Journal of Nutrition and Food Security
Shahid Sadoughi University of Medical Sciences
School of Public Health
Department of Nutrition

eISSN: 2476-7425 pISSN: 2476-7417 JNFS 2024; 9(4): 733-743 Website: jnfs.ssu.ac.ir

Food Insecurity and Its Relationship with Food Intake and Demographic Factors in Pregnant Women in Tehran

Mina Haji hosein; MSc[1], Shahryar Eghtesadi; PhD[*2] & Ariyo Movahedi; PhD[2]

[1] Science and Research Branch, Islamic Azad University, Tehran, Iran; [2] Department of Nutrition, Science and Research Branch, Islamic Azad University, Tehran, Iran.

ARTICLE INFO

ORIGINAL ARTICLE

Article history:
Received: 10 Mar 2023
Revised: 15 Jul 2023
Accepted: 25 Jul 2023

Corresponding author:
segtesadi@gmail.com
Azad University Science and Research Branch Shohada Hesarak Bulvard Daneshgah Square Sattari Highway Tehran Iran.

Postal code: 1477893855
Tel: + 98 21 4486517982

Keywords:
Food security; Pregnancy; Nutritional status; Nutritional requirements; Nutritive value

ABSTRACT

Background: Food security is described as physical and economic access for all people at all times to sufficient food for an active and healthy life. The purpose of this study was to investigate the prevalence of food insecurity and its relationship with the health status of pregnant women referred to North Tehran Health Center. **Methods:** The current study is a cross-sectional study conducted on 160 pregnant women in the third trimester covered by North Tehran Health Center in 2017-2018. Food security status, and dietary intake were assessed using general demographic and socioeconomic questionnaires, USDA 18-item household food security, and semi-quantitative food frequency recall, respectively. Statistical analysis was performed using SPSS and nutritionist IV software. Significance level was set at 0.05. **Results:** The study showed that 21.8% of mothers suffered insecure nutritional status and 78.2% of them were in safe nutritional status. There was a significant difference (P=0.013) between the two category of food groups (P=0.013). The mean consumption of legumes in people with insecure nutrition status (65.72±42.40 g) was more than nutrition secure group (50.08±29.77 g). Other food items showed no significant difference between the two groups of safe and unsafe nutrition status. In terms of economic status, there was a significant difference between safe and unsafe groups (P=0.001). **Conclusion:** In this study, food insecurity rate and prevalence of pregnant women was much less than that other studies. Given the role of the economic situation in the ability to purchase and supply food, probably one of the main reasons of more consumption of legumes in insecure groups would be low-income level and lower purchasing power of other food groups, such as meat.

Introduction

Food security is defined as the physical and economic access of all people at all times to sufficient food in order to have an active and healthy life. Limited access to sufficient and safe nutrients or having no access to appropriate food through acceptable methods can lead to food insecurity (Gamba *et al.*, 2016).

Food insecurity is related to consequences such as overweight and obesity, adverse health status, chronic diseases and even mental health. This issue can affect the physical health of the pregnant woman and her child and directly affect the

This paper should be cited as: Haji hosein M, Eghtesadi Sh, Movahedi A. ***Food Insecurity and Its Relationship with Food Jntake and Demographic Factors in Pregnant Women in Tehran.*** *Journal of Nutrition and Food Security (JNFS)*, 2024; 9(4): 733-743.

[DOI: 10.18502/jnfs.v9i4.16902]

nutritional status and serum characteristics of micronutrients, such as iron (Alabi and Ngwenyama, 2023, Demétrio *et al.*, 2020).

The Food and Agriculture Organization of the United Nations (FAO) report on food insecurity revealed that in 150 countries of the world, 9.3% of people suffer from severe food insecurity (IFAD and UNICEF, 2017). The food security status has worsened in Sub-Saharan Africa and Southeast and West Asia. On the other hand, the prevalence of food insecurity in developing and developed countries is between 6% and 73% (Demétrio *et al.*, 2020, Pandey and Fusaro, 2020). The prevalence of food insecurity is also increasing in Iran. The prevalence of this phenomenon was 49% among households, 67% among children, 61% among mothers, 49% among adults, and 65% among the elderly (Behzadifar *et al.*, 2016).

During pregnancy, there is an increase in the demand for energy, micronutrients, essential amino acids and fatty acids for the growth of new tissues, such as the fetus and existing tissues (Ciulei *et al.*, 2023, Gernand *et al.*, 2016). Food insecurity during pregnancy is an important factor in adverse maternal and infant outcomes. Nutritional status during pregnancy not only affects the current health status of women and babies, but also plays a crucial role in the future health status of children and adults. Therefore, food insecurity is associated with maternal complications including low birth weight, increased risk of congenital disabilities, such as cleft palate, and increased mortality caused by pregnancy (Norris *et al.*, 2022, Renyoet and Nai, 2019, Sholeye *et al.*, 2014). Age, education of the head of the household, economic status, not having a stable job, single parenting, ethnicity, increasing size of the household, and food habits of the region are among the effective factors of food insecurity (Fathi Beyranvand *et al.*, 2019).

It is possible to evaluate the mother's nutritional status through measurements, such as pre-pregnancy weight, weight gain during pregnancy, body mass index (BMI), and mother's height. Some of these values, such as the mother's height, indicate her nutritional status in the long term, and others, such as weight gain during pregnancy, indicate the mother's nutritional status during pregnancy. The weight and height of the mother are the most critical factors determining the baby's birth weight. Mothers who weigh less than normal are at greater risk of adverse birth complications such as premature birth or intrauterine growth restriction (Schieve *et al.*, 2000).

During pregnancy, according to the physiological changes in the mother's body, the metabolism of food and even the need for it also changes, and a suitable food plan is needed for this period. In order to provide nutrients during pregnancy, it is necessary to use 4 to 5 food groups with diversity and balance (Pandey and Fusaro, 2020). Thus, this study aims to investigate the prevalence of food insecurity and its relationship with food intake and demographic factors in pregnant women referring to the North Health Center of Tehran.

Materials and Methods

Study design and participants

The present study is an analytical cross-sectional study conducted on 160 pregnant women referred to the North Health Center of Tehran in 2017 and the first three months of 2018. The target population included pregnant women referring to North Tehran Health Center, which includes 21 urban community health centers and 57 community health sub centers. The number of pregnant women in different months of pregnancy under the coverage of this center is about 2000 women. The sample size was calculated using GPower software with study settings based on two modes of multiple linear regression and the need to compare between two groups of food secure and food insecure. The highest number of individuals estimated in the above situations was equal to 73 people in each group, and considering the 10% probability of dropout, 80 individuals in each group and 160 in all samples were included in the study. They were selected among the centers covered by the North Tehran Health Center and volunteers who met the study criterion using random cluster sampling. Then, they were asked to complete the related questionnaires.

[DOI: 10.18502/jnfs.v9i4.16902]

Measurements

General information, food security status, and food intake were investigated using general demographic and socioeconomic status questionnaires, USDA 18-item household food security, and semi-quantitative food frequency questionnaire (FFQ). All pregnant women who met the inclusion criterion referred to the nutrition department by the health care provider of the community health center. After explaining the purpose of the study and obtaining written informed consent from the women, the interviewer completed the first part of the general questionnaire of demographic characteristics and socioeconomic factors and then food security and frequency questionnaires. Based on the calculated score of food security status, mothers were divided into two food secure and food insecure groups. This questionnaire had two parts. The first part contained 13 questions including age, weight at the beginning of pregnancy, height, BMI at the beginning of pregnancy, mother's occupation, occupation of the head of the family, education level, number of household items, number of births, family size, history of abortion and history of low-birth-weight babies. They were completed during the first visit of the mother in the third trimester using the electronic file and an interview with the mother. The second part was completed after the baby's birth. This part contained ten questions including weight gain during pregnancy, anemia during pregnancy, thyroid disorders during pregnancy, bacterial vaginitis, and history of pregnancy complications.

Food security in the studied women was calculated using the Household Food Security Questionnaire (USDA). This questionnaire, examining the food security situation of the household in the last 12 months, was completed by interviewing the pregnant women. This questionnaire was validated and confirmed during a study on households in Shiraz city (Ramesh *et al.*, 2010). The scoring of 18-item USDA was based on the method of Bickel et al. Accordingly, a positive score (1 point) was allocated to the answers "most of the time true" and "sometimes true" to questions 1 to 3 and 11 to 13 and "almost every month" and "some months" in questions 5, 10, and 16 and the answer "yes" to questions 4, 6 to 9, 14 and 15, 17 and 18, and zero point was given to answers "not true," "don't know or refuse," "only 1 or 2 months" and "no". The final score of the food security questionnaire was calculated according to the number of positive answers (Nord, 2009).

A FFQ designed in the fourth stage of the nutrition cohort in Tehran sugar and lipid study was used to evaluate food intake. It evaluated the individual's usual food intake during the last year. The FFQ includes a list of 147 food items along with a standard size of each food item. It should be mentioned that the validity and reliability of this questionnaire were evaluated in the study by Esmailzadeh in Tehran in 2003 (Esmailzadeh *et al.*, 2004). All 147 food items were divided into 16 subgroups (grains and starches, legumes, meat, fast food, viscera, dairy, vegetables, condiments, fruit, dry, oils, sugary substance, tea and coffee, salt, snacks, and spices). Then based on food intake of each person, total amount of each subgroup food intake was calculated by Nutritionist IV software.

Ethical consideration

The project was approved by Ethics Committee for Human Studies of health Science in nutrition of the Islamic Azad University Science and Research Branch Under the ethic code of IR.IAU.SRB.REC.195.53

Data analysis

The obtained information was analyzed using SPSS statistical software (version 23). Mean (standard deviation) were used to describe quantitative variables according to conditions, and frequency report (percentage) was used for qualitative variables. An independent t-test was used to compare the mean value of quantitative outcomes between the two study groups. Chi-squared test or Fisher's exact test was used to compare qualitative factors between two groups. Pearson's correlation test and multivariate regression were also used to investigate the relationship between the anthropometric indices of

[DOI: 10.18502/jnfs.v9i4.16902]

newborns and the studied variables. Moreover, analysis of food items , FFQ forms was done using Nutritionist IV software. P-value < 0.05 was considered statistically significant.

Results

The study showed that 21.8% of mothers had food insecurity, and 78.2% were in secure food situations. Also, among people with food insecurity, 20% of people had food insecurity without hunger, 1.2% had moderate hunger, and 0.6% experienced severe hunger (**Table 1**). People with safe and unsafe food status in the age range of 25 to 34 years had the highest frequency (73.4% and 58.3%, respectively), and the lowest frequency was observed in the age range of 35 to 41 years (1.8% and 11.1%, respectively). In terms of age, no significant difference was observed in the two food groups (*P*=0.213). In the food security, people with postgraduate diplomas and bachelor education levels (56.6%), and in the food insecurity, people with diploma and under-diploma education levels (61.1%) had the highest frequency.

Regarding education level, no significant difference was observed between food security and insecurity groups (*P*=0.082). Housewives had the highest frequency in food security and insecurity groups, with 78.2% and 80.6%, respectively, and working mothers had the lowest frequency, with 8.1% and 2.8%, respectively. There was no significant difference (*P*=0.516) between the two food groups in terms of mother's employment status, and there was no significant difference (*P*=0.075) between the two food groups with the employment status of the head of the household. Families with three members in two food security and insecurity groups had the highest frequency with 50.4% and 47.2%, respectively. No significant relationship (*P*=0.332) was observed regarding household dimensions and nutritional status. In food security group, people with average economic status had the highest frequency (79.68%), and people with high economic status had the lowest frequency (8.94%). In food insecurity group, people with poor nutritional status had the highest frequency (54.28%), and people with high economic status had the lowest frequency (3.14%). A significant difference (*P*=0.001) was observed between the two food groups regarding economic status (**Table 2**).

Table 1. Frequency and percentage of maternal food security groups.

Food security groups	n	%
Food security	124	78.2
Food insecurity without hunger	33	20
Food insecurity with moderate hunger	2	1.2
Food insecurity with severe hunger	1	0.6

The results of the present study did not show any significant difference in terms of fertility factors of mothers in food security and insecurity group (**Table 3**). According to the results of **Table 3**, mothers with a history of childbirth in food security and insecurity groups had the highest frequency (57% and 54.3%, respectively), and mothers without a history of childbirth had the lowest frequency (11.6% and 14.3%, respectively) (*P*=0.905). Mothers without a history of abortion had the highest frequency in the two groups, with 89.4% and 91.7%, respectively (*P*=0.999). Also, in terms of the history of low-birth-weight babies, 89.4% and 97.1% of the studied groups had no history of low-birth-weight babies (*P*=0.395). Mothers benefiting from 5 to 10 care sessions during pregnancy had the highest frequency in both groups, with 48.2% and 45.8%, respectively (*P*=0.270). Mothers with no history of bacterial vaginosis had the highest frequency in food security and insecurity groups (93.4% and 97.1%, respectively). No significant relationship was observed between the history of bacterial vaginosis with food security and insecurity (*P*=0.685). There was no significant relationship between the history of anemia and food security and insecurity (*P*=0.786). Mothers without pregnancy disorders had the highest frequency in the food security and insecurity groups, with 92.7% and 100%, respectively (*P*= 0.208).

[DOI: 10.18502/jnfs.v9i4.16902]

Table 2. The relationship between nutritional status and demographic variables in mothers.

Variable	Insecure (n=36)		Secure (n=124)		P-value[a]
	n	%	n	%	
Age(years)					
15-24	11	30.6	23	18.5	0.213
25-34	21	58.3	91	73.4	
35-41	4	11.1	10	8.1	
Mother's educational level					
Under diploma and diploma	22	61.1	50	41.0	0.082
Postgraduate diplomas and bachelor education	14	38.9	69	56.6	
MS and PhD	0	0.0	3	2.5	
Mother's occupation					
Housewife	29	80.6	97	78.2	0.516
Businesswoman	6	16.7	17	13.7	
Employee	1	2.8	10	8.1	
Father's occupation					
Employee	3	8.3	13	10.5	0.075
Businessman	18	50.0	83	66.9	
Manual worker	15	41.7	28	22.6	
Family size					
<3	11	30.6	24	19.5	0.332
3	17	47.2	62	50.4	
3<	8	22.2	37	30.1	
Economic Situation					
Weak	19	54.2	14	11.3	0.001
Medium	15	42.5	98	79.6	
Strong	1	3.1	11	8.9	

[a]: *Chi-square or Fisher's exact test.*

The results of the present study did not show any significant difference in terms of fertility factors of mothers in food security and insecurity group (**Table 3**). According to the results of **Table 3**, mothers with a history of childbirth in food security and insecurity groups had the highest frequency (57% and 54.3%, respectively), and mothers without a history of childbirth had the lowest frequency (11.6% and 14.3%, respectively) (*P*=0.905). Mothers without a history of abortion had the highest frequency in the two groups, with 89.4% and 91.7%, respectively (P=0.999). Also, in terms of the history of low-birth-weight babies, 89.4% and 97.1% of the studied groups had no history of low-birth-weight babies (*P*=0.395). Mothers benefiting from 5 to 10 care sessions during pregnancy had the highest frequency in both groups, with 48.2% and 45.8%, respectively (*P*=0.270). Mothers with no history of bacterial vaginosis had the highest frequency in food security and insecurity groups (93.4% and 97.1%, respectively). No significant relationship was observed between the history of bacterial vaginosis with food security and insecurity (*P*=0.685). There was no significant relationship between the history of anemia and food security and insecurity (*P*=0.786). Mothers without pregnancy disorders had the highest frequency in the food security and insecurity groups, with 92.7% and 100%, respectively (*P*=0.208).

[DOI: 10.18502/jnfs.v9i4.16902]

Table 3. The relationship between nutritional status and fertility factors in mothers.

Variable	Insecure (n=36)		Secure (n=124)		P-value[a]
	n	%	n	%	
Birth history					
No birth	5	14.3	14	11.6	0.905
One childbirth	19	54.3	69	57	
Two or more births	11	31.4	38	31.4	
History of Abortion					
No	33	91.7	110	89.4	0.999
Yes	3	8.3	13	10.6	
History of low birth weight babies					
No	34	97.1	122	99.2	0.395
Yes	1	2.9	1	0.8	
Number of care sessions					
<5	10	41.7	23	27.1	
5-10	11	45.8	41	48.2	0.270
11-15	3	12.5	12	14.1	
16<	0	0	9	10.6	
History of bacterial vaginosis					
No	34	97.1	113	93.4	0.685
Yes	1	2.9	8	6.6	
History of anemia					
No	32	88.9	106	86.2	0.786
Yes	4	11.1	17	13.8	
Pregnancy disorders					
No	35	100	115	92.7	0.208
Yes	0	0	9	73	

[a]: *Chi-square or Fisher's exact test.*

The average BMI of pregnant women in food security and food insecurity was 24.47±3.15 and 24.65±3.26 kg/m^2, respectively, and no significant difference (P=0.734) was observed between the two groups in terms of BMI. Considering other anthropometric indices of pregnant women, no significant difference was observed between the two groups (**Table 4**).

Table 4. Comparison of anthropometric indices of mothers between two secure and insecure groups.

Variable	Insecure (n=36)	Secure (n=124)	P-value[a]
Mother's Age (years)	27.67±4.53[b]	29.15±4.39	0.078
Mother's Height (cm)	161.11±7.05	162.32±3.81	0.177
Weight at the beginning of pregnancy (kg)	63.51±7.89	64.04±8.18	0.734
BMI at the beginning of pregnancy (kg/m^2)	24.65±3.26	24.47±3.15	0.758

[a]: *Independent t-test;* [b]: *Mean±SD.*

The results of the current study showed that (**Table 5**), among the items of food groups, the consumption of legumes had a significant difference between the two groups (P=0.013). The average daily consumption of legumes in people with food insecurity was 72.42±40. 65 g, which was more than food security (50.08±29.77 g). No significant difference was observed between the two groups considering other food items. Among the food items in the food security, the average daily consumption of grains and starches (492.79±242.90 g) was more than other food items, and daily salt consumption (2.21±1.26 g) had the lowest mean consumption in the food security.

[DOI: 10.18502/jnfs.v9i4.16902]

Table 5. Comparison of the consumption of different daily food consumption (g) in two secure and insecure food groups.

Foods	Insecure (n=36)	Secure (n=124)	P-value[a]
Grains and starches	506.11±259.58[b]	492.79±242.90	0.776
Legumes	65.72±42.40	50.08±29.77	0.013
Meat	54.99±46.62	56.63±39.82	0.835
Fast Food	7.96±9.45	11.88±18.01	0.212
Viscera	0.81±1.21	3.87±31.18	0.559
Dairy	370.17±233.85	397.92±240.15	0.540
Vegetables	205.80±130.72	197.78±126.84	0.741
Condiments	36.25±40.63	31.25±36.45	0.481
Fruits	242.37±203.38	247.15±198.99	0.900
Dry	13.04±17.12	17.52±27.58	0.358
Oils	22.65±12.75	22.06±19.09	0.861
Sugary substance	51.69±55.61	56.57±68.61	0.696
Tea and coffee	301.09±210.17	285.90±180.86	0.670
Salt	2.54±1.60	2.21±1.26	0.195
Snacks	5.26±6.95	63.51±7.89	0.653
Spice	2.17±1.39	24.65±3.26	0.811

[a]: *Independent t-test;* [b]: *Mean±SD.*

Discussion

In the current study, the prevalence of food insecurity in the studied mothers was 21.8%, of which 0.6% had severe food insecurity, 1.2% had moderate food insecurity, and 20% had food insecurity without hunger. In Tabriz (Dastgiri *et al.*, 2009), the prevalence of food insecurity was 36.3%; in Shiraz (Ramesh *et al.*, 2010), it was 44%; in Dezful (Hakim *et al.*, 2010), it was 37.6%, in Khoi (Sharafkhani *et al.*, 2011), it was 59.6%, in Bushehr (Mohammadpourkhadeh *et al.*, 2010), it was 86%, and in a study in Tehran (Hojaji *et al.*, 2015), it was 34.8%, indicating higher food insecurity compared to the present study. Moreover, in a study conducted in New York (Kendall *et al.*, 1995), the prevalence of food insecurity was reported 25.9%. Nasrabadi et al. (Mohammadi *et al.*, 2008) reported that the prevalence of food insecurity was 18.2%, indicating a lower prevalence than the present study. A study conducted in 2013 on mothers referring to health centers in the northwest of Tehran reported that the prevalence of food insecurity in these mothers was 34.8%. Also, this study revealed that living in food-insecure households can increase the risk of pregnancy complications (Hojaji *et al.*, 2015). The difference in the results of the studies can be due to the difference in the scale utilized in the study of food insecurity, the difference in the samples and communities under study, and the size of different samples. Therefore, due to the difference in the measurement scale of food insecurity, it is difficult to compare accurately the prevalence of food insecurity in pregnancy in different populations.

In the present study, no significant relationship was observed between food insecurity status of pregnant mothers and age. In the study of Hajji in Tehran (Hojaji *et al.*, 2015), Ramesh in Shiraz (Ramesh *et al.*, 2010), Hakim's study in Dezful (Hakim *et al.*, 2010) and Biranvand in Khorramabad (Fathi Beyranvand *et al.*, 2019), no significant relationship was observed between food insecurity and women's age. The lack of relationship between age and food insecurity can be due to the same distribution of age groups of pregnant mothers.

In the results of the present study, no significant difference was observed between the level of education and nutritional status. However, the studies by Zarafati *et al.* (Zerafati SHoae, 2014)

[DOI: 10.18502/jnfs.v9i4.16902]

and Hajji in Tehran (Hojaji *et al.*, 2015) showed a significant relationship between food insecurity and mother's education level.

No significant relationship was also observed between mother's occupational status, household head's occupational status, and household dimension with nutritional status. However, in the study by Zarafati *et al.*(Zerafati SHoae, 2014) on food security of urban households in the 20th district of Tehran, food insecurity showed a significant relationship with the household dimension and father's job position. The study of Tasgiri *et al.* in Tabriz (Dastgiri *et al.*, 2009), Ramesh in Shiraz (Ramesh *et al.*, 2010), Hakim's study in Dezful (Hakim *et al.*, 2010), Hajji in Tehran (19) showed a significant relationship between increasing household size and food insecurity.

The lack of significant difference in this study in terms of the variables mentioned can be caused by the closeness and similarity of different variables between the two groups in comprehensive health centers and health centers in the north of Tehran, which covers only 4 areas of Tehran. These regions have similar structural and demographic structure.

In the present study, a significant difference was observed between economic status and food security. Food insecurity was observed more in families with poor nutritional status. Nevertheless, the results of the study are consistent with the study of Zerafati in Tehran (Zerafati SHoae, 2014), Dastgiri in Tabriz (Dastgiri *et al.*, 2009), Ramesh in Shiraz (Ramesh *et al.*, 2010), Hakim in Dezful (Hakim *et al.*, 2010), and Hojaji in Tehran (Hojaji *et al.*, 2015). In a study conducted in New York by Kendall (Kendall *et al.*, 1995), a significant relationship was reported between food insecurity and low economic status.

In the current study, no significant difference was found in the two food groups concerning BMI. However, in the study of Hakim in Dezful (Hakim *et al.*, 2010) and Mohammad poor in Bushehr (Mohammadpourkhadeh *et al.*, 2010), the average BMI in food insecurity group was significantly higher than in food security group. In a study conducted in Uganda (Chaput *et al.*, 2007), anthropometry and obesity index were higher in food-insecure women compared to food-secure women.

The results of the present study indicated that factors such as birth history, abortion history, and care during pregnancy had no significant difference with nutritional status. Also, regarding pregnancy disorders, the history of anemia and bacterial vaginosis did not significantly differ with nutritional status. However, Hojaji's study in Tehran (Hojaji *et al.*, 2015) reported a significant relationship between pregnancy disorders and food insecurity.

The present study showed a significant difference in the consumption of legumes between the two food-secure and food-insecure groups, and the average daily consumption of legumes in people with food insecurity was 65.72±42.40 g, and food security was 77.29±08.50. There were no significant differences between other food items and food security and insecurity. However, in the study of Dastigiri *et al.* (Dastgiri *et al.*, 2009), the findings related to the frequency of food consumption showed that the average frequency of bread and potato consumption in the insecure group was significantly higher than that of the secure group and the average frequency of consumption of rice, vegetable, fruit, red meat, and dairy products in the insecure group was significantly lower than the secure group. Zarafati *et al.*'s study (Zerafati SHoae, 2014) also showed that by increasing food insecurity, the consumption of bread and potatoes increases significantly, and the consumption of red meat, rice, fruits, vegetables, and dairy products decreases significantly. In their study, Tara Suk *et al.* (Tarasuk, 2001) showed that the intake of vegetables, fruits, and meat is lower in women with low food security status. Moreover, Isanaka *et al.* (Isanaka *et al.*, 2007) found an inverse relationship between food insecurity and protein intake. Some studies have observed dietary patterns with higher fat and refined carbohydrates and fewer fruits and vegetables, whole grains, fish, and chicken in insecure

[DOI: 10.18502/jnfs.v9i4.16902]

households (van Dam *et al.*, 2002). Champagne *et al*. did not observe a relationship between food security and carbohydrate and protein intake in their study (Champagne *et al.*, 2007).

Among the limitations of the present study, it can be mentioned that the study was carried out in an urban area, which is at the same economic and social level in terms of economic status; therefore, most of the investigated characteristics of the society in question had the same distribution. Also, non-participation of some pregnant women was one of the limitations of the study.

Conclusion

According to the results of this study, the prevalence of food insecurity among pregnant women was less than other studies, and no significant relationship was found between the studied variables except for the consumption of legumes and economic status. Considering the role of the economic status in affording different food items, it can be concluded that one of the main reasons for the higher consumption of legumes in insecure group is their low-income level and lower purchasing power.

Acknowledgment

The authors of the article consider it necessary to thank all the employees of North Tehran Health Center and all the people who participated in this study. This article is taken from the master's thesis in the field of health sciences in nutrition of the Faculty of Medical Sciences and Technologies, Science and Research Branch, Islamic Azad University.

Conflict of interest

There is no conflict of interest between the authors and in the implementation of this project

Author's Contributions

Hajihosein M, Eghtesadi Sh, and Movahedi A designed the research; Hajihosen M conducted the research; Movahedi A analyzed the data; and Hajihosein M, Eghtesadi Sh, and Movahedi A wrote the paper. Eghtesadi Sh had primary responsibility for final content. All authors read and approved the final manuscript.

Funding

This Project was carried out by personal fund.

References

Alabi MO & Ngwenyama O 2023. Food security and disruptions of the global food supply chains during COVID-19: building smarter food supply chains for post COVID-19 era. *British food journal.* **125 (1)**: 167-185.

Behzadifar M, et al. 2016. Prevalence of Food Insecurity in Iran: A Systematic Review and Meta-analysis. *Archives of Iranian Medicine.* **19 (4)**: 288-294.

Champagne CM, et al. 2007. Poverty and food intake in rural America: diet quality is lower in food insecure adults in the Mississippi Delta. *J Am Diet Assoc.* **107 (11)**: 1886-1894.

Chaput JP, Gilbert JA & Tremblay A 2007. Relationship between food insecurity and body composition in Ugandans living in Urban Kampala. *J Am Diet Assoc.* **107 (11)**: 1978-1982.

Ciulei MA, et al. 2023. Nutritious Supplemental Foods for Pregnant Women from Food Insecure Settings: Types, Nutritional Composition, and Relationships to Health Outcomes. *Current developments in nutrition* **7(6)**: 100094.

Dastgiri S, Sultanali M, Totouchi H & Rahimi A 2009. Factors Affecting Food Security: A Cross-Sectional Study in Tabriz, Iran, 2004-2003. *Journal of Ardabil University of Medical Sciences.* **6 (3)**: 233-239.

Demétrio F, Teles CAdS, Santos DBd & Pereira M 2020. Food insecurity in pregnant women is associated with social determinants and nutritional outcomes: a systematic review and meta-analysis. *Ciência & Saúde Coletiva.* **25**: 2663-2676.

Esmailzadeh A, Mirmiran P, Azad Bakht L, Sohrab G & Azizi F 2004. Predictors of cardiovascular risk factors in adults from Tehran. *Razi journal of medical sciences.* **10 (37)**: 789-797.

Fathi Beyranvand H, Eghtesadi S, Ataie-Jafari A & Movahedi A 2019. Prevalence of Food Insecurity in Pregnant Women in Khorramabad City and its Association with General Health and

[DOI: 10.18502/jnfs.v9i4.16902]

other Factors. *Iranian journal of nutrition sciences & food technology*. **14 (3)**: 21-30.

Gamba R, Leung CW, Guendelman S, Lahiff M & Laraia BA 2016. Household food insecurity is not associated with overall diet quality among pregnant women in NHANES 1999–2008. *Maternal and child health journal.* **20**: 2348-2356.

Gernand AD, Schulze KJ, Stewart CP, West KP, Jr. & Christian P 2016. Micronutrient deficiencies in pregnancy worldwide: health effects and prevention. *Nature reviews endocrinology*. **12 (5)**: 274-289.

Hakim S, Dorosty AR & Eshraghian M 2010. Association of food insecurity and household socio-economic status with the body mass index among urban women in Dezful. *Journal of school of public health and institute of public health research.* **8 (2)**: 55-66.

Hojaji E, Zavoshy R, Noroozi M & Jahanihashemi H 2015. Assessment of household food security and its relationship with some pregnancy complications. *Journal of Mazandaran University of Medical Sciences.* **25 (123)**: 87-98.

IFAD & UNICEF 2017. The state of food security and nutrition in the world 2017.

Isanaka S, Mora-Plazas M, Lopez-Arana S, Baylin A & Villamor E 2007. Food insecurity is highly prevalent and predicts underweight but not overweight in adults and school children from Bogota, Colombia. *Journal of nutrition.* **137 (12)**: 2747-2755.

Kendall A, Olson CM & Frongillo EA, Jr. 1995. Validation of the Radimer/Cornell measures of hunger and food insecurity. *Journal of nutrition.* **125 (11)**: 2793-2801.

Mohammadi F, Omidvar N, Houshiar Rad A, Mehrabi Y & Abdollahi M 2008. Association of food security and body weight status of adult members of Iranian households. *Iranian journal of nutrition sciences & food technology*. **3 (2)**: 41-53.

Mohammadpourkhadeh M, Fouladvand MA & Awokh Kisami M 2010. Food insecurity as a risk factor for obesity in low-income women in Bushehr. *South medicine.* **13 (4)**: 263-272.

Nord M 2009. Food insecurity less prevalent in Canada than in the United States. *Amber Waves.* **7 (2)**: 4.

Norris SA, et al. 2022. Nutrition in adolescent growth and development. *Lancet.* **399 (10320)**: 172-184.

Pandey S & Fusaro V 2020. Food insecurity among women of reproductive age in Nepal: prevalence and correlates. *BMC public health.* **20**: 1-11.

Ramesh T, Dorosty Motlagh A & Abdollahi M 2010. Prevalence of household food insecurity in the City of Shiraz and its association with socio-economic and demographic factors, 2008. *Iranian journal of nutrition sciences & food technology*. **4 (4)**: 53-64.

Renyoet BS & Nai HME 2019. Estimasi potensi kerugian ekonomi akibat wasting pada balita di indonesia. *Indonesian journal of nutrition).* **7 (2)**: 127-132.

Schieve LA, et al. 2000. Prepregnancy body mass index and pregnancy weight gain: associations with preterm delivery. The NMIHS Collaborative Study Group. *Obstetrics & Gynecology*. **96 (2)**: 194-200.

Sharafkhani R, Dastgiri S, Gharaaghaji Asl R & Ghavamzadeh S 2011. Prevalence of The Household Food Insecurity and Its Influencing Factors: A Cross-Sectional Study (Khoy City-Qaresoo-2009). *Urmia medical journal.* **22 (2)**: 123-128.

Sholeye OO, Jeminusi OA, Orenuga A & Ogundipe O 2014. Household food security among pregnant women in Ogun-East senatorial zone: a rural urban comparison. *Journal of public health and epidemiology*. **6 (4)**: 158-164.

Tarasuk VS 2001. Household food insecurity with hunger is associated with women's food intakes, health and household circumstances. *Journal of nutrition.* **131 (10)**: 2670-2676.

van Dam RM, Rimm EB, Willett WC, Stampfer MJ & Hu FB 2002. Dietary patterns and risk for type 2 diabetes mellitus in US men. *Annals of internal medicine.* **136 (3)**: 201-209.

[DOI: 10.18502/jnfs.v9i4.16902]

Zerafati SHoae N 2014. Validity of Modified Radimer Questionnaire Kornel in assessing household food security Urban area of 20th city of Tehran. Shahid Beheshti University of Medical Sciences: Tehran.

[DOI: 10.18502/jnfs.v9i4.16902]