

Brief Report

Food Security and its Related Factors in the Rural Households of Bam City in Iran: A Logistic Regression Model Approach

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Abstract

Awareness of the food security status of rural population and its influencing factors is essential for policy makers, public health institutions and the development of rural programs. This descriptive cross-sectional study was conducted in 2017 on 384 rural households in Bam city. The data was collected via the 6-item USDA questionnaire. Logistic regression was used to determine the relationship between social, economic and health factors with food security. The results indicate that 35.67% of households had full food security status, 24.47% had medium food security status and 7.04% had food insecurity status. Despite the high level of food insecurity in Bam rural households, creating employment opportunities for increasing household income, reforming inappropriate food habits, and increasing households' nutritional awareness might be effective in promoting food security.

Keywords: Coping strategy index, Food security, Logistic models, Rural population

Cite this article as: Khodabakhshzadeh S, Amirzadeh Moradabadi S, Khodabakhshzadeh S, Baniyasi M, Harati Khalilabad T. Food security and its related factors in the rural households of Bam city in Iran: A logistic regression model approach. Arch Iran Med. 2018;21(1):26-28.

Received: June 7, 2017, Accepted: December 16, 2017, ePublished: January 1, 2018

Introduction

The importance of nutrition in promoting health, performance, learning and economic development has been emphasized in worldwide studies. Therefore, achieving food security is one of the development priorities for countries.¹ In fact, food security is one of the foundations of a developed community and a key element of mental, psychological and physical health of its members. It has always been one of the main objectives of agricultural and rural development plans in Iran and is one of the strategic objectives and priorities in Iran's 20-Year Vision Plan.²

Studies on food insecurity demonstrate that food insecurity has been raised as a major challenge in most societies and is associated with food intake and nutritional, economic, social and cultural status.³

Hence, it can be claimed that information about food security of the rural population and factors affecting it can assist health policy makers to take efficient steps towards enhancing rural development and health plans. This paper aimed to find food security status and its relationship with social, economic and health factors.

Methods

This was a cross-sectional study in which the required data were mainly obtained from a questionnaire developed in 2017.

A stratified 2-stage cluster sampling methodology was performed to collect data. The first stage involved random sampling of 40 villages out of 145 major villages. In stage two, based on village populations, a subset of households within each selected village were randomly selected for inclusion in the sample.

Using Cochran's formula, the sample size was determined to be 384. The validity of the questionnaire was confirmed by experts and its reliability was calculated to be 0.93 using Cronbach α coefficient.⁴

The questionnaire was developed in 2 sections: The first section contained general information and socio-economic factors affecting households' food security. In this section, there were some questions on age, gender, household head's level of education, household head's employment status, household head's annual income, number of family members, distance from city, home ownership status, sickness of a household member,

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possessing living facilities, being under coverage of a supporting center and access to healthcare centers.

The second section addressed the food security status of rural households using non-food coping strategy index.

After calculating the numerical value of food coping strategies using K-means cluster analysis with SPSS 16, the household were classified in different categories with respects to food insecurity status. Then, the relationship between food security status of rural households and the socioeconomic and health factors was examined using logistic regression analysis in Eviews 9. The logit model structure in this study is as follows:

Logit Model Structure

Logit model is used in cases where the dependent variable is not observable. In these cases, the dependent variable appears as a binary choice. Based on the occurrence or non-occurrence of a desired event, the dependent variable is scored zero or one. The dependent variable can be used to estimate the occurrence or non-occurrence of the event. The logit model used in this study is as follows:

$$Y_i = \alpha + \beta_1 X_{i1} + \beta_2 X_{i2} + \beta_3 X_{i3} \dots + \beta_n X_{in} + u_i$$

Where Y_i (qualitative dependent variable) is the probability of food security ($Y_i = 1$), $Y_i = 0$ stands for food insecurity, α shows the model intercept, n indicates the number of observations, u_i refers to the random intervening component, and B_j represent the model unknown parameters that must be estimated.⁵ In this equation, X_j stands for the model independent variables including a set of social, economic and health features affecting the food security status.

Results

Estimation of Non-food Coping Strategy Index

The results obtained from coping strategies index showed that 126 households (32.82%) were in a food-secure status and other 258 households experienced

different levels of food insecurity. A large number of households in rural areas of Bam city (292 households, equivalent to 76.23%) adopted “using less preferred and low-cost foods” strategy among food coping strategies. This strategy was common and of lower intensity. “Reducing women’s food”, “reducing men’s food”, “abstaining from a meal in a day”, “reducing children’s food”, and “spending some days without food” were the other coping strategies preferred by the households, respectively. Then, we used K-means cluster analysis in order to categorize individuals base on food security status. The results indicated that households were placed in 3 groups using non-food coping strategy index: 137 households (35.67%) in poor food insecurity status, 94 households (24.47%) in medium food insecurity status and 27 households (7.04%) in severe food insecurity status.

Results of Logit Model

To estimate the logit model, *the maximum likelihood estimated* (MLE) was used. Prior to estimating the logit model, multicollinearity of variables, heteroskedasticity of residuals and the model modification were considered. There was no problem with the abovementioned items in the final model. The logit model results are shown in Table 1.

According to the results, the model goodness of fit was 81%, indicating that the model is well-fitted. The results obtained for all these indices show the appropriateness of the model in explaining the behavior of variables. Also, Coefficients of ultimate impact of variable showed independent variables effects on Probability of food insecurity occurrence.

Discussion

Based on results obtained from calculation of the coping strategy index, the ultimate impact of the income variable was -0.146, indicating that if the annual

Table 1. Estimated Logit Models With Maximum Likelihood Estimated Method

Variable	Variables	Coefficient	Standard Error	Z	Ultimate Impact of Variable
Constant coefficient	C	2.09***	0.663	3.15	0.146
Household head's annual income	X_1	-0.63***	0.230	-2.73	0.146-
Household head's level of education	X_2	-0.84***	0.261	-3.21	-0.061
Household head's employment status	X_3	-0.15**	0.073	-2.03	-0.011
Distance from city in km	X_4	0.042*	0.021	1.99	0.029
Home ownership status	X_5	-0.58**	0.156	-3.71	0.042 -
Access to health centers	X_6	-0.23**	0.105	-2.19	0.016-
Number of family members	X_7	0.49***	0.116	4.20	0.035
Possessing life facilities	X_8	-0.54*	0.285	-1.89	0.039-
Being under the coverage of a supporting center	X_9	-0.21***	0.049	-4.25	0.015-
Sickness of one of family members	X_{10}	0.15*	0.078	1.91	0.0157

LR statistic: 70.57; Prob (LR statistic): 0.000; R-squared: 0.81; %Correct: 81%; *10% significance level; **5% significance level; ***1% significance level; Source: Research Findings.

household income increases by one unit (1 million Rials, which approximately equals \$US30), the risk of food insecurity among rural households decreases on average by 14.6%. Similar results have been also reported in studies by Tiwari et al and others.⁶⁻⁸ The education level and occupational status of the household head had negative significant impact on the food insecurity index. Accordingly, with an increase in education level from diploma to higher education, as well as improvement in household head's employment status, the likelihood of food insecurity among households of rural areas in Bam City decreased on average by 6.1% and 11%, respectively, which is also reported by other studies.^{1,4,8} Moreover, a household member's illness as well as number of household members were significantly correlated with the food insecurity level. The ultimate effect size indicates that the risk of food insecurity in households increases by 3.5% on average if a member is added to the household, whereas it increases by 1.5% on average if a household member is sick. Previous studies such as the one by Tiwari et al have found similar results.^{6,9} The results of the logit model also demonstrate that home ownership status, life facility possession status, access to healthcare center and being supported by a supporting organization had negative significant impact on the food insecurity index. However, village/city distance have been shown to be positively significantly associated with the food insecurity index.^{9,10}

Overall, the study indicated high levels of food insecurity among the rural households under study. Creating employment opportunities to increase the income of rural families, running special programs for modifying individuals' lifestyle and their poor nutritional habits might be effective in improving households' food security.

Conflict of Interest Disclosures

The authors have no conflicts of interest.

Acknowledgments

This article was derived from the research project No. 95/50 that was funded by the Deputy of Research at Bam University of Medical Sciences, Iran. We would like to appreciate the anonymous reviewers and the chief editor for their valuable comments which led to a substantial improvement of our manuscript.

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