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Original Article

Nutritional Education and Its Effects on Household Food Insecurity in Southeastern Iran

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Abstract

Background: Food insecurity can affect health directly or indirectly through its impact on nutritional status. We aimed at determining the effects of nutrition education intervention on household food insecurity in Zahedan, southeast Iran.

Methods: The study was conducted using multi-stage sampling method. The first stage was a cross-sectional investigation whereby 2,160 households were studied in Zahedan in 2015. The prevalence of food insecurity was determined and food-insecure households were identified. Household food security status was assessed through the 18-item US Household Food Security Survey Module. In the second stage, based on the determined sample size of 150 households in each group, eligible households were randomly divided into the intervention and control groups. Before the educational intervention, questionnaires including demographic and socioeconomic information were completed for both groups. Then, data analysis was performed and the intervention was conducted on the intervention group. Six months post-intervention, a final assessment was made by interviewing the two groups to complete demographic, socioeconomic, and household food security questionnaires.

Results: The prevalence of food insecurity in the 2,160 households was 58.8%. After the intervention, the number of food-insecure households diminished by 22% in the intervention group, and these households were assigned to the food secure category. After controlling the confounding variables, the educational intervention was significantly effective in reducing food insecurity score ($P<0.001$).

Conclusion: The findings demonstrated the beneficial role of nutritional education and the skills of resource management in modifying nutritional behaviors and improving food security in the study population.

Keywords: Food insecurity; Nutrition education; Intervention; Iran

Introduction

Food insecurity is broadly defined as eating less desirable foods; eating a poor quality diet as a result of limited food options; not having sufficient food and experiencing hunger; anxiety about acquiring food; skipping meals; or not eating for the entire day (1-3).

Food insecurity can affect health through its effects on nutritional status, manifested as over- or undernutrition. Women of reproductive age and children under the age of five are particularly at risk of poor health due to malnutrition and deficiency of micronutrients. Food insecurity is associated with lack of dietary diversity and low intake of macro- and micronutrients (4, 5). Food insecurity has been associated with higher rates of poor health and chronic health conditions, overweight and obesity, symptoms of anxiety and depression, high-risk sexual behaviors, and adverse pregnancy outcomes and an increased risk of diet-related chronic disorders such as high blood pressure, cardiovascular diseases, diabetes, as well as nutritional vulnerability (6-15). Food insecurity depends not only on economic status and poverty but also nutritional knowledge and culture, as well as numerous other factors. Mitigating food insecurity, therefore, requires many interventions, including those aimed at increasing household purchasing power and nutrition knowledge. Implementing most general interventions needs the broad support of government institutions on a large scale. In this context, educational interventions are one of the more efficient, effective, and at the same time less costly solutions. This form of intervention arguably promotes cultural and nutritional literacy and health-nutritional behaviors. However, no previous study has been carried out into the impact of nutritional education on food insecurity status in Iran.

Using a pre-test post-test group design, Dollahite et al. assessed the effect of nutrition education on food insecurity among low-income participants. Both groups displayed a significant reduction ($P<0.05$) in the score of food insecurity after the educational program (16). Food insecurity and nutritional inadequacy was improved significantly in the experimental group which received nutrition education, compared to the control group (17).

Food insecurity often originate in poverty and low socio-economic status and have serious consequences on health and nutritional status of people. However, interventions aiming at increasing income or supplementary foods have not eliminated food insecurity inasmuch as this problem is not resulted from economic poverty alone. Instead, the focus must be on raising awareness, cultivating attitudes and skills conducive to healthy eating, improving access to healthy food, and providing healthy options when choosing food especially with limited budget (3, 4, 18). The present study addresses the effect of nutrition education on household food insecurity in Zahedan, southeast Iran.

Materials and Methods

The present study used multi-stage sampling method. The first stage was a cross-sectional analysis, which studied 2,160 households living in Zahedan, Iran in 2015. Thus, the mother or any other person responsible for food preparation in those households was interviewed by means of questionnaires covering demographic, socio-economic, and household food security information. The prevalence of food insecurity was determined and food-insecure households were identified. At the end of this stage, the content of the training program was prepared. In the second stage, based on the determined sample size (150 households in each group), eligible households were specified with regard to the following considerations:

The inclusion criteria included mothers of reproductive age with at least primary school education. The exclusion criteria, on the other hand, included non-Iranian nationals, households with temporary residence, households migrating or moving to another location during the study, and non-cooperation of the mother in the study process.

Considering the effect size of 1.3 and power of 80% and 95% confidence interval, 100 households in each group was calculated. However, considering the probability of lost to follow up, 150 households in each group was selected.

The qualified households were randomly divided into the intervention and control groups.

Households in the two groups were selected with regard to issues such as socio-economic status, education, household size, and ethnicity as the allocation layer. Before the educational intervention, the questionnaires related to demographic and socioeconomic information. Then, data analysis was performed and the intervention was conducted on the experimental group. After six months, a final assessment was made by interviewing the two groups to complete demographic, socioeconomic, and household food security questionnaires.

Household Food Insecurity

Household food security status was assessed through the 18-item US Household Food Security Survey Module (19). This questionnaire has been validated by some other studies in Iran (20, 21).

To determine the food security status of households based on their obtained score, the households were classified as food-secure, food-insecure without hunger, food-insecure with moderate hunger, and food-insecure with severe hunger (22, 23).

Codification of Educational Booklet: To codify the educational booklet, an initial needs assessment was undertaken. Thus, a number of mothers were invited to participate in focus group discussions (FGDs). The training content was prepared according to educational goals and through consulting the available literature. Finally, the booklet was codified as a collection of household nutritional instructions. In addition, an educational CD containing nutritional education videos was prepared.

Educational Intervention

The intervention was conducted with the mothers (otherwise the person in charge of preparing food and cooking for the family) invited to participate in the program. The educational intervention took place in accordance with the prepared package, which included a booklet, educational images, classes, and films, question-answer, and discussions. In each of the training sessions, an average of 10-12 mothers attended. The duration of each session was a maximum of 30 minutes. The program was held on average in 2-3 sessions. The educational intervention emphasized enhancing household food and nutrition security, with aim of improving:

The level of nutritional knowledge and behavior of household members during the selection, Preparation, and distribution of food in the household; Habits and healthy food practices and appropriate food selection; appropriate use of indigenous and traditional foods; Proper management of the household budget; Prevention and control of infectious and parasitic diseases; Planting vegetables at home; Encouraging women to work at home in order to contribute to the household budget; Purchasing fruits and vegetables from low-cost locations such as farmers markets and produce stores (24).

Ethical Approval

The project and data collection procedure were approved by the Ethics Committee of Zahedan University of Medical Sciences (IR.ZAUMS.REC.1392.6237) and School of Nutritional Sciences and Dietetics, Tehran University of Medical Sciences.

Statistical analysis

SPSS version 22 (Chicago, IL, USA) was used for statistical analysis. The quantitative data was presented as mean and standard deviation and the qualitative data we presented as frequency and percent. Paired *t*-test was used for before-after comparisons. Chi-square test and analysis of covariance (ANCOVA) were used for between group comparisons. Following confounders were considered as covariate in ANCOVA: food insecurity before the intervention, maternal education, household size, and number of children.

Results

At the first stage, based on the study objectives, demographic and socio-economic data along with food security status of 2,160 households

were collected. The mean score of household food security in the studied households was 4.8±4.5. 41.2% of households were food-secure and 58.8% suffered from different degrees of food insecurity. Among the food-insecure households, food insecurity without hunger (31.7%) was the most frequent (Table 1).

Table 1: Frequency distribution of household food security status in the study population at baseline (n=2,160)

Food security status	***Number***	***%***
Food-secure	891	41.2
Food-insecure without hunger	684	31.7
Food-insecure with moderate hunger	426	19.7
Food-insecure with severe hunger	159	7.4
Total	2,160	100

Demographic and socioeconomic characteristics of food-insecure households were determined in the experimental and control groups at the beginning of the second stage and before the educational intervention. Before the intervention, the two groups did not have statistically significant differences in terms of demographic and socioeconomic characteristics.

Food insecurity status in intervention and control groups before and after the intervention

The particularities of household food security status in food-insecure families was determined before and after the intervention in both groups (Table 2).

In the intervention group, the severity of food-insecurity shrank by 22% after the educational intervention.

Table 2: Frequency distribution of household food security status in the intervention and control groups

Time	***Before intervention***				***[1]P-value***	***After intervention***				***[1]P-value***
Group	Intervention (n=150)		Control (n=150)			Intervention (n=150)		Control (n=150)		
Frequency										
Food security status	N	[2](%)	N	[2](%)		N	[2](%)	N	[2](%)	
Food-secure	-	-	-	-	0.5	33	22.0	4	2.7	<0.001
Food-insecure without hunger	76	50.7	72	48.0		80	53.3	56	37.3	
Food-insecure with moderate hunger	57	38.0	54	36.0		36	24.0	60	40.0	
Food-insecure with severe hunger	17	11.3	24	16.0		1	0.7	30	20.0	

[1] Chi-square test

[2] Percentage was reported as Columnar

Comparing the scores of food insecurity in intervention and control groups before and

after the intervention in food-insecure households

Analysis of covariance was used to compare the scores of food insecurity in the two groups before and 6 months after the educational intervention.

Variables such as maternal education and the number of children showed statistically significant relationships with household food insecurity in both groups ($P<0.05$). Thus, to control the confounding variables, they were assessed along with the food insecurity variable before the intervention.

Analysis of covariance test showed that after controlling for confounding variables, the educational intervention ($P<0.001$) was effective in significantly reducing the food insecurity score, such that the average score in the intervention group decreased by 2.7. In addition, the test indicated the significant influence of time on the score of food insecurity ($P<0.001$).

The results of paired *t*-test revealed that the score of insecurity before and after the intervention had significant differences in the two groups (Table 3).

Table 3: Comparison of food insecurity score in the intervention and control groups before and after the intervention

Time	*Before intervention*	*After intervention*	*Test*
Statistical Index	[1]Mean ±SD	[1]Mean ±SD	Paired T-test
Group			*P*-value
Intervention	8.02 ± 3.4	5.3 ± 3.1	<0.001
Control	8.2 ± 3.9	8.8 ± 3.8	0.01
Analysis of Covariance[2] *P*-value	0.61	<0.001	-

Standard deviation±[1]Mean

[2] By controlling covariates (confounding factors): food insecurity before the intervention, maternal education, household size, and number of children

[*]All households had children under 18 yr old

Discussion

In the present study, we aimed at determining the effects of nutrition education intervention on household food insecurity and showed that six months after nutrition education intervention, the number of food-insecure households and the severity of food insecurity with moderate and severe hunger decreased significantly. This decrease in the frequency of food insecurity could be thanks to applying the proposed training materials and providing nutritional advice. In the control group, the mean score of food insecurity increased and moved closer to higher intensities. On the other hand, consistent with the findings of Rivera et al. (24), in the control group a few of the food insecure households reached the food secure status. This could be due to the exposure of households in both groups to various educational materials (including books, magazines and newspapers, the Internet, satellite TV, etc.) outside the program, not controlled by the researchers. Additionally, both groups were referred to health centers; some of them included pupils and students (who could transfer the information they received at school or university to their family); in both groups, mothers were referred to related physicians in case of any health problem (in which case they might receive nutritional advice besides other prescriptions). The nutritional information obtained from these sources could have positively influenced the control group. Another possibility is that sensitive mothers in the control group could have become interested in acquiring nutritional advice after completing

the questionnaires, leading to the 2.7% improvement in food security in this group.

Since the present study is the first attempt on probing the effect of educational intervention on household food insecurity in Iran, no comparison with similar studies was feasible. Meanwhile, our findings concerning the effect of nutrition education on food insecurity are consistnt with those of previous studies performed abroad. For instance, food insecurity declined significantly in the training group (16). Another research on female heads of households observed that food insecurity and food inadequacy decreased significantly in the experimental group compared to the control group. Nutrition education is an appropriate intervention to alleviate food insecurity (17). Similarly, Ivers and Cullen assessed the role of nutrition education on food security in US female heads of households randomly assigned to two groups: receiving and not receiving education about food and nutrition insecurity. The results established the significant improvement of food security in the intervention group (7). Being the nutrition-development branch of SNAP, the Supplemental Nutrition Assistance Program-Education (SNAP-Ed) helps low-income households in the United States enhance their dietary intake and alleviate food insecurity by means of nutrition education (25). In a study on the Navajo nation, USA, knowledge, beliefs, and attitudes were strongly associated with food insecurity, such that healthy eating self-efficacy and knowledge were considerably lower in people with higher degrees of food insecurity (26).

Food insecurity is a sporadic experience which makes its impact felt over time (24). Similar to the results of the present study concerning the role of time on food insecurity status over the 6 month follow-up period, another research (24) on the effect of SNAP-Ed intervention reported a 25% improvement in household food security during the 1-year study period. Continued betterment in household food security of the intervention group, as opposed to the control group, could be due to the fact that new nutrition and budgeting knowledge resulting from SNAP-Ed were put to practice when this group experienced situations of reduced resources during the entire 1-year follow-up (24).

Acculturation represents a continuing process whereby individuals acquire and alter some of their values, norms, and behavior, including their diet and lifestyle. In this context, conducting public health and dietary education interventions which deal with diverse health requirements of particular populations seems to be quite rewarding (27).

Limitations and strengths

This is the first investigation into the impact of educational intervention on household food insecurity in Iran. The main limitation is related to the long interval between the intervention (6 months) and measuring the effect of training.

Conclusion

The findings of the present study, in accordance with other similar studies (3, 4), highlight the role of nutritional education and instructing resource management skills in modifying nutritional behaviors and improving food security. Therefore, nutrition education programs be administered for all ages in health care centers and further studies be carried out in other seasons and regions of the country.

Ethical considerations

Ethical issues (Including plagiarism, informed consent, misconduct, data fabrication and/or falsification, double publication and/or submission, redundancy, etc.) have been completely observed by the authors.

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Conflict of interest

The authors declare that there is no conflict of interest.

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