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Impact of Household Socio-Economic Factors on Food Security: Case of Adana

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Abstract: Food insecurity is the situation where people do not have access to sufficient, stable and safe food that meets their dietary needs for an active and healthy life. The objective of this study was to determine the status of food security in the Adana metropolitan area by using, for the first time in Turkey, Household Food Security Survey Module (HFSS). Household's food security levels and socio-economic factors affecting the food security were analyzed using the ordered logistic regression technique. The household food security level surveys in the Adana metropolitan area indicated that hunger was not in a serious condition, however food insecurity was critical. While the rate of food insecurity in households with children was 69%, food insecurity rate of households without children was 39.6%. It was a highly worrisome situation that hunger and food insecurity rates were more frequent in households with children. In this study, it has been found that among the socio-economic variables, the income level was the most decisive variable for food security. The gender of household head, employment status, education level and household count were the other variables affecting food security.

Key words: Food security, HFSSM, Rasch model, income

INTRODUCTION

Food security, sufficient, stable and safe food consumption, is the main priority of the nations to achieve healthy and strong life, the economic and social development, prosperity for the society and its constituent individuals (Buzbas, 2010). Food insecure communities suffer from hunger and malnutrition. Better management of countries resources is necessary to prevent these problems. Therefore, indicators are needed to measure food security at the household level to reduce hunger and food insecurity. Measurement of food security at the household level is easy to evaluate, fast and are relatively inexpensive. These measurements are important because they lead to predict the presence of food insecurity by governments and relevant organizations, to target and monitor better communities with the risk of food insecurity and to develop programs related to these issues (Hackett *et al*., 2008).

Food security is an important current problem for Turkey like all other countries. Therefore, measurement of food security at the household level and the demographic variables affecting the food security were evaluated. Adana province of Turkey was considered a suitable place to conduct food security survey due to the fact that high migration rate from Eastern provinces and rural areas increases the population as well brings socio-cultural richness to Adana. Food Security survey was conducted in 2011.

MATERIALS AND METHODS

Food security was measured by the U.S. Household Food Security Survey Measure (HFSSM) model developed by the U.S. Department of Agriculture (USDA), which was used for the first time in Turkey. The survey module was translated into Turkish. HFSSM has been focused on the insufficient amount of food or nutritious food due to the lack of money. HFSSM method is cheap and easy to implement to evaluate food insecurity levels correctly. In addition to that, it is a survey method that can be adapted to many countries with different social and cultural characteristics in the world (Rafiei *et al*., 2009). The model consists of 18 questions intended to measure the prevalence of food insecurity in households and the severity of hunger (Kennedy, 2002). The original English version of the questions is included in Table 1.

Households' food security levels were classified based on the responses has been given to HFSSM scale of 18 questions with children and 10 questions in households with no children (children under age 18 were evaluated as children in the analysis). The scale is intended to demonstrate food-related behaviors of households and households experience difficulties in access to food (Rafiei *et al*., 2009). The food security status of each household is assessed by their responses to survey questions about food-related behaviors, experiences and conditions that are known to characterize households having difficulty meeting their food needs.

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Table 1: Food insecurity questionnaire items

	During the last 12 months
Were you worried that you would run out of food before being able to buy or receive more food?	Often true Sometimes true Never true
Did you run out of food before having money to buy more?	Often true Sometimes true Never true
Were you able to afford to eat balanced meals?	Often true Sometimes true Never true
Did you or other adults in your household ever eat less than you felt you should because there was not enough money to buy food?	Yes No
[If yes above, ask] How often did this happen?	Almost every month Some months but not every month Only 1 or 2 months
Did you or other adults in your household ever cut the size of your meals or skip meals because there was not enough money for food?	Yes No
[If yes above, ask] How often did this happen?	Almost every month Some months but not every month Only 1 or 2 months
Did you ever eat less than you felt you should because there wasn't enough money to buy food?	Often true Sometimes true Never true
Did you or other adults in your household ever not eat for a whole day because there wasn't enough money	Yes No
[If yes above, ask] How often did this happen?	Almost every month Some months but not every month Only 1 or 2 months
Did you lose weight because there wasn't enough money for food?	Yes No
Household with children	
CH1. Did you rely on only a few kinds of low-cost foods to feed your child/the children because you were running out of money to buy food?	Often true Sometimes true Never true
CH2. Were you not able to feed your child/the children with a balanced meal, because you couldn't afford.	Often true Sometimes true Never true
CH3. Was your child//were the children not eating enough because you just couldn't afford enough food?	Often true Sometimes true Never true
CH4. Did you ever cut the size of your child's/any of the children's meals because there wasn't enough money for food?	Often true Sometimes true Never true
CH5. Did your child/any of the children ever skip meals because there was not enough money for food?	Yes No
CH5b. [If yes above, ask] How often did this happen?	Almost every month Some months but not every month Only 1 or 2 months
CH6. Did your child/any of the children ever not eat for a whole day because there was not enough money for food?	Often true Sometimes true Never true

Numbers of positive responses in the food security survey were used to determine the level of food security based on the scoring of the food security scales (Radimer, 2002). This scale provides a continuous, graduated measure of the severity of food deprivation. Then, households were classified into food security status categories as food secure, food secure at risk, food insecure without hunger, food insecure with moderate hunger and food insecure with severe hunger (Table 2) for monitoring and statistical analysis of the food security status of the population.

Data collection: In this study, households living in the district Seyhan and Yuregir in Adana province were used as the research population. Sample size of the study was determined using the method population probability ratio based on simple random sampling method (Malhotra, 2003).

Since there was no prior knowledge on the food security condition of the population to be examined for food security, p value taken as 50% to obtain the highest p• (1-p) value for ensuring largest sample size. The sample size was calculated as 384 for this method and has been completed to 400. Adana metropolitan area is

Table 2: Scoring of the food security scales: 18 item module (11 items with no children)

	No. affirmative responses	
Food security level	Household with children	Household without children
Food secure	0	0
Food secure, at risk	1-2	1-2
Food insecure, without hunger	3-7	3-5
Food insecure, moderate hunger	8-12	6-8
Food insecure, severe hunger	13>	9-11

Table 3: No. surveys conducted in Adana based on household income levels

Income	Total population	No. surveys
Mostly high income	293493	121
Mostly middle income	275603	114
Mostly low income	400738	165
Total	969834	400

divided into three regions as mostly low income, mostly middle income and mostly high income to ensure equal chance households for entering the survey (Table 3).

After determining the sample size, stratification was made in urban district of the Adana province proportional to population. Data were collected through randomly selected households from neighborhoods representing high, middle and low income groups. Survey was conducted with face to face interview using a pre-tested interview schedule. Prior to data collection, the respondents were informed that their responses were important only to the researchers' understanding of food insecurity in Adana province and would not entitle them to any financial assistance. Providing this information was important as the responses were subjective and could be skewed if there were expectations that they would affect financial assistance.

Logistic regression analysis: Important demographic factors on household food insecurity were determined by logistic regression analysis according to the survey of household food security measurement.

Due to the presence of order at dependent variable of food security categories, sequential (ordinal) logistic regression method has been used. Ordered logistic regression analysis is preferred to other methods to describe the relationship between variables when the dependent variable is categorical. Independent variables of this method is appropriate to multivariate normal distribution and can be used without the need for significant assumptions like groups must have homogeneous (equal) variance-covariance values. Modeling was carried out using logit function. Due to the assumption of parallelism, the estimated values of the parameters were required to go through the same cut-off point for all categories of the dependent variable (Akin and Senturk, 2012).

Parallelism assumption was tested by chi-square test. The probability value, p, was 0.769. Since p>0.05, H_0 hypothesis cannot be rejected. This suggests those food security categories, the dependent variable, were parallel to each other and parameters were equal in each category (Table 4). After providing this assumption, goodness of fit tests for the model can be completed. Probability of the goodness of fit of the model to the test statistic was greater than 0.05 (Table 5.).

Table 4: Parallelism assumption test

Model	-2 Log Likelihood	Chi-Square	SD	Probability
Null hypothesis	604.362	-	-	-
General	513.158[a]	91.205[b]	102	0.769

Table 5: Goodness of the fit test

	Chi-Square	SD	Probability
Pearson	783.293	1190	1.000
Deviation	554.488	1190	1.000

Table 6: Household food security ratios in Adana province

	--------- Ratio No. households ---------	
Food security level	Household with children (%)	Household without children (%)
Food secure	9.3 (21)	2.3 (40)
Food secure, at risk	21.7 (49)	37.4 (65)
Food insecure, without hunger	40.3 (91)	22.4 (39)
Food insecure, moderate hunger	16.4 (37)	6.3 (11)
Food insecure, severe hunger	12.4 (28)	10.9 (19)

There were a total of 8 independent variables in this model. Probability values of these variables are investigated to interpret the data. The probability values of the parameters used to test the significance were belonging to Wald test. Probability values smaller than 0.05 (statistically significant variables) were interpreted. e^x value of the analysis estimated parameter should be used in sequential (ordinal) logistic regression analysis. Thus, final form of the values to interpret data was obtained. Reference categories of the variables were the final categories. Therefore, the interpretation were completed based on the reference category (Akin and Senturk, 2012). Studying the parameters meanings by their significance is called as the odds ratio interpretation. Statistical analyses were conducted with SPSS version 17.0 (SPSS, Version 17.0, SPSS, Inc., Chicago IL, USA).

RESULTS AND DISCUSSION

Survey results of HFSSM scale were grouped as in Table 5. Among 400 households surveyed, 226 of them were with children and 174 of them were without children. Households with and without children were surveyed with 18 item and 10 item HFSSM scale, respectively.

While the ratio of food insecure household with children was 69.1%, it was 39.6% for the households without children. Low income households with children were more vulnerable to food insecurity risk than without children (Table 6).

Food secure at risk and food insecure without hunger comprise of the majority of households holding the ratio of 62 and 59.8% for the household with and without children, respectively. On the other hand, the ratio of food

Table 7: Model parameter values

	β	Wald	Sig.	e^{β}
[Food Security Category = 1]	10.456	48.349	0.000	-
[Food Security Category = 2]	12.601	68.875	0.000	-
[Food Security Category = 3]	16.293	116.739	0.000	-
[Food Security Category = 4]	19.756	172.900	0.000	-
[Income = 1]	-8.973	139.667	0.000	7.89×10^{-3}
[Income = 2]	-6.357	126.813	0.000	5.77×10^{-2}
[Income = 3]	-2.832	48.632	0.000	1.70×10^{-1}
[Income = 4]	0[a]	.	.	-
[Monthly Food Expenditure = 1]	0.066	0.001	0.974	-
[Monthly Food Expenditure = 2]	-2.425	14.304	0.000	1.13×10^{-1}
[Monthly Food Expenditure = 3]	-0×107	0.042	0.838	-
[Monthly Food Expenditure = 4]	0.317	0.444	0.505	-
[Monthly Food Expenditure = 5]	0[a]	.	.	-
[Children = 0]	0.268	1.019	0.313	-
[Children = 1]	0[a]	.	.	-
[Employment Status = 1]	0.783	7.112	0.008	2.19
[Employment Status = 2]	-1.243	7.206	0.007	3.47
[Employment Status = 3]	0.187	0.117	0.732	-
[Employment Status = 4]	-0.353	0.045	0.832	-
[Employment Status = 5]	0[a]	.	.	-
[Education of the head of household = 1]	1.187	2.562	0×109	-
[Education of the head of household = 2]	1.726	3.988	0.046	5.62
[Education of the head of household = 3]	0.726	2.110	0.146	-
[Education of the head of household = 4]	0.371	0.514	0.473	-
[Education of the head of household = 5]	0.710	0.486	0.486	-
[Education of the head of household = 6]	0[a]	.	.	-
[Number of person in the household = 1]	20.035	200.629	0.000	5.02×10^{8}
[Number of person in the household = 2]	20.136	215.037	0.000	5.56×10^{8}
[Number of person in the household = 3]	18.549	230.932	0.000	1.14×10^{8}
[Number of person in the household = 4]	18.255	227.217	0.000	8.48×10^{7}
[Number of person in the household = 5]	17.923	218.712	0.000	6.08×10^{7}
[Number of person in the household = 6]	17.729	191.603	0.000	5.01×10^{7}
[Number of person in the household = 7]	17.309	164.624	0.000	3.29×10^{7}
[Number of person in the household = 8]	14.917	.	.	3.01×10^{6}
[Number of person in the household = 9]	0[a]	.	.	-
[Marital status = 1]	-1.943	2.494	0.114	-
[Marital status = 2]	-0.525	0.243	0.622	-
[Marital status = 3]	0.672	0.596	0.440	-
[Marital status = 4]	0.409	0.125	0.724	-
[Marital status = 5]	0.173	0.019	0.891	-
[Marital status = 6]	-0.632	0.421	0.516	-
[Marital status = 7]	20.900	0.000	0.998	-
[Neighborhood income status = 1]	0×109	0.134	0.715	-
[Neighborhood income status = 2]	-0.488	3.191	0.074	0.61
[Neighborhood income status = 3]	0[a]	.	.	-

insecure household with moderate and severe hunger was 28.8% for the families with children, 17.2% for the families without children.

Ordered (Ordinal) Logistic Regression Analysis Results: Except family life cycle category, 7 of independent variables were found significant (Table 6). Therefore, these seven variables found significant were interpreted by categories.

Income: Household income more than 1000$ was selected as the reference for income variable. Therefore, categories were interpreted according to this reference value. Results indicated that households with $1000 or more income had 1.7, 5.7 and 7.8 times more likely to have food security than households with income between $701-1000, between $351-700 and less than $350, respectively (Table 7). The amount of monthly income was found to be the most important variable on food security from the survey conducted in Adana.

Economic difficulties and low-income affect households accessibility of food and thus in turn affect daily diet negatively (Oh and Hong, 2003). Households with low income and low monthly food expenditure experience food insecurity and hunger.

Monthly food expenditure: Household with monthly food expenditure $300 or more was selected as the reference for the monthly food expenditure variable. They had 1.1 times more likely to have food security than households with $101-150 monthly food expenditure (Table 7).

Monthly food expenditure is a good indicator for food security. Increase of monthly food expenditures, directly related to income, improves food security status of the

families. Monthly food expenditure was less than $100 for the 70% of the food insecure households with hunger.

Melgar-Quinonez *et al.* (2006) has reported a significantly high correlation between food expenditures and food security level. Although this study has been applied to different income groups, it has been found that households with low food expenditure were lack of food security. Low food expenditure due to low income results in low consumption of animal origin foods. Thus, a close relationship has been reported between food insecurity and consumption of animal origin foods. In addition to that, households with food insecurity and low food expenses had poor diet quality resulting in insufficient intake of vitamins and minerals (Melgar-Quinonez *et al.*, 2006).

Work status: Retired was selected as the reference category for the work status of the head family. While the households with retired head of family had 3.4 times more likely to have food security than from households with unemployed head of family, they were 2.1 times less likely to have food security than employed head of family (Table 7).

There was a significant effect of head of household being a woman and unemployed on food insecurity with hunger status. Ratio of households with experiencing hunger in urban areas of Adana was 35.7% if the head of household was woman. This was due to low labor force participation rate of woman. Although labor force participation rate of women increases in Turkey, it is still very low compared to men, which is 30.1% (TUIK, 2012). Therefore, employment status of woman was an important factor to achieve food security.

Education of the head of household: University graduate was selected as the reference category for the education of head of household variable. Households were 5.6 times more likely to have food security when head of household was university graduate compared to only literate ones (Table 7).

As the level of education increases, opportunities for employment and jobs with higher wages increase. It has been reported that one of the main indicators to ensure food security of households was the level of education, especially mother's education level for households with children in a study conducted in North Carolina. In addition, family education was accepted as an indicator worldwide for the health of children (Quandt *et al.*, 2004). Besides the advantages of finding a job, household members with higher level of education had higher level of awareness for child health and better diet, important for food security. Another advantage of higher education is, educated people have more knowledge and skills than others for budgeting, saving and using the resources (Quandt *et al.*, 2004). According to poverty study in Turkey, poverty decreases as the education increases (TUIK, 2009).

Number of person in the households: Households with nine-person were selected as the reference category for the number of person in the household variable. Households with 9 persons had 5.02 times and 5.5 times less likely to have food security than households with one-person and two person, respectively (Table 7). Increase in the number of persons in the households increase food insecurity. This finding was more significant when households had children. Poverty studies conducted in Turkey indicated that increase in the number persons in households increases poverty. While family poverty rate for the households with 1-2 person was 11.52%, it was 9.41 and 38.5% for the households with 3-4 person and 7 or more person, respectively (TUIK, 2009). Poverty might be regarded as the most important cause of food insecurity, thus, increase in poverty increases food insecurity.

Neighborhood income status: Mostly low income category was selected as the reference this variable. Mostly middle income neighborhoods were 0.6 times more likely to have food security than mostly low-income neighborhoods. Food security status of mostly low and mostly middle income neighborhoods was close. Therefore model coefficient was small.

Conclusion: Food security survey conducted in Adana indicated that although hunger was not observed, food insecurity was in a critical condition. Food insecurity ratios for the household with and without children were 69.1% and 39.6%, respectively.

Observing hunger and food insecurity more often in households with children might increase some socio-economic problems like illnesses, deaths, work force and production loss, infertility, mental developmental problems, mental depression, delinquency and tendency to violence. It will be very difficult to achieve social peace for the countries without solving the food security issue.

Therefore, household food security surveys should be conducted nationwide to determine areas with food security risk and necessary political measures should be taken to prevent food insecurity into a more serious condition. The survey results indicated that the most important causes of household food insecurity were poverty. Policies to eradicate poverty throughout the nation will be the solution for food security. Education of the mother and the head of household were important for assuring food security. To ensure food security, education and labour force participation of woman should be supported.

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