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# The role of educational channels in the motivating of rural women to improve household food security



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## ABSTRACT

The main purpose of the present study was to explore the role of educational channels in motivating rural women to participate in improving household food security. The statistical population was composed of all married women in the Sirvan County (Ilam Province). Using Cochran's sampling formula, 368 women were sampled. The main instrument was a questionnaire whose validity was confirmed by a panel of food security experts and members of faculty agricultural sciences and natural resources university of Khuzestan and its reliability was confirmed by Cronbach's alpha coefficient and composite reliability. The alpha values varied from 0.79 to 0.85 for the educational channels and participation sections, respectively. Data were analyzed by the SPSS<sub>18</sub> and Lisrel<sub>8.54</sub> software packages. Results showed that rural women were not in the promotion of food security are participating high and nearly 80% of the studied rural household are exposed to food insecurity. The main channels used by rural women for the improvement of food security include family, TV, and neighbors. The results of the correlation analysis revealed that educational channels (local, national, and international) were significantly ( $P < .01$ ) correlated with rural women's participation in promoting household food security. Also, based on the results of means comparison, women's participation in food security improvement is significantly related with the variables of participating in extension courses, getting nutrition information, production systems, family size, distance between residency location and the city, educational level, and job of the person who is in responsibility of food provision. In addition, the results of the structural equation modeling showed that education channels had a positive and significant effect on the participation in improving household food security ( $R^2 = 0.49$ ,  $\gamma = 0.70$ ,  $t = 8.60$ ). The present research provides a scientifically rational justification as to how to improve food security among rural communities. The results can essentially help policymakers alleviate food insecurity and undernourishment.

## 1. Introduction

Although it is not feasible to accomplish sustainable development in all fields (including family, social and economic) without the participation of women, recent studies have indicated that several social and cultural factors, as well as various expectations from women, has seriously inhibited their participation, especially when it comes to rural women [34]. Unfortunately, the importance of women's role in many rural development programs has been forgotten, so many rural development programs and projects have failed around the world [3]. To use women's talents and skills, it is necessary to have a good understanding of their activities [12].

Since half of the population in developing countries live in rural areas and half of the rural population are women, one way to activate

this human resource is to study their participation in different areas [46]. Recent studies on rural women's participation have indicated that rural women have a lot of experience in food production. As such, their role in agriculture is crucial. Most subsistence farmers are women, who are responsible for producing 50 to 60% of the world's food [38]. Although this is an undeniable fact that rural women supply, on average, 40% of the labor for agricultural activities, their leading role in rural development has been overlooked [8].

Since participatory approaches started to be considered in development in Iran in the early 2010s, the importance of participation as a means and also a goal of sustainable development has been emphasized [38]. Sustainable development needs the participation of women as half of the population [25,39] because it will be impossible to accomplish sustainable development without the active participation of women in

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all areas including family, society, and economy [6].

To achieve sustainable development at the global level, attention should be paid to challenges related to the food supply. The first challenge is hunger growth. According to the latest report of the Food and Agriculture Organization (FAO), over 969 million people live on with almost less than 1 USD/day and three-quarter of them are dependent on agriculture. In fact, it seems impossible to settle this challenge given the severe poverty of these people. The second challenge is the lack of balance in the daily diet, and environmental degradation is the third challenge [24]. Food insecurity is a great barrier facing welfare and development and it can make human future uncertain and vague [9,14,21,25,35,39].

Various studies have shown that women participate in production, processing, and consumption of food in many different forms and they are increasingly engaging in production. Despite these activities, women's ability to achieve food security is underestimated around the world, and their capability to improve food security is not used [1,6]. Women's services to agricultural production and household food security are different around the world. In areas where men migrate to urban areas because of drought, women's participation in agriculture is remarkable. In many countries, they also do hard and repetitive tasks over the year [16]. In the world, women are regarded as an essential manufacturing unit, and the economic structure of the family is dependent on them. In most developing countries they produce 60 to 80% of the food productions [10]. Thus, one can claim that they accounted for half of the food production of the world. Thus, rural women play a key role, especially in crises and in ensuring the health and food security [17]. Despite the important role of women and their considerable contribution to the food supply, they often are neglected in development strategies [11]. The role of women's participation in the promotion of food security has been established. In other words, if women are provided with opportunities and resources in agriculture or non-agriculture activities, they will prove their efficiency [6,10].

## 2. Iran's policy on food security

After the 1979 years Islamic revolution in Iran, the country has always placed emphasis on self-efficiency in crop production so that this has been considered in the development action plans. Indeed, food security has always been in attention and its improvement has been on the agenda [26]. Some studies report that 32% of Iranian families are living in food insecurity [36]. Thus, attention has been drawn in recent years towards the policy of direct subsidy payment to support consumers [26] and supportive agricultural policies, e.g. guaranteed purchase and supportive pricing, in order to improve the food security of households. In addition, since the agricultural sector plays a key role in meeting the food demands of Iranian households, the producers of this sector are provided with tax exemptions in an attempt to support food security. Increasing access to healthy drinking water (96.8% of the Iranian households), reducing the infant mortality rate during birth, and increasing the literacy level of Iranian men and women (about 99%) are some policies in Iran to enhance and increase food security [13]. Developing the infrastructure to communicate information on health and nutrition to Iranian families and increasing awareness as to the reduction of salt and tobacco consumption are two other policies in Iran to improve the health and food security of families [13]. Finally, given the political conditions and the US's sanctions, attention has been drawn to the control of food prices against the volatility of exchange rate and price transmission in order to support the livelihood of families and improve their food security in recent years [26].

## 3. Theoretical background and literature review

Experts believe that the revision of planning approaches should include attention to women. Therefore, based on the recent changes in the development theories, participatory approaches and rural women

empowerment get more attention. Meanwhile, information and communication channels are drawing interests as a phenomenon of our time [17,29,48]. Accordingly, information and communication channels are a tool that can empower rural women and make them participate in different activities efficiently [2]. Information and communication technology (ICT) build a lot of capabilities and facilities in developing countries in order to make a big transition in rural development. The first step of this transition can be providing opportunities for rural communities to bridge the digital gap and reach information resources [37]. The beneficial impacts of the information technology revolution are not limited only to citizens and specific people, but it also has a wide impact on the local, national and international economy [19]. In this regard, it can be stated that the development of information and communication resources can open new doors for villages to utilize unlimited facilities, and it can also change rural communication unprecedentedly [28]. Access to information and communication resources in order to retain jobs is becoming an essential issue in rural communities [23,32]. Information and communication channels have created several new opportunities for empowerment in economic and social dimensions. Therefore, it can be said that information and communication channels are useful tools for empowering the poor population of society, especially women [22]. Information and communication channels can help rural women to overcome many barriers, difficulties, and discriminations in their life. They can also help them reach justice, equality, welfare, participation, and quality growth in their life [5]. The United Nations regards information and communication channels as a powerful tool for women empowerment [31]. Many studies have indicated that information and communication channels have a major impact on women's participation in the promotion of food security. In fact, these channels are effective tools for women's empowerment. Some of these studies are reviewed below.

Savari et al. [37] studied the role of information and communication channels in food security in Divandarreh City, Iran and concluded that these channels had a significant impact on household food security promotion. In a study on food security and female-headed households, Nagamani & Veni [33] found that education, ICT, number of children, and property ownership were the factors that influenced their food security. Forouzani & Mohammadzadeh [19] studied the relationship between the extent of the use of ICT and women's empowerment. The results illustrated that women who used these technologies to a greater extent had more capabilities. Andrea [3] studied the role of ICT in empowering rural women and concluded that there was a significant positive relationship between ICT use and women's empowerment. Wegenast & Beck [47] in Africa concluded that rural women who had more participation in rural organizations and production activities enjoyed more food security. In a study on the effects of educational programs and nutrition awareness on food security, revealed that these programs had a strong impact on women's participation in promoting food security. In a research work in China, Del Prete et al. [15] concluded that women's education and the use of educational multimedia were the important factors that made the women participate in food security improvement. In a study on the rural areas of Rwanda, Clement et al. [10] understood that one of the most important factors that influenced food security was land reforms. In this regard, rural households that had arable lands at the micro-level had more food security and sustainability.

Given the importance of food security and its role in development, it is essential to study the role of people who have high participation. It is also necessary to study rural women's role as house managers who have a lot to do. This research aimed to study the role of educational channels in women's participation in enhancing food security. To achieve this important goal, the following objectives should be pursued:

- Studying the personal characteristics of rural women.
- Studying the extent of the use of educational channels by rural women and their participation in food security improvement.

- Studying the status of food security in rural communities.
- Studying the relationship between the dimensions of educational channels associated with women's participation.
- Studying the effect of each dimension on educational channels in women's participation.

#### 4. Methodology

##### 4.1. Study design

This research is an applied, non-experimental study. Due to time limitations, data were gathered in a specific time period (May 2016). To classify the extent of participation in food security promotion, the Interval of Standard Deviation from the Mean (ISDM) method was used as follows [20]:

Low:  $A < \text{Mean} - \frac{1}{2}\text{SD}$

Medium:  $\text{Mean} - \frac{1}{2}\text{SD} < B < \text{Mean} + \frac{1}{2}\text{SD}$

High:  $C > \text{Mean} + \frac{1}{2}\text{SD}$

Here, SD represents the standard deviation of the mean. Data were subjected to both descriptive and inferential analysis in the SPSS software package. For this purpose, the descriptive section included the calculation of frequency, percentage, mean, and standard deviation and the inferential section included means comparison, correlation analysis, and structural equation modeling.

##### 4.2. Statistical population and sampling method

The research population consists of all married women in the rural district of Sirvan County in Ilam province, Iran ( $N = 8768$ ). Using by Cochran's formula, the sample size to be 368 people were selected. The research used a stratified sampling technique with proportional allocation for which the county was divided into the four rural districts as per the classification of the Statistical Center of Iran. At the next step, the share of each rural district was specified in the total sample with respect to their population. Then, three villages were selected from each district considering their spatial distribution. So, a total of 12 villages were sampled for the research.

##### 4.3. Study area

Ilam is one of the western provinces of Iran accounting for 1.2% of the total area of the country. It has a mountainous and semi-hot climate. Sirvan County (study area) in this province is composed of 2 districts and 4 rural districts. The economy of this county is agriculture-dependent. In addition to animal farming, agriculture is practiced in both irrigated and rain-fed forms. The main crops include rice, wheat, barley, tomato, pea, lentil, pomegranate, and cucumber. A major part of the agricultural activities is carried out by rural women. The county is enjoying plentiful water resources. A major fruit produced in the study site is pomegranate in which rural women are mostly involved in the collection and processing. However, despite the production of many crops and fruits in this province, people of the province are severely suffering from food insecurity (Fig. 1).

##### 4.4. Measurements

The main tool for data collection was a self-designed questionnaire consisted of four main parts as follows. Section 1 contained 12 items related to individual, social and economic characteristics of rural women. Section 2 included 17 items to study women's participation in household food security promotion. Section 3, which had 20 items, assessed educational channels. Eventually, Section 4 had 18 items to

assess the status of food security. This section was assessed by a standard questionnaire of the US Department of Agriculture (USDA, 2008).

##### 4.5. Validity and reliability

To determine the validity of the questionnaire, a panel of experts from the faculty of agricultural sciences and natural resources university of Khuzestan and food security experts were used. Then, the questionnaire was amended based on their comments and recommendations. Cronbach's alpha coefficient was used to estimate the reliability of the questionnaire. The alpha value was 0.79 for the participation part in food security and 0.85 for the educational channels. Since the Cronbach's alpha for every part of the questionnaire was more than 0.7, it could be said that the questionnaire had good reliability.

#### 5. Results

##### 5.1. Studying the personal characteristics of rural women

The findings indicated that the average age of the studied rural women was 45.85 years with a standard deviation (SD) of 13.25 and a range of 17–73. The participants were, on average, active in agricultural work for 18.12 years ( $SD = 11.13$ ). In addition, the results indicated that the average family size among the studied rural women was 4.32 ( $SD = 2.49$ ). The average annual income of rural women's households in Sirvan County was estimated at 95.85 million IRR ( $SD = 5.23$ ). The results on other demographic characteristics of the studied women are presented (Table 1).

##### 5.2. Studying the extent of the use of educational channels by rural women and their participation in food security improvement

In this research, the use of educational channels in household nutrition was prioritized by 20 items as to three types of channels (local, national and international). (Table 2). As shown, the results in Table 2 indicate that based on the respondents' attitude, family and TV are the most useful channels in preparing foods, and Educational journals and Local seminars and exhibitions are least frequently used. Furthermore, it can be said that the studied rural women do not use the educational channels frequently enough because their average use of educational channels (local, national and international) is lower than the average (2.5 of 5).

In order to prioritize items related to food security promotion among rural women, the coefficient of variation was used (Table 3). According to result the maximum participation of women in food security promotion is related to processing dairy product (yogurt, cheese, etc.) and processing agricultural products (e.g. flour). However, women participate in activities like mushroom planting or using non-preserved foods less frequently than in other activities.

As stated in the methodology, the ISDM index was used to categorize women's participation in food security improvement (Table 4). The results showed, only 77 of the women (20.93%) have high participation in food security improvement, while 267 of them (72.55%) have normal participation and 24 of them (6.52%) low participation. Thus, it can be stated that women's participation in food security improvement in Sirvan County is not at a desirable level as the participation of 291 of them (79.02%) is at the average level or lower.

##### 5.3. Studying the status of food security in rural communities

The coefficient of variation was used to prioritize items that assessed food security (Table 5). Given that the information in the questionnaires was based on the last 12 months, so it could be said that items like Inability to buy enough food and Inability to provide appropriate meals to children had happened more frequently in the last 12 months. The items like reducing number of children's meals and not feeding children well happened less frequently among rural households.

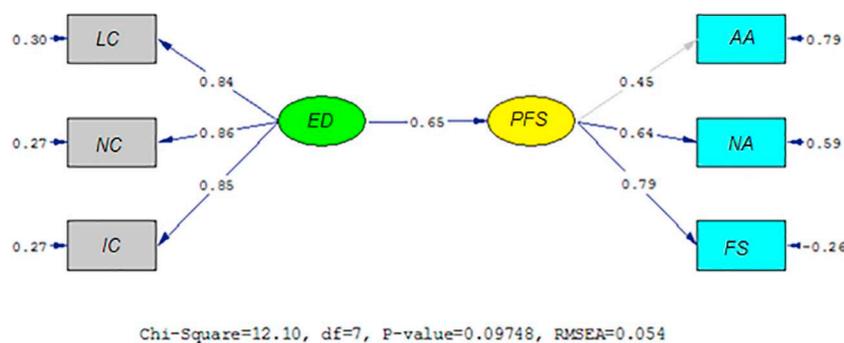


Fig. 1. Case study.

**Table 1**  
Demographic characteristics of rural woman.

Variable	Variable level	Frequency	Percent	Mode
Number of household's employees	< 2	245	66.57	*
	2–4	106	28.80	
	> 4	17	4.63	
Distance between residential place and the city	< 20 km	98	26.63	
	20–40 km	116	31.52	
	> 40 km	154	41.85	*
The production system of the household	Small	125	33.96	
	Mixed	201	54.61	*
	Agribusiness	42	11.43	
The amount of household land	< 5 ha	201	54.61	*
	5–10 ha	116	31.52	
	> 10 ha	51	13.87	
Participating in educational and extension courses	Yes	185	50.27	
	No	234	63.58	*
Getting information about household' nutrition	Yes	148	40.21	
	No	220	59.79	*
Level of education	Illiterate	95	25.81	
	Primary	117	31.79	*
	Upper primary	79	21.46	
	Diploma or higher	77	20.94	
	Housewife	192	52.17	*
Job	Tailor	42	11.43	
	Rancher	11	2.98	
	Carpet weaver	105	28.53	
	Other	18	4.89	

**Table 2**  
Prioritization of the use of educational channels.

Items	Mean	SD	Rank
Local channels	1.53	0.787	–
Family	3.84	0.841	1
Neighbors	2.98	0.852	2
Friends	2.05	0.752	3
Health Network	2.02	0.958	4
Relatives	1.98	0.789	5
Nutrition Consultants	1.38	0.685	6
Other rural women	1.31	0.785	7
Women counseling services	1.08	0.829	8
Information boards	1.02	0.875	9
Nutrition experts	0.798	0.852	10
Local leaders	0.528	0.647	11
Rural informants	0.523	0.742	12
Local seminars and exhibitions	0.421	0.624	13
National channels	1.08	0.747	–
TV	3.24	0.854	1
Book	0.754	0.685	2
Extension journals	0.652	0.745	3
Newspaper	0.435	0.711	4
Educational journals	0.352	0.741	5
International channels	1.18	0.738	–
Internet	1.85	0.824	1
Radio	0.520	0.652	2

As mentioned in the methodology, the scale designed by the US Department of Agriculture was used to analyze the status of food security (Table 6). Based on these results, it could be said that among the rural households in Sirvan County, only 22.82% had food security, 53.53% had food insecurity without hunger, 14.94% had food insecurity with average hunger, and finally, 8.71% had food insecurity with severe hunger. Thus, it can be stated that the rural households of Sirvan County are not at a desirable status in terms of food security because 284 households (77.18%) are faced with food insecurity.

5.4. Studying the relationship between the dimensions of educational channels associated with women's participation

In order to compare the difference between the independent dichotomous variables with the dependent variable (women's participation in food security improvement), an independent t-test was used (Table 7). The results show a significant difference between participating in educational courses and obtaining information about the household nutrition with food security. In other words, women who participate in educational classes and learn about household nutrition participate in food security promotion to a greater extent.

In order to compare the difference between rural women's participation in food security promotion based on three-category variables, the Kruskal Wallis test was used (Table 8). The results in show a significant difference between variables such as household production system, number of employees, family size, distance to the city, the amount of arable land, educational level, the mother's job with food security. In other words, households that have a mixed production system and have fewer employees and family size have more participation in food security. Also, those who have 2–4 ha of arable lands and whose home is 20–40 km away from the city participate in food security more. Women whose educational level is more than a diploma and who are self-employed exhibit the highest level of participation in food security promotion. Meanwhile, variables like age, household income, and experience in agriculture do not influence women's participation significantly.

Spearman's coefficient of correlation was used to study the relationship between educational channels and women's participation in food security improvement (Table 9). Based on these results, it can be said that there is a significant difference between all educational channels (local, national and international) in terms of women's participation at the 1% level.

In this study, the effect of educational channels on women's participation in food security was assessed by structural equation modeling. The components of the educational channels include local channels (LC), national channels (NC), and international channels (IC) and the participation of rural women consisted of three components, i.e. participating in agriculture activity (AA), participating in non-agriculture activities (NA), and participating in household food safety (FS). Finally, these components were inputted to the lisrel software package to be analyzed (Fig. 2).

**Table 3**  
Prioritization of the items pertaining to the participation of rural women in enhancing food security.

Dimensions	Items	Mean	SD	CV	Rank
Non-agriculture	Processing dairy product (yogurt, cheese, etc.)	3.01	0.742	0.246	1
Agriculture	Processing agricultural products (e.g. flour)	2.81	0.752	0.267	2
Nutrition health	Using major food groups in diet	2.53	0.688	0.271	3
Nutrition health	Using organic products at home	2.43	0.688	0.283	4
Agriculture	Processing horticultural products (paste, raisins, etc.)	2.36	0.685	0.290	5
Nutrition health	Disinfecting vegetables	2.47	0.725	0.293	6
Nutrition health	Considering production and expiry date when buying food	2.83	0.842	0.297	7
Non-agriculture	Carpet weaving	2.32	0.712	0.306	8
Agriculture	Poultry for meat production	2.31	0.735	0.318	9
Nutrition health	Considering the standard mark when buying food	2.25	0.741	0.329	10
Agriculture	Cultivation of vegetables	2.06	0.698	0.338	11
Non-agriculture	Activity in the field of handicrafts	2.20	0.748	0.340	12
Agriculture	Fostering poultry for eggs	2.33	0.812	0.348	13
Nutrition health	Considering the Health Ministry marks when buying food	2.28	0.802	0.351	14
Non-agriculture	Working outside house	2.22	0.822	0.370	15
Nutrition health	Using food products with no preservatives when buying	2.25	0.871	0.387	16
Non-agriculture	Mushroom planting	1.52	0.652	0.428	17

**Table 4**  
Classifying respondents based on the level of participation.

Participation level	Frequency	Percent	Cumulative percent
Low	24	6.52	6.52
Average	267	72.55	79.02
High	77	20.93	100
Total	368	100	-
Mean = 33.80 SD = 6.57 Min = 37 Max = 50			

**Table 5**  
Prioritization of the items pertaining to household food security.

Items	Mean	SD	CV	Ranking
Inability to buy enough food	1.32	0.278	0.210	1
Inability to provide appropriate meals to children	0.985	0.241	0.244	2
Being worried about food shortage	1.42	0.346	0.243	3
Providing cheap foods for children	1.21	0.298	0.246	4
Eliminating some meals during the last three months	1.11	0.302	0.272	5
Eating less than usual	1.08	0.322	0.298	6
Inability to provide appropriate food meals	1.05	0.320	0.304	7
Children have not eaten for a whole day	0.777	0.254	0.326	8
Adults have not eaten for a whole day during the last three months	0.688	0.245	0.356	9
Eliminating some meals from children's diet	0.885	0.362	0.409	10
Eliminating some of the adults meals	1.01	0.421	0.416	11
Being hungry but having nothing to eat	0.684	0.318	0.464	12
Children's staying hungry because of the inability to provide food	0.752	0.354	0.470	13
Eliminating many of food meals from the diet of adults	0.628	0.319	0.507	14
Losing weight because of inadequate food	0.785	0.412	0.524	15
Not having enough food during a day	0.741	0.427	0.576	16
Reducing number of children's meals	0.526	0.368	0.699	17
Not feeding children well	0.456	0.324	0.710	18

**Table 6**  
Classifying respondents based on the level of food security.

Level	Frequency	Percent	Cumulative percent	Total
Food security	84	22.82	22.82	22.82
Food insecurity	197	53.53	76.35	77.18
	with medium hunger	55	14.94	91.29
	with severe hunger	32	8.71	100
Total	368	100	-	

The results showed that the standardized path coefficient between educational channels and women's participation in improving food security is 0.65 ( $\gamma = 0.65, t = 8.26$ ). In addition, the results in Table 10 imply that the coefficient of determination ( $R^2$ ) of women's participation is 0.49. This means that 49% of the variance in women's participation in food security improvement is accounted for by the educational channels (local, national, and international).

There are several goodness of fit indices to assess the fitness of a structural equation model. Here, as suggested by Shook et al. [44], we used chi-square ( $\chi^2$ ) along with its significance (P), incremental fit index (IFI), non-normed fit index (NNFI), goodness of fit index (GFI), root mean square residual (RMR), root mean square error of approximation (RMSAE), and comparative fit index (CFI). According to results, it could be stated that the data have a statistically good fitness with the factor structure (Table 11).

It was found that the use of educational channels has a positive and significant effect on women's participation in promoting household food security. According to the Fig. 3, it can be said that among all the aspects of educational channels, local channels have the greatest impact on women's participation in food security promotion. On the other side, international channels have the least impact on it.

## 6. Conclusions

The role of food cannot be exaggerated in the health and survival of families and communities. Food is one of the basic needs of humans. During the history of human beings, food has had a key role in the rise and fall of civilizations. Nutrition science shows that daily food intake has an important role in physical and mental growth, immunity against diseases, healthy birthing, long life, and the quality of life.

Women in rural communities have experiences of discrimination and deprivations because their economic activities do not suffice for them to make a satisfactory life. Although in rural households, females are more active than males, women's access to resources and properties

**Table 7**  
The comparison between women's participation in food security improvement based on two-category variables.

Dependent variable	Independent variable	Categories	Number	Mean	SD	t	Sig.
Participation in food security improvement	Participating in extension courses	Yes	185	23.12	3.52	5.142	0.000
		No	234	18.17	4.12		
	Getting nutrition information	Yes	148	16.02	3.11	3.125	0.000
		No	220	12.25	4.02		

is limited, and of course, they have no rights in decision makings. In most developing countries, women are the main workforce at farms and play a crucial role in many activities associated with the preparation, storage, and processing of foods and livestock husbandry. Despite the fact that women are considered one of the intangible factors in agrarian economies, contributions to agricultural manpower are mainly dependent on them. So, we decided to explore the role of educational channels in women's participation in food security promotion.

The results showed that the studied rural women mostly use family and TV to prepare and make foods, and they think that and Educational journals and Local seminars and exhibitions are not useful for providing and cooking foods. The maximum participation of women in food security promotion is related to processing dairy product (yogurt, cheese, etc.) and processing agricultural products (e.g. flour). However, women have the least participation in activities like mushroom planting and using non-preservative foods compared to the other activities. The analysis of the status of food security revealed that food security was not at a desirable status among the studied households. It was also concluded that participating in educational courses and obtaining information related to household nutrition were significantly influential on food security. In other words, women who participate in educational classes and learn about household nutrition have more participation in food security promotion. Also, food security was found to be significantly affected by the variables of household production system,

**Table 8**  
The comparison between women's participation in food security improvement based on three-category variables.

Dependent variable	Independent variable	Classes	Frequency	Mean rank	Kruskal Wallis	Sig
Participation in food security improvement	age	< 30	107	85.41	5.85	0.325
		30–45	202	89.15		
		> 45	59	84.11		
Participation in food security improvement	Production systems	Small	125	67.14	11.52	0.000
		Mixed	201	76.22		
		Agribusiness	42	69.12		
Participation in food security improvement	Number of employees	< 2	245	114.21	4.25	0.050
		2–4	106	108.25		
		> 4	17	106.23		
Participation in food security improvement	Household income (IRR)	> 60 million	114	85.41	7.98	0.857
		60–120	211	87.21		
		> 120 millions	43	86.87		
Participation in food security improvement	Family size	< 4	57	114.0.25	14.12	0.000
		4–6	215	110.25		
		> 6	96	95.04		
Participation in food security improvement	Experience in agriculture activities	< 15 years	145	125.28	4.36	0.454
		15–30	165	121.36		
		> 30 years	58	95.05		
Participation in food security improvement	Distance between residency location and the city	< 20 km	98	117.86	25.36	0.041
		20–40 km	116	125.52		
		> 40 km	154	113.36		
Participation in food security improvement	Farm land size	< 5 ha	201	117.52	28.85	0.000
		5–10 ha	116	132.36		
		> 10 ha	51	114.39		
Participation in food security improvement	Educational level	Illiterate	95	85.12	8.41	0.034
		Primary	117	94.17		
		Upper primary	79	93.14		
		Diploma and higher	77	104.25		
		Housewife	192	52.11		
Participation in food security improvement	Job of the person who is in responsibility of food provision	Tailor	42	86.14	11.68	0.000
		Rancher	11	63.25		
		Carpet weaver	105	84.87		
		Other	18	101.58		

**Table 9**  
The relationship between research variables.

Dimensions	Participation in food security improvement	
	r	Sig.
Local channels	0.465	0.001
National channels	0.387	0.000
International channels	0.367	0.005

number of employees, family size, distance to the city, amount of arable land, educational level, and the mother's job. In other words, households that have a mixed production system and have fewer employees and family members have more participation in food security. Also, those who have 2–4 ha of agriculture lands and whose home is 20–40 km away from the city have more participation too. Women whose educational degree is more than a diploma and who are self-employed have the most participation in food security promotion. The results of this part of the study are in agreement with Wegenast & Beck [47]; Hudson et al. [27,37]; Shokati Amghani et al. [43]; Abbasi et al. [1]; Li et al. [30]; Babatunde & Qaim [7].

Meanwhile, there was no significant difference in women's participation between the different levels of age, household income, and experience in agriculture. The results of correlation analysis illustrated

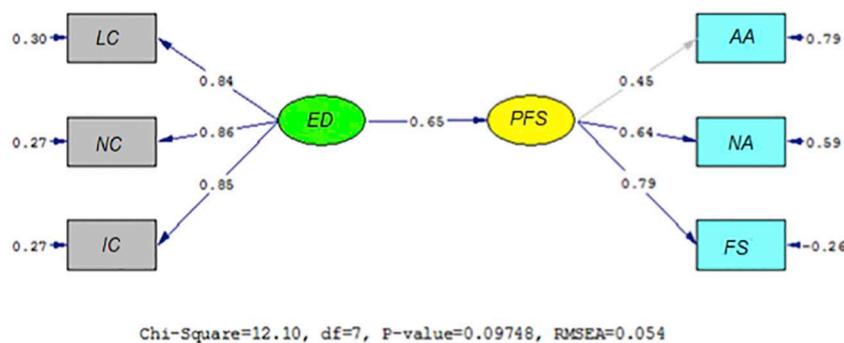


Fig. 2. Path model with standardized factor loadings.

**Table 10**  
The results of path diagram.

The effect of variable	On variable	Path coefficient	Standard error	t	R <sup>2</sup>
Educational channels	Women's participation in food security improvement	0.65	0.09	6.26**	0.43

\*\* Significant at the 1% level.

**Table 11**  
Summary of goodness of fit indices for the measurement model.

Index	Suggested	Reported
RMR	Lower than 0.05	0.011
GFI	0.9 and higher	0.98
AGFI	0.9 and higher	0.95
NFI	0.9 and higher	0.99
NNFI	0.9 and higher	0.99
IFI	0.9 and higher	0.99
CFI	0.9 and higher	0.99
RMSAE	Lower than 0.08	0.051

that there is a significant relationship between the dimensions of educational channels (local, national and international) and women's participation. These findings are consistent with Shokati Amghani et al. [37,43]; Sarani et al. [42]; Abbasi et al. [1] and Del Prete et al. [15]. In addition, the results of the structural equation modeling showed that educational channels with a coefficient of 49% had a positive and significant effect on improving rural women's participation in promoting household food security. These results are supported by Azizi et al. (2020); Arene, & Anyaeji [4]; Savari et al. [37], Forouzani & Mohammadzadeh, [19]; Wegenast & Beck [47]. Although the present research contributes to extending the literature by its results and new insights and filling some gaps, it has three limitations. The first limitation is that it was conducted in a part of Iran whereas its

implementation in other parts of Iran might yield different results, so caution should be exercised in generalizing its results to the other parts [39]. The second limitation is associated with its paradigm. Since the dominant paradigm of the research was quantitative, it is recommended to researchers to identify the factors improving food security by a qualitative paradigm or a mixed method in future studies. The third limitation is related to the timeframe of the study. Since the research is a single-sectional study in terms of time, it is very difficult to prove the causality of the factors underpinning food security. So, interesting results may be obtained from longitudinal studies, the observation and measurement of predictor variables in a time section, and the observation and measurement of food security in the subsequent time sections [18].

### 7. Policy and practice recommendations

The findings provide new insight into how to improve food security among rural households, so the results are expected to help policymakers in resolving undernourishment and food insecurity. It was found that appropriate nutritional knowledge and behavior play a key role in selecting, preparing, and distributing food among family members. The effective use of the economic facilities that are at the family's disposal to create a healthy society depends on the knowledge and appropriate behavior of the one who is in charge of the family's nutrition. Knowledge is the key element for appropriate food basket preparation, healthy food habits and procedures, appropriate and timely selection of food, sound management of family budget, and the reduction of food wastage.

The results showed that rural women play an essential role in different aspects of food security, but they are not well aware of some aspects such as mushroom cultivation or the purchase of preservative-free foodstuffs. In this sense, it is recommended to policymakers to educate rural women in order to use the potentials of rural communities in the long run because short-term policies, e.g. subsidy distribution and food subsidization, are not so effective in improving their food

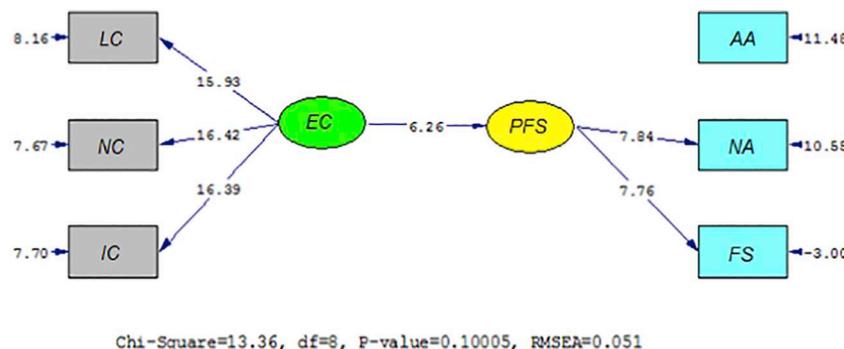


Fig. 3. Path model with t-values.

security. Since short-term policies may be harmful to rural communities and turn them from an independent and productive community into a government-dependent community, it is imperative to hold on-site educational workshops for rural women about the important aspects of food security in rural areas. These training courses are suggested to focus on agricultural production, non-agricultural activities, processing and packaging, crop marketing, business management, family nutrition, housework management, sanitation, and food management.

Also, they should be trained as to how to develop a food program to, subsequently, use it in food preparation and provide the family with a balanced and affordable food regime. Also, women should be involved in non-agricultural activities because it will not only empower them to prepare balanced and high-calorie foodstuffs for their families but they will also spend a part of their income to purchase food basket of the family. So, nutritional and occupational awareness of rural women is effective in directing them into new agricultural fields, such as green-house production and safe crop production.

In general, it is crucial to adopt optimal policies and appropriate interventions to enhance the work efficiency of rural women in the agricultural sector in order to help produce foodstuffs for rural families. It is quite possible to boost food availability through increasing production and reducing food wastage by rural women. As such, policies should focus on informing rural women as to the supply of facilities for production, welfare, justice, efficiency, empowerment, and poverty alleviation.

## Statement

The authors declared that they have no conflict of interest.

## Declaration of Competing Interest

We confirm that the submitted work is my own and that copyright has not been breached in seeking its publication. Also, we declare that the submitted work has not previously been published in full, and is not being considered for publication elsewhere.

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