

Household Food Security and Demographic Factors in Children and Their Parents

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ABSTRACT

Background: Food insecurity and hunger contribute to physical, psychological, and social effects. The relationship between food insecurity and negative consequences on health has been confirmed in multiple studies. The present study aims to identify food security and its association with some demographic factors in children and their parents. **Methods:** In this descriptive-analytical study, 1688 children aged 3-6 years were selected using cluster random sampling in 15 health centers in Qazvin, Iran. **Results:** The results showed that 855 participants (50.7%) had food security, while 552 (32.7%) had food insecurity without hunger, 242 (14.4%) had food insecurity with slight hunger, and 37 (2.2%) had food insecurity with severe hunger. A significant correlation was observed between parental education level and food security ($P < 0.001$). Also, there was a significant correlation between the children's body mass index (BMI) and food security ($P < 0.005$). No significant difference was observed between BMI, mother weight before delivery, and children's sleeping and wake-up time in both groups. However, the birth rank ($P < 0.01$) and number of family ($P < 0.02$) in the secured group was significantly higher. The age of complementary feeding in the secured group was significantly higher ($P < 0.06$). **Conclusion:** Given that there is an association between birth weight, breastfeeding, parents' education, and occupation with food security, it seems that pregnancy status and breastfeeding should be much more studied.

Keywords: Food security; Body mass index; Children nutrition

Introduction

An adequate food supply and proper nutrition are basic societal needs (Dastgiri *et al.*, 2006, Javadi *et al.*, 2014, Ziaee *et al.*, 2013). Food insecurity is defined as uncertain and limited ability to acquire safe and nutritionally adequate foods through socially acceptable ways

(Jafarvand *et al.*, 2022, Liu *et al.*, 2014). Food insecurity and hunger contribute to physical, psychological, and social effects. The relationship between food insecurity and negative consequences on health have been confirmed in multiple studies (Cook *et al.*, 2006, Jafarvand *et*

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al., 2022, Janzadeh *et al.*, 2020) .

According to the World Food Summit definition, food security has to be provided to all people at all times for an active and healthy life. Food security is based on three principles, including availability, access, and use of food. According to World Health Organization (WHO), 842 million people are not food secure (Azizi *et al.*, 2013, Botreau and Cohen, 2020, Food and Agriculture Organization, 2013). Out of every 6 children, one is underweight; approximately 100 million (Moradi *et al.*, 2018, Payab *et al.*, 2012). Nearly half of all deaths of children under 5 are due to malnutrition, which equates to 3.1 million children each year (Obert E *et al.*, 2013). Most hungry people (about 827 million) live in developing countries. In these countries, 14.3% of the population is undernourished (Azizi *et al.*, 2013, Food and Agriculture Organization, 2013). Asia has the largest number of hungry people, but the prevalence of hunger in Sub-Saharan Africa is also high (Ahmadi Dehrashid *et al.*, 2021, Botreau and Cohen, 2020).

The prevalence of hungry children of primary school age is significant, i.e. 66 million in the world and 23 million in Africa alone (Botreau and Cohen, 2020, Jafarvand *et al.*, 2022). In addition, the prevalence of stunted children in developing countries is also high, which is one out of four in the world and one out of three in developing countries (Moradi *et al.*, 2018).

Studies have illustrated that the prevalence of food insecurity is between 20% and 40% in Iran. But in a study in north of Iran, the prevalence of moderate and severe food insecurity was about 8% and 7%, respectively (Eshraghian *et al.*, 2007, Ostadrahimi *et al.*, 2006, Ramesh *et al.*, 2009). Iran is going through a period of transition in nutrition. Therefore both obesity and food insecurity are prevalent (Ebadi-Vanestanagh *et al.*, 2019). In a meta-analysis study by Mohammadi-Nasrabadi *et al.*, the prevalence of mild to severe food insecurity was 28.6%, 14.9%, and 6.2%, respectively. In this study, mild and moderate food insecurity increased in Iran, while severe food insecurity decreased, but these

changes were not significant (Mohammadi-Nasrabadi, 2011). In Iran, however, household food insecurity is mainly affected by economic factors, such as food access and food price instability (Mohammadi-Nasrabadi *et al.*, 2014). Previous studies have suggested that food insecurity affects different variables, such as psycho-social factors (Janzadeh *et al.*, 2020) and also overweight in women (Ahmadi Dehrashid *et al.*, 2021, Botreau and Cohen, 2020) . In another study, there was a positive relation between food insecurity and overweight (Elizabeth *et al.*, 2009). This study aims to evaluate the relationships between food security, body mass index (BMI), and demographic factors in children and mothers.

Materials and Methods

Study design and participants: This descriptive-analytical cross-sectional study was conducted in health centers in Qazvin in 2015-2016. Based on the population at 15 centers, 1688 children aged 3-6 years were selected using cluster random sampling. After being informed of the goals of the study, the mothers completed the data form related to age, gender, the number of children, parents' educational level, place of residence, and food security with their consent.

Children aged 3-6 years who lived in Qazvin city, Iran and were generally considered as healthy, without any metabolic diseases confirmed by a pediatrician were entered the study. Participants with diseases including metabolic disorders, acute digestive and respiratory infections, chronic renal failure and hepatic diseases, hemolysis of red blood cells, intestine parasites, and fever were excluded from the study.

Out of 30 health centers in Qazvin, 15 health centers were selected using systematic cluster random sampling method. At each center, children whose mothers signed the consent letter consciously entered the study, and finally 1688 subjects were included in the study.

Measurements: The measurement of weight, height, and BMI were conducted by dividing the weight (kg) by the square of height. The children were weighed in a standing position, without

shoes, and with minimum clothes. Their height was measured by an inflexible metering strip installed on the wall, as they were in a standing position, looking straight ahead, without shoes, in a way that their buttocks, shoulders, and heels touch the wall.

An 18-item United States Department of Agriculture (USDA) questionnaire was used, reviewing household food security in the last 12 months (Bickel *et al.*, 2000). This questionnaire was validated in a study in Isfahan (Rafiei *et al.*, 2009) and adjusted in another study (Ramesh *et al.*, 2009). It was completed by the subjects' mothers. The questionnaire was rated as follows:

Responses of "often", "sometimes", "almost every month", "some months", and "yes", were scored 1 and responses of "incorrect", "only 1 or 2 months", and "no" were scored 0. The subjects were divided into four groups, according to the questionnaire rating, including food secured, food secured without starvation, food secured with moderated starvation, food secured with severe starvation (Payab *et al.*, 2012, Ramesh *et al.*, 2009).

Ethical considerations: The study was submitted and approved for ethics approval and obtaining participant consent by Qazvin University of Medical Science with ethics approval meeting no. 600 held on July 13, 2018.

Data analysis: Data were analyzed by SPSS software version 21.0.0.1 (SPSS Inc., Chicago, Ill., USA). Absolute and relative frequency, mean, and SD were calculated. To find out the relationship between variables, Chi-square was run for nominal and ranked variables and t-student test was run for quantitative variables in two groups of food secured and food unsecured. Using simple and multiple regression logistic, major variables having a huge effect on food security were studied. The significance level was considered less than 0.05.

Results

Out of 1688 participants aged 36 years, 869 (51.5%) were male and 819 (48.5%) were female. In terms of food security, 855 (50.7%) participants

were food secured, 552 (32.7%) unsecured without starvation, 242 (14.4%) unsecured with moderate starvation, and 37 (2.2%) participants unsecured with severe starvation. There was no significant difference between genders, as well as body mass index. There was a significant correlation between parental education level and job, kind of birth of the child based on the level of food security ($P < 0.001$, **Table 1**).

There was a relationship between mothers' lower education level and housewives with decreased food security. Even though the number of mothers with obesity was higher in food insecure group, there was no significant correlation between BMI and food security ($P = 0.2$, **Table 2**). There was no significant difference between mothers' weight before delivery and children's BMI and bedtime and wake-up time in both groups. However, the birth rank ($P = 0.01$) and number of family members ($P = 0.02$) in the insecure group was significantly higher (**Table 2**). There was a relationship between mothers' lower education level and housewives with decreased food security. Even though the number of mothers with obesity was higher in food insecure group, there was no significant correlation between BMI and food security ($P > 0.1$, **Table 2**).

There was no significant difference between mothers' weight before delivery and children's BMI and bedtime and wake-up time in both groups. However, the birth rank ($P < 0.01$) and number of family members ($P = 0.02$) in the insecure group was significantly higher (**Table 2**). The number of family members, parents' education, mothers' job and type of birth were predictive of household food security (**Table 3**).

Simple logistic fitness suggests a correlation between food insecurity and baby's height at birth ($P = 0.03$), ranking at birth ($P = 0.01$), the number of family members ($P < 0.001$), father's education ($P < 0.001$), mother's education ($P < 0.001$), mother's occupation ($P < 0.001$), and the age of complementary nutrition ($P < 0.06$).

Table 1. Frequency distribution of demographic variables in two groups: food secure and food insecure.

Variables	Food secure	Food insecure	Total	P-value ^b
Mothers' education				
Illiterate	14 (11.8) ^a	105 (88.2)	119	<0.001
High school	200 (41.6)	281 (58.4)	481	
Diploma and advanced	413 (54.6)	344 (45.4)	757	
University education	227 (69.4)	100 (30.6)	327	
Fathers' education				
Illiterate	17 (17.0)	83 (83.0)	100	<0.001
High school	224 (43.1)	296 (56.9)	520	
Diploma and advanced	369 (51.8)	343 (48.2)	712	
University education	243 (69.0)	109 (31.0)	352	
Mothers' job				
Housewife	709 (49.4)	726 (50.6)	1435	<0.001
Retired	0 (0)	3 (100)	3	
Government employee	128 (62.1)	78 (37.9)	206	
Self- Employment	15 (39.5)	23 (60.5)	38	
Fathers' Job				
Unemployed	10 (29.4)	24 (70.6)	34	<0.001
Retired	14 (58.3)	10 (41.7)	24	
Staff	302 (63.6)	173 (34.4)	475	
Self - employment	522 (45.6)	622 (54.4)	1144	
Kind of birth				
Normal vaginal delivery	268 (43.0)	355 (57.0)	623	<0.001
Cesarean section	577 (55.3)	467 (44.7)	1044	
Body mass index (kg/m ²)				
Underweight	662 (90.4)	637 (87.0)	1299	0.10
Normal	49 (6.7)	59 (8.1)	108	
Overweight	7 (1.0)	16 (2.2)	23	
Obese	14 (1.9)	20 (2.7)	34	
Gender				
Male	440(50.7)	428(49.3)	868	0.50
Female	415(50.7)	403(49.3)	818	

^a: N (%), ^b: Chi-square test.**Table 2.** Comparison of Mean (\pm SD) of qualitative in two groups: food secure food insecure.

Variables	Food secure	Food insecure	P-value ^a
Mother's weight before delivery (kg)	73.8 \pm 11.7	73.9 \pm 47.3	0.90
Number of family	1.8 \pm 0.8	2.3 \pm 1.2	0.02
Mother's age before delivery (year)	27.3 \pm 5.7	26.7 \pm 5.9	<0.001
Age of complementary feeding	5.9 \pm 0.4	5.9 \pm 0.4	0.06
Child body mass index (kg/m ²)	16.5 \pm 5.7	16.1 \pm 7.2	0.20
Duration of breast feeding	21.0 \pm 6.3	20.9 \pm 5.0	0.004
Birth weight (kg)	3.2 \pm 0.4	3.2 \pm 0.4	0.20
Birth height (cm)	49.5 \pm 2.0	49.5 \pm 2.3	0.90
Birth rank	1.5 \pm 0.6	1.6 \pm 0.7	0.01
Sleep time (night)	11.05 \pm 1.28	11.51 \pm 1.42	0.06
Wake up time (morning)	8.39 \pm 1.17	8.49 \pm 1.17	0.20

^a: Student t-test

Table 3. Regression logistic ultimate model to study the simultaneous effect of independent variables on food security.

	B	Odds Ratio	P-value
Number of families	0.067	1.07	0.005
Mother's education	-0.611	0.75	<0.001
Father's education	-0.288	0.75	0.002
Mothers' job	0.201	1.22	0.01
Kind of birth	-0.371	0.69	0.002

Discussion

Food insecurity has been known as a serious public health concern worldwide and more than 850 million people around the world suffer from food insecurity, about 99% of whom are in developing countries, such as Iran. However, the prevalence rate of insecurity in Iran was estimated more than 49% (Jafarvand *et al.*, 2022, Safarpour *et al.*, 2014). In this study, food security was about 50.7% and approximately 16.6% of children had insecurity with starvation. Such figures are warning issues which should be considered. Nasrabadi reported 26.8% moderate malnourishment (Mohammadi-Nasrabadi, 2011), quite different from the present study; while Daneshi (Daneshi Maskooni *et al.*, 2013) reported 69.7%, with almost 40% having starvation, which was much more than the present study. The results of the study by Safarpour (Safarpour *et al.*, 2014) was in line with the present study.

Parents' occupation and education are economic parameters which play a crucial role in food awareness and food selection (Javadi *et al.*, 2014), and they are considered as important reasons for food insecurity (Jafarvand *et al.*, 2022, Mohammadi-Nasrabadi *et al.*, 2014). In the present study, mothers had low educational levels and were housewives in the unsecured group. In addition to economy, other factors are at play in food insecurity. Lack of food insecurity in low-income households and the existence of food insecurity in high-income ones point to other effective factors (Ahmadi Dehrashid *et al.*, 2021, Botreau and Cohen, 2020). There was a significant correlation between mothers' education and food security. Education affects food awareness and culture. It is one of the factors of food insecurity,

since it plays a role not only in selecting food and allocating a part of income to buy food but also in its maintaining and cooking (Dastgiri *et al.*, 2006, Jafarvand *et al.*, 2022, Javadi *et al.*, 2014). Such an approach ensures that people buy food rich in calories containing minerals which are necessary for physical health (Dastgiri *et al.*, 2006, Mohammadzadeh *et al.*, 2010).

In terms of mothers' awareness, the results of the present study correlates with Mohammadzadeh's study, but does not correlate with Hakim's study (Hakim *et al.*, 2010, Mohammadzadeh *et al.*, 2010). Considering the fact that occupation is influenced by education, the kind of occupation affects food security, as well. Hakim (Hakim *et al.*, 2010) reported no significant correlation between occupation and food security. However, Dastgiri (Dastgiri *et al.*, 2006), Ebadi-Vanestanagh (Ebadi-Vanestanagh *et al.*, 2019) and Mohammadzadeh (Mohammadzadeh *et al.*, 2010) found out a correlation (similar to the present study) between housewives and food insecurity. There was no association between food security and gender in this study. Although the effect of gender on food security can be much more significant in developing countries, it was of little significance in underdeveloped countries. Food security has been reported in 60% of females which is more than males (Botreau and Cohen, 2020).

In the present study, there was a significant correlation between the period of breastfeeding and household food security, indicating that the more infants were breastfed, the more they had food security. It can be suggested that food security is less likely in children who were breastfed. One of

the most effective strategies in low-income societies to decrease food insecurity is breastfeeding (Salmon, 2015, Zubieta *et al.*, 2006). Adopting correct behaviors lead to a healthy life (Hajhashemkhani *et al.*, 2015, Javadi *et al.*, 2014), one of which is sleeping that plays a crucial role in children's health, appetite, and growth (Javadi *et al.*, 2014). In the present paper, bedtime and wake-up time was not different in secured and unsecured groups. However, in the study by Yong Liu *et al.*, insufficient sleeping correlated with food insecurity (Liu *et al.*, 2014).

Another parameter signifying healthy eating habits and the lack of food insecurity is mothers' weight during pregnancy, correlating with birth weight. There was a positive connection between mother's weight at delivery and food insecurity, in line with other studies (Daneshi Maskooni *et al.*, 2013, Eshraghian *et al.*, 2007, Hakim *et al.*, 2010). One of the strengths of the present study was the subjects' numbers as well as the simultaneous study of the relationship between sleeping and BMI with food security. A limitation of the study was that the mother's level of nourishment during pregnancy was not considered which might be correlated with birth weight.

Conclusion

Given the fact that there was a relationship between birth weight, breastfeeding, parents' education, and occupation with food security, it seems that pregnancy status and breastfeeding should be much more studied.

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Authors' contributions

Javadi M collected the data and designed the research and wrote the manuscript, Pakbin B and Bruck WM wrote, reviewed, and revised the manuscript, Ziaeeha M analyzed the data and Barkani A supervised the project, designed the

research, and performed the statistical analysis. All authors have read and approved the final manuscript.

Conflict of interest

There is not any conflict of interest.

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