The Evolution of Food Security

Subjects: Health Care Sciences & Services
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Food security is one of the most challenging topics globally; however, the concept of food security has taken on additional dimensions that are general and are less detailed. Recognizing the factors that directly and indirectly affect food security will enable future researchers to focus on and study important topics. One of the important indicators of sustainable development is eliminating hunger and ensuring sustainable food security. International organizations and the WHO have various programs and measures to achieve this goal. The consequences of food insecurity, including hunger, malnutrition, and its direct or indirect effects on health and quality of life, have always been considered.

Keywords: food security ; bibliometric review ; co-citation analysis

1. Introduction

Concerns about food security arose very clearly a few years after World War Two (1939–1945), and some scholars point to Malthus' research (1798) as the beginning of studies on populations' food security [1]. Responding to the growing demand for food is, without a doubt, the most fundamental issue and the most striking demographic and environmental challenge [2]. The growing world population and nature's limited ability to produce food are at the root of growing food security concerns around the world [3]. There is a general concern that the size of the population may someday exceed the global food supply [2]. Food insecurity may result from the unavailability of food, insufficient purchasing power [4][5], improper distribution and improper use of food [6]. Poverty [7], natural catastrophes [6][8][9], political violence, and geopolitical factors contribute to a disproportionate distribution of food globally [10].

With the evolution of the concept of food security, many studies have been conducted to define [11][12], measure and evaluate food security [13][14][15], analyze the factors affecting it [16][17][18][19][20][21][22][23], and investigate the relationship between environment and food production [3][8], dietary diversity and food security [24][25], and new strategies of food security [6][26]. Therefore, the literature associated with food security is inevitably expansive [27].

2. Effective Factors

2.1. Socio-Economic Factors

Socio-economic factors affect the level of access to food [28]. Some researchers have used different methods to study the association between food security and household income [15][29], food prices [30], nutritional status, and dietary diversity [15][31], physical and mental health status [32][33], poverty [34][28], gender and household size [35], family knowledge about food and nutrition [36], food behaviors [37], and demographic factors [38][39]. A review of these studies suggests that most studies' primary focus is on economic variables such as household income and purchasing power [40]; however, the role of factors such as eating behaviors, nutrition knowledge, and education has received less attention. Therefore, more research is needed on learning methods and food-related knowledge in individuals through experimental interventions and longitudinal studies [37]. On the other hand, the concept of food security encompasses very broad and accurate assessments of the causal direction and type of relationship between different variables and their impact on food security and requires consideration of the interaction of ecological, socio-economic, political, and cultural factors [41]. For example, purchasing power depends on pricing policies, income, subsidies, and household welfare. Thus, rising prices for many people in the community, especially in the lower-income bracket, can reduce physical access to food, variety, and diet quality [42].

2.2. Political Factors

Given that ensuring food security is of high importance for many governments and societies [15], it is necessary to examine it from the dimension of politics and governance. A growing body of research has studied the association between food security and food policy [43], food sovereignty [42][40][44], governance [45][46], self-sufficiency [44][47], food

production and distribution systems [13][48][49], and global trade [15]. Due to its important role in ensuring food security at different levels, governance has received more devotion from scholars in this field, since the root of many factors affecting food security, such as political, economic, social, and environmental components, can be sought in governance [50]. That is why, in recent years, food sovereignty has become one of the most important elements of governance [51]. However, current knowledge about food governance is fragmented. Therefore, complementing this area of literature with alternative governance perspectives in future research may strengthen the current understanding of food security governance [46].

2.3. Cultural Factors

The impact of culture on food security is a complex and challenging issue that has received less attention [52]. Indeed, the dynamics and relative importance of cultural influences on food security are not well studied. Nevertheless, physical and economic access, preparation, and selection of food baskets are influenced by culture, eating habits, and lifestyle [53][38][52]. Instead, culture can lead the way to better implement food security policies [52].

2.4. Environmental Factors

Climate change as one of the key factors affecting food security has been considered by many researchers [18][54]. There is a dual connection between climate change and food security [55][56]. Climate change affects all dimensions of food security, such as physical and economic access, dietary patterns and food use, and the stability and flexibility of food systems [57]. Striving for food security in terms of climate change has far-reaching implications for endangered communities [58]. In addition, efforts to ensure food security by increasing agriculture and expanding agricultural land lead to increased greenhouse gas emissions from deforestation and land-use changes [16][59]. Alternatively, by affecting production and supply, climate change can lead to rising prices of food and agriculture, which in turn worsens the global hunger crisis [60]. In addition to climate change, the decline in agricultural production for various reasons, including the prevalence of pests and diseases, endangers the livelihood and welfare of farmers and producers and related businesses, especially small-scale farmers, foresters, ranchers, and fisheries [19][61].

3. Coping Strategies (Actions, Plans, and Policies)

One of the important indicators of sustainable development is eliminating hunger and ensuring sustainable food security [62]. International organizations such as the UN, FAO, IFAD, UNICEF, WFP, and the WHO have various programs and actions measurements to achieve this goal [61]. Studies in this field have provided practical strategies by focusing on each period and geographical area's specific conditions and requirements. Coping strategies can be classified into four dimensions: food quantity and quality improvement, food safety, and socio-cultural and environmental acceptance [63][64][65][66].

A group of studies in the field of food security, one that has a long history and extensive volume, has examined various strategies, programs, and policies to improve economic and physical access to food. The starting point of this group of studies is to address the issue of poverty and strategies to combat food insecurity in various societies, especially in developing countries. Researchers have tried to use practical strategies by relying on food supply through domestic production or imports and improving people's purchasing power, especially vulnerable groups. Various approaches have been considered to increase the performance and efficiency of the agricultural sector to ensure sustainable food security. Focusing on the existing agricultural lands with priority given to climate-friendly agriculture, transfer of new high-yielding technologies to these croplands [67], integrated water resources management, increase in product efficiency, and agricultural waste management [49] are examples of the strategies mentioned in these studies.

Many farmers worldwide use the maintenance of biodiversity as it provides both food security and sustainable livelihoods for users and greater resilience to the dangers of climate change or other natural shocks [68]. However, to feed the growing population, innovative and acceptable ways of combining biodiversity conservation and food production must be identified. To this end, one study [69] has considered the development of fisheries and aquaculture. A limited number of studies have observed the relative influence of urban agriculture on sustainable food security [70][71], the approach of diversification and the use of micronutrients to improve dietary quality [15][72]. However, despite the importance of nutritional quality in sustainable food security, limited studies have been conducted to improve nutrition quality, especially for disadvantaged and low-income areas [73][64].

However, global studies have confirmed the negative impact of chemical residues on soil and terrestrial and aquatic ecosystems and their toxic effects on humans [74]. Some researchers have turned their attention to the issue of safe and healthy food. Their main purpose is to increase people's access to health services and health care along with food

security [75][76][77][78]. However, there are still serious concerns about the overuse of pesticides and chemical contaminants and the development of genetically modified foods that need to be carefully studied [65].

Other studies have focused on socio-cultural and environmental acceptability. In addition to discussing the physical and economic improvement of food, food hygiene and various strategies in opposition to socio-cultural values (consumer acceptance) have been proposed [79][80].

A review of studies shows that due to researchers' efforts and participation in various fields such as economics, agriculture, sociology, nutrition, and medicine, the literature on food security has become richer over time. There are still many questions that determine the future direction of food security programs. For example, food insecurity measures are generally defined at the household level, not for individuals [14][53][81][35]. Some studies have attempted to measure the food security of particular groups such as children and pregnant women [33][82]. Instead, depending on how the food distribution system in different regions affects food security, the proposed measures and strategies will be different. The USA has an advanced food distribution system that allows food prices to be lower than other high-income countries; as a result, the rate of food insecurity in this country is much lower. Therefore, research on improving the food distribution system to deal with food insecurity, especially in underdeveloped or less developed areas, can be pursued [83].

Furthermore, it is essential to pay attention to the research needs and priorities in different areas. According to the World Map on Food Security in 2020, many regions are located in high-risk zones. Given the widespread effects of the COVID-19 pandemic, it is estimated that this epidemic will decrease access to food [84] and increase the number of hungry people in the world to 840 million by 2030 [85]. In this regard, policies related to social protection, increasing purchasing power, and making healthy diets affordable for the most vulnerable populations are a priority [86].

4. Impacts and Outcomes

The consequences of food insecurity, including hunger, malnutrition, and its direct or indirect effects on health and quality of life, have always been considered [87]. A group of studies has evaluated the effects and consequences of hunger and food insecurity on physical, mental, and social health [32][83][88]. These studies suggest that food shortages are one of the dimensions of the individuals' pervasive vulnerability to a wide range of physical, psychological, and social problems among households struggling with economic constraints. People who do not have enough access to healthy food are significantly more likely to face issues such as chronic heart disease, diabetes, high blood pressure, major depression, and anxiety [89][90][91][92][29][93]. Alternatively, continuing the cycle between food insecurity and various diseases will lead to decreases in job productivity, learning capacity, and ability to grow physically, mentally, and intellectually [15][92]. However, most research on food insecurity has relied on cross-sectional data. This is partly due to the lack of longitudinal data that households and their food security status follow over time [20][92][94][83]. Therefore, to understand the long-term effects of food insecurity, the association between food security, policy, income, consumption instability, and other variables should be examined. It should also be considered how food insecurity is transmitted from childhood to adulthood and its long-term effects on adults' health and human capital [83]. The Panel Study of Income Dynamics, Fragile Families and Child Well Being, and the Early Childhood Longitudinal Survey, are some exceptional examples, both of which have multiple reports of food insecurity over time.

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