



## Food Security of the Elderly during COVID-19 Pandemic

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### ABSTRACT

**Background:** COVID-19 ushered in a new era of devastating economic and social conditions and sustainable food chains around the world. One of the most vulnerable groups in this situation was the elderly. This study aims to investigate the consequences of the COVID-19 pandemic on food security of the elderly living in Isfahan, Iran. **Methods:** Written informed consent was obtained from 350 old people before entering the study. Data were collected using socioeconomic status and FaCPS-FSSM food security questionnaires; there were eight items which measured food security among the elderly. **Results:** 41.7% (n=146) of the elderly had complete food security. In addition, 29.4% (n=103), 20% (n=70), and 8.9% (n=31) of participants suffered from food insecurity without hunger, food insecurity with moderate hunger, and food insecurity with severe hunger, respectively. There was a significant association between socioeconomic factors, such as age, education level, family size, the number of children and food security ( $P<0.001$ ). Meanwhile, variables of gender, ethnicity, the total number of children, and marital status were not significantly associated with food security ( $P>0.001$ ). In addition, there was a significant association between economic factors such as employment status, homeownership, having health insurance, receiving food aid, being supported by philanthropic organizations, and food security ( $P<0.001$ ). **Conclusion:** Considering the high prevalence of food insecurity among the elderly, special attention should be paid to factors contributing to this issue; they should be translated into improved food security for the elderly by removing risk factors and strengthening protective factors.

**Keywords:** Food security; COVID-19; Elderly; Isfahan

### Introduction

COVID-19 is a highly contagious disease identified in December 2019 and was declared a pandemic by World Health Organization (WHO) on March 11, 2020. The impact of COVID-19 on the lives of the billions of people was not limited to direct health threat; it also jeopardized food security through disruptions of local and national food systems and economies

(Béné, 2020). Food security ensures access of all people at all times, both physical and economic, to the basic food they need for a healthy and active life (Behzadifar *et al.*, 2016). Before COVID-19 pandemic, millions of people were suffering from hunger, malnutrition, and food insecurity all around the world. The situation is worse now because the pandemic posed several major threats

regarding food availability and stability; they include decline in food production, disruptions in supply chain and restrictions in trade. On the other hand, food shortages and lower incomes can affect families' food choices (Laborde *et al.*, 2020). In general, there is food insecurity when social, physical, and economic access to safe and nutritious food is not adequate; therefore, human nutritional needs are not provided for in a healthy and active life (Prosekov and Ivanova, 2018). Food security is one of the most critical factors affecting elderly's health. It can improve the quality of life through physiological processes (Pak and Kim, 2020). As the older population ages, the necessity of evaluating the extension of food insecurity increases; this is because food security affects the elderly's health and medical expenditures (5). Various studies investigated food insecurity and the various factors contributing to this issue such as economic and social factors (Leroux *et al.*, 2018, Njeri, 2021). In Iran, Fallah-Tafti *et al.* studied the impact of education, family size, income, and employment on a sample of elderly people living in the city of Arak (Fallah Tafti *et al.*, 2016). In Iran, few studies specifically examined the prevalence of food insecurity among the elderly and the factors affecting it during COVID-19 pandemic. This information is important for developing and evaluating healthcare and social welfare policies for the elderly.

### Materials and Methods

*Study design and participants:* This cross-sectional study was conducted from April 2020 to June 2021. The inclusion criteria consisted of all the individuals over 60 with the ability to answer the questions and willingness to participate in this study. The exclusion criteria were incomplete filling of the questionnaire by more than 20%, unwillingness to participate, or withdrawing from the study. The sample size was estimated to be 350 subjects, based on the confidence coefficient (Z) of 95% (1.96) and the prevalence of 65% for the elderly's food insecurity (Behzadifar *et al.*, 2016). Samples were selected through simple random sampling (using national code) from

comprehensive educational health service centers in Isfahan.

*Measurements:* Data were collected using an 8-item Farsi Current Population Survey–Food Security Survey Module questionnaire (FaCPS-FSSM) designed and validated by Milani *et al.* to assess food security among old age population (Milani Bonab *et al.*, 2012). In order to score this questionnaire, first, the positive answers, i.e. yes, often and sometimes, were given one point, while the negative answers, i.e. no, and never answers received zero. Then, the scores were summarized and food security was determined. A score of 0-2 was considered food security; 3-4, food insecurity without hunger (or mild hunger); 5-6, food insecurity with moderate hunger; and 7-8, food insecurity with severe hunger. The total score of this 8-item questionnaire ranges from zero (the highest level of food security) to eight (the lowest level of food security).

The information about age, sex, education, employment status, marital status, number of children, ethnicity, house ownership, receiving humanitarian aid, food aid, complementary insurance coverage, and family size were also collected. This data was self-reported by participants and Food safety questions were completed through interviews.

*Ethical considerations:* This study was performed according to the principles established by the Declaration of Helsinki and revised in 2013 in Fortaleza. The study was reviewed and approved by the Ethics Committee of Isfahan University of Medical Sciences (IR.MUI.MED.REC.1399.480).

*Data analysis:* SPSS version 22, chi-square test, one-way variance analysis (ANOVA), and regression analysis were used for data analysis. P-value<0.05 was considered significant.

### Results

The study involved 350 elderly people, of whom 165 were women, and 185 were men. The mean age of participants was 72.24±7.90 year. According to the findings, 41.7% (n=146) enjoyed food security, 29.4% (n=103) suffered from food insecurity without hunger, 20% (n=70) experienced moderate

hunger, and 8.9% (n=31) suffered from food insecurity with severe hunger (Table 1). There was no significant association between gender and food security. 42.7% of men and 40.6% of women had secure food status. In addition, being married was not significantly associated with food insecurity. On the other hand, there was a significant association between education level and food insecurity, so that 17.2% of illiterate participants were suffering from severe food insecurity; this was while for those with an education level of high school diploma and higher, this rate was 2.2%. As expected, variables of being employed, retirement, house ownership, unemployed, etc., were significantly associated with food insecurity. Employed participants had the highest level of food security (76.6%). Moreover, ethnicity has a significant effect on food insecurity ( $P = 0.045$ ).

As shown in Table 2, there was significant difference between mean age and food insecurity. The mean age of those with food security was 69.6, food insecurity without hunger was 72.34, food

insecurity with moderate hunger was 74.7, and food insecurity with severe hunger was 78.77 year. In other words, with aging, food security would be more challenging. Furthermore, family size and the number of children living with the elderly significantly affected food security; such an effect was not observed for the total number of children ( $P= 0.818$ ).

The effect of economic factors on food security is shown in Table 3. Variables of health insurance, complementary insurance, receiving food aid, house ownership, and coverage of supportive organizations were associated with food security ( $P<0.001$ ). In addition, 44.9% of those with health insurance and 62.6% of those with complementary insurance benefited from food security. In addition, 1.4% of those who owned a house suffered from severe food insecurity.

Linear regression test was used to predict food security scores based on the studied variables. The best variables to predict food security score included employment status, age, and house ownership, respectively.

Table 1. Frequency distribution of different levels of food security based on the studied qualitative social factors.

Variables	Food security status				Total	P-value <sup>b</sup>
	Secure	Mild insecurity	Moderate insecurity	Severe insecurity		
<b>Gender</b>						
Female	67(40.6) <sup>a</sup>	47(28.5)	36(21.8)	15(9.1)	165	0.868
Male	79(42.7)	56(30.5)	34(18.4)	16(8.6)	185	
<b>Marital status</b>						
Single	16(25.4)	27(42.9)	12(19.0)	8(12.7)	63	0.012
Married	130(45.3)	76(26.5)	58(20.2)	23(8.0)	287	
<b>Education level</b>						
Illiterate	27(33.3)	24(29.6)	16(19.8)	14(17.3)	81	<0.001
Elementary	29(28.4)	40(39.2)	21(20.6)	12(11.8)	102	
(Diploma degree	67(54.9)	29(23.8)	22(18.0)	4(3.3)	122	
Academic education	23(51.1)	10(22.2)	11(24.4)	1(2.2)	45	
<b>Employment status</b>						
Employed	59(76.6)	14(18.2)	4(5.2)	0(0.0)	77	<0.001
Retired	35(31.3)	45(40.2)	26(23.2)	6(5.4)	112	
Housewife	46(46.0)	28(28.0)	19(19.0)	7(7.0)	100	
Income with no job	6(18.2)	11(33.3)	9(27.3)	7(21.2)	33	
Unemployed	0(0.0)	4(19.0)	9(42.9)	8(38.1)	21	
Others	0(0.0)	1(14.3)	3(42.9)	3(42.9)	7	
<b>Ethnicity</b>						
Fars	121(44.6)	70(25.8)	56(20.7)	24(8.9)	271	0.045
Non-Fars	25(31.6)	33(41.8)	14(17.7)	7(8.9)	79	
<b>Total</b>	146(41.7)	103(29.4)	70(20.0)	31(8.9)	350	

<sup>a</sup>: N (%); <sup>b</sup>:Chi-square test.

**Table 2.** The mean ( $\pm$ SD) of quantitative social factors in terms of food security status.

Variables	Food security status				Total	P-value <sup>a</sup>
	Secure	Mild insecurity	Moderate insecurity	Severe insecurity		
Age	69.60 $\pm$ 6.38 <sup>a</sup>	72.34 $\pm$ 7.97	74.70 $\pm$ 8.40	78.77 $\pm$ 7.65	72.24 $\pm$ 7.90	<0.001
Family size	2.76 $\pm$ 1.12	2.09 $\pm$ 0.68	2.17 $\pm$ 0.76	2.06 $\pm$ 0.81	2.38 $\pm$ 0.96	<0.001
Total number of children	3.23 $\pm$ 1.15	3.20 $\pm$ 1.61	3.34 $\pm$ 1.51	3.42 $\pm$ 1.11	3.26 $\pm$ 1.37	0.818
Number of children living with elders	0.51 $\pm$ 0.68	0.29 $\pm$ 0.55	0.23 $\pm$ 0.45	0.13 $\pm$ 0.34	0.35 $\pm$ 0.59	<0.001

<sup>b</sup>: ANOVA test.

**Table 3.** Frequency distribution of different levels of food security based on the studied economic factors.

Variables	Food security status				Total	P-value <sup>b</sup>
	Secure	Mild insecurity	Moderate insecurity	Severe insecurity		
<b>Insurance coverage</b>						
Yes	136(44.9) <sup>a</sup>	92(30.4)	58(19.1)	17(5.6)	303	<0.0001
No	10(21.3)	11(23.4)	12(25.5)	14(29.8)	47	
<b>Complementary insurance coverage</b>						
Yes	67(62.6)	23(21.5)	13(12.1)	4(3.7)	107	<0.0001
No	79(32.5)	80(32.9)	57(23.5)	27(11.1)	243	
<b>House ownership</b>						
Private	114(54.3)	57(27.1)	36(17.1)	3(1.4)	210	
Rent	27(23.5)	39(33.9)	29(25.2)	20(17.4)	115	<0.0001
Conditional on providing a service	4(33.3)	5(41.7)	2(16.7)	1(8.3)	12	
Free	1(14.3)	0(0.0)	1(14.3)	5(71.4)	7	
Others	0(0.0)	2(33.3)	2(33.3)	2(33.3)	6	
<b>Coverage of supportive organizations</b>						
No	144(45.7)	96(30.5)	56(17.8)	19(6.0)	315	
Imam Khomeini Relief Foundation	1(5.6)	0(0.0)	8(44.4)	9(50.0)	18	<0.0001
State Welfare Organization of Iran	1(10.0)	3(30.0)	3(30.0)	3(30.0)	10	
Charity organizations	0(0.0)	4(57.1)	3(42.9)	0(0.0)	7	
<b>Food aid</b>						
Yes	7(14.9)	7(14.9)	19(40.4)	14(29.8)	47	<0.0001
No	139(45.9)	96(31.7)	51(16.8)	17(5.6)	303	
<b>Total</b>	146(41.7)	103(29.4)	70(20.0)	31(8.9)	350	

<sup>a</sup>: N (%); <sup>b</sup>: Chi-square test.

## Discussion

Food security is an essential prerequisite for the elderly's health. Older population is among the vulnerable groups regarding food insecurity with direct effects on their health; it can impose additional costs on health system (Gundersen and Ziliak, 2015). The findings of the present study showed that only 41.7% of the elderly benefited from food security, and more than half suffered from food insecurity; 29.4% faced food insecurity

without hunger, 20% experienced moderate hunger, and 8.9% suffered from food insecurity with severe hunger. The findings indicated a significant association between variables of education and age, and food security; however, such association did not take into account gender, marriage status, and ethnicity. There was a significant association between employment status, retirement, being a housewife, income with no job, unemployment, and food insecurity. Food

insecurity was highly severe among people without income. In addition, the results showed that although the total number of children had no significant effect on food security, the family size and the number of children living with the elderly had a significant effect on food security. The association between having insurance coverage, complementary insurance, house ownership, and receiving benefits from philanthropic organizations and food security was significant.

The rate of food insecurity among the elderly was reported to be 13.5% in the United States- a 58.8% increase compared to the period before COVID-19 pandemic (Ashbrook, 2021). In a study conducted by Ziliak *et al.* nutritional deficiencies in adults during COVID-19 pandemic was tripled compared to 2019. The deficiencies among the elderly during this period was increased by 75% (Ziliak, 2021). Elshahry *et al.* assessed the impact of COVID-19 on household food security in Jordan and revealed that 23.1% of the participants faced severe food insecurity, while 36.1% experienced moderate food insecurity, and 40.7% enjoyed food security (Elshahry *et al.*, 2020). This difference in results can be explained due to the target group.

Various studies investigated factors that contribute to food security of the elderly in different societies by emphasizing socioeconomic factors. While some studies investigated this issue in Iran, there is no literature on food insecurity among the elderly during COVID -19 pandemic. In a study on factors regarding food insecurity in Tehran (Iran), Egrari *et al.* reported similar results; lower education levels and insufficient income were directly associated with food insecurity (Eghrari *et al.*, 2020). In the same vein, Alipour *et al.* reported that having a high school diploma or lower educational degree, not having health insurance, and suffering from chronic diseases directly affected food insecurity among those living in Tehran (Alipour *et al.*, 2021). Cheng *et al.* investigated the prevalence of food insecurity in the elderly in Beijing, China (Cheng *et al.*, 2016). They showed that the elderly living with children suffered from a lower level of food security

compared with their counterparts. This was not in line with the findings of the present study, as the authors of this study found a significant association between the number of children living with elders and prevention of food insecurity.

In a study in South Africa, Oldewage-Theron found a 60% prevalence of food insecurity among older population. They also reported a significant association between food insecurity and variables of age and income. However, such association was not observed for marital status. In general, they found that age and marital status can be used to predict food insecurity (Oldewage-Theron and Egal, 2021). However, based on the present study's findings, employment status, age, and house ownership were the main factors predicting food insecurity. Similar studies were reported by Lee *et al.*, who evaluated the impact of socioeconomic variables (e.g., income and education level) as well as food aid programs among old people living in New York. They noted that lower economic status, lower education level, and receiving food aid were significantly associated with food insecurity (Lee and Frongillo Jr, 2001). Fernandes *et al.* also suggested a significant association between economic factors and food insecurity (Fernandes *et al.*, 2018).

It seems that food aid programs play a considerable role in reducing food insecurity, including the elderly living in Isfahan city. Hence, further studies are needed to extend the knowledge regarding this issue.

This study also had limitations. First, it was a cross-sectional study that limited the ability to explore stochastic relationships and created time sequences of relationships. Second, the method of data collection was self-reporting, in which individuals may for some reason refuse to provide a consistent answer. Third, the tools used were domestic, which limited the possibility of comparison with other countries. Despite these limitations, the findings provide a valuable resource for understanding the key factors associated with food insecurity among the elderly during the pandemic. They can be used for the development of public health prevention strategies

and policies.

### Conclusion

Some socioeconomic factors, including marital status, gender, ethnicity, and the total number of children, were not significantly associated with food insecurity. In contrast, other social factors such as employment status, age, education level, family size, and the number children living with the elderly had a significant relationship with food insecurity. In addition, economic factors such as house ownership, insurance coverage, complementary insurance, receiving food aid, and the support from philanthropic organizations had a significant association with food security.

### Authors' Contributions

Lafz S participated in design, data analysis and manuscript writing and Amini Z participated in the study design, data collection and manuscript writing.

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### Conflict of interest

The authors declared no conflict of interest.

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