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Research Paper

Household Food Security: Case of Summer Crop Growers in Shoushtar Township, Iran

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Abstract

The purpose of this research was to analyze household food security and identifies key socio-economic factors associated with this condition among summer crop growers in Shoushtar Township, Khouzestan Province, Iran. This cross-sectional survey study was conducted from September 2015 to February 2017. The population consisted of summer crop farmers in the Shoushtar Township (N=850). The sample size was determined based on Morgan table (n=150). For analyzing food security level, the 18-item USDA household food security questionnaire, which contains questions that underlie the 12-month food security scale in survey-instrument form, was used. The food security scale was developed based on responses to questions Q2 to Q16 (18 questions). These include both qualitative and quantitative aspects of the household's food supply as well as household members' psychological and behavioral responses. Based on the results, more than half of households (52.67%) experienced food insecurity and less than half (47.33%) indicating that they are food secure. Correlation coefficient results showed that there was significant relationship between the income, educational level, extension education activities, social participation, technical knowledge and food security. Based on regression analysis, income, educational level, extension education activities, technical knowledge and social participation may well explain for 75.43% changes (R2=0.7543) in level of food security.

Keywords:
food security; summer crop growers; USDA questionnaire

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INTRODUCTION

Extensive research in the late 1980s focused on understanding household food security, food insecurity, and hunger. This work led to the development by an expert working group of the American Institute of Nutrition of the following conceptual definitions, which were published in 1990 by the Life Sciences Research Office (LSRO) of the Federation of American Societies for Experimental Biology (Bickel et al, 2000): Food security include access by all people at all times to enough food for an active, healthy life (World Food Summit, 1996). Food security includes at a minimum: (1) the ready availability of nutritionally adequate and safe foods, and (2) an assured ability to acquire acceptable foods in socially acceptable ways (e.g. without resorting to emergency food supplies, scavenging, stealing, or other coping strategies) (United State Department of Agriculture, 2009). Food insecurity, on the other hand, is a situation of "limited or uncertain availability of nutritionally adequate and safe foods or limited or uncertain ability to acquire acceptable foods in socially acceptable ways", according to the United States Department of Agriculture (Bickel et al., 2000). Between years 2011-2013, an estimated 842 million people were suffering from chronic hunger (Boeing, 2016). The FAO (2009) explained the four pillars of food security as availability, access, utilization, and stability.

Availability: Food availability is defined as sufficient quantities of food of appropriate quality, supplied through domestic production or imports, including food aid and in a green economy context, food availability is closely linked to the availability and use of natural, human and economic resources, especially scarcity of natural resources (Scialabba, 2011). Food availability relates to the supply of food through production, distribution, and exchange (Gregory et al., 2005).

Access: Food access refers to the affordability and allocation of food, as well as the preferences of individuals and households (Gregory et al., 2005). Food access consists of three elements, which are physical, economic and socio-cultural. The physical dimension can be illustrated by a situation where food is being produced in one part of a country but an inefficient or non-existent transport infrastructure means that food cannot be delivered to another part suffering from a lack of food. From the economic viewpoint, food security exists when people can afford to buy sufficient food. The third element is the socio-cultural dimension which arises when food may be physically available and the potential consumer has the money to buy the food; however, it is prevented from doing so for being a member of a particular social group or even gender. Social conflict and civil strife can seriously disrupt food production and lead to the loss of livestock for example with dire consequences for a household's future food security (Napoli et al., 2011).

Utilization: The next pillar of food security is food utilization, which refers to the metabolism of food by individuals (Tweeten, 1999). The World Food Summit's definition of utilization (the third element of food security) is "safe and nutritious food which meets their dietary needs". The availability of and access to food on their own are not enough; people have to be assured of "safe and nutritious food" (Napoli et al., 2011).

Stability: Food stability refers to the ability to obtain food over time (FAO, 1997). The World Food Summit says that stability must be present "at all times" in terms of availability, access and utilization for food security to exist. The literature distinguishes between chronic food insecurity where food needs cannot be met over a protracted period of time and transitory food insecurity, where the time period is more temporary (Maxwell & Frankenberger, 1992; Napoli et al., 2011,).

Moradi et al. (2015) states that the results of various studies in Iran, regardless of the scale used, the prevalence of food insecurity were 20% to 60%. Reduce variation in the consumption of food and essential micronutrients, poor feeding infants and inconsistent effects on body mass index and weight of

children, teenagers, women and men from the consequences of food insecurity was studied.

Savari et al., (2015) in their study titled "evaluation of the ability of rural women to improve household food security in the city Divandarreh" concluded that households in terms of food security are not desirable. Also, between all dimensions of empowerment (economic, social and psychological) rural women there is a significant positive correlation with household food security.

Saadi et al., (2014) concluded that only 15 percent of households are food secure. In addition, 42.5 percent had food insecurity in low levels, 31.5 percent had food insecurity in moderate level and 11 percent had severe insecurity. Results showed five variables nutritional knowledge, the participation of women, extension education, economic capacity and number of dependents had a greater impact on household food security.

The measurement of food insecurity allows governmental and development agencies to estimate the prevalence of this phenomenon, better target high risk populations, and monitor and evaluate the impact of their programs at the household level (Abbasi et al., 2016 & Hackett et al., 2010). Therefore, the analyzing household food security is necessary for planners and decision makers. This analyzing can apply to assessment of efficiency of livelihood programs (Salem &Mojaverian, 2013).

Food insecurity is one of the most important barriers to the development of each nation (Hackett et al., 2010). The most important issue facing various societies, including Iran, is the lack of awareness of the state of food security and the lack of awareness of the variables associated with them. The importance of this research is to identify the current status of food security and related issues.

The purpose of this research was to analyzing household food security and identifies key socio-economic factors associated with this condition among of summer crop growers in Shoushtar Township, Khouzestan Province, Iran. The specific goals include: 1) Identify demographic and socio-economic characteristics of respondents, 2) Identifyfood security status and 3) Determine relationship between the demographic and socio-economic characteristics and food security level.

METHODOLOGY

This cross-sectional survey study was conducted in Shoushtar Township of Iran from September 2015 to February 2017. The population consisted of summer crop growers in the Shoushtar township (N=850). The sample size was determined based on Morgan table (n=150). For analyzing food security level, an 18-item USDA household food security questionnaire, which contains questions that underlie the 12-month food security scale in survey-instrument form, was used (USDA, 2012). The food security scale is based on responses to questions Q2 to Q16 (18 questions), which are summarized in Table 2. These questions capture four kinds of situations or events, all related to the general definition of food insecurity presented earlier. These include both qualitative and quantitative aspects of the household's food supply as well as household members' psychological and behavioral responses. The four kinds of situation are:

- Anxiety or perception that the household food budget or food supply was inadequate (Q_2, Q_3);
- Perceptions that the food eaten by adults or children was inadequate in quality (Q_4, Q_5, Q_6);
- Reported instances of reduced food intake, or consequences of reduced intake, for adults (Q_8, Q_{8a}, Q_9, Q_{10}, Q_{11}, Q_{12}, Q_{12a}); and
- Reported instances of reduced food intake or its consequences for children (Q_7, Q_{13}, Q_{14}, Q_{14a}, Q_{15}, Q_{16}).

Each of these four groups of questions measures a cluster of central conditions or components of the experience of food insecurity and hunger as these are expressed at each of the successive stages, or ranges, of severity (Bickel et al., 2000).

Questionnaire items 1, 1a, and 1b, shown

in Table 1, are not part of the actual scale but are included for optional use. For households whose response to Q1 indicates a condition short of full food sufficiency, Q1a or Q1b may be asked as follow-ups. These five-part questions are designed to provide further information on circumstances that may be connected to conditions of food insecurity.

Table 1
Screening Question and Follow-Up Items Not Used in Creating Scale

Question numbers	Questions
Q_1	Which of these statements best describes the food eaten in your household in the last 12 months: we always have enough to eat and the kinds of food we want; we have enough to eat but not always the kinds of food we want; sometimes we don't have enough to eat; or often we don't have enough to eat?
Q_{1a}	(*If sometimes or often not enough to eat*) Here are some reasons why people don't always have enough to eat. For each one, please tell me if that is a reason why you don't always have enough to eat. Not enough money for food Too hard to get to the store, On a diet, No working stove available, Not able to cook or eat because of health problems.
Q_{1b}	(*If enough food, but not the kinds we want*) Here are some reasons why people don't always have the kinds of food they want or need. For each one, please tell me if that is a reason why you don't always have the kinds of food you want or need. Not enough money for food, too hard to get to the store, on a diet, Kinds of food we want not available, Good quality food not available.

Three of the 15 questions contain an embedded follow-up question asking how often the condition occurred. Questions Q8, Q12, and Q14 all ask whether a condition of food insecurity has occurred within the past 12 months. For households that answer affirmatively, the follow-up question asks about the number of months in which the condition occurred. Because these three follow-up questions are treated as separate indicators in constructing the food security scale, the scale is described as consisting of 18 items.

Coding survey responses for the food security scale

For determine households' scores on the food security scale, it is first necessary to code their response to each question as either "affirmative" or "negative." Some of this coding is obvious because the only response choices are "yes" or "no." Two groups of questions, however, have less obvious response categories. The procedure for coding these questions is described below and summarized in Table 3 (Bickel et al., 2000 & USDA, 2012).

Two measures of households' food security can be computed from the core module data. In principle, the continuous food-security *scale* measure is the more fundamental of the two forms. Since the scale actually measures the severity of food *insecurity*, the condition of fully secure, which represents the *absence* of the measured condition, is assigned a scale value of zero. The most severe condition, represented by presence of all the available indicators, is assigned a scale value approaching ten. Thus, the full range of the continuum captured by the measure is indicated by scale scores ranging from zero to ten (Figure 1). The unit of measure used is largely a matter of convenience, so the 0- 10 metric has been adopted for the standard U.S. food security scale due to its simplicity and familiarity (Bickel et al., 2000 & USDA, 2012). The SPSS20 software was used for data analysis. Also descriptive and inferential methods such as correlation, regression and path analysis were used for data analysis.

Table 2
Questions Included in the Food Security Scale

Question numbers	Questions
Q_2	"I *worried whether our food would run out* before we got money to buy more." Was that often, sometimes, or never true for you in the last 12 months?
Q_3	"The *food that we bought just didn't last*, and we didn't have money to get more." Was that often, sometimes, or never true for you in the last 12 months?
Q_4	"We *couldn't afford to eat balanced meals*." Was that often, sometimes, or never true for you in the last 12 months?
Q_{5*}	"We relied on only a few kinds of low-cost food to feed the children because we were running out of money to buy food." Was that often, sometimes, or never true for you in the last 12 months?
Q_{6*}	"We *couldn't feed the children a balanced meal* because we couldn't afford that." Was that often, sometimes, or never true for you in the last 12 months?
Q_{7*}	"The *children were not eating enough* because we just couldn't afford enough food." Was that often, sometimes, or never true for you in the last 12 months?
Q_8	In the last 12 months, did you or other adults in your household ever *cut the size of your meals or skip meals* because there wasn't enough money for food?
Q_{8a}	How often did this happen — almost every month, some months but not every month, or in only one or two months?
Q_9	In the last 12 months, did you ever *eat less than you felt you should* because there wasn't enough money to buy food?
Q_{10}	In the last 12 months, were you ever *hungry but didn't eat* because you couldn't afford enough food?
Q_{11}	Sometimes people lose weight because they don't have enough to eat. In the last 12 months, did you *lose weight* because there wasn't enough food?
Q_{12}	In the last 12 months, did *you or other adults* in your household ever not eat for *a whole day* because there wasn't enough money for food?
Q_{12a}	How often did this happen — almost every month, some months but not every month, or in only one or two months?
Q_{13*}	In the last 12 months, did you ever *cut the size of any of the children's meals* because there wasn't enough money for food?
Q_{14*}	In the last 12 months, did any of the *children ever skip meals* because there wasn't enough money for food?
Q_{14a*}	How often did this happen — almost every month, some months but not every month, or in only one or two months?
Q_{15*}	In the last 12 months, were the *children ever hungry* but you just couldn't afford more food?
Q_{16*}	In the last 12 months, did any of the *children ever not eat for a whole day* because there wasn't enough money for food?

*Questions asked only of households with children. Children are defined as persons age 0-17.
Less than 18 years old.
Source: (Bickel et al, 2000 & USDA, 2012).

Table 3
Coding Survey Responses for the Food Security Scale

Question numbers	Question	Negative responses (Code = 0)	Affirmative responses (Code = 1)	Missing data (Code =2)
Q_2	Worried food would run out	Never true	Often true; Sometimes true	Refused; Don't know
Q_3	Food bought just didn't last	Never true	Often true; Sometimes true	Refused; Don't know
Q_4	Couldn't afford to eat balanced meals	Never true	Often true; Sometimes true	Refused; Don't know
Q_5	Few kinds of low-cost food for children	Never true	Often true; Sometimes true	Refused; Don't know (or No children)
Q_6	Couldn't feed children a balanced meal	Never true	Often true; Sometimes true	Refused; Don't know (or No children)
Q_7	Children were not eating enough	Never true	Often true; Sometimes true	Refused; Don't know (or No children)
Q_8	Adult(s) cut or skipped meals	Never true	Yes	Refused; Don't know
Q_{8a}	Adult(s) cut or skipped meals, 3+ months	Only 1 or 2 months	Almost every month; Some months but not every month	Refused; Don't know
Q_9	You ate less than felt you should	No	Yes	Refused; Don't know
Q_{10}	You were hungry but didn't eat	No	Yes	Refused; Don't know
Q_{11}	You lost weight because not enough food	No	Almost every month; Some months but not every month	Refused; Don't know
Q_{12}	Adult(s) not eat for whole day	No	Yes	Refused; Don't know
Q_{12a}	Adult(s) not eat for whole day, 3+ months	Only 1 or 2 months	Yes	Refused; Don't know
Q_{13}	Cut size of children's meals	No	Yes	Refused;
Q_{14}	Children ever skip meals	No	Yes	Don't know
Q_{14a}	Children skip meals, 3+ months	Only 1 or 2 months	Almost every month; Some months but not every month	Refused; Don't know (or No children)
Q_{15}	Children ever hungry	No	Yes	Refused; Don't know (or No children)
Q_{16}	Children not eat for whole day	No	Yes	Refused; Don't know (or No children)

Source: (Bickel et al., 2000 & USDA, 2012).

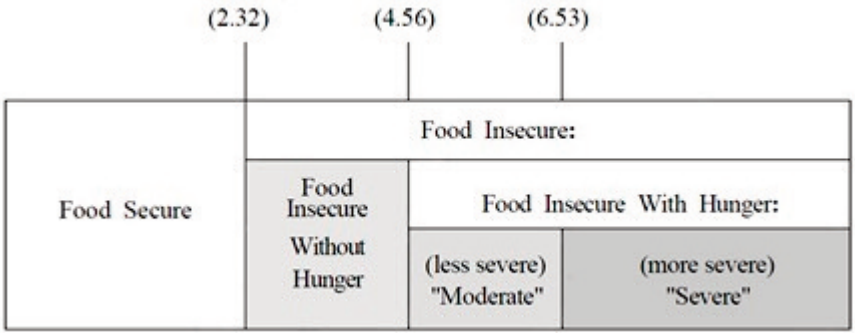

Figure 1.Household Food Security Status (categorical measure) (Bickel et al., 2000)

RESULTS

Demographic and socio-economic characteristics of respondents in this study are summarized in Table 4. The mean of years old was 42. The respondents consisted of 128 men (85.3%) and 23 women (14.7%). The results showed that about one-third (36.7%) of the sample had guidance school level of education. Results also showed that 18% of the respondents held an elementary education. Nearly half (45.3%) of the respondent indicated an average annually income between 200-300 million Iranian Rials. More than one-third of the respondents (36.7%) had mixed exploitation system in agriculture. About half of the respondents (54.8%) were 43 years old and less. More than half of the respondents (52.7%) have experienced between 15-25 years in the agriculture.

Table 4
Demographic and Socio-Economic Characteristics of Respondents

Variables	Level	Frequency	percent	Cum percent	Mean or mod
Age(year)	20-30	22	14.7	14.7	Mean=42
	30-40	50	33.3	48	
	40-50	40	26.7	74.7	
	50 and more	38	25.3	100	
Level of education	Reading and writing	35	23.3	23.3	Mod=Guidance school
	Primary	27	18	41.3	
	Guidance school	55	36.7	78	
	High school	11	7.3	85.3	
	Diploma and higher	22	14.7	100	
Income (annually) Million Rial	100-200	22	14.7	14.7	Mean=280
	200-300	68	47.3	60	
	300-400	60	40	100	
Exploitation system	Rental	22	14.7		
	Ownership	44	29.3		
	Share	29	19.3		
	Mixed	55	36.7		
Gender	Male	128	85.3		
	Female	22	14.7		

Based on the results, more than half of households (52.67%) experienced food insecurity (total of the three groups of food insecurity), with less than half (47.33%) indicating that they are food secure. Less than one-fifth of the respondents (19.33%) experienced food insecurity without hunger, also less than one-fifth of the respondents (18.67%) suffered food insecurity with mild hunger and less than one-sixth of the respondents (18.67%) experienced food insecurity with intense hunger. These results are illustrated in Table 5.

Table 5
Frequency Distribution of Food Security Status

Food insecurity Status	Frequency	Percent	Cumulative percent
Food secure	71	47.33	47.33
Food insecure without hunger	29	19.33	66.67
Food insecure with mild hunger	28	18.67	85.33
Food insecure with intense hunger	22	14.67	100.00
Total	150	100.00	

Correlation studies

In the present study, the Spearman correlation coefficient was used for assessing the relationship between the research variables (Table 6). Correlation coefficient results showed that there was significant relationship between the income, educational level, extension education, social participation, technical knowledge and food security.

Table 6
Relationship between the Research Variables (Spearman Correlation Coefficient)

Variable 1	Variable 2	r	p-value
Income	Food Security	0.668**	0.000
Educational level		0.299**	0.000
Extension Education		0.349**	0.000
Social participation		0.250**	0.002
Technical knowledge		0.411**	0.000

**p<0.01

Regression analysis

Based on regression analysis, income, educational level, extension education activities, technical knowledge and social participation may well explain for 75.43% changes (R^2=0.7543) in level of food security. Based on Table 8, we can see that the predictor variables of income, educational level, extension education activities and social participation are significant because their p-values are <0.01. Given to Variance Inflation Factor (VIF), we can argue about co-linearity statistics. If VIF is less than 10, co-linearity will not be significant. According to results, it is considered amount of co-linearity is less than 10 for predictor variable in the last stage of regression analysis. Considering to quantity of beta (ß) can be arbitrated ratio and proportion predictor variables in explanation of dependent variable. Quantities of beta (the fourth column of Table 7) show that per unit of variation in income, educational level, extension education activities and social participation can be varied standard deviation of dependent variable.

Table 7
Regression Analysis between Dependent and Independent Variables

Independent Variables	B	S.E. B	Beta	t	p-value
Income	2.375	1.098	0.881	3.871**	0.000
Educational level	1.851	2.091	0.861	4.816**	0.000
Extension education	3.771	2.009	0.811	2.901**	0.000
Social participation	4.527	1.891	0.796	3.985**	0.000
Technical knowledge	3.741	1.912	0.761	3.011**	0.000
Constant	8.451	8.541	----	3.789**	0.000

**p<0.01

Path analysis

In addition to being thought of as a form of multiple regression focusing on causality, path analysis can be viewed as a special case of Structural Equation Modeling (SEM) – one in which only single indicators are employed for each of the variables in the causal model. That is, path analysis is SEM with a structural model, but no measurement model. Other terms used to refer to path analysis include causal modeling, analysis of covariance structures, and latent variable models (Figure 2). A path coefficient indicates the direct effect of a variable assumed to be a cause on another variable assumed to be an effect. Path coefficients are standardized because they are estimated from correlations (a path regression coefficient is unstandardized) (Ommani, 2011). Path coefficients are written with two subscripts (Table 8). Effects of independent variables on dependent variable:

1) Income on food security: Direct Effect: P53=0.881

2) Educational level on food security: Direct Effect: P52=0.861, Indirect Effect = P32×P53=0.112×0.881= 0.098, Total effect=0.861+0.098=0.959

3) Extension education on food security: Direct Effect: P51= 0.811, Indirect Effect = P41×P34×PP53=0.126×0.201×0.881=0.022, P41×P54=0.126×0.796=0.100, P61×P56=0.156×0.761=0.090, Total effect=0.811+0.022+0.100=0.942

4) Social participation on food security: Direct Effect: P54= 0.796, Indirect Effect = P34×P53=0.201×0.881=0.177, Total effect=0.796+0.177=0.973

Table 8
Effects of Independent Variables on Dependent Variable

Independent variables	Direct effect	Indirect effect	Total effects
Income	0.881	---	0.981
Technical knowledge	0.761	---	0.761
Educational level	0.861	0.098	0.959
Extension education	0.811	0.131	0.942
Social participation	0.796	0.177	0.973

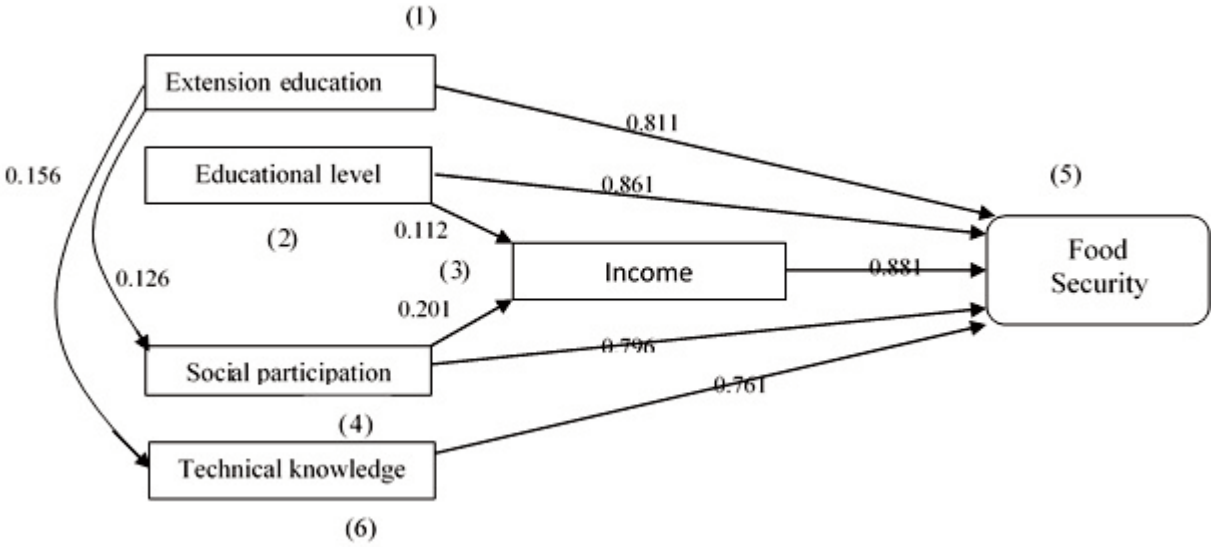

Figure 2. Path analysis of Food Security

DISCUSSION

Food and nutrition security exists when all people at all times have physical, social and economic access to food, which is safe and consumed in sufficient quantity and quality to meet their dietary needs and food preferences, and is supported by an environment of adequate sanitation, health services and care, allowing for a healthy and active life (Moltedo et al., 2014). This cross-sectional survey study was conducted in Shoushtar township of Iran from September 2015 to February 2017. For analyzing food security level, the 18-item USDA household food security questionnaire, which contains questions that underlie the 12-month food security scale in survey-instrument form, was used (USDA, 2012). Based on the results, more than half of households (52.67%) experience food insecurity (total of the three groups of food insecurity), with less than half (47.33%) indicating that they are food secure. Less than one-fifth of the respondents (19.33%) experienced food insecurity without hunger, also less than one-fifth of the respondents (18.67%) suffered food insecurity with mild hunger and less than one-sixth of the respondents (18.67%) experienced food insecurity with intense hunger. Correlation coefficient results showed that there was significant relationship between the income and food security. Tabatabai et al. (2011) and Pyab et al. (2010) suggested a relationship between food security and household income. Education appears to be a key factor for food security, and was significantly related to food security. This finding is supported by the findings of Abbasi et al. (2016) and Dean et al. (2011) and Chizari and Ommani (2009), but not by Simsek et al. (2013). Food security extension programs targeting all members of families can be specifically designed to promote 'better' food choices and healthier lifestyles for the prevention of health problems later in life, given the multiple roles that women and mothers fulfill in this community; these may also reach all family and community members (Abbasi et al., 2016). Based on the results, there was relationship between extension education activities and food security. This finding is supported by the findings of Ommani et al. (2009). In addition, the findings showed social participation was significantly related to food security. This finding is supported by the findings of Ommani (2011) and Sseguya (2009). DeFilippis (2001) has suggested that social capital based on networks and social participation accruing from them only make sense if the poor people involved have authority and influence on the flow and operations of the organizations, and have opportunity to access resources.

CONCLUSION AND RECOMMENDATIONS

Based on the results of research, more than half of households experience food insecurity. Due to the vital role of food security in the health of the community and considering it as a key factor in the ability of individuals to perform mental and physical activities, policymakers and planners need to pay more attention to this issue.

There needs to be extensive research on the factors affecting the development of food security, and provide the necessary conditions for food security.

Also based on the results of research there was significant relationship between the income and food security. Thus agricultural planners need to provide conditions that increase the income development areas for farmers.

Educational development is one of the important issues in improving food security that should be considered by planners.

Due to the important role of extension and education programs in the development of food security and increasing the information and knowledge of people in the field of community health, it is necessary to use the participatory methods to evaluate the educational needs of farmers to designing and planning appropriate training courses.

Also the findings showed social participation was significantly related to food security. Developing social participation and empowering people to engage in determining their own destinies plays an important role in development of food security.

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