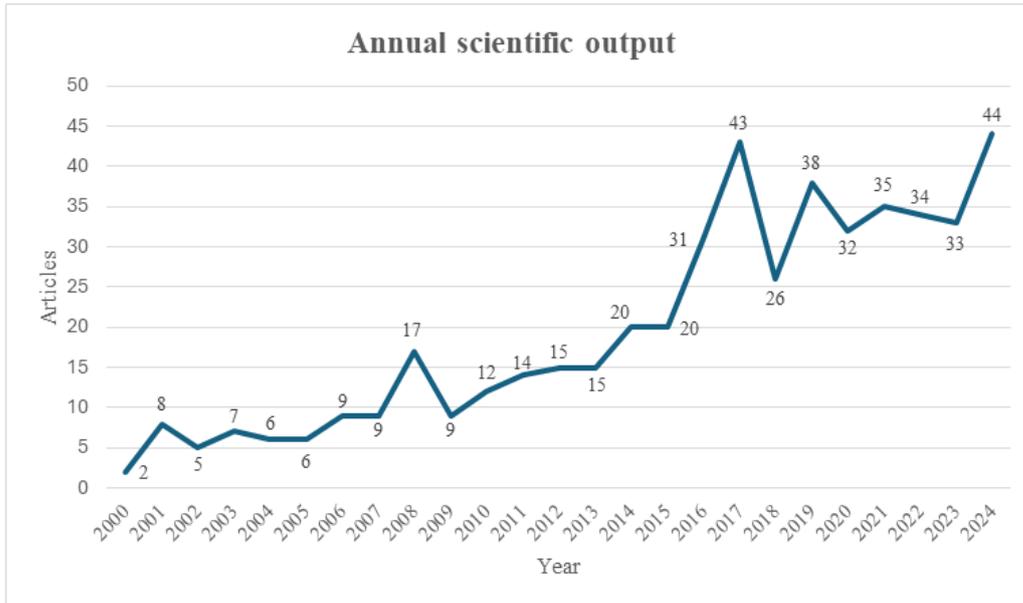


Figure 2. Annual scientific output

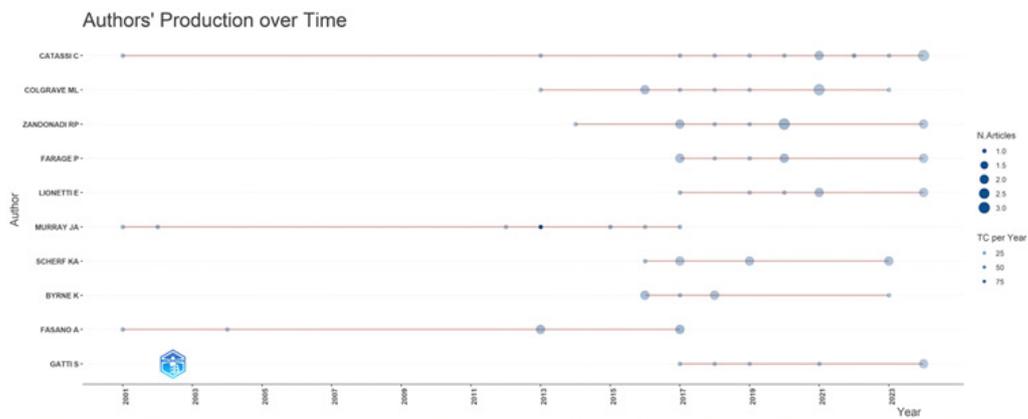


Figure 3. Annual distribution of author publications

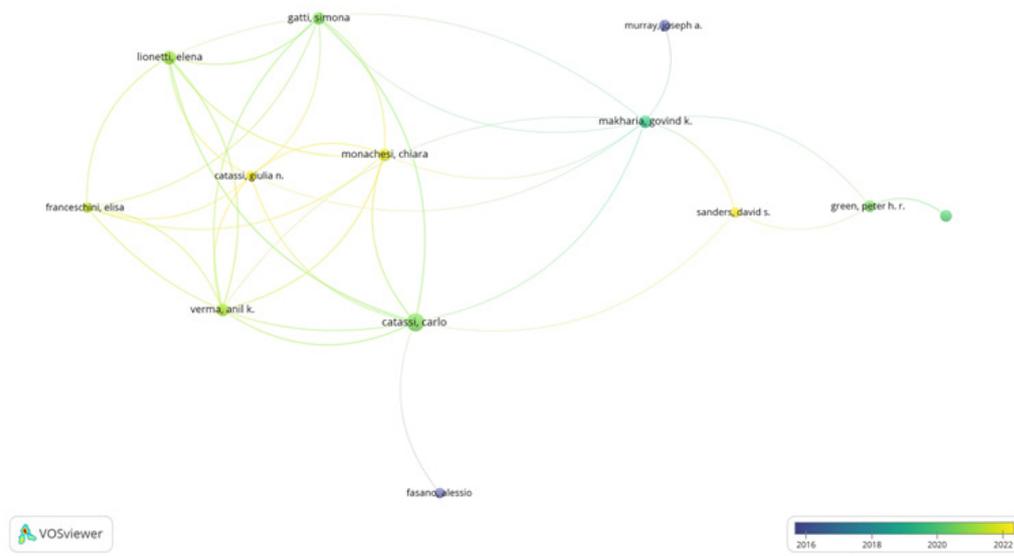


Figure 4. Co-authorship analysis of authors

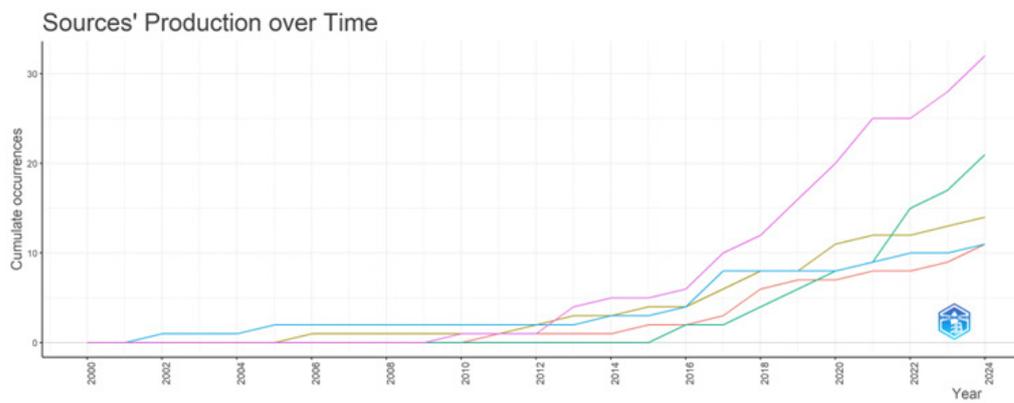


Figure 5. Journal productivity trends

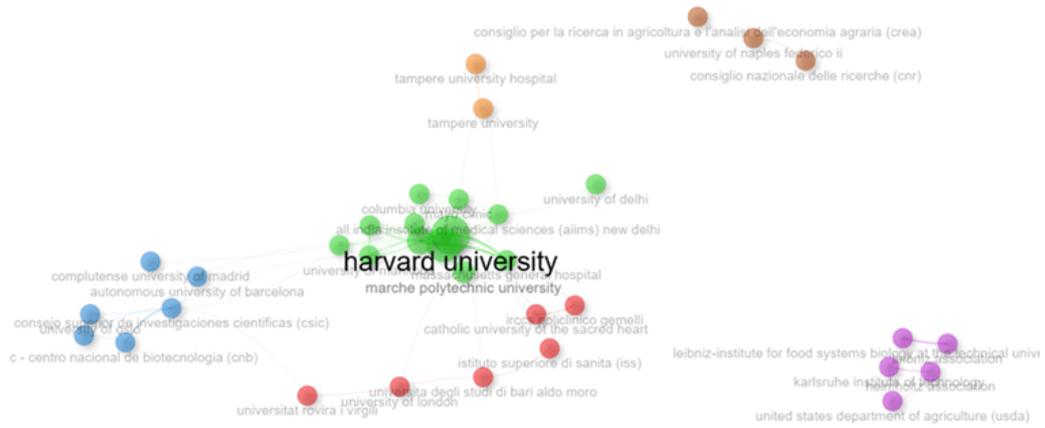


Figure 6. Collaboration of affiliations

### Country Collaboration Map

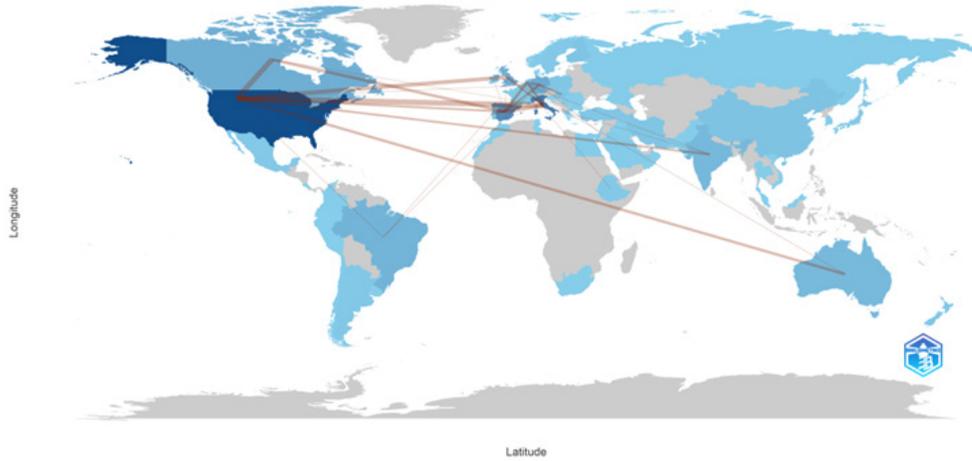


Figure 7. Country collaboration map

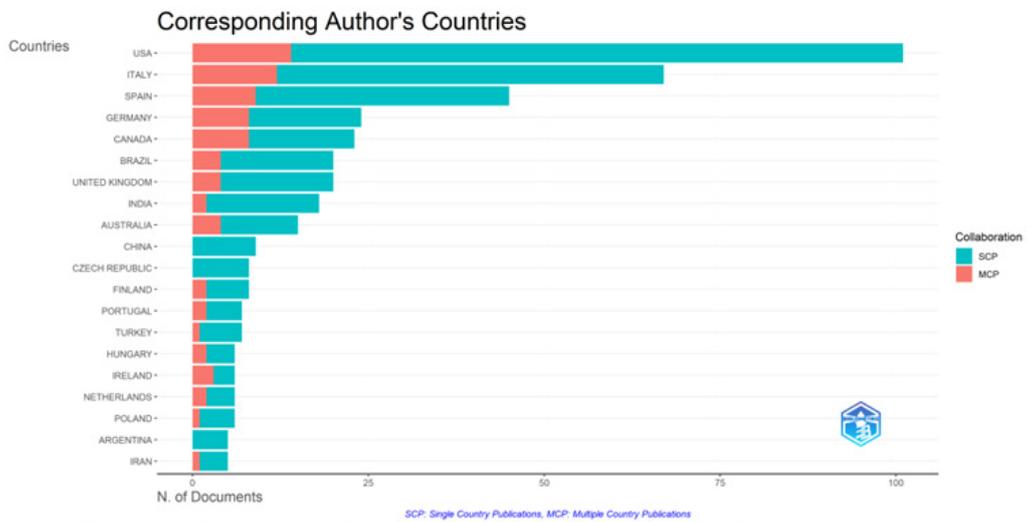


Figure 8. Geographic distribution by corresponding author

