

Association of socioeconomic status and food security with anthropometric indices among 2-5-year-old urban and rural children in Hamedan city

Golnaz Majdizadeh ¹, Zahra Vafaei Mastanabady ¹, Zahra Zare ¹, Mena Farazi ¹, Zahra Mohammadzadeh ¹, Ariyo Movahedi ¹, Mina Minaie ², Zahra Abdollahi ², Ahmadreza Dorosty Motlagh ³, Maryam Zarei ⁴, Arezoo Kavei ⁵, Hassan Hamed ⁶

¹ Department of Nutrition, Science and Research Branch, Islamic Azad University, Tehran, Iran

² Community Nutrition Department, Ministry of Health and Medical Education, Tehran, Iran

³ Department of Community Nutrition, School of Nutritional Sciences & Dietetics, Sports Medicine Research Center, Tehran University of Medical Sciences, Tehran, Iran

⁴ Department of Community Nutrition, Ministry of Health and Medical Education, Tehran, Iran

⁵ Department of Nutrition Improvement, Deputy of Health, Hamadan University of Medical Sciences and Health Services, Hamedan, Iran

⁶ Department of Food Safety and Hygiene, Science and Research Branch, Islamic Azad University, Tehran, Iran

ARTICLE INFO

Original Article

Article history:

Received 18 August 2019

Revised 22 November 2019

Accepted 03 December 2019

Available online 15 December 2019

Keywords:

Food security

Anthropometric indices

Hamedan city

Pediatric

ABSTRACT

Food insecurity is one of the issues that have a serious impact on the nutritional status of all individuals in society, especially children and given that food insecurity can be a precursor of health, developmental and nutritional problems, determining the factors associated with it, is also essential in any community it seems. According to this, this study aimed to determine the relationship between food security, socioeconomic status and anthropometric indices in children 2-5 years in Hamedan city. In this analytical descriptive cross-sectional study, 683 children 2-5 years (360 boys, 323 girls) from Hamedan city and villages were selected by systematic cluster sampling methods from the Hamedan University of Medical sciences. HFLAS 9-item questionnaire to investigate food security, and also, a general questionnaire was completed through interviews with mothers of children. Also, children of anthropometric Z scores were measured by using the world health organization (WHO) Anthro software basal on WHO 2007 standards. Eventually, data were analyzed by SPSS software. According to this study, there was a significant correlation between the mother's and father's education and occupation, frequency of snack and food security with children's weight for age ($p < 0.05$). Also, there was a significant correlation between the mother's and father's job, frequency of snack with children's weight for height ($p < 0.05$). While BMI for age had a significant correlation with maternal education, ($p < 0.05$). Also, height for age correlated with the mother's education and occupation, father's education, number of snacks and food security ($p < 0.05$). Also, no significant difference was found between other components ($p > 0.05$). The result of this study shown that there was a significant correlation between food security, Z score height for age, Z scores BMI for age, mother's and father's education, mother's job and socioeconomic status of the household.

© 2019 Science and Research Branch, Islamic Azad University. All rights reserved.

1. Introduction

Obesity of children in the 21st century is one of the serious health problems. This is a global problem that has an increasing incidence in many low-income and middle-income countries. In 2016, more than 41 million children were

overweight and obese, of which almost half were in Asia and quarter in Africa. With an increase in obesity and overweight, it is expected to reach 70 million in 2025. Since that overweight and obesity in children could in the future lead to diseases such as cardiovascular diseases and insulin resistance. Changing lifestyle (healthy diet, physical activity) will be very

* Corresponding author: Department of Food Safety and Hygiene, Science and Research Branch, Islamic Azad University, Tehran, Iran.
E-mail address: hamedih@ut.ac.ir (Hassan Hamed)

influential in reducing the prevalence of overweight and obesity in children (1). Underweight is one of the most common problems in developing countries, in which one out of every four children under the age of five is underweight. The highest prevalence of underweight in children under the age of 5 is in South Asia. There is also a high prevalence of underweight among children in Sub-Saharan Africa (2). Because of the risk of death of children under the age of 5 with moderate and severe underweight more than other children, consideration of underweight is important in children (3). In Iran, the prevalence of obesity and underweight has been reported to be 13.9 % and 13.4 %, respectively according to national surveys conducted in Iran. The incidence of obesity is higher in the northern provinces of Iran, while the incidence of underweight is higher in the southern provinces, especially in Sistan and Baluchistan (4). Food security, as defined by the world health organization (WHO) means that all people must have access to healthy and nutritious food all times (5). Africa has the highest incidence of food insecurity (more than 256 million people) (6). The causes of food insecurity can be attributed to poverty; unemployment and illiteracy at the household level (7). Food insecurity can lead to high levels of anxiety for access to food at the household level and also lead to hunger in children who are deprived of food and they eventually become malnourished (8). Malnutrition is itself one of the causes of underweight, overweight and obesity in children (9). In other words, food insecurity can sometimes lead to obesity in children, because insufficient household income can lead to buying food with poor nutritional value and using inappropriate dietary patterns, such as increasing fat and sugar intake in the diet and eventually increasing weight and obesity (10). On the other hand, diet consumption lacks the essential nutrients for growth can cause underweight among children of developmental age (11). According to this, this study aimed to determine the relationship between socioeconomic status, food security, and incidence of underweight, overweight and obesity and other anthropometric insides in children age 2-5 years in Hamedan.

2. Materials and methods

In this study, we had 683 participants from Hamedan city aged 2-5 years old. There were 360 boys and 323 girls in this study that 580 of them were in the city and 103 were rural. The data were gathered in the Hamedan Medical Science University. The sampling method was a randomized cluster sampling. After getting approval from the ethics committee the cross-sectional study started. We hold training classes for our questioning team. The questions included the number of children in the family, mother's education, mother's job, father's education, father's job, who is the head of the family, who cares the child, eating breakfast, going or not going to kindergarten, the type of milk using by the child, the history of childhood diseases in last two weeks, child using supplementary, the child using a drug for diseases, mother's conception about her child weight, the number of child main

meals and snacks, socioeconomic status, child breastfeeding time, screen time, the time of playing around, duration of sleep. Food insecurity status was performed based on Iranian. Household Food insecurity Access Scale (HFIAS) (12). The HFIAS is a national food security tool for determining food insecurity in some countries. It includes nine-question of distinguishing food security status among families that adapted to the Iranian people. The weight, height, and body mass index of the children were measured using standard methods, and then we measured the correlation of the data. This paper has expressed data as mean \pm SD and frequencies, using IBM SPSS Statistics Software (V.24, Chicago, IL, USA). The Kolmogorov-Smirnov test was used to test the normality of the data. Independent sample t-test and Mann-Whitney U test based on the data were used to determine the statistical difference between genders. Pearson and Spearman Rho regarding quantitative or qualitative variables were used to test the correlation between factors. For a better conclusion on associated factors to BMI among children, multiple regressions were used. One-way repeated-measures analysis of variance (ANOVA) followed by Turkey's multiple comparison test was used to determine statistical differences of anthropometric indices between food security groups. Differences between groups were considered significantly different when the p-value was <0.05 .

3. Results

According to [Table 1](#), there was a significant correlation between the mother's and father's education and occupation, duration of computer games, playing time outdoors, duration of sleep, frequency of snack and food security with children's weight for age ($p<0.05$). However, there was no significant difference between household size, number of 2-5-year-old households, birth rate, duration of breastfeeding, the number of main meals and food security with children's weight for age ($p>0.05$). Also, according to [Table 2](#), there was a significant correlation between the mother's and father's job, playing time outdoors and frequency of snack with children's weight for height ($p<0.05$). However, there was no significant difference between other components and weight for height ($p>0.05$). While, as [Table 3](#) shows, BMI for age had a significant correlation with maternal education, duration of computer games ($p<0.05$). Whereas, there was no significant difference between other variables such as food security and sleep duration with body mass index (BMI) ($p>0.05$). Also, according to [Table 4](#), height for age correlated with mother's education and occupation, father's education, playing time outdoors, number of snack and food security ($p<0.05$) and no significant difference was found between other components and height for age ($p>0.05$). As shown in figures 1 to 4, the skewness of all weight for age, weight for height, height for age, BMI for age curves negatively to the left. Also, less than 1 % of obesity was seen among children between the ages of 2-5 in Hamadan, while about 5 % were found to be underweight.

Table1. Comparison of the correlation of different factors with weight status for age in children 2-5 years old in Hamedan.

Variable	Correlation Coefficient	Significant Level
Household size	-0.006	0.872
Number of 2-5 year-old children's household	-0.015	0.698
Birth rate	-0.052	0.177
Mother's education	0.201	0.0001
Mother's job	0.125	0.001
Who is the head of the household?	-0.063	0.098
Father's job	0.056	0.141
Father's education	0.145	0.0001
Duration of breast feeding	-0.055	0.154
Duration of watching TV	0.030	0.432
Duration of computer game	0.093	0.015
Duration of playing outdoors	-0.078	0.041
Duration of sleep	-0.078	0.043
Number of main meals	-0.048	0.213
Number of snacks	0.119	0.002
Food security	0.070	0.067

Table 2. Comparison of the correlation of different factors with weight status for height in children 2-5 years old in Hamedan.

Variable	Correlation Coefficient	Significant Level
Household size	0.009	0.821
Number of 2-5 year-old children's household	0.001	0.97
Birth rate	-0.041	0.285
Mother's education	0.121	0.002
Mother's job	0.076	0.047
Who is the head of the household?	-0.005	0.897
Father's job	0.018	0.643
Father's education	0.044	0.248
Duration of breastfeeding	- 0.038	0.318
Duration of watching TV	-0.001	0.978
Duration of computer game	0.118	0.002
Duration of playing outdoors	-0.013	0.728
Duration of sleep	-0.070	0.068
Number of main meals	-0.022	0.571
Number of snacks	0.075	0.049
Food security	0.008	0.827

Table 3. Comparison of the correlation of different factors with BMI for age in children 2-5 years old in Hamedan.

Variable	Correlation Coefficient	Significant Level
Household size	0.013	0.738
Number of 2-5 year-old children's household	0.010	0.791
Birth rate	-0.038	0.322
Mother's education	0.109	0.004
Mother's job	0.071	0.065
Who is the head of the household?	- 0.001	0.981
Father's job	0.013	0.740
Father's education	0.027	0.478
Duration of breast feeding	-0.034	0.381
Duration of watching TV	-0.003	0.938
Duration of computer game	0.121	0.002
Duration of playing outdoors	0.001	0.980
Duration of sleep	-0.073	0.057
Number of main meals	-0.014	0.716
Number of snacks	0.071	0.064
Food security	0.018	0.632

Table 4. Comparison of the correlation of different factors with height for age in children 2-5 years old in Hamedan.

Variable	Correlation Coefficient	Significant Level
Household size	-0.026	0.504
Number of 2-5 year-old children's household	-0.032	0.399
Birth rate	-0.035	0.365
Mother's education	0.163	0.0001
Mother's job	0.097	0.011
Who is the head of the household?	-0.084	0.029
Father's job	0.064	0.095
Father's education	0.166	0.0001
Duration of breast feeding	-0.037	0.331
Duration of watching TV	0.044	0.256
Duration of computer game	0.003	0.929
Duration of playing outdoors	-0.103	0.007
Duration of sleep	-0.37	0.331
Number of main meals	-0.050	0.191
Number of snacks	-0.090	0.019
Food security	0.114	0.003

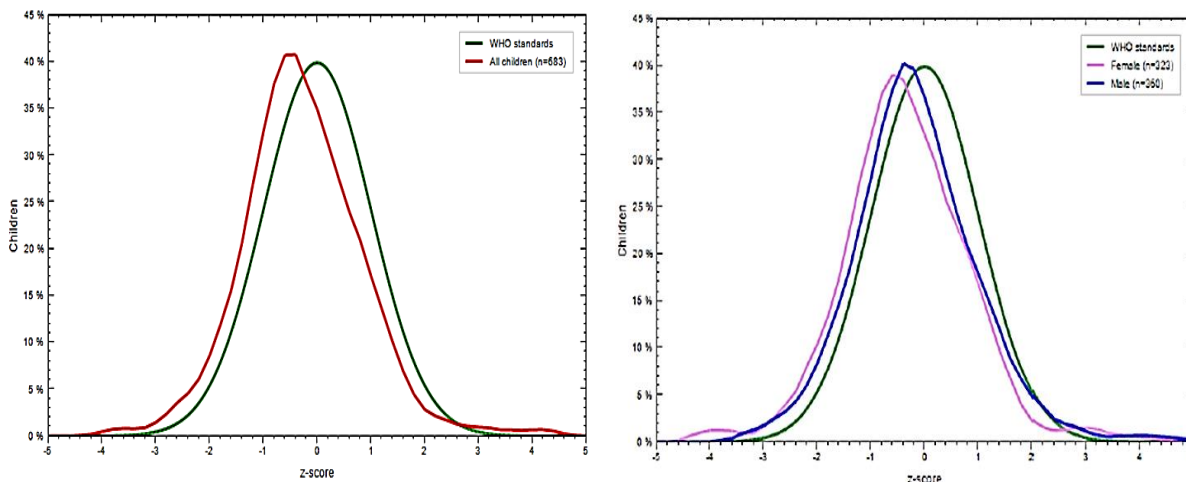


Fig. 1. Weight for age in children 2-5 years old (A), and gender-based comparison of weight for age with WHO standard (B) in Hamedan.

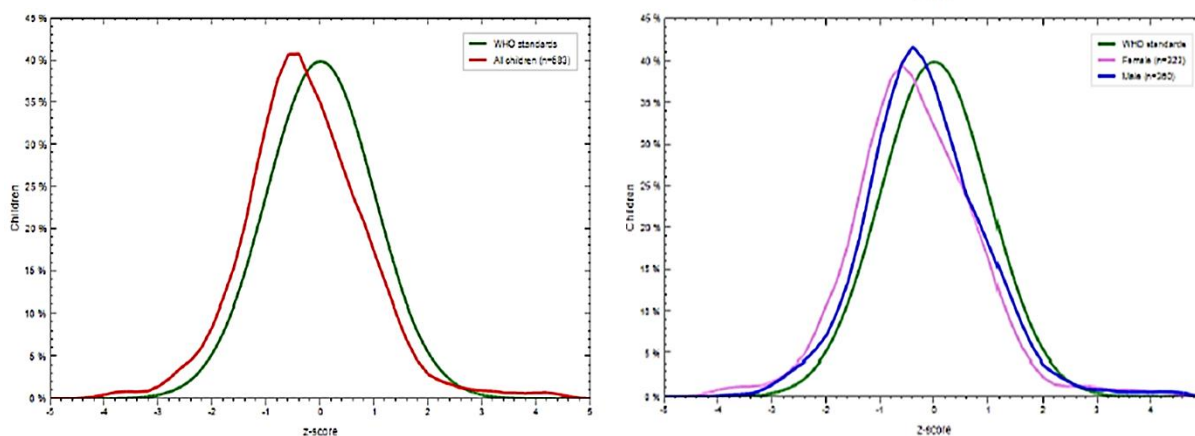


Fig. 2. Weight for height in children 2-5 years old (A), and gender-based comparison of weight for age with WHO standard (B) in Hamedan.

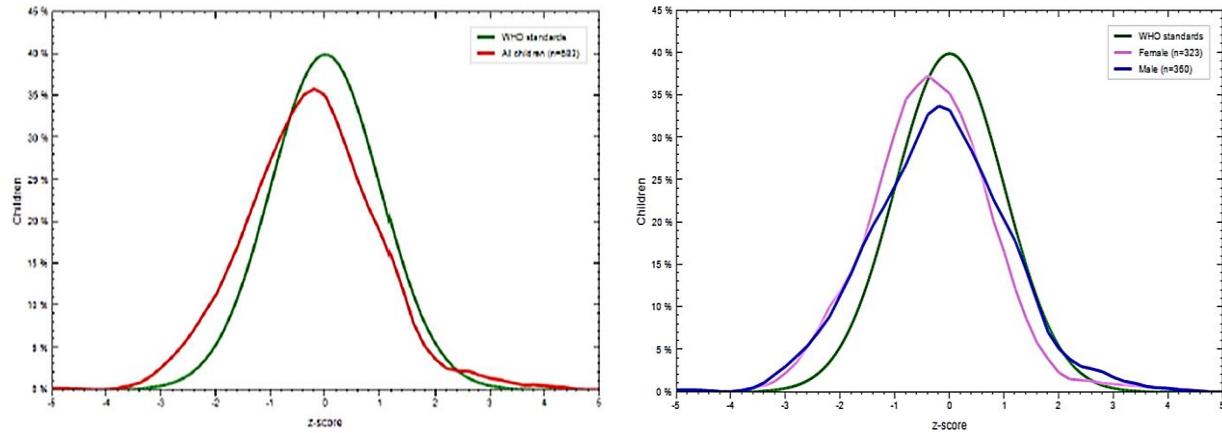


Fig. 3. Height for age in children 2-5 years old (A), and gender-based comparison of weight for age with WHO standard (B) in Hamedan.

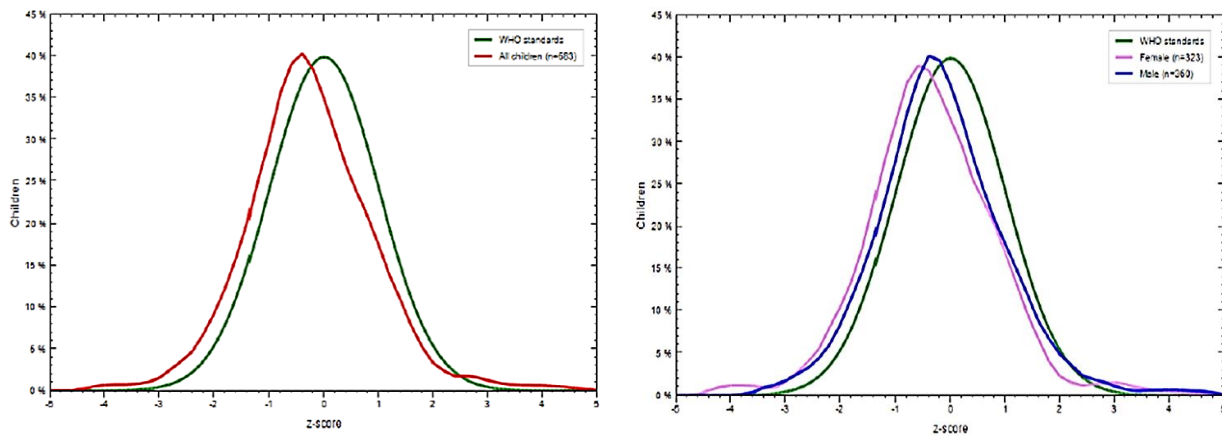


Fig. 4. BMI for age in children 2-5 years old (A), and gender-based comparison of weight for age with WHO standard (B) in Hamedan.

4. Discussion

This study aimed to determine the relationship between food insecurity and anthropometric indices and socioeconomic status among children aged 2-5 in Hamedan. This study showed that the existence of food insecurity in the family in various ways can cause adverse effects such as behavioral and socio-psychological disorders and create adverse health status among family children. The results of this study showed that there is a significant relationship between food insecurity and z-score for height for age in children and food, insecurity can decrease stature growth among children which is in line with the results of some studies. For example, a study conducted in Zabol by Mirshekar et al. (13) on primary school children showed that there was a significant positive relationship between food security and stunting. In the present study, there was a significant relationship between food security status and Z score of body mass index for age in children, which is consistent with the results of some studies. For example, a

study conducted in Yazd by Karam Soltani et al. (14) on primary school children showed that there was a significant positive relationship between food security and obesity after varying levels of fat intake. But Basirat et al. (15) found no association between BMI of children and food insecurity. Also, a study released in 2015 shows that Household food insecurity was not associated with BMI percentile (16). A 2019 study by Poulsen et al. (17) found no association between food insecurity and youth anthropometric. A study on children in Sekela District Western Ethiopia of under five years children showed food insecurity had an association with children underweight, but not with stunting and wasting (18). Also, a study in Iran showed that a significant association was observed household food insecurity and the average height of their 6-year-old children (19). In a study in Kailali of Nepal, there was no significant association between household food insecurity and stunting, underweight, or anemia among children (20). A 2016 study of preschool children showed that although food insecurity and overweight were not

significantly correlated, a significant proportion of insecure children were overweight or obese (21). Also, this present study showed that there is a significant relationship between food insecurity and poverty which is in line with the results of some studies. For example, a study conducted by Mohammadpour Kalde et al. (22) among low-income families in Bushehr showed that food insecurity was an estimated 86% among these households (4). In the United States prevalence of food insecurity in a household below the poverty line, having children and living in the metropolis was above the national average (23). In Canada, food insecurity has been higher in low-income and childbearing households (24). Food insecurity has also been linked to income; employment and food ration among African immigrants (25). In a study conducted by Jafari Sani and Bakhshoude (26) on the distribution of food poverty and insecurity throughout Iran showed that only provinces in urban areas based on f (0) (one of the food safety measures) showed more than 25% food insecurity (in terms of access to minimum calorie requirements). In Chaharmahal and Bakhtiari province was $f(0) = 37.46$. Of course, the same indicator was also measured in the rural areas and Food insecurity in rural areas in the province of Chaharmahal and Bakhtiari was $f(0) = 32.71$, Yazd $f(0) = 29.16$ and Kerman $f(0) = 28.62$. It is noteworthy that in this study, poverty distribution was also studied, with the highest prevalence being in the urban areas of Sistan and Baluchistan province (48.17%), while poverty was reported in Chaharmahal & Bakhtiari province (22.9%). These results indicate that the prevalence of poverty cannot predict food insecurity. The results also show that there is a significant relationship between mother's education and occupation and father's education with a Z score for height for age and Z score for body mass index for age, which correlates with higher education of parents and having a suitable job position. In mothers due to their economic status and knowledge of proper nutrition, it can reduce the risk of malnutrition and food insecurity among children, which is consistent with the results of other studies. For example, a study by DAST et al. (27) in Tabriz showed an inverse relationship between food insecurity and the level of education and occupation of the head of household (6). There are parental education and occupations that are replicated in a study conducted in Bandar Anzali by Safarpur et al. (28).

5. Conclusion

The result of this study shown that there was a significant correlation between food security, Z score height for age, Z scores BMI for age. BMI, which determines a person's weight health according to their height, is associated with food security in this study. Since decreasing BMI and increasing it at an early age affect childhood and adult health. To improve community health, greater attention must be paid to children's food security. Also, this study showed that there was a significant correlation between food security, mother's and father's education, mother's job and socioeconomic status of the household. This illustrates that, the importance of parental

education and the economic level of the household in preventing food insecurity.

References

- Minaie M, Movahedi A, Dorosty Motlagh A, Abdollahi Z, Jazayeri A. Association of socioeconomic status and food security with anthropometric indices among 2-5-years-old urban children in eight different cities in Iran. *International Journal of Preventive Medicine* 2019;10:173.
- Moccia P. (2009). Progress for children: A report card on child protection: UNICEF.
- Lahmann NA, Tannen A, Suhr R. Underweight and malnutrition in home care: A multicenter study. *Clinical Nutrition*. 2016;35(5):1140-6.
- Waxman A. WHO global strategy on diet, physical activity and health. *Food and Nutrition Bulletin*. 2004;25(3):292-302.
- WHO. Nutrition Landscape Information System (NLIS) country profile indicators: interpretation guide. World Health Organization. 2010.
- WHO. The state of food security and nutrition in the world 2018: Building climate resilience for food security and nutrition. World Health Organization. 2018.
- Burgess A. Undernutrition in adults and children: causes, consequences and what we can do. *South Sudan Medical Journal*. 2008;1(2):18-22.
- Borji M, Moradi M, Otaghi M, Tartjoman A. Relationship between nutritional status, food insecurity, and causes of hospitalization of children with infectious diseases. *Journal of Comprehensive Pediatrics*. 2018;9(2).
- Central Statistical Agency [Ethiopia]: Ethiopia Demographic and Health Survey 2011. 2012, Addis Ababa, Ethiopia. Calverton, Maryland, USA: Central statistical agency and ICF International.
- Mohammadi F, Omidvar N, Harrison GG, Ghazi-Tabatabaei M, Abdollahi M, Houshiar-Rad A, et al. Is household food insecurity associated with overweight/obesity in women? *Iranian Journal of Public Health*. 2013;42(4):380.
- Abdurahman AA, Mirzaei K, Dorosty AR, Rahimiforoushani A, Kedir H. Household food insecurity may predict underweight and wasting among children aged 24–59 months. *Ecology of Food and Nutrition*. 2016;55(5):456-72.
- Mohammadi F, Omidvar N, Houshiar-Rad A, Khoshfetrat M-R, Abdollahi M, Mehrabi Y. Validity of an adapted Household Food Insecurity Access Scale in urban households in Iran. *Public Health Nutrition*. 2012;15(1):149-57.
- Mirshekar S, Safavi S, Yadegarfar G. The relationship between food insecurity and stunting combined with obesity and overweight in children aged 7 to 11 years in Zabol, Iran. *Iranian Journal of Epidemiology*. 2017;12(4):44-54.
- Karam Soltani Z, Dorosty A, Ashrafiyan M, Siasi F, Jazayeri A. Obesity and Food security in school children in Yazd city. *Science Information Database*. 2007;65(7):68-76.
- Basirat Reyhane, Salehi Abarghouei A, Esmail Zade A. Investigating the relationship between household food insecurity and obesity in Farrokhsahr elementary school students. *Koomesh Journal of Semnan Medical Sciences University*. 13(2):254-63.
- Isanaka S, Mora-Plazas M, Lopez-Arana S, Baylin A, Villamor E. Food insecurity is highly prevalent and predicts underweight but not overweight in adults and school children from Bogota, Colombia. *The Journal of Nutrition*. 2007;137(12):2747-55.
- Poulsen MN, Bailey-Davis L, Pollak J, Hirsch AG, Schwartz BS. Household food insecurity and home food availability in relation to youth diet, body mass index, and adiposity. *Journal of the Academy of Nutrition and Dietetics*. 2019;119(10), 1666-75.
- Mulu E, Mengistie B. Household food insecurity and its association with nutritional status of under five children in Sekela District, Western Ethiopia: a comparative cross-sectional study. *BMC Nutrition*. 2017;3(1):35.
- Razmpoosh E, Khosravi H, Nadjarzadeh A. The relationship between nutritional status and anthropometric indices among 2-5-Year old children in Tehran. *Journal of Nutrition and Food Security*. 2018; 3(4), 202-8.
- Osei A, Pandey P, Spiro D, Nielson J, Shrestha R, Talukder Z, et al. Household food insecurity and nutritional status of children aged 6 to 23 months in Kailali District of Nepal. *Food and Nutrition Bulletin*. 2010;31(4):483-94.

21. Speirs KE, Fiese BH, Team SKR. The relationship between food insecurity and BMI for preschool children. *Maternal and Child Health Journal*. 2016;20(4):925-33.
22. Mohammadpour Kalde M, Fouladvand M, Avokh Keisami M. Food insecurity as a risk factor for obesity in low-income women in Bushehr. *Iranian South Medical Journal*. 2011;13(4):263-72.
23. Nord M, Andrews M, Carlson S. Household food security in the United States, 2007. United States Department of Agriculture, Economic Research Report. 2007;66.
24. Chen J, Che J. Food insecurity in Canadian households. *Health Reports*. 2001;12(4):11.
25. Hadley C, Zodhiates A, Sellen DW. Acculturation, economics and food insecurity among refugees resettled in the USA: a case study of West African refugees. *Public Health Nutrition*. 2007;10(4):405-12.
26. Jafari Sani M, Bakhshoude M. Investigating the spatial distribution of poverty and food insecurity in urban and rural households in Iran. *Agriculture Economics and Development*. 2008;16(61):103-23.
27. Dast GS, Mahboub S, Toutounchi H, OSTAD RA. Determinants of food insecurity: a cross-sectional study in Tabriz. *Research and Sciences Journal of Ardabil University of Medical Sciences*. 2006;6(3):233-9.
28. Safarpour M, Dorosty A, Hosseini SM, Noshari FR, Safarpour M, Maskooni MD, et al. The prevalence and consequences of food insecurity and its association with socio-economic factors. *Knowledge and Health*. 2013;8(4):193-8.