

## Systematic Review

# Prevalence of Food Insecurity in Iran: A Systematic Review and Meta-analysis

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## Abstract

**Background:** Food security is one of the main factors of individual and social health. It is of such importance that the World Bank and Food and Agriculture Organization (FAO) announced it as one of the Millennium Development Goals. This study aimed to report the prevalence of food insecurity in Iran.

**Methods:** We searched English databases including; Scopus, Ovid, Web of Science, PubMed and Google Scholar and also Iranian databases; SID, Magiran and IranMedex for words Iran, food insecurity, and prevalence up to August 2015. The pooled food insecurity prevalence was calculated using Der-Simonian test. All analyses were performed using random effects model with 95% CI. We assessed heterogeneity of the studies using sub-group and meta-regression analyses.

**Results:** A total of 31 studies were included. The prevalence of food insecurity was 49% among households (95% CI: %40–%59), 67% in children (95% CI: %63–%70), 61% in mothers (95% CI: %35–%88), 49% in adolescents (95% CI: %33–%66) and 65% in the elderly (95% CI: %44–%86).

**Conclusion:** The prevalence of food insecurity is high in Iran. Fiscal policies should promote the nutritional knowledge of household members and also support the households to meet their nutritional needs. This plan should give priority to mid and low socioeconomic groups.

**Keywords:** Food insecurity, Iran, meta-analysis, nutrition

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## Introduction

Food Insecurity has been known as a serious public health problem in the past two decades in the world and attracted the attention of health professionals and policy-makers.<sup>1</sup> More than 852 million people worldwide suffer from this condition with almost nine million of them in developed and the rest in developing countries.<sup>2</sup> Food insecurity means limited or entrusted access to nutritionally adequate and safe food or limited ability to access food through socially accepted ways.<sup>3,4</sup> Food security is one of the main risk factors for individual and social health and is essential for the development of the society. It is of such importance that the World Bank and FAO introduced it as one of the Millennium Development Goals.<sup>5</sup>

Given that food security is an indicator of family and individual

health, it can be a precursor for health and nutritional problems. Therefore, understanding the associated factors is necessary in every society.<sup>6</sup> Overall, macro-economic and macro-social policies affect changes in prices, wages, employment and provision of food, all of which can affect the access of households to food. Economic status is the most important determinant of food security.<sup>7,8</sup>

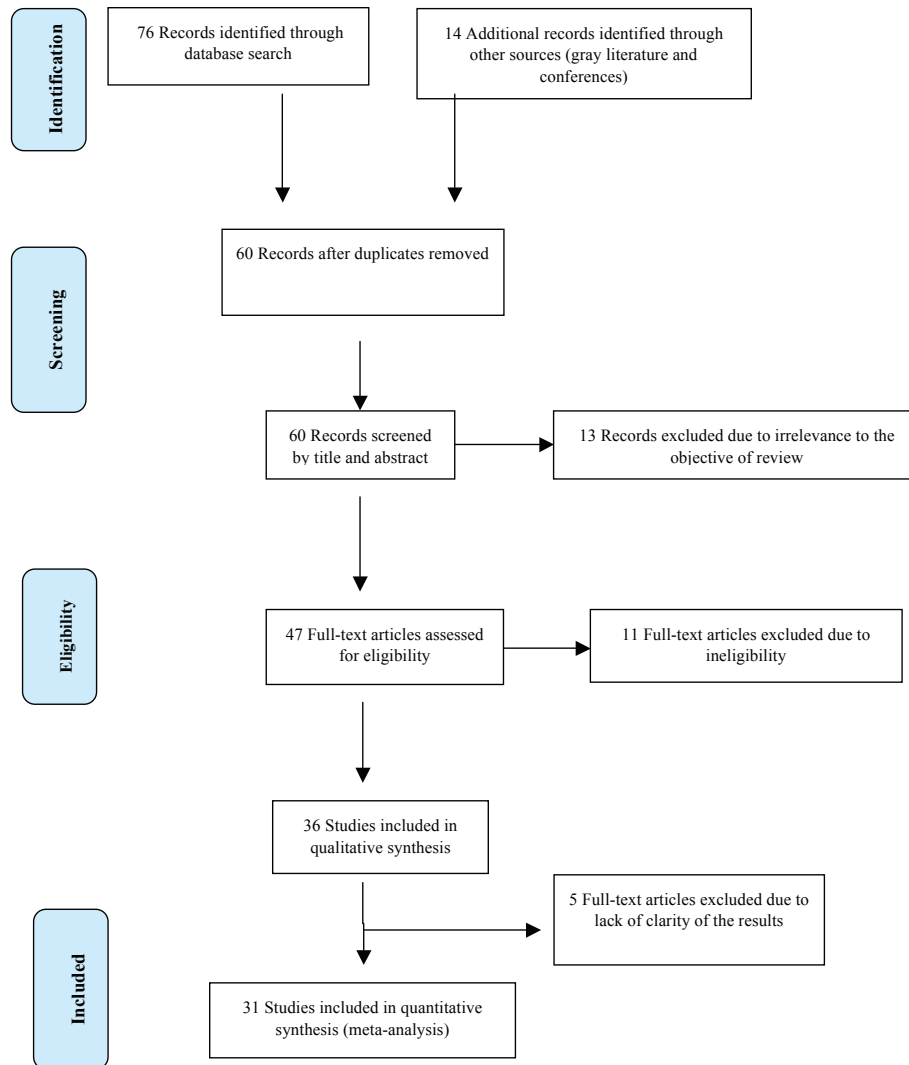
Food insecurity may be chronic, seasonal, or transient and its range varies from anxiety about access to food at the household level to severe hunger in children.<sup>4</sup> Insecurity is a complex and multidimensional phenomenon that may have social, psychological and cultural dimensions in addition to the quantity and quality of life. A study in the United States showed that food insecurity had an increasing trend since year 2000 and eleven million US households (11.1% of the population) had food insecurity in 2007. Of these people, 8.2 million were adults and 3.7 million were children.<sup>9</sup> These estimates increased to 14.7 % in 2009.<sup>10</sup>

According to household expenditure research studies in Iran, 20% of the populations do not have economic access for satiety and about 50% have trouble making their cells full. In other words, a quarter of population have energy deficiency and half of them have micro nutrient deficiency.<sup>11</sup> Since the imbalance of food intake can also have adverse effects on physical, social and mental wellbeing, monitoring and evaluation of food security and coping with food insecurity and hunger are important. Little is known about food insecurity in Iran. This study is a meta-analysis that aims to determine the prevalence of food insecurity among different groups in Iran.

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**Figure 1.** Flowchart of the search strategy.

## Materials and Methods

### Search strategy

We searched English databases including: Scopus, Ovid, Web of Science, PubMed and Google Scholar and also Iranian databases; SID, Magiran and IranMedex from the beginning up to August 2015. We also searched gray literature and conference proceedings in relation to food insecurity. The searched keywords were “food insecurity” OR “food security” OR “nutritional status” OR “food consumption” AND “Iran” OR “Iranian” OR “Iranians”, OR “Persia”, OR “Persian”, OR “Persians” in English and the equivalent keywords in Persian in Iranian databases.

### Inclusion and exclusion criteria

We included population-based studies that reported the prevalence of food insecurity among Iranians. All non-population-based studies and those with unclear methods or focusing on patients were excluded. Two of the authors independently extracted data from the selected papers and disagreements were resolved by discussions between the authors. The extracted information from

the studies included the study region, study type, age, sex, total sample size, the year of publication, questionnaire type used, and type of food insecurity measured.

### Assessment of studies

Two reviewers independently assessed the quality of 31 included studies, according to the STROBE questionnaire.

### Statistical analysis

The pooled food insecurity prevalence was calculated using random effects model with 95% confidence interval (CI). The researchers assessed heterogeneity between studies by Chi-square test and  $I^2$  statistic. P-value less than 0.1 was considered statistically significant. We assessed heterogeneity of the studies using subgroup analysis and meta-regression analysis according to the sample size and the year of publication. We used Egger’s and Beggs’ tests to assess publication bias. STATA version 11 (Stata Corporation, College Station, TX, USA) software, was used for data analysis.

**Table 1.** Characteristics of the included studies on prevalence of food security in Iran from beginning to 2015.

Author	Reference	Year	Sample	Location	Population	Type FI*	Questionnaire
Sharafkhani	12	2012	2439	Khoy	Household	FS/FI	USDA-6
Safarpour	13	2014	400	Bandar Anzali	Household	FS/FI (3)	USDA-18
Salarkia	17	2011	400	Varamin	Household	FS/FI (3)	HFIAS
Ramesh	18	2009	778	Shiraz	Household	FS/FI (Hun/3)	USDA-18
Mohammadi	19	2008	7158	Total Iran	Household	FS/FI (3)	FFQ
Najafi	20	2004	120	Arsanjan	Household	FS/FI	FFQ
Hakim	24	2010	400	Dezfol	Household	FS/FI (Hun/3)	USDA-18
Najafianzadeh	26	2015	373	Arak	Household	FS/FI (Hun/3)	USDA-18
Saadi	31	2014	198	Gharveh	Household	FS/FI (3)	HFIAS
Koohi	28	2014	426	Tabriz	Household	FS/FI	HFIAS
Fallah Madvari	29	2015	500	Mehriz	Household	FS/FI (Hun/3)	USDA-18
Rostami	30	2013	100	Village Krmachy	Household	FS/FI (Hun/3)	USDA-18
Asgharian-Dastnaei	32	2010	352	Kiar	Household	FS/FI (Hun/3)	USDA-18
Dastgiri	37	2011	2442	Tabriz	Household	FS/FI (3)	HFIAS
Mohammadi	39	2013	418	Tehran	Household	FS/FI (3)	HFIAS
Hoseini Khorrani	41	2007	405	Marand	Household	FS/FI (3)	Food recall
Ghazi Tabatabaei	36	2014	300	Tehran	Household	FS/FI (Hun/3)	Radimr/Cornell
Gholami	42	2011	4647	Neyshabur	Household	FS/FI (3)	HFIAS
Karam soltani	14	2007	3245	Yazd	Children	FS/FI (Hun/3)	USDA-18
Basirat	25	2012	314	Farrokh Shahr	Children	FS/FI	Radimr/Cornell
Mohammadpour	21	2010	300	Bushehr	Mothers	FS/FI	Radimr/Cornell
Hojaji	34	2015	700	Tehran	Mothers	FS/FI (Hun/3)	USDA-18
Payab	22	2012	430	Ray	Mothers	FS/FI (Hun/3)	USDA-18
Saadi	27	2013	92	Razan	Mothers	FS/FI (3)	HFIAS
Milani-Bonab	33	2011	20	Tehran	Elders	FS/FI (Hun/3)	HFIAS
Karajibani	35	2015	252	Zahedan	Adolescents	FS/FI (Hun/3)	Radimr/Cornell
Mohammadzadeh	23	2011	580	Esfahan	Adolescents	FS/FI (Hun/3)	USDA-18
Parsavala	38	2013	330	Tehran	Adolescents	FS/FI (Hun/3)	USDA-18
Hasan-Ghomi	40	2012	200	Tehran	Individuals	FS/FI (3)	USDA-18
Dastgiri	15	2006	300	Tabriz	Individuals	FS/FI	USDA-6
Ostad rahimi	16	2006	300	Tabriz	Individuals	Ob hun/Hid hun	Food recall

FS/FI = Food security / Food insecurity \ (3) = Food security / Food insecurity (Mild, moderate, severe) FS/FI (Hun/3) = Food security / Food insecurity (Insecurity without hunger, with moderate hunger, severe hunger) ----- Ob hun/Hid hun = Hunger obvious / hidden hunger

## Results

The search results according to PRISMA checklist are shown in Figure 1. The meta-analysis consisted of 31 studies.<sup>12-42</sup> (Table 1). A total of 18 studies were based on households and 13 studies were based on community sub-groups. Studies were conducted between 2004 and 2015. Fifteen studies used USDA questionnaire, eight studies used HFIAS, four studies used Radmir/Cornell method and four studies used food frequency questionnaire. Thirty studies were cross-sectional; one study was case-control.

### Prevalence of food insecurity according to household studies

Eighteen studies reported the prevalence of food insecurity in Iranian households. Overall, 21,856 households with an average of 1,214 household per study were evaluated. The prevalence of food insecurity in Iranian households was 49% (95% CI: 40% – 59%). The highest prevalence was reported by Saadi *et al.*<sup>31</sup> in 2014 (85%) and the lowest by Koohi *et al.*<sup>28</sup> (10%) (Figure 2).

In those studies that reported food insecurity in households in two categories of secure and insecure, the overall prevalence was 36% (95% CI: 1% to 73%). In those studies that divided households to four categories as secure, slightly insecure, moderately insecure, and severely insecure, the overall prevalence was 50% (95% CI: 35%–64%). And in those studies that divided food inse-

curity to four categories of secure, insecure without hunger, insecure with moderate hunger, and insecure with severe hunger, the overall prevalence was 55% (95% CI: 43%–67%).

Furthermore, the prevalence was assessed based on the questionnaire used in the study. In studies that used USDA questionnaire (15 studies), the prevalence was 54% (95% CI: 45%–62%); in studies that used SAIFH questionnaire (8 studies), the prevalence was 53% (95% CI: 35%–71%); in studies that used Radmir/Cornell questionnaire (4 study), the prevalence was 67% (95% CI: 62%–72%); and in studies that used food frequency questionnaire (4 studies), the prevalence was 24% (95% CI: 16%–32%).

Meta-regression analysis was done according to the year of publication ( $P = 0.07$ ) (Figure 3A) and sample size ( $P = 0.25$ ) (Figure 3B). The food insecurity has increased from 2004 to 2015, and also decreased by increasing the number of households in several studies.

### Prevalence of food insecurity by sex and age groups

Of the total 13 studies that reported food insecurity in sub groups, 2 studies were on children, 4 on mothers, 3 on adolescents, 1 on the elderly and 3 on other age and sex groups. The total sample size was 7,063 people with an average of 543 people per study. Figure 4 demonstrates the results.

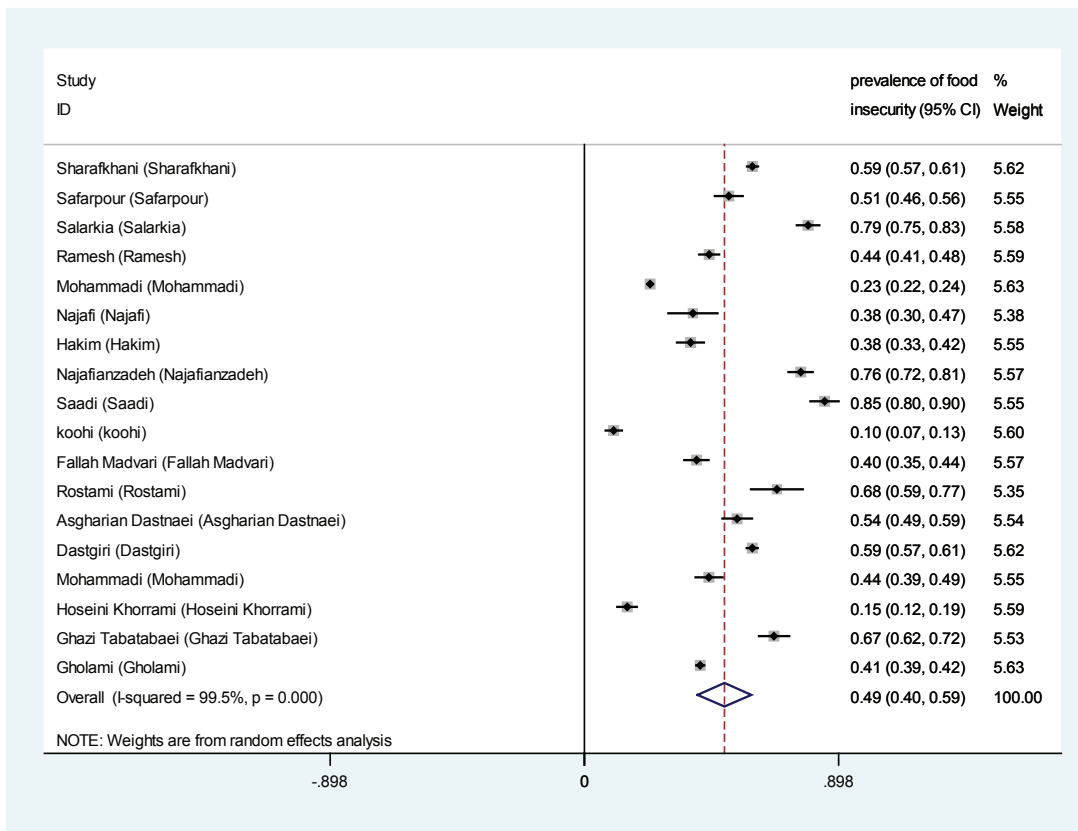


Figure 2. Prevalence of food insecurity in Iranian Households.

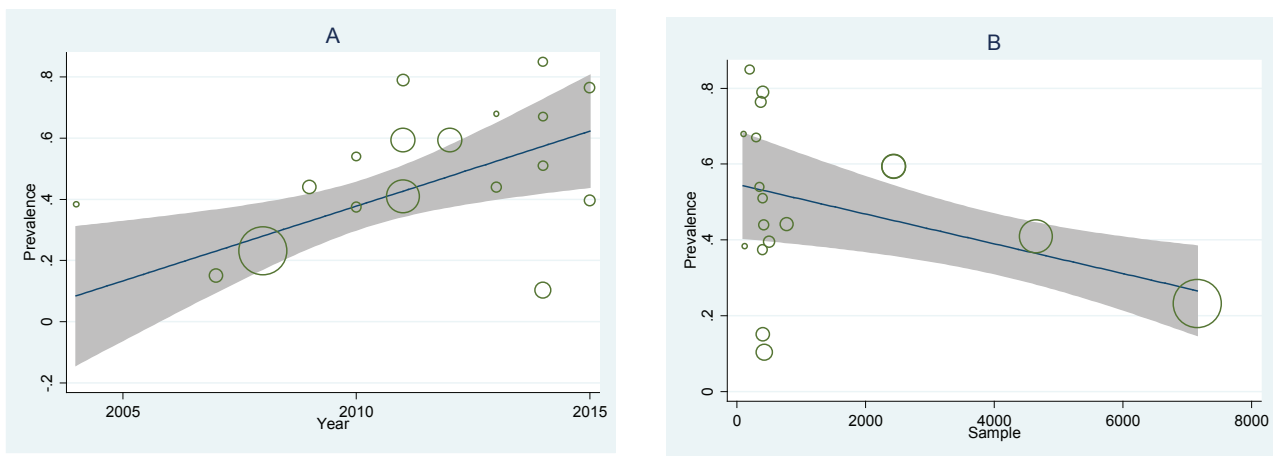


Figure 3. Association of prevalence of food insecurity in households with years of the study and sample size.

#### Publication bias

The results of the statistical test for publication bias, including Egger’s regression asymmetry test and Begg’s adjusted-rank correlation test were not statistically significant. The effect of publication bias was not significant in 31 articles included in this meta-analysis.

#### Discussion

The overall prevalence of food insecurity among Iranian households (n = 21856) was 49%. One of the main reasons for the variation of food insecurity in different studies included is economic,

social and cultural differences between areas and populations included in the current study. The recent economic crisis and rapid increase in food prices may also contribute to this variation over time. Melgar *et al.*<sup>43</sup> reported that the prevalence of food insecurity was 73% in households of Burkina Faso, 70% in Bolivia, 35% in the Philippines, 32% in Java in Indonesia,<sup>44</sup> and 44% in Thailand.<sup>45</sup> In a study on 370 households in Korea, 52.7% suffered from food insecurity.<sup>46</sup> The prevalence of food insecurity in the US was reported about 11.1% in 2007,<sup>47</sup> and 10% in Canada.<sup>48</sup>

The percentage of income spent on food and other necessities of life in Iran is more than developing countries such as Pakistan and South Africa and less than developed countries. An important

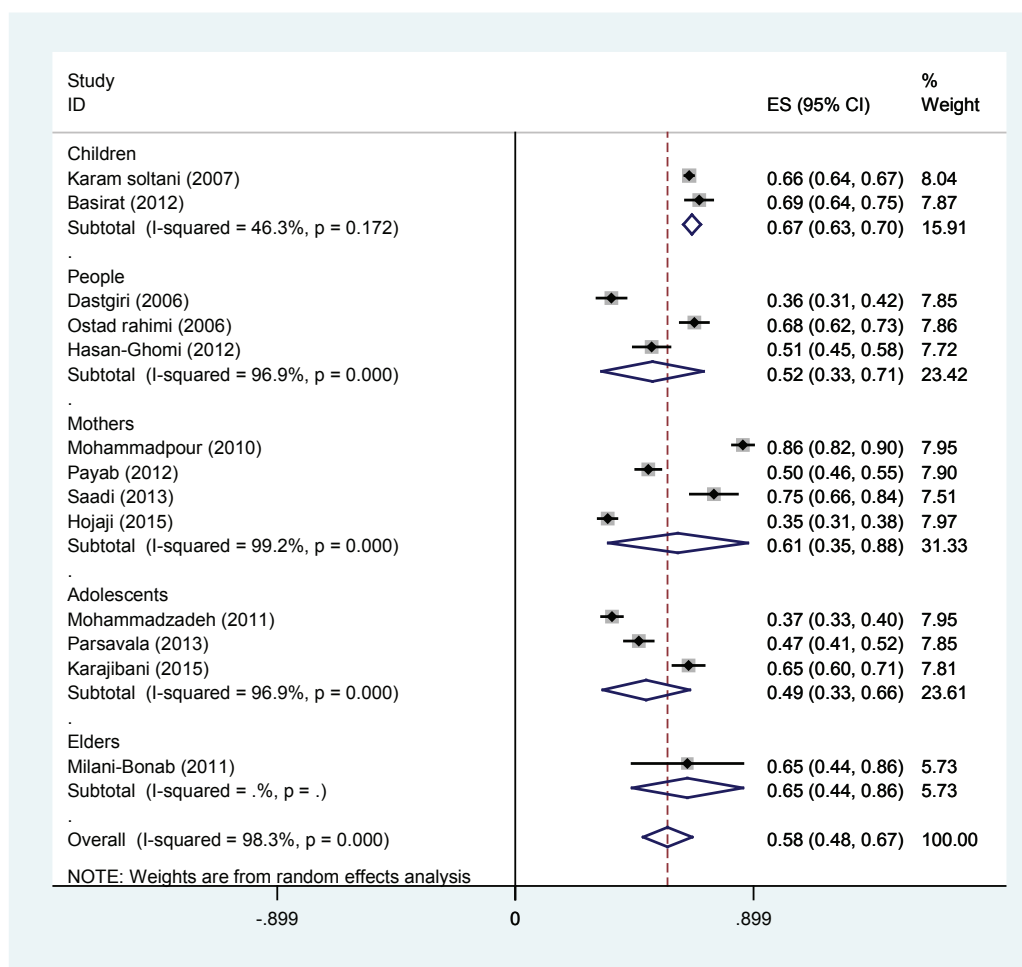


Figure 4. Prevalence of food insecurity in various sub- groups of Iranian population.

factor regarding the differences observed between Iran and the developed countries is the various food aid programs provided to low-income households and individuals in Canada and the US. Almost half of low-income people in those countries are covered by the nutrition program, school lunch for students and vouchers for households.<sup>49-52</sup>

The prevalence reported in different studies varies depending on the categorization of food security. The prevalence of slight, moderate and severe insecurity in Brazil was 23.1, 9.7 and 4.7, respectively.<sup>53</sup> According to the studies conducted by Nord *et al.* in 2003, 12.4% of the American families had food insecurity without hunger, 3.2% had food insecurity with moderate hunger, and 0.6% had insecurity with severe hunger.<sup>10</sup> A study on 199 Thai households revealed that 44.2% of Thai households had food security and the percentage of food insecurity without hunger was 39.2%, with moderate hunger was 13.6%, and with severe hunger was 3%.<sup>54</sup>

Meta-regression results of this study showed that the prevalence of food insecurity decreased with the increasing number of households in different studies, though it was not statistically significant. The absence of a positive relationship in the present study may be due to the other working people in addition to parents, such as grandparents who consider themselves involved in ensuring household food basket.

The overall prevalence of food insecurity was 67% among Ira-

nian children, 61% among mothers, 49% among adolescents, and 69% among the elderly. One study in California showed that the presence of children in the families could increase the chance of food security by 1.7 times.<sup>1</sup> Food insecurity may have a negative influence on children's relationships with their parents and cause anxiety and negative feelings of human worth.<sup>55</sup>

The results of American Household's Food Security show that the prevalence of food insecurity in households headed by women was higher than the national average.<sup>56</sup> It is obvious that women are at the forefront of households to remove poverty and hunger. In households with food insecurity, mothers try to reduce the food volume or reduce their own food to protect other family members, especially children, from hunger. In a study by Casey *et al.* on national and nutritional health survey data, the prevalence of food insecurity among adolescent was 11.2%.<sup>6</sup> Different results from different studies may be due to time intervals, cultural factors, differences in the method of determining food insecurity, difference in the percentage of income spent on food preparation and food aid given to families with low-income in different societies.

This study has several limitations, including lack of sex- and age-specific data in many studies included, heterogeneity in results of the included studies, diversity of methods and questionnaires used in different studies and low sample size of several included studies.

In conclusion, food insecurity has an estimated prevalence of

49% in Iran. Food is a basic necessity of life and essential for sustenance. The prevalence of food insecurity is high in Iran. Fiscal policies should promote the nutritional knowledge of household members and also support the households to meet their nutritional needs. This plan should give priority to mid and low socioeconomic groups. An adequate food intake, in terms of quantity and quality, is key for a healthy life.

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