frontiers | Frontiers in Sustainable Food Systems

TYPE Original Research
PUBLISHED 30 April 2024
DOI 10.3389/fsufs.2024.1354421

OPEN ACCESS

EDITED BY
Ramadas Sendhil,
Pondicherry University, India

REVIEWED BY
Ravirajan Karunanithi,
Larsen and Toubro, India
Ikechi Kelechi Agbugba,
Rivers State University, Nigeria

*CORRESPONDENCE
Razieh Namdar
✉ r.namdar@shirazu.ac.ir

RECEIVED 12 December 2023
ACCEPTED 18 March 2024
PUBLISHED 30 April 2024

CITATION
Haghighi Z and Namdar R (2024) Social path assessment and food security status of rural households in Iran.
Front. Sustain. Food Syst. 8:1354421.
doi: 10.3389/fsufs.2024.1354421

Social path assessment and food security status of rural households in Iran

Zahra Haghighi and Razieh Namdar*

Department of Agricultural Extension and Education, School of Agriculture, Shiraz University, Shiraz, Iran

Introduction: Food and nutrition are the most vital needs of human society and its provision lies in the category of food security. The concept of food security is very broad and is determined by the interaction of a range of biological, economic, social, agricultural, and physical factors. The purpose of this study is to investigate the social factors affecting food security among rural households.

Methods: This is quantitative research conducted by survey method. The statistical population included 384 rural households in Shiraz County that were selected by stratified random sampling. Data analysis was performed using SPSS and LISREL software.

Results and discussion: Results indicated that the values of combined reliability calculated for all three variables studied were >0.7, which implies that research tools have good reliability and validity. The results of structural analysis of social capital and social health variables with food security using confirmatory factor analysis techniques and structural equations showed social capital variable affects food security directly and social health variable has an indirect effect. According to the value of fitness indicators obtained; it was found that the structural equation model of the research variables had a suitable and acceptable fit and the general structure of the research was approved. Hence, the components used in the research were able to estimate food security. Accordingly, by improving the level of social capital and social health, promotion of food security in communities, would be expected.

KEYWORDS

food security, social capital, social health, rural households, structural equation model, Iran

1 Introduction

Today, with the expansion of the concept of human development, the issue of food security is one of the most important interests all over the world. Access to adequate food and nutritional health is one of the main axes of development. Most of countries in the world attach special importance to creating, maintaining, sustaining food security and consider its absence as a serious threat to economic, social and political development (Safarkhanlu and Mohammadinejad, 2011; Savari et al., 2014). Ensuring food security is essential for maintaining the health of society, so that individuals can play a key role as a main element of political, economic, social and cultural development (Nord et al., 2009; Nord and Parker, 2010). This concept means ability of all people at all times, it is necessary for all individuals to have both physical and economic access to sufficient, nutritious food that meets their needs and supports an active and healthy lifestyle (Agriculture Organization of the United Nations and Forest Resources Development Branch, 1986; Esfandiari and Mirabbasi, 2014).

Eradicating poverty in all its forms is one of the biggest challenges facing humanity. While the number of people living in extreme poverty has more than halved between 1990 and 2015, many are still struggling to meet their most basic human needs (Tienken, 2012).

The 17 UN 2030 Sustainable Development Goals (SDGs) have a clear focus on social issues, mainly on eradicating poverty. This is concluded to be the greatest global challenge and an indispensable requirement for Sustainable Development (Wennersten and Qie, 2018). FAO believes that SDG 2 calls for accelerated investment in food and agriculture, which will be catalytic for changes across all Goals. In relation to the SDGs, the key messages of the FAO have been officially defined as: food and agriculture can contribute massively to achieving the SDGs (Nakai, 2018). According to IFAD and UNEP (2013), smallholder farmers in developing countries are said to comprise over 50% of final consumers, creating employment opportunities and thereby alleviating poverty to a large extent. In other words, to actualize food sufficiency and security as articulated in the United Nations Sustainable Development Goals (SDGs), it becomes peremptory for the farmers who are mainly small-scale farmers to attain a productive and sustainable life (Musungwini, 2018).

Among the important categories in sustainable development, one can mention social health and social capital. The sense of security is a remarkable factor in creating social capital in society. Households with higher social capital would be at the lower risk of suffering from hunger and food insecurity (Hezar Jaribi and Alizadeh Aghdam, 2012; Rusmawati et al., 2023). Social capital in household can indirectly affects food security in two ways: increasing dependence or increasing household resources (Liverpool-Tasie and Winter-Nelson, 2011). In addition, the quantity and quality of indicators for social capital play a decisive role in achieving food security (Sseguya, 2009). The concept of social health as another important dimension of health, was proposed by World Health Organization in recent years. It means that to achieve complete health, not only physical and mental health but also social health is essential (Amini Rarani et al., 2010).

Food security is a complex concept that depends on the interplay of various biological, economic, social, agricultural and physical factors (Sarlio-Lahteenkorva and Lahelma, 2001; Zarafati, 2004; Boshrabadi and Ouhadi, 2014; Rostami et al., 2014). Human development largely depends on the ability of society to create safe and sustainable food security, which is possible in the shadow of developed farmers (Shakoori, 2004). Therefore, it seems necessary to plan for this sector by recognizing its issues and in order to enhance food security must de focused on both social health and social capital as tow essential pillars.

Food security refers to the state in which all individuals have access to sufficient, safe, and nutritious food at all times to meet their dietary needs and preference, to lead an active and healthy life (World Health Organization Staff and World Health Organization, 1996; Peng and Berry, 2019); or ensuring that all individuals have sufficient access to healthy and nutritious food to lead an active and healthy life all times (World Bank, 2001; Nord et al., 2010). At the household level, when a family has food security, all individuals have sufficient access to healthy and nutritious food to lead an active and healthy life all times (Mallick and Rafi, 2010; Nord and Parker, 2010; Nord et al., 2010; Mbow et al., 2019). Food security refers to a variety of dimensions, the most important of which are the four components of "food availability", "food access", "food use or food utilization" and "food sustainability" (Riely et al., 1999; World Bank, 2001; Oxfam, 2007; Renzaho and Mellor, 2010; Carletto et al., 2013; Enrique et al., 2013).

1.1 Theory

1.1.1 Social capital

Humans are always looking for resources that increase the possibility of achieving their goals. What kind of people we know and what kind of relationship is established between us and others plays an important role in determining the achievements of our life; Sociologists refer to this factor as social capital (Ghaderi and Taghavi, 2012). word social capital was first introduced in 1916 in an article by Lida J. Hanifen from West Virginia University (Sadeghi Shahdani and Maghsoodi, 2019). Social capital theory included mainly from the theories of Bourdieu, Coleman, Putnam and Fukuyama. Social capital is a set of networks, norms and values that facilitate intra-group and inter-group cooperation to achieve common goals. Social capital is the coherence important for the capability and flexibility of society, development of the other capitals (natural, cultural, human, political, financial) is incomplete without it and used (Ostrom, 2000; Adger, 2003; Grootaert et al., 2004).

The concept of social capital or "connections between people—social networks and mutual and reliable norms resulting from them" (Putnam, 2001) is usually used to understand people's behavior (Portes, 1998). In this study, the three main components of social capital, structural, cognitive and relational, are proposed (Nahapiet and Ghoshal, 1998).

The structural component is created by the number of interactions and the existence of communication across the levels of hierarchy and performance between the parties. This component includes the links within the network, the shape and composition of the network and organizational fit (Nahapiet and Ghoshal, 1998).

The cognitive component refers to the knowledge that people have about each other. The focus of this knowledge is on the commonalities that are the primary link and consistency to the relations of the parties. From these commonalities, different interpretations such as share a view (Bolino et al., 2002), common understanding or common vision (Whipple, 1945), common language and codes and common stories, myths and metaphors and common narratives (Nahapiet and Ghoshal, 1998; Harandi, 2014) has been mentioned.

The relational component includes trust, norms, obligations and interaction and determination of common identity (Putnam, 1995; Nahapiet and Ghoshal, 1998; Bastani and Salehi Hikoi, 2007).

1.1.2 Social health

Among the social structures, one of the basic axes of health assessment for different societies is the society's enjoyment of social health, which plays an important role in ensuring the dynamism and efficiency of each society and is a function of various social, cultural and other factors (Sabbagh, 2011; Khoshfar et al., 2013). According to Goldsmith, social health is "the evaluation of

significant positive and negative behaviors of a person in relation to others" which leads to the efficiency of the person in the society (Larson, 1996). Social health includes the levels of social skills, social performance and the ability of each person to recognize himself as a member of the larger society (Keyes, 1998; Brown et al., 2011).

In this research, based on Keyes' theory of social health and the five indicators of social integration, i.e., evaluating the quality of the individual's mutual relations in society and social groups, a sense of belonging to society is a characteristic of healthy individuals. Social integration is comparable to the meaninglessness of life (Seaman et al., 2014). Social acceptance expresses a person's understanding of the characteristics and attributes of people in society as a whole. Social contribution, i.e., individual's assessment of his social value, social actualization and social coherence, is the assessment of an individual by considering the quality of his association with the surrounding society (which is based on the health-oriented approach) and has been used as a model for defining and presenting indicators of the concept of social health (Keyes, 1998; Keyes and Shapiro, 2004; Yazdan panah and Nik Varz, 2015).

1.2 Research background

According to various studies and research in the field of food security, household food experiences can be influenced by numerous factors, including socio-cultural, economic, and demographic factors such as age, gender, ethnicity, and household size (Salarkia et al., 2013; Dastagiri et al., 2015; Olum et al., 2017; Ramesh et al., 2017; Veliz-Briones et al., 2017; Poer, 2018; Tarasuk et al., 2019). These factors are also known to have an impact on household food security. For instance, research has shown that social capital, economic capital, nutritional literacy, education, and demographic factors can influence the food security of households (Salarkia et al., 2013; Dastagiri et al., 2015; Ramesh et al., 2017; Egamberdiev, 2024).

Experts believe that social capital has a significant effect on reducing food insecurity and increasing food security (Kohi, 2013). High social capital has an inverse relationship with household food insecurity. Activating social networks, nutrition education programs and community-based monitoring can strengthen social capital and reduce food insecurity (Walker et al., 2007; Hezar Jaribi and Alizadeh Aghdam, 2012). There is a strong correlation between social capital at the community and family levels and food security (Martin et al., 2004). Kawachi argues that social capital can increase the chances of accessing different types of social support in times of need (Álvarez et al., 2017).

Social capital can be a powerful tool to inform policymakers and community leaders can provide guidance on community approaches that can improve the food security of families (Martin et al., 2004). Also, Social capital enhances food security by tow mechanisms through facilitating the sharing of knowledge and food products between individuals and communities (Nosratabadi et al., 2020). According to several studies, food security and social capital are two factors related together (Misselhorn, 2009; Sseguya, 2009; Liverpool-Tasie and Winter-Nelson, 2011; Dzanja et al., 2013; Gallaher et al., 2013; Sseguya et al., 2018; Nosratabadi et al., 2020; Niles et al., 2021).

1.3 Statement of the problem and necessity of research

Today, 40,000 people in the world die of hunger every day. It is expected that the world population will reach eight billion people in 2050, which will be two billion people more than the current population, without increasing food production in countries facing population growth (Sanai Moghadam et al., 2017).

In rural areas, access to food is the most important concern, while in urban areas, the cost is often the main concern (Garvelink et al., 2013; Paul and Elder, 2019). Therefore, it is necessary to thoroughly study the food security issue in rural and urban communities and to identify the factors affecting each case. By working in various sectors, especially agriculture, villagers provide more than 87 percent of the resources needed to ensure the country's food security (Sidaei et al., 2013). Also, agriculture remains a very good platform to reverse gaps in food production (Oteh et al., 2021). It provides food for the growing population, employment for over 65 percent of population and raw materials and foreign exchange earnings for the development of the manufacturing sector (Agbugba and Binaebi, 2018; Oteh et al., 2021). It is expected that the rural households that provide food, in terms of type and amount, have full access to food. The results of various studies related to the discussion of food security in rural areas (Dastanai et al., 2011; Rostami et al., 2014; Sharafkhani et al., 2015) show that food security is more common in rural areas compared to urban areas. In other words, rural households that depend on agriculture for livelihood are more exposed to food insecurity (Johnson, 2009). According to the statistics of the Food and Agriculture Organization in 1996, 75% of the chronically hungry lived in rural areas (FAO, 1996).

If food stability provides availability and access to food, then social capital is the "glue" that keeps the four pillars of food security in place (Christ et al., 2017). Social capital is linked to social health (Khosravipour et al., 2015; Torani et al., 2015). Also, the components of social capital have a significant relationship with social health (Torani et al., 2015). This subject considered that there is a relationship between social health and social capital with family food security (Faghihi Farhamand and Zanjani, 2012).

The review of the studies conducted in the field of food security in Iran showed that most of them has been investigated the level and extent of food security, but the impact of social factors on food security, especially in the rural areas of provinces with good performance and background of agricultural production, including Fars province, has never been considered. Fars province including Shiraz County is an important hub for the production of various important agricultural products in Iran. This province ranks second with the production of about 10% of the country's agricultural products and ranks first in the country in the production of nine agricultural products. Shiraz county is the most populated city in Fars province and southern Iran, which has been considered in this study.

In literature review of food security indices, four dimensions of availability, access, benefit, stability or sustainability were proposed. In this regard, some important studies include FAO (1996), Regutlinger (1986), Riely et al. (1999), Benson (2007), Oxfam

(2007), Barrett (2010), Renzaho and Mellor (2010), Enrique et al. (2013), Forster (2013), Akbarpour et al. (2016), Gomeini et al. (2016), and Pir Yalghun Aghach (2014) have been investigated. For the social capital index, three components were used: structural, cognitive and communication (Whipple, 1945; Nahapiet and Ghoshal, 1998; Ebrahimpour and Elmi, 2014; Ebrahimzadeh et al., 2014). The third index was social health which was explained based on related studies (Keyes, 1998; Keyes and Shapiro, 2004; Hatami, 2010; Arun, 2011; Babapour Khairuddin et al., 2013; Khoshfar et al., 2013; Zahedi Asl and Pilehvari, 2013; Afshani and Shiri Mohammadabad, 2015).

2 Method

2.1 Research method, validity, and reliability of the questionnaire

This research is of a descriptive type and data was collected using a survey technique. In terms of the amount and degree of control, this research was conducted in the field to collect information, the theoretical foundations and background of its research were examined through library studies and after that, after identifying the desired variables, a questionnaire was developed and reviewed by faculties in the agricultural extension and education department to confirm its face validity. The reliability of the questionnaire was assessed by conducting a guided study and calculating Cronbach's alpha coefficient. Data were analyzed using SPSS version 21 software and statistical methods such as frequency test, mean, percentage and standard deviation, correlation coefficients and structural equations. Finally, LISREL 8.8 software was used to assess and make up the model.

2.2 Statistical population, sampling method, and measurement tool

All households located in the rural areas of Shiraz County were considered as statistical population of this study during 2021 cropping year. This city consists of three main parts: Central, Dasht Arjan and Zarghan.After investigating the districts that had different climatic zone and agricultural production, stratified random sampling method with proportional assignment was used. One rural district was selected from each district and between 1 and 3 villages were selected from each rural district and then sampling was done according to each village population. Finally, according to Morgan's table, based on the number of households in Shiraz County (1443027) and the population of Shiraz city (1869001), the number of selected samples of this population were 384 households[1]. Data collection in this research was done using a questionnaire. In this research, information was collected in person and by interviewing the head of the household. This study employed Cronbach's alpha test to assess the questionnaires' reliability. Table 1 shows the amounts of alpha parameters for measurement scales in this study.

TABLE 1 Cronbach's alpha values of research variables.

Variables	Components	Alpha coefficient of each components	Alpha coefficient of each variable
Food security	Availability	0.72	0.68
	Access	0.68	
	Benefit	0.75	
	Stability	0.74	
Social capital	Structural	0.81	0.72
	Cognitive	0.73	
	Communicational	0.81	
Social health	Social integration	0.83	0.79
	Social acceptance	0.65	
	Social contribution	0.76	
	Social coherence	0.65	
	Social actualization	0.78	

3 Result

3.1 Research findings

The mean age of participants was 44 years. About half of the people had experienced about 7 years of education. In terms of the employment status of the heads of households, 43% reported their occupation as agriculture, 30% reported a combination of agricultural and non-agricultural jobs and 27% reported non-agricultural employment. The mode of agricultural land area in the surveyed location was five hectares.

To describe the general security situation of rural households in Shiraz County in the studied areas, food security was divided into five levels: very safe, safe, moderate, unsafe and very unsafe. The findings showed that in the studied community, the food security of most households is at an average level. 24.7% are in very safe food conditions, 21.9% are in safe food conditions, 30.5% are in moderate food conditions, 13.5% are in food insecure conditions and 9.4% are in very food insecure conditions (Figure 1).

3.2 Correlation between social capital and social health and its effect on food security

To investigate the relationship between the two variables of social capital and social health with food security, Pearson's correlation test was used. According to the observed correlation coefficients, there is a positive and significant correlation between social capital and social health variables with food security (Table 2). Also, according to the result of this study, social capital

1 Statistical Center of Iran. (2018). *Population and Household by Province and City*. Available online at: https://www.amar.org.ir/population-and-migration#app3046

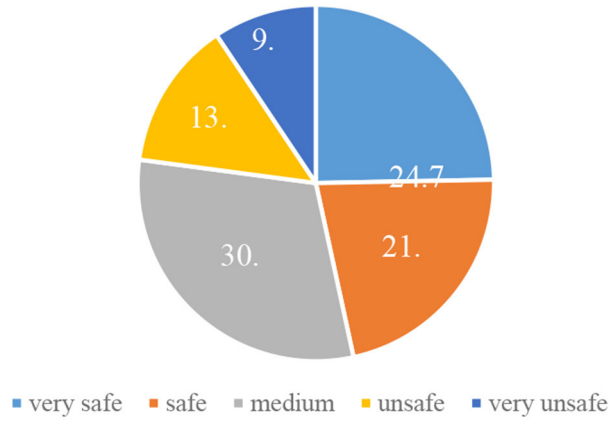

FIGURE 1
Household Food Security Status in the study area.

TABLE 2 Correlation coefficient between social capital and social health with food security.

Variable	The value of the correlation coefficient r	Sig
Social capital	0.54	0.001
Social health	0.75	0.001

and food security are positively and significantly related. People who have social capital are less exposed to the risk of hunger. On the other hand, social health and food security are positively and significantly related, according to the result of this study. This finding means that the higher the level of social health among people, the higher their food security.

3.3 Structural equation analysis results

This study's confirmatory factor analysis showed that, the variables have a factor load >0.5 and a *t*-value >1.96. This means all the questions forming the components of the three variables were approved and remained in the model (Table 3).

Several indicators were used to evaluate the fit of the model. Standard values and model fit indices are presented in Table 4.

According to the data in Table 4, it is possible to obtain the goodness-of-fit statistics for the selected constructs at an acceptable level and at a desirable level and the selected constructs of the research show their impact in measuring food security in a meaningful way.

To determine the relationships between the variables of the model, which include the relationships between the three variables of food security, social capital and social health, the structural model was made up, which is presented in Figure 2. Also, information related to this section, including standard coefficients, standard error and t and R values, are provided in Table 5.

The path coefficient between food security and social capital ($\Upsilon = 0.65$ and $t = 6.68$) and the path coefficient between social capital variable and social health ($\Upsilon = 0.97$ and $t = 10.55$) were observed (Table 5). The analysis of the findings showed that the social capital variable directly and the social health variable indirectly affects food security and a significant relationship between them is observed (Figure 3).

As indicated in Table 6, the path coefficients (value of the standard coefficient and standard error) are acceptable for the structural model and represents the appropriate compatibility of the structural model. From the study results, all the variables had a factor load >0.5 335 and the *t*-value for all the paths >1.96.

3.4 Composite reliability

The trust and reliability of indicators were checked through the composite reliability formula.

$$Formula: P_{C=}(\sum \lambda)^2 /[(\sum \lambda)^2 + \sum(\theta)]$$

Formula guided:
P_C = composite reliability
λ = loads related to indicators
θ = error variance of indicators
$\sum$ = sum of indices of each latent variable

As indicated in Table 7, the reliability value of the three variables is at the desired level and above 0.7. From the study results discussed, the reliability of the indicators models is respectively related to the measurement 350 of the variable "social health", "food security" and then "social capital."

3.5 Assessment of model fit

To evaluate the fit of the structural equation model, indices in the three main categories of model fit, model adaptation and model economy were used. As shown in Table 8, the criterion value (optimal limit) and the reported value of each of the above indicators are given for the structural equation model of the research.

Therefore, based on the adjusted research model, it can be said that the structure used to examine the relationship between food security and social capital and social health shows an acceptable consistency. It can also be said that the data are consistent with the proposed model and the presented indices show that in general, the proposed model has the required ability to explain the variables and it is an acceptable model in terms of the total fit indices.

4 Discussion

As basic human needs, this study recognize the important role of food in promoting both individual and societal health and its provision lies in the category of food security. As basic human needs differ and the population of the planet is increasing daily at

TABLE 3 Summary of the results obtained from the second-order confirmatory factor analysis.

Variable	Structure	Indicator in the model	Standard coefficient	standard error	*t* Value	R^2
Food security	Availability	Fs1	0.98	0.22	6.57	0.51
	Benefit	Fs2	0.40	0.46	5.66	0.16
	Access	Fs3	0.68	0.24	10.44	0.46
	Sustainability	Fs4	0.69	0.26	10.75	0.48
Social capital	Structural	Social 1	0.67	0.25	10.78	0.45
	Cognitive	Social 2	0.60	0.16	10.47	0.44
	Communicational	Social 3	0.73	0.17	12.01	0.53
Social health	Social integration	Health 1	1.09	0.18	−3.94	0.73
	Social acceptance	Health 2	0.58	0.25	9.35	0.34
	Social contribution	Health 3	0.79	0.23	13.78	0.63
	Social coherence	Health 4	0.69	0.05	11.59	0.48
	Social actualization	Health 5	0.74	0.52	12.36	0.54

TABLE 4 Standard values and model fit indices.

Indicator	Standard values	The obtained values of the model
Chi-square/degree of freedom (X^2/df)	≤ 3	2.37
Normed Fit Index (NFI)	≥ 90	0.95
Non-Normed Fit Index (NNFI)	≥ 90	0.96
Comparative Fit Index (CFI)	≥ 90	0.97
Goodness-of-Fit Index (GFI)	≥ 90	0.93
Adjust Goodness-of-Fit Index (AGFI)	≥ 90	0.88
Incremental Fit Index (IFI)	≥ 90	0.97
Root Mean Residual (RMR)	≤ 0.05	0.040
Root Mean Square Error of Approximation (RMSEA)	≤ 0.08	0.07

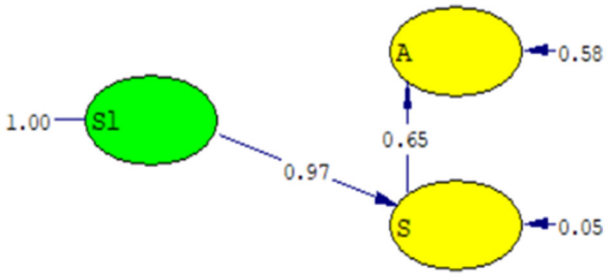

FIGURE 2
Diagram of the structural part of the model (Structural Model).

TABLE 5 Value of the standard coefficient, standard error and *t* of the latent variables (structural equations).

Direction	Standard coefficient	standard error	*t*	R^2
Social capital → Food security	0.65	0.09	6.68	0.42
Social health → Social capital	0.97	0.12	10.55	0.95

an incredible speed, so the demand is increasing day by day (Safari, 2023).

It is pertinent to note that food security is not just an indicator for household/individual health (Gundersen and Ziliak, 2015), but can feature as precursor to developmental, health and nutritional problems, due to climate change issues that occurred in recent years thereby affecting agricultural production, as well as the livelihood and life of rural households which is consistent with the results of Food Agriculture Organization of the United Nations (2019) and Ghanbari Movahed et al. (2022). More so, other factors that could lead to insufficient availability of food is another reason, ignorance and incorrect eating habits in villages, nutritional status of farmers which has worsened in different from cities associated with the study area. Salarkia et al. (2013) made a similar observation in their study. Additionally, due to the instability in the agricultural situation, which is part of the main livelihood of villagers, there is no fixed income and the financial situation of rural households is worse than that of urban households which is consistent with the results of Asadi-Lari et al. (2019), Amiresmaeili et al. (2021), and Mortazavi et al. (2017).

On the other hand, considering that social capital, especially in times of crisis and need, is considered as one of the most necessary components in increasing food security (Kohi, 2013), it has the potential to reduce barriers to accessing food for impacted families or communities. It can also be pointed out that social capital determines social health. In other words, ensuring social

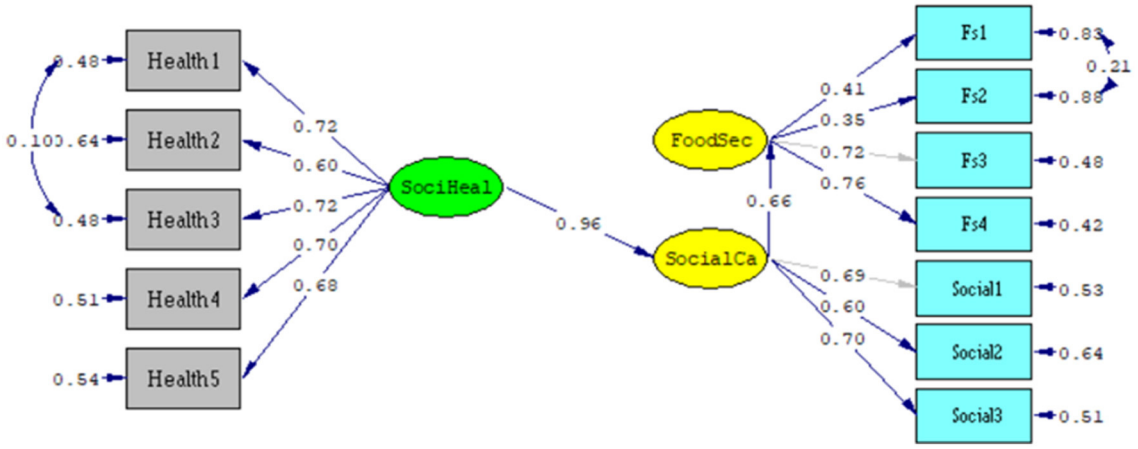

FIGURE 3
Diagram of the modified model of food security.

TABLE 6 Summary results of structural equation on food security measurement model.

Variable	Structure	Indicator in the model	Standard coefficient	standard error	t Value	R^2
Food security	Exist	Fs1	0.41	0.83	5.23	0.51
	Benefit	Fs2	0.35	0.88	4.54	0.16
	Access	Fs3	0.72	0.48	–	0.46
	Sustainability	Fs4	0.76	0.42	7.98	0.48
Social capital	Structural	Social 1	0.69	0.53	–	0.45
	Cognitive	Social 2	0.60	0.64	8.03	0.44
	Communicational	Social 3	0.70	0.51	9.27	0.53
Social health	Social integration	Health 1	0.72	0.48	11.81	0.73
	Social acceptance	Health 2	0.60	0.64	9.43	0.34
	Social contribution	Health 3	0.72	0.48	11.73	0.63
	Social coherence	Health 4	0.70	0.51	11.44	0.48
	Social actualization	Health 5	0.68	0.54	11.02	0.54

TABLE 7 Combined reliability results obtained for latent variables of the model.

Latent variables	Composite Reliability (Pc)
Food security	0.65
Social capital	0.70
Social health	0.81

health is crucial for maintaining the vitality and effectiveness of a society, and people with social health can face the challenges of social life, confront them and perform better in society. Therefore, in this research, a study was conducted to examine how social capital and social health affects food security of rural households in Shiraz County.

The outcome of this survey among the villagers of Shiraz County showed that 24.7% of the studied subjects were in very food secure conditions, 21.9% were in food secure conditions, 30.5% were in moderate conditions, 13.5% were in food insecure conditions and 9.4% were in very insecure food conditions. Based on the obtained results, it can be argued that in the studied area, the food security of most of the studied households was at an average level. This ranking was used in some studies among similar populations around the world including Mohed Shariff and Lin (2004), Omotesho et al. (2006), Gomeini et al. (2016), Dastanai et al. (2011) and Joulaei et al. (2023).

5 Conclusion

Based on the optimal average of the availability of food security components, we found out that due to the great communication and closeness between the studied areas and the city, the people

TABLE 8 Standard value and model fit indices.

Indicator	Standard values	The obtained values of the model
Chi-square/degree of freedom (X^2/df)	≤ 3	2.45
Normed Fit Index (NFI)	≥ 90	0.94
Non-Normed Fit Index (NNFI)	≥ 90	0.95
Comparative Fit Index (CFI)	≥ 90	0.96
Goodness-of-Fit Index (GFI)	≥ 90	0.91
Adjust Goodness-of-Fit Index (AGFI)	≥ 90	0.87
Incremental Fit Index (IFI)	≥ 90	0.96
Root Mean Residual (RMR)	≤ 0.05	0.30
Root Mean Square Error of Approximation (RMSEA)	≤ 0.08	0.08

of the village are satisfied with the quality, and the variety of food is enough for them. They stated that they produce and consume some organic and healthy food in the fields. The moderate level of benefiting and achieving food security is declared issues such as diverse diet, use of food in balance with physiological conditions, quality of water and food, ability to buy and use balanced meals and distribution of meals among the studied rural households.

Results showed that under the effects of the recent economic crises in the world, increase in food prices and insufficient income, they had less access to balanced, suitable and more diverse foods. The level of stability of food in the studied areas was at an unfavorable level. In the studied area, the food security situation had worsened compared to the past and people expect this situation would improve in the future. Financial problems, rising food prices, seasonal fluctuations and temporary job loss have caused these components to be low in the studied areas. The results of the correlation between social capital and food security of rural households show a significant and positive effect of social capital on food security, so that with the increase of social capital, food security of household also increases.

Social capital through improving the food security pillars (i.e., food availability, food accessibility, food utilization, and food system stability) affects food security. In other words, the interaction among the community members results in sharing food products and information among community members, which facilitates food availability and access to food. A detailed examination of the correlation of social health components with food security also, showed that there will be higher food security if a person establishes trusting relationships with others, accepts others with all their defects and positive/negative aspects and improves farmers' understanding of society and positive thinking. There is also a positive and significant correlation between the social integration components and food security.

The social coherence components are significantly and positively correlated with the food security of rural households in Shiraz county. Findings also showed that two components of social actualization and food security have a positive and significant correlation. If a person has come to believe that society is continuously evolving, would benefit from the potential of social growth and will have higher food security.

There was a significant and positive relationship between the two variables of social capital and social health and the components of these two variables, with food security.

According to the results of second order confirmatory factor analysis, the research hypothesis about existing relationship between three core variable was confirmed. The path coefficients and fit indices are also at a favorable level.

The findings of the research in the structural equation modeling section of the research also indicate that the social capital variable affects food security directly (with the path coefficient $\Upsilon = 0.65$ and $t = 6.68$). Also, the social health variable indirectly affects food security (with the path coefficient $\Upsilon = 10.55$, and $t = 8.97$). Among the existing structures, the accessibility structure (with the path coefficient $\Upsilon = 0.76$ and $t = 7.95$) and the social cohesion structure indirectly (with the path coefficient $\Upsilon = 0.72$ and t=8.27) have the greatest impact on the food security of rural households studied. As showed in result section, the *t*-value of all structures is >1.96, which indicates the significance of the studied structures on food security. The results indicate that the calculated combined reliability values for all three studied variables were >0.7 and it can be said that the research tools have good reliability and validity. According to these interpretations and according to the reported value of the fit indices, it was also determined that the structural equation model of the research variables has a suitable and acceptable fit and the overall structure of the research is approved. So, based on the fitted model of the research, it can be said that the components used in the research, which were extracted from the literature, could estimate food security.

During the course of the research, there were some limitations and challenges encountered in conducting the study, which can be highlighted as follows: Research in rural areas was time-consuming and also required significant financial resources, which could create limitations in securing the necessary funds for conducting interviews, data collection, and statistical analysis. Access to some villages was limited and difficult, especially in less developed and remote areas. It could lead to a reduced number of samples for investigation and a decrease in the reliability of research results. Also, there were cultural and social challenges in understanding and interpreting data in some villages of this study.

6 Recommendations

Based on the research findings on the food security situation in the study area, the following recommendations were made:

1) According to the results of this research, the social capital factor plays an effective role in the food security of households, so it is suggested to make more efforts in the direction of cultural development regarding the promotion of characteristics such as honesty, trustworthiness, helping Others, endowment and charity, which are considered factors of creating and strengthening social capital, should be done in rural communities. It is also recommended to maintain the social network of households and to strengthen it, in the direction of creating a culture

to promote greater social cohesion, to provide measures to increase awareness and change the attitude of people in avoiding luxury lifestyle and to strengthen the culture of contentment and simplicity. This can play a very important role in maintaining social capital and lead to a better food security situation in the long run.

2) Implementation of programs in the field of modifying the lifestyle and inappropriate eating habits in the nutritional pattern of the studied community's household and promoting nutritional culture and literacy to increase the level of nutritional awareness of the household can be effective in improving the food security of the household. Dealing with all these issues requires the cooperation and coordination of various government and private institutions and individuals in planning different policies at different national and local levels. To achieve this important goal, it is recommended to plan to increase the non-agricultural income of farmers by providing training them in the field of non-agricultural businesses.

3) Based on the findings of the current research on the food security situation of the villagers of Shiraz County, the necessity of more organized efforts from the government seems necessary, in this regard, the following practical suggestions are presented: The government should provide immediate price support and stabilize food prices, revise the optimal allocation of subsidized goods to improve the feeding pattern of poor households, consider special facilities for vulnerable groups such as women and children, and give subsidies. Targeted products in the form of basic food products (including protein materials) at regular intervals to low-income households, providing special facilities to help create entrepreneurial opportunities and home businesses for rural women, creating distribution networks and safe trade of village products and increasing the number of cooperatives selling food products in villages far from shopping centers to increase household access to food.

Also, based on the findings of the research, future studies can be directed toward the following areas:

1) The relationship between social capital and social health and food security, specifically, is a new topic that has not been extensively studied in various rural areas of the world. Investigation of these relationship can significantly contribute to reassuring and more generalization of the study findings.
2) Further studies can focus on economic solutions that can effectively improve food security in rural areas. Exploring agricultural opportunities, local industry development, and creating local markets can be among the topics of interest.
3) In order to achieve food security, more research in the field of social communication and networking in rural areas can contribute to improving communication among individuals, enhancing collaboration and interaction among villagers, and forming local social networks.

Data availability statement

The original contributions presented in the study are included in the article/supplementary material, further inquiries can be directed to the corresponding author.

Ethics statement

The studies involving humans were approved by Shiraz university instruction for confirmation M.S. dissertation. The studies were conducted in accordance with the local legislation and institutional requirements. The participants provided their written informed consent to participate in this study.

Author contributions

ZH: Data curation, Investigation, Project administration, Resources, Software, Writing – original draft. RN: Conceptualization, Data curation, Formal analysis, Methodology, Software, Supervision, Validation, Visualization, Writing – review and editing.

Funding

The author(s) declare that no financial support was received for the research, authorship, and/or publication of this article.

Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

Publisher's note

All claims expressed in this article are solely those of the authors and do not necessarily represent those of their affiliated organizations, or those of the publisher, the editors and the reviewers. Any product that may be evaluated in this article, or claim that may be made by its manufacturer, is not guaranteed or endorsed by the publisher.

References

Adger, W. N. (2003). "Social aspects of adaptive capacity," in *Climate Change, Adaptive Capacity and Development*, 29–49. doi: 10.1142/9781860945816_0003

Afshani, A., and Shiri Mohammadabad, H. (2015). Investigating the relationship between life satisfaction and social health of women in Yazd. *J. Yazd Health Faculty Tolo Health*. 15, 34–44.

Agbugba, I. K., and Binaebi, E. (2018). A comparative study of the agriculture sector contribution to the economic growth of Nigeria and Malaysia. *IOSR J. Agric. Vet. Sci.* 2, 18–21.

Agriculture Organization of the United Nations and Forest Resources Development Branch (1986). *Food and Fruit-Bearing Forest Species: Examples From Latin America*. Rome: FAO. Available online at: https://www.fao.org/3/ap368e/ap368e.pdf

Akbarpour, M., Mahdavi Damghani, A., Dayhim Fard, R., and Veisi, H. (2016). "An introduction to the concept of food security," in *National Conference on Optimizing the Production, Distribution and Consumption Chain of the Food Industry (Master's Thesis)*. Sari, Iran: Sari University of Agricultural Sciences and Natural Resources.

Álvarez, A., Bansode, A., Urakawa, A., Bavykina, A. V., Wezendonk, T. A., Makkee, M., et al. (2017). Challenges in the greener production of formates/formic acid, methanol, and DME by heterogeneously catalyzed CO2 hydrogenation processes. *Chem. Rev*. 117, 9804–9838. doi: 10.1021/acs.chemrev.6b00816

Amini Rarani, M., Mousavi, M., and Rafiei, H. (2010). The relationship between social capital and social health in Iran. *Sci. Res. Q. Soc. Welf*. 11, 203—228.

Amiresmaeili, M., Yazdi-Feyzabadi, V., and Heidarijamebozorgi, M. (2021). Prevalence of food insecurity and related factors among slum households in Kerman, south of Iran. *Int. J. Health. Plan. Manag*. 36, 1589–1599. doi: 10.1002/hpm.3242

Arun, R. (2011). *The Basic Stages of the Course of Thought in Sociology*. Tehran, Iran: Scientific-Cultural Publications.

Asadi-Lari, M., Jahromi, L. M., Montazeri, A., Rezaee, N., Mehrizi, A. A. H., Shams-Beyranvand, M., et al. (2019). Socio-economic risk factors of household food insecurity and their population attributable risk: a population-based study. *MjIRI*. 33, 119. doi: 10.47176/mjiri.33.119

Babapour Khairuddin, J., Toosi, F., and Hekmati, A. (2013). Examining the role of determining factors in the social health of Tabriz University students. *Q. J. Psychol. Stud*. 4, 1–19.

Barrett, C. B. (2010). Measuring food insecurity. *Science*. 327, 825–828. doi: 10.1126/science.1182768

Bastani, S., and Salehi Hikoi, M. (2007). Network social capital and gender: investigating the structural, interactive and functional characteristics of women's and men's social network in Tehran, *J. Soc. Sci*. 1, 63—95.

Benson, T. (2007). *Study of Household Food Security in Urban Slum Areas of Bangladesh, 2006: Final Report for World Food Programme, Bangladesh*. Rome: United Nations World Food Programme.

Bolino, M. C., Turnley, W. H., and Bloodgood, J. M. (2002). Citizenship behavior and the creation of social capital in organizations. *Acad. Manage. Rev*.4. 505–522. doi: 10.2307/4134400

Boshrabadi, H., and Ouhadi, A. (2014). Investigating factors affecting food security in rural areas of Iran. *J. Agric. Econ*. 3, 111–121.

Brown, K. W., Ryan, R. M., Loverich, T. M., Biegel, G. M., and West, A. M. (2011). *Out of the Armchair and into the Streets: Measuring Mindfulness Advances Knowledge and Improves Interventions: Reply to Grossman 2011*.

Carletto, C., Zezza, A., and Banerjee, R. (2013). Towards a better measurement of household food security: Harmonizing indicators and the role of household surveys. *Glob. Food Sec*. 2, 30–40. doi: 10.1016/j.gfs.2012.11.006

Christ, L., Raiborg, C., Wenzel, E. M., Campsteijn, C., and Stenmark, H., (2017). Cellular functions and molecular mechanisms of the ESCRT membrane-scission machinery. *J. TiBS*. 42, 42–56. doi: 10.1016/j.tibs.2016.08.016

Dastagiri, S., Mehboob, S., Totonchi, H., and Rahimi, A. (2015). Factors affecting food insecurity: a cross-sectional study in the city of Tabriz, 1-84. *J. Ardabil Uni. Med. Sci*. 6, 233–239.

Dastanai, A., Karmi, A., and Keshavarz, M. (2011). Determinants of food security of rural households. *j. Agric Econ*. 7, 109–187.

Dzanja, J., Kapondamgaga, P., and Tchale, H. (2013). Value chain analysis of beef in central and southern Malawi (case studies of Lilongwe and Chikhwawa Districts). *Int. J. Soc. Sci. Bus*. 4, 92–102. Available online at: https://www.ijbssnet.com/journals/Vol_4_No_6_June_2013/12.pdf

Ebrahimpour, R., and Elmi, M. (2014). Investigating the relationship between social capital and the sense of social security of the citizens of Sardasht City. *Open J. Sociol.Stud*. 8, 53–71.

Ebrahimzadeh, A., Brimani, F., Eskandari Thani, M., and Ramzanpour, P. (2014). A comparative study of the social capital of villages integrated in to the city and independent villages (case studies of the integrated village of Tarbeghan and the independent village of Raghaz Abad, Kashmar). *Village and Develop. Q*. 1, 43–62.

Egamberdiev, B. (2024). Social capital effects on resilience to food insecurity: evidence from Kyrgyzstan. *J. Inter. Develop*. 1, 435–450. doi: 10.1002/jid.3826

Enrique, E. H., Haub, P. N., and Bailey, T. P. (2013). "DC arc flash calculations for solar farms," in *2013 .(SusTech)* (Portland, OR: IEEE), 97–102.

Esfandiari, C. H., and Mirabbasi, B. (2014). Examining the dimensions of the right to food and food security in international documents. *Medical Law*. 4, 158–184.

Faghihi Farhamand, N., and Zanjani, S. (2012). The relationship between social security and the components of social capital and social well-being (case study: Tabriz city families). *East Azarbaijan Police Knowl. Quart*. 3, 45–69.

FAO (1996). *World Food Summit: Rome Declaration on World Food Security and World Food Summit Plan of Action*. Rome: FAO.

Food and Agriculture Organization of the United Nations (2019). *The State of Food Security and Nutrition in the World 2019: Safeguarding Against Economic Slowdowns and Downturns*. Rome: Food and Agriculture Organization. Available online at: https://www.fao.org/3/ca5162en/ca5162en.pdf

Forster, T. (2013). Issues Paper: Linkages with rural development, including food security and ecosystem resources, un habitat for a better urban future, Coalition for Sustainable Cities and Regions in The New Un development *Agenda* 1–10.

Gallaher, C. M., Kerr, J. M., Njenga, M., Karanja, N. K., and WinklerPrins, A. M. (2013). Urban agriculture, social capital, and food security in the Kibera slums of Nairobi, Kenya. *Agric. Human Values*. 30, 389–404. doi: 10.1007/s10460-013-9425-y

Garvelink, M. M., ter Kuile, M. M., Fischer, M. J., Louw,é, L. A., Hilders, C. G., Kroep, J. R., et al. (2013). Development of a decision aid about fertility preservation for women with breast cancer in The Netherlands. *J. Psychosom. Obstet. Gynecol*. 34, 170–178. doi: 10.3109/0167482X.2013.851663

Ghaderi, A., and Taghavi, N. (2012). Investigating the relationship between social capital and the quality of life of Saqqez citizens. *J. Sociol. Stud*. 5, 111–126.

Ghanbari Movahed, R., Maleki Fard, F., Gholamrezai, S., and Pakravan-Charvadeh, M. R. (2022). The Impact of COVID-19 pandemic on food security and food diversity of Iranian rural households. *Front. Public Health*. 10, 862043. doi: 10.3389/fpubh.2022.862043

Gomeini, D., Amini, A., Qadirmozi, H., and Tavakoli, J. (2016). Assessing food security and analyzing its challenges in rural areas (case study: Badr village, Ravansar city). *Regional Plann. Quart*. 7, 87–102.

Grootaert, C., Narayan, D., Jones, V. N., and Woolcock, M. (2004). *Measuring Social Capital: An Integrated Questionnaire*. Washington, D.C.: The World Bank.

Gundersen, C., and Ziliak, J. P. (2015). Food insecurity and health outcomes. *Health Affairs*. 11, 1830–1839. doi: 10.1377/hlthaff.2015.0645

Harandi, A. A. (2014). Explaining the role of social capital and knowledge transfer in organizational learning of knowledge-based companies. *Sci. Q. J of Tech. Dev. Manag*. 2, 161-182. doi: 10.22104/JTDM.2015.111

Hatami, P. (2010). *Investigating Factors Affecting the Social Health of Students With Emphasis on Social Networks (Master's Thesis of Social Work)*. Tehran: Allameh Tabatabai University.

Hezar Jaribi, J., and Alizadeh Aghdam, F. (2012). The determining role of economic and social capital in the food insecurity of citizens, a case study: Tabrizi citizens. *J. Econ. Soc. Dev*. 1, 195–220.

Johnson, R. (2009). *Food Security: the Role of Agricultural Trade*. Washington, DC: Int. Agric. Food Policy Council.

Joulaei, H., Keshani, P., Foroozanfar, Z., Afrashteh, S., Hosseinkhani, Z., Mohsenpour, M. A., et al. (2023). Food insecurity status and its contributing factors in slums' dwellers of southwest Iran, 2021: a cross-sectional study. *Arch. Public Health*. 1, 1–10. doi: 10.1186/s13690-023-01049-8

Keyes, C. L. M. (1998). Social well-being. *Soc. psychol Q*. 58, 121–140.

Keyes, C. L. M., and Shapiro, A. D. (2004). "Social Well-Being in the United States: A Descriptive Epidemiology," in Kessler *How Healthy Are We? A National Study of Well-Being at Midlife*, eds. O. G. Brim, C. D. Ryff, and R. C. (Chicago: The University of Chicago Press), 350–372.

Khoshfar, G., Mohammadi, A., Mohammadzadeh, F., Mohammadi, R., and Akbarzadeh, F. (2013). Social security and social health (case study: youth aged 15-29 in Qain city). *Iran J. Soc.Stud*. 9, 71–102.

Khosravipour, B., Durrani, M., and Mehrab Gouchani, A. (2015). Assessing the food insecurity situation of households in Bavi City. *J.RDS*. 2, 231–246. doi: 10.22048/RDSJ.2017.58203.1566

Kohi, K. (2013). Food insecurity and social capital. *Bioet.Q*. 4, 161–192. doi: 10.22037/bioeth.v4i11.13836

Larson, J. S. (1996). The World Health Organization's definition of health: social versus spiritual health. *Soc Indic Res*. 38, 181–192. doi: 10.1007/BF00300458

Liverpool-Tasie, L. S. O., and Winter-Nelson, A. (2011). Asset versus consumption poverty and poverty dynamics in rural Ethiopia. *Agric. Econ*. 42, 221–233. doi: 10.1111/j.1574-0862.2010.00479.x

Mallick, D., and Rafi, M. (2010). Are female-headed households more food insecure? Evidence from Bangladesh. *World Dev*. 38, 593–605. doi: 10.1016/j.worlddev.2009.11.004

Martin, K. S., Rogers, B. L., Cook, J. T., and Joseph, H. M. (2004). Social capital is associated with decreased risk of hunger. *Soc.Sci. Med*. 58, 2645–2654. doi: 10.1016/j.socscimed.2003.09.026

Mbow, C., Rosenzweig, C., Barioni, L. G., Benton, T. G., Herrero, M., Krishnapilla, M., et al. (2019). "Chapter 5: Food security," in *Climate Change and Land: An IPCC Special Report on Climate Change, Desertification, Land Degradation, Sustainable land Management, Food Security, and Greenhouse Gas Fluxes in Terrestrial Ecosystems*, eds N. Benkeblia, A. Challino, A. Khan, and J. R. Porter (Cambridge University Press), 439–550.

Misselhorn, A. (2009). Is a focus on social capital useful in considering food security interventions? Insights from KwaZulu-Natal. *Dev.South. Afr*. 26, 189–208. doi: 10.1080/03768350902899454

Mohed Shariff, Z., and Lin, K. G. (2004). Indicators and nutritional outcomes of household food insecurity among a samples of rural Malaysian women. *Pak. J. Nutr*. 3, 50–55. doi: 10.3923/pjn.2004.50.55

Mortazavi, Z., Dorosty, A. R., Eshraghian, M. R., Ghaffari, M., Ansari-Moghaddam, A., and Mohammadi, M. (2017). Household food insecurity in Southeastern Iran: severity and related factors. *Int. J. Food Sci*. 2017, 7536024. doi: 10.1155/2017/7536024

Musungwini, S. (2018). Mobile phone use by Zimbabwean smallholder farmers: a baseline study. *The African J. Inf. Communi* 22, 29–52. doi: 10.23962/10539/26171

Nahapiet, J., and Ghoshal, S. (1998). Social capital, intellectual capital, and organizational advantage. *Acad. Manage. Rev*. 23, 242–26. doi: 10.5465/amr.1998.533225

Nakai, J. (2018). Food and Agriculture Organization of the United Nations and the sustainable development goals. *Sustain Develop*. 22, 1–450.

Niles, M. T., Emery, B. F., Wiltshire, S., Brown, M. E., Fisher, B., and Ricketts, T. H., (2021). Climate impacts associated with reduced diet diversity in children across nineteen countries. *Environ. Res. Lett*. 16, 015010. doi: 10.1088/1748-9326/abd0ab

Nord, M., Alisha C.-J., Andrews, M., and Carlson, S. (2010). *Household Food Security in the United States, 2009*. ERR108, U.S. Dept. of Agriculture, Econ. Res. Serv. Available online at: https://www.ers.usda.gov/webdocs/publications/44776/7024_err108_1_.pdf

Nord, M., Andrews, M., and Carlson, S. (2009). *Measuring Food Security in the U.S: Household Food Security in the United States, 2008*. Washington, DC: United State Department of Agriculture Economic Research Report Number 83, 15–16.

Nord, M., and Parker, L. (2010). How adequately are the food needs of children in low-income households being met? *Child Youth Serv. Rev*. 32, 1175–1185. doi: 10.1016/j.childyouth.2010.03.005

Nosratabadi, M., Sharifian Thani, M., Raghfar, H., Nagin, V., Rahgozar, M., and Babapour, M. (2020). Measuring and analyzing the trend of food poverty in households with children in Iran using the generational approach: 1363-1391. *Social Welfare*. 1, 201–226.

Olum, S., Okello-Uma, I., Tumuhimbise, G. A., Taylor, D., and Ongeng, D. (2017). The relationship between cultural norms and food security in the Karamoja sub-region of Uganda. *J. Food Nutr. Res*. 5, 427–435. doi: 10.12691/jfnr-5-6-10

Omotesho, O., Adewumi, M., Muhammad-Lawal, A., and Ayinde, O. (2006). Determinants of food security among the rural farming households in Kwara state, Nigeria. *Afri. J. Agric*. 2, 49–57.

Ostrom, E. (2000). Collective action and the evolution of social norms. *J. Econ. Pers*. 14, 137–158. doi: 10.1257/jep.14.3.137

Oteh, O. U., Agbugba, I. K., Agwu, N. M., Oloveze, A. O., and Ayoola, M. O. (2021). Leading post-COVID-19 recovery from the front: on the shoulder of agriculture and food policy. *AGEERS*. 2, 64–76.

Oxfam (2007). *Oxfam Timor-Leste food Security Baseline Survey Report*. Available online at: https://reliefweb.int/report/timor-leste/timor-leste-food-security-baseline-survey-report

Paul, R., and Elder, L. (2019). *A Guide for Educators to Critical Thinking Competency Standards: Standards, Principles, Performance Indicators, and Outcomes with a Critical Thinking Master Rubric.* Lanham: Rowman and Littlefield.

Peng, W., and Berry, E. M. (2019). The concept of food security. *Food Secur. Sustain*. 2, 1–7. doi: 10.1016/B978-0-08-100596-5.22314-7

Pir Yalghun Aghach, S. (2014). *Investigating the Level of Food Security and Social, Economic and Demographic Determinants Related To It (Case Study: Households in Takab city). (Master's thesis).* Tabriz: Tabriz University, Faculty of Law and Social Sciences.

Poer, B. R. (2018). "60 career wins for Coach Todd Whittenm," in *UWIRE Text 1—1*.

Portes, A. (1998). Social capital: Its origins and applications in modern sociology. *Annu Rev sociol*. 24, 1–24. doi: 10.1146/annurev.soc.24.1.1

Putnam, R. (2001). Social capital: measurement and consequences. *Canadian .J. Policy Res*. 1, 41–51.

Putnam, R. D. (1995). Tuning in, tuning out: The strange disappearance of social capital in America. *PS: Poli Sci Polit*. 28, 664–683. doi: 10.2307/420517

Ramesh, T., Darshti Mutlaq, A., and Abdullahi, M. (2017). The prevalence of food insecurity in the households of Shiraz City and the relationship of some economic-social and demographic factors with it in the year. *Iran J. Nutr. Sci. Food*. 4, 53–64.

Regutlinger, S. (1986). *Poverty and Hunger: Issues and Options for Food Security in Developing Countries. res. work. pop*. Washington, DC: The World Bank

Renzaho, A. M., and Mellor, D. (2010). Food security measurement in cultural pluralism: Missing the point or conceptual misunderstanding? *Nutrition*. 26, 1–9. doi: 10.1016/j.nut.2009.05.001

Riely, F., Mock, N., Cogill, B., Bailey, L., and Kenefick, E. (1999). *Food Security Indicators and Framework for Use in the Monitoring and Evaluation of Food Aid Programs*. Washington, DC: Nutrition Technical Assistance Project (FANTA).

Rostami, F., Shahmoradi, M., and Baghai, S. (2014). Investigating factors affecting the food security of rural households (case study: Kernachi village, Kermanshah city). *Iranian J. Agric. Econ. Devel. Res*. 45, 725–737. doi: 10.22059/IJAEDR.2014.53846

Rusmawati, E., Hartono, D., and Aritenang, A. F. (2023). Food security in Indonesia: the role of social capital. *Develop. Stud. Res*. 1, 2169732. doi: 10.1080/21665095.2023.2169732

Sabbagh, S. (2011). Assessment of social health and social factors related to it among households in Tabriz city. *Sociol. Stud*. 3, 27–44. doi: 10.22067/social.2021.71606.1058

Sadeghi Shahdani, M., and Maghsoodi, H. (2019). Measuring the social capital of the country's provinces using the hierarchical analysis method. *Poli. Knowl*. 6, 139–176.

Safari, Y. (2023). An overview of indicators for measuring food security in the country and the missing role of soil. *Scient. J. Land Manage*. 1, 15–29.

Safarkhanlu, A., and Mohammadinejad, A. (2011). Investigating the effect of bread waste on the poverty line and food security index of urban and rural households in Iran during the years 1380–1386. *Agric. Econ. Devel*. 3, 54–73. doi: 10.30490/AEAD.2011.58757

Salarkia, N., Abdulahi, M., Amini, M., and Islami Amirabadi, M. (2013). Validation and application of HFIAS questionnaire in measuring food insecurity of Varamin urban households in 2018. *Iran. J. Endocrinol. Metab*. 13, 383–374.

Sanai Moghadam, S., Shafiee, M., Jahantighpour, A., and Mohammadi, Y. (2017). The role of rural-urban links in food security of rural households (Case study: Poshteh Zeilaei village, Dehdasht city). *J. Environ. Stud. Sci*. 2, 526–598.

Sarlio-Lahteenkorva, S., and Lahelma, E. (2001). Food insecurity is associated with past and present economic disadvantage and body mass index. *J. Nutr*. 131, 2880–2884. doi: 10.1093/jn/131.11.2880

Savari, M., Shabanali Fami, H., and Daneshvar Ameri, J. (2014). Food security and factors affecting it in the rural community of Diwandre. *Rural Res*. 5, 313—332. doi: 10.22059/JRUR.2014.52473

Seaman, J. A., Sawdon, G. E., Acidri, J., and Petty, C. (2014). The Household Economy Approach. Managing the impact of climate change on poverty and food security in developing countries. *Climate Risk Manage*. 4, 59–68. doi: 10.1016/j.crm.2014.10.001

Shakoori, A. (2004). Food security and access to it in Iran. *J. Soc. Sci*. 4, 133—160.

Sharafkhani, R., Dastagiri, S., Qara-Aghaji Asl, R., and Qavamzadeh, S. (2015). Prevalence and factors affecting household food insecurity: a cross-sectional study (Qarasu village, Khoy city- 2008). *J. Urmia Uni. Med. Sci*. 22, 123—128.

Sidaei, A., Ghanbari, Y., Gemini, D., and Bashaq, M. (2013). Assessing the sustainability of agriculture in rural areas (case study: rural areas of the central part of Ravansar). *Geogr*. 2013, 200.

Sseguya, H. (2009). *Impact of social capital on food security in Southeast Uganda* (Graduate Theses and Dissertations), 10747.

Sseguya, H., Mazur, R. E., and Flora, C. B. (2018). Social capital dimensions in household food security interventions: Implications for rural Uganda. *Agric Human Values*. 35, 117–129. doi: 10.1007/s10460-017-9805-9

Tarasuk, V., Fafard St-Germain, A. A., and Mitchell, A. (2019). Geographic and socio-demographic predictors of household food insecurity in Canada, 2011–12. *BMC Public Health*. 19, 1–12. doi: 10.1186/s12889-018-6344-2

Tienken, C. H. (2012). Poverty matters. *AASA J. Scholars. Pract*. 9, 3–6.

Torani, S., Delgoshaei, B., Hosseini, A. F., Ziaeifar, H., and Raadabadi, M. (2015). Relationship between social well-being and health related quality of life level among senior retirees of Tehran University of medical sciences. *Asian Soc Sci*. 11, 116–122. doi: 10.5539/ass.v11n18p116

Veliz-Briones, V. F., Alonso-Becerra, A., Alfonso-Robaina, D., and Michelena-Fernández, E. S. (2017). Análisis estratégico de una universidad basado en el enfoque por procesos. *Ingeniería Industrial*. 38, 201–209.

Walker, J. L., Holben, D. H., Kropf, M. L., Holcomb Jr, J. P., and Anderson, H. (2007). Household food insecurity is inversely associated with social capital and health in females from special supplemental nutrition programs for women, infants, and children households in Appalachian Ohio. *J. Am. Diet. Assoc*. 107, 1989–1993. doi: 10.1016/j.jada.2007.08.004

Wennersten, R., and Qie, S. (2018). "United Nations sustainable development goals for 2030 and resource use," in *Handbook of Sustainable Science and Research. World Sustainability Series*, ed W. Leal Filho (Cham: Springer).

Whipple, A. O. (1945). Pancreaticoduodenectomy for islet carcinoma: a five-year follow-up. *Ann. Surgery*. 121, 847. doi: 10.1097/00000658-194506000-00008

World Bank (2001). *Nuts and Bolts, World Bank Policy Study*. Washington: World Bank.

World Health Organization Staff and World Health Organization (1996). *Cancer Pain Relief: With Guided to Opioid Availability*. Genenve: World Health Organization.

Yazdan panah, L., and Nik Varz, T. (2015). The relationship between social factors and the social health of students of Shahid Bahonar University, Kerman. *JAS*. 26, 100–117.

Zahedi Asl, M., and Pilehvari, A. (2013). A meta-analysis of social health studies. *Soc. Dev. Welf. Plan. Q*. 19, 107–172. doi: 10.2979/JEWISOCISTUD.19.3.172

Zarafati, P. (2004). Prevalence of obesity and its relationship with parental obesity in primary school girls of the 6th education district of Tehran. *J. Faculty of Med*. 3, 972–974.