

# Food insecurity and its related socioeconomic and nutritional factors: evidence from a sample of population in the northwest of Iran

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## RESEARCH ARTICLE

### Abstract

Food insecurity defined as limited access to enough food in a socially acceptable way, is associated with physical, social and psychological problems. In the present study we assess food insecurity status and related socioeconomic and nutritional factors in a sample of urban population in Tabriz, Iran. This cross-sectional study on 300 households (99 men and 201 women) was conducted among subjects in Qumtepe region in Tabriz. General and socioeconomic factors have been obtained from participants. Food security status and dietary intake were assessed by a 6-item short questionnaire and a 32-item food frequency questionnaire respectively. SPSS 11.5 was used for statistical analysis. The prevalence of food insecurity in the current study was 36%. Mean family size in food insecure group was significantly higher and body mass index (BMI) was significantly lower compared with food secure group. Subjects in food insecure group consumed lower amounts of dairy products ( $P<0.05$ ). In the multinomial logistic regression model, being male subject, having lower income and lower BMI were potent predictors of food insecurity ( $P<0.05$ ). In conclusion, food insecurity was prevalent in our study and was associated with BMI and several socioeconomic factors. Prospective studies are needed to further elucidate the causal relationship between variables.

**Keywords:** food insecurity, households, Iran

### 1. Introduction

Food insecurity, defined as limited access to nutritionally adequate and safe food or limited or uncertain ability to gain acceptable foods in socially acceptable ways (Daneshi-Maskooni *et al.*, 2013) is a common problem in both developed and developing countries and affects approximately 5-25% of the general population in different research reports (Dastgiri *et al.*, 2007). Food insecurity is strongly associated with numerous physical, social and psychological problems in human; according to previous reports, a number of poor health conditions including hyperlipidemia, heart disease, hypertension, metabolic syndrome and some types of cancers are more prevalent in individuals with food insecurity (Daneshi-Maskooni *et al.*, 2013; Parker *et al.*, 2010; Seligman *et al.*, 2010; Stuff *et al.*, 2007).

Several effective factors on food insecurity includes age and household's economic, social and cultural situations (Sharafkhani *et al.*, 2011). Individuals in poor economic status, low educational attainment, single parent families, families with children and those with disability for work are at higher risk of food insecurity (Nord and Waves, 2008; Nord *et al.*, 2009).

The prevalence of food insecurity is increasing worldwide; the total number of food insecure individuals throughout the world have been raised from 849 million in 2006 to 982 million in 2007 (IFT, 2008). According to a USDA report 14.6% of the US households (approximately 17 million) were food insecure at least some time during 2008 (Nord *et al.*, 2009).

The prevalence of food insecurity among Iranian households is approximately 20% with access to less than 90% of their dietary energy needs and 11% are severely

food insecure with access to less than 80% of dietary energy needs; additionally there is a concern with dietary quality with less than 30% of households consuming less than 80% of the calcium, 46% for vitamin A and 70% for riboflavin (Pajouyan and Ghassemi, 1998; Ghassemi *et al.*, 2001).

In a study by Rahim S *et al.* among 2500 households in Qaresoo in Iran, the prevalence of low and very low food insecurity in northwest of Iran was 40 and 20%, respectively (Sharafkhani *et al.*, 2011). In another study by Dastgiri *et al.* (2006) the prevalence of food insecurity among 300 subjects in Tabriz was 36.3% and its significant determinants were family size, income, education and employment status. In the present study we aimed to further evaluate the prevalence of food insecurity and its determinants in Qumtepe region in Tabriz, Iran.

2. Methods and materials

This cross-sectional study was conducted in Qumtepe region of Tabriz, Iran. Based on the previous reports (Pajouyan and Ghassemi, 1998) considering 95% power and an  $\alpha$  of 5%, a sample of 300 households including 99 men and 201 women were selected from households referring to the health centre in Qumtepe region with a simple random method. The subjects were informed about the aims of the study and written informed consents have been obtained from participants. Demographic and socioeconomic data were collected through interviewer administered questionnaires including information about age, sex, family size, employment status, income and education. Weight was measured with a calibrated Seca scale (Itin Scale Co. Inc., Brooklyn, NY, USA) with an accuracy of 0.1 kg and height with a mounted tape and recorded with an accuracy of 0.5 cm. Measurements were performed while subjects were in light clothing and their shoes were removed. BMI was calculated as: weight/height<sup>2</sup> (kg/m<sup>2</sup>). Underweight, overweight and obesity were defined as BMI less than 18.5, 25-29.9 and more than 30 kg/m<sup>2</sup>, respectively (Remington *et al.*, 1988; WHO, 1995).

Dietary intake was analysed with a food frequency questionnaire including 32 food items. Subjects were asked that how often they consume the following food groups: grains and cereals, fruits and vegetables, meat, fish and legumes, milk and dairy products.

Food security status was measured by a validated short questionnaire including six questions and has been classified into three subgroups including: high or marginal food security (HFS) for subjects with negative answers to all six items or only one positive answer, low food security (LFS) for subjects with 2-4 positive answers and very low food security (VLFS) for subjects with 5-6 positive answers to questions (Nord *et al.*, 2005). Independent sample t-test, chi-square and binary logistic regression were applied for

data analysis with Statistical Package for Social Sciences (SPSS for Windows, release 11.5, 2002; IBM, Chicago, IL, USA).

3. Results

The prevalence of food insecurity was approximately 36% among participants: 21.6% were LFS and 14.6% were VLFS (Table 1).

As shown in Table 2, the majority of food secure families had a household size of 4-5 persons, whereas the majority of food insecure subjects were in families with 6-7 persons. The mean family size in food secure and insecure groups was 4.2±1.5 and 6.4±1.5 persons, respectively ( $P<0.001$ ). The education of most of the food secure and food insecure participants were high school and some school, respectively. In food secure group, mean weight in men was significantly higher than in women, whereas in food insecure group this was *vice versa*. The majority of food secure and insecure men were overweight and underweight, respectively. However, women were mostly overweight and normal weight in both groups (Table 3). The mean BMI in food secure and insecure groups was 26.98±5.97 and 21.78±4.31 kg/m<sup>2</sup>, respectively ( $P<0.001$ ).

In food secure group, daily consumption of grains and cereals in women was higher than men ( $P=0.049$ ), whereas in food insecure group the frequency of vegetables and fruits consumption was higher in men compared with women ( $P=0.036$ ). Food secure participants consume more amounts of milk and dairy products compared with food insecure group ( $P=0.05$ ).

In multinomial logistic regression model, age, household income and BMI were significant determinants of food insecurity among participants (Table 4). Men were two times most likely to be food insecure. Households with income 3,000,000-5,000,000 Rial were two times more likely to be food insecure compared with households with income more than 10,000,000 Rial. Subjects with BMI<18.5 kg/m<sup>2</sup> were 1.3 times most likely to be food insecure compared with subjects with BMI>30 kg/m<sup>2</sup>. There was no association between other social and nutritional factors and food security status in multinomial logistic regression model.

Table 1. The prevalence of high or marginal (HFS), low (LFS) and very low (VLFS) food security in subjects based on a short questionnaire.

Food insecurity	N (%)
HFS	191 (63.7)
LFS	65 (21.6)
VLFS	44 (14.6)

**Table 2. Demographic and socioeconomic characteristics of food secure and insecure participants of a questionnaire.**

Variable	Food secure (n=191)			Food insecure (n=109)			<i>P</i> <sup>3</sup>
	Men (n=61)	Women (n=130)	<i>P</i> <sup>2</sup>	Men (n=38)	Women (n=71)	<i>P</i> <sup>2</sup>	
Household size (number of persons in family)							
2-3	18 (9.4%)	52 (27.2%)	0.38	6 (5.5%)	6 (5.5%)	0.049	<0.0001
4-5	24 (12.6%)	44 (23%)		1 (9%)	9 (8.3%)		
6-7	14 (7.3%)	29 (15.2%)		20 (18.3%)	25 (22.9%)		
>7	5 (2.6%)	5 (2.6%)		11 (10.1%)	3 (28.4%)		
Household income (Rial <sup>1</sup> )							
≤3,000,000	9 (4.7%)	6 (3.1%)	0.035	21 (19.3%)	34 (31.2%)	0.67	<0.0001
3,000,000-5,000,000	10 (5.2%)	43 (22.5%)		14 (12.8%)	29 (26.6%)		
5,000,000-7,000,000	19 (9.9%)	42 (22%)		1 (9%)	3 (2.8%)		
7,000,000-10,000,000	15 (7.9%)	25 (13.1%)		2 (1.8%)	3 (2.8%)		
≥10,000,000	8 (4.2%)	14 (7.3%)		0 (0%)	2 (1.8%)		
Education							
No formal schooling	12 (6.3)	12 (6.3)	0.24	12 (11%)	22 (20.2%)	0.68	<0.0001
Some school	9 (4.7)	24 (12.6)		17 (15.6%)	25 (22.9%)		
High school	25 (13.1)	55 (28.8)		6 (5.5%)	15 (13.8%)		
Diploma and more	15 (7.9)	39 (20.4)		3 (2.8%)	9 (8.3%)		
Employment status							
Employed	6 (3.1)	9 (4.7)	0.33	6 (5.5)	9 (8.3)	0.42	<0.0001
Non-employed	55 (28.8)	121 (63.4)		32 (29.4)	62 (56.2)		

<sup>1</sup> 100,000 Rial = 2.83502 Euro.  
<sup>2</sup> *P* provided for the comparison of male and female participants  
<sup>3</sup> *P* provided for the comparison of food secure and insecure groups.

**Table 3. Anthropometric characteristics and dietary intake of food secure and insecure participants of a questionnaire.**

Variable	Food secure (n=191)			Food insecure (n=109)			<i>P</i> <sup>2</sup>
	Men (n=61)	Women (n=130)	<i>P</i> <sup>1</sup>	Men (n=38)	Women (n=71)	<i>P</i> <sup>1</sup>	
Age (mean±SD)	34.36±8.9	34.64±8.76	0.83	35.71±8.7	35.44±9.03	0.87	0.35
Weight (kg)	71.82±15.99	65.15±15.04	0.006	49.01±10.16	57.56±10.56	<0.001	<0.001
Height (cm)	158.82±4.30	157.28±4.53	0.03	157.96±4.67	158.34±4.72	0.68	0.43
BMI (kg/m <sup>2</sup> )							
<18.5	9 (4.7%)	24 (12.6)	0.049	27 (24.8)	16 (14.7)	<0.001	<0.001
18.5-24.9	2 (1)	18 (9.4)		4 (3.7)	38 (34.9)		
25-29.9	25 (13.1)	51 (26.1)		7 (6.4)	15 (13.8)		
>30	25 (13.1)	37 (19.4)		0 (0)	2 (1.8)		
Food groups (no. of servings/day)							
Grains/cereals	7.74±1.3	8.16±1.45	0.049	8.09±1.45	8.07±1.25	0.94	0.76
Fruits/vegetables	6.80±0.76	6.98±0.9	0.17	7.06±0.78	6.69±0.90	0.036	0.32
Meat/fish/legumes	6.20±1.41	6.22±1.20	0.89	6.02±0.21	6.22±1.31	0.60	0.50
Milk/dairy products	1.69±0.23	1.68±0.27	0.74	1.65±0.97	1.61±0.27	0.36	0.05

<sup>1</sup> *P* provided for the comparison of male and female participants.  
<sup>2</sup> *P* provided for the comparison of food secure and insecure groups.

**Table 4. Determinants of food insecurity in multinomial logistic regression model among participants of a questionnaire.**

Variable	OR	CI (95%)	P-value
Sex			
Male	1.84	1.02-2.91	<0.0001
Female	1		
Household income (Rial <sup>1</sup> )			
≤3,000,000	0.7	0.1-0.69	0.06
3,000,000-5,000,000	1.75	0.11-1.52	0.001
5,000,000-7,000,000	0.27	1.02-2.5	0.35
7,000,000-10,000,000	0.33	0.35-1.12	0.78
≥10,000,000	1		
BMI (kg/m <sup>2</sup> )			
<18.5	1.3	0.1-2.03	0.036
18.5-24.9	0.011	0.002-0.058	0.058
25-29.9	0.063	0.013-0.295	0.295
>30	1		

<sup>1</sup> 100,000 Rial = 2.83502 Euro.  
CI = confidence interval; OR = odd's ratio.

4. Discussion

Our findings indicated that the prevalence of food insecurity in an urban low-income sample of northwest of Iran was approximately 36% which among them 21.6% were LFS and 14.6% were VLFS. In the previous report by Sharafkhani *et al.* (2011) the prevalence of LFS and VLFS among 2,442 households in a rural area in northwest of Iran was 39.71 and 20%, respectively. In another study by Ostadrahimi *et al.* (2005) the corresponding values were 41.6 and 26%. More of food insecure individuals were in overcrowded, low income households with lower educational level. These findings were in agreement with the report by Gulliford *et al.* (2003) in Trinidad and Tobago and the study by Dharod *et al.* (2013) among a sample of Somali refugee women in United States.

Our findings also showed that food insecurity increased the rate of underweight and decreased the rate of overweight or obesity. Mean BMI in food insecure subjects was significantly lower than food secure subjects ( $P<0.001$ ). Several previous reports also found similar results; Dastgiri *et al.* (2007) found that 62.3% of food insecure compared with 4.7% of food secure subjects had BMI lower than 18.5 kg/m<sup>2</sup>. In another study by Sarlio-Lateenkorva and Lahelma (2001) underweight subjects were at higher risk of food insecurity than obese or normal subjects. In other research (Guilliford *et al.*, 2003) underweight was associated with food insecurity (odd's ratio (OR)=3.21, 95% confidence interval (CI)=1.17-8.81). On the other hand, several other reports found an association between overweight or obesity

and food insecurity. Chaput *et al.* (2007) reported a positive association between overweight and food insecurity among women (BMI≥25, OR=2.3, CI=1.2-3.4). Dhaod *et al.* (2013) and Townsend *et al.* (2001) found similar results. This controversy might stem from difference from economic status, eating habits and availability of food (Dastgiri *et al.*, 2007).

In our study, men were 1.84 times more likely to be food insecure than women. Moreover, the prevalence of underweight in our male food insecure participants were higher than women. In a study conducted by Wilde and Peterman (2006) using data from National Health and Nutrition Examination Survey the prevalence of food insecurity without hunger among men was slightly higher than women.

These findings were in contrast with several previous studies finding higher prevalence of food insecurity among women; in the report by Guilliford *et al.* (2003) the prevalence of both food insecurity and underweight were higher in men. Hanson *et al.* (2007) also found similar results in a sample of 4,338 men and 4,172 women. As suggested by this author, food insecurity relates differently to body weight for men and women.

Adults in food insecure group consumed significantly lower amounts of milk and dairy products compared with adults in food secure group ( $P=0.05$ ). This finding consistent with previous reports confirmed that dietary inadequacy is prevalent among food insecure participants and further confirms the lower serum concentrations of nutrients in food insecure subjects demonstrated by previous reports (Devaney *et al.*, 2005; Kirkpatrick and Tarasuk, 2008).

Our study had several limitations. First, cross-sectional design of the study makes us unable to address a causal inference between variables. Second, there was no information about smoking habits and physical activities and limitations. These factors had confirmed influence on nutritional status and access to food and therefore might had an impact on food security status (Guilliford *et al.*, 2003). Additionally no laboratory analysis has been made and therefore the possible existence of other disease had not been diagnosed. Third, although the short questionnaire used in the current study has been validated and used in northwest of Iran before, but its validity in other settings may be questionable as the experiences related to food insecurity are specific to those experiencing it in the setting (Wolfe and Frongillo, 2001).

5. Conclusions

In conclusion, our study demonstrated that food insecurity is prevalent in the sample of urban population in Tabriz and was related to BMI and several socioeconomic factors.



Future studies with prospective and longitudinal designs are warranted to further clarify these associations and to consider other effective factors including physical limitations and smoking habits.

## Conflict of interest

The authors declare that there are no conflicts of interest.

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