

# Comprehensive Literature Review of Research on Online Food Safety

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## Abstract

Food is the most basic requirement for human survival and development, and despite advancements in its large-scale production, the demand for food remains unmet. In many countries, the food industry has become one of the pillar industries. Safety is the most crucial aspect of food and also the primary criterion for the selection of food by consumers. In recent years, with the frequent occurrence of incidents related to food safety, particularly after the coronavirus disease-2019 pandemic, studies on food safety have been increasing rapidly. For an in-depth analysis of the progress of food safety research, this study used CiteSpace for literature measurement to analyze relevant research studies in the Web of Science (WOS) database from 2001 to 2021 and to map keywords, authors, and institutions. Results indicated that research from the United States is comprehensive and research institutions are closely related. Since 2015, the number of periodicals included in the WOS has increased rapidly, and its influence has gradually increased. At present, the research hot spots in the field of food safety are the micro-subject of food safety, food safety products, food safety laws and regulations, and other related fields.

## Keywords

Food Safety; Online Food; Research Progress; Literature Measurement; Reviews; CiteSpace.

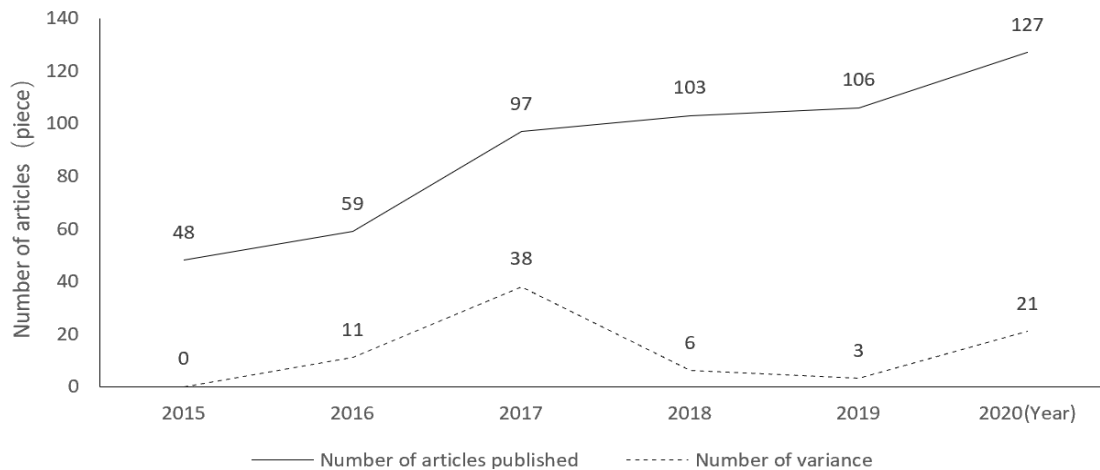
## 1. Introduction

With economic development, food safety incidents have been reported worldwide in recent years. Therefore, research on food safety continues to expand, with the expansion of research theories and methods. In-depth studies are being conducted, leading to the achievement of numerous theoretical and empirical results. In this paper of literature research on food safety, a food safety knowledge map was created with CiteSpace to analyze the available studies on food safety and identify food safety concerns. The findings revealed the trend in food safety research and provide empirical results for future studies on food safety.

## 2. Analysis of Findings

### 2.1. Annual Distribution of Literature

Figure 1 shows that the number of papers published in the food safety field has increased from 48 (in 2015) to 127 (in 2020), representing an increase by approximately 130%. The number of papers published in 2017 is 97 as compared to 59 in 2016, indicating that the growth in the year 2017 as compared with that in 2016 is close to twofold. Numerous food safety incidents occur between 2016 and 2017, such as zombie meat frozen for >30 years, pesticide residue in beer, glyphosate toxicity, salami sausages containing Botox, and poisonous bread. The number of papers on food safety has rapidly increased from 2016 to 2017.



**Figure 1.** Numbers of papers published on food safety and numbers of variances in food safety in WOS from 2015 to 2020.

### 2.2. Analysis of Scientific Cooperation in Food Safety

A coexisting analysis of the authors of the sample literature resulted in a network map of cooperation among scholars in the food safety field (Figure 2). In the scholar cooperation analysis, each node represents one core author, node size and font size indicate the author's centrality, the number and thickness of connections indicate the frequency and intensity of cooperation between scholars, the node shape is the citation ring, the annual wheel size represents the frequency of paper citation, and the color of the annual wheel represents the corresponding citation time, with the darkest color (red) indicating the farthest time and the lightest color (yellow) indicating the closest time. The larger the node is, the more frequently the author is quoted, and the thicker the line is, the stronger the partnership between the authors. In the international cooperation map (Figure 2), the network node is 191, the network connection is 157, and the network density (actual number of relationships in the network/theoretical maximum number of relationships) is 0.0087. The network as a whole is decentralized; we can see less international cooperation among scholars in the field of food safety, with the largest subnetwork of members having 30 nodes, accounting for 15% of the total network nodes. In terms of the frequency of the total frequency, the high frequency of the total frequency was observed for Francisco J Barba and Guido Rychen at the center of the research team, North Carolina State University, and Goodwin Barry K. and Chinese scholar Ye Tao as the center of the research team, the US scholar Woodard J. D centered research teams, etc.



**Figure 2.** 2015–2020 food safety scholars' collaborative network map.

### 2.3. Co-existing Analysis of Corporate Analytics Research Institutes

To explore the cooperation of the core institutions and institutions in the field of food safety research, a co-existing analysis was conducted of the research institutions involved in the sample studies, and a network map of institutional cooperation was obtained (Figure 3). Figure 3 demonstrates that international research institutions cooperate, with network nodes 165, connects 438, and a network density of 0.0324; food safety international agencies cooperate more closely, with the largest subnetwork of members having 119 nodes, accounting for 72% of the total network nodes. The large cooperative subnetwork has the US Food and Drug Administration (FDA) as the core of the US scientific research community, with National University of Ireland, Massachusetts General Hospital, Duke University, University of Valencia, Icahn School of Medicine at Mount Sinai, Mayo Clin, and Johns Hopkins University as the center of the scientific research team, with Columbia University and Stanford University as the core of the research team. The highest total frequency citations were by the World Health Organization Foodborne Disease Burden (541), and the most central was Duke University (0.36), and the most emergent was the US FDA (13).

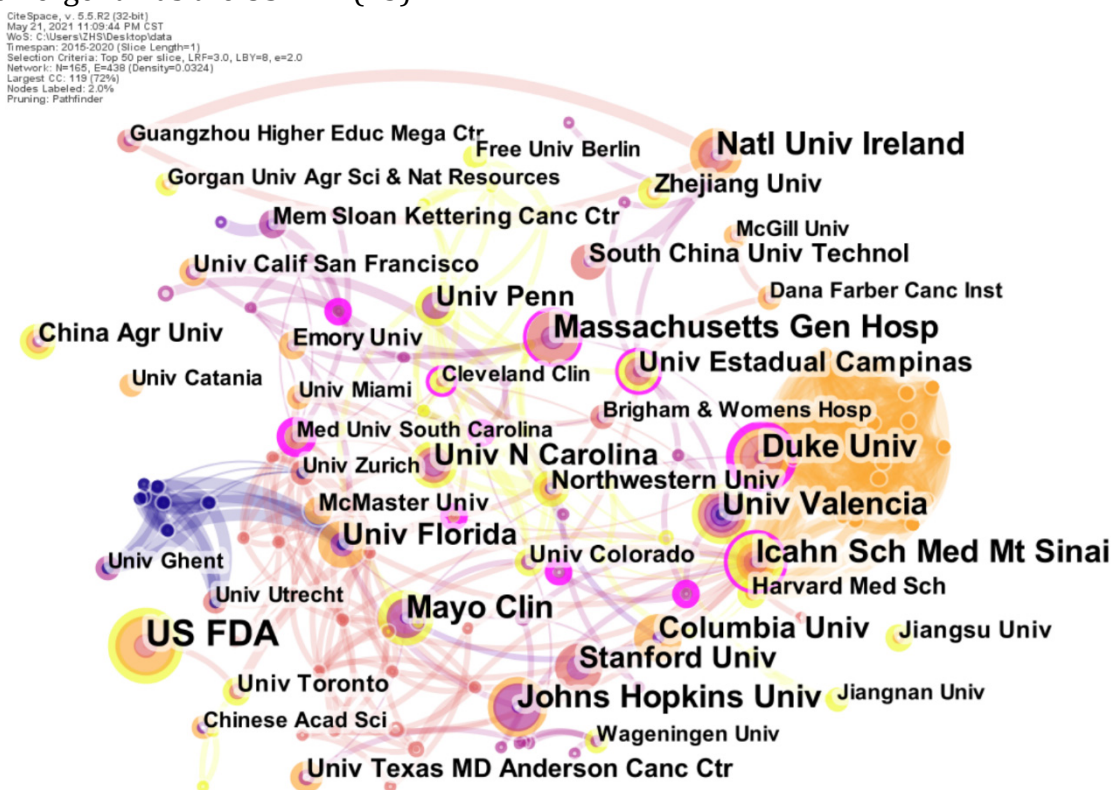


Figure 3. Cooperation network map of international food safety agencies from 2015 to 2020.

### 2.4. Food Safety Research Hot Spot Analysis

A co-existing analysis of WOS source literature keywords resulted in 323 keywords with a high frequency: food safety, *Escherichia coli*, safety, double-blind, food, lactic acid, etc. Clustering was performed on the basis of a common relationship and intensity between keywords and converted to a timeline view (Figure 4). The timeline view presents large-size to small-size clusters from top to bottom, and the larger the cluster size the more important the cluster fields. In terms of clustering of common networks, figure 4 shows that the common network is divided into 11 co-cited clusters, with food safety as the core to food conservation, double-blind, food, efficacy, lactic acid type, and so on in multiple directions. One of the most important clusters (0') contains 45 members; the homogeneity of the members (the greater the homogeneity, the greater the similarity of the cluster members) is 0.879; the average year of clustering is 2017;

and the top keywords include food safety, food-and-fingers, adulteration, authenticity, gold nanoparticles, and legal framework.

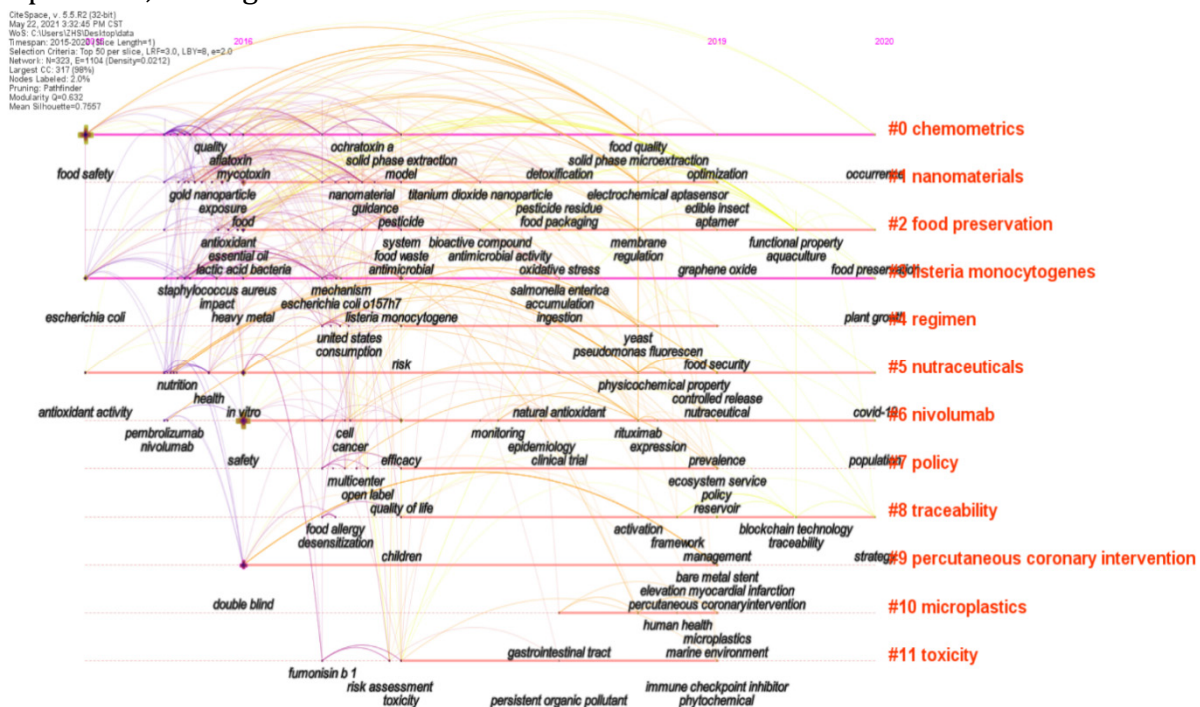


Figure 4. 2015 timeline view of keywords from food safety research for 2020.

### 3. Research Conclusion

From the time series point of view, food safety research has maintained a steady growth trend in recent years, from the research institutions and regions, and the United States leads this field. China’s research influence in this field is increasing, and from the viewpoint of scientific cooperation, the cooperation between core scholars must be further strengthened; inter-agency cooperation and academic cooperation are relatively good. The highest frequency of international total is the World Health Organization, foodborne Deli food, food safety, *Escherichia coli*, safety, double blind, food, lactic acid bacteria etc.

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