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-Simmonian 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


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.1 More than 852 million people worldwide suffer from this condition with almost nine million of them in developed and the rest in developing countries.2 Food insecurity means limited or entrusted access to nutritionally adequate and safe food or limited ability to access food through socially accepted ways.3,4 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.5

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.6 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.7,8

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.4 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.9 These estimates increased to 14.7% in 2009.10

According to household expenditure research studies in Iran, 20% of the populations do not have economic access for satis-ety 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.11 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.
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 grey 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 I² 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.

Figure 1. Flowchart of the search strategy.
Prevalence of Food Insecurity in Iran

Results

The search results according to PRISMA checklist are shown in Figure 1. The meta-analysis consisted of 31 studies.12–42 (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.31 in 2014 (85%) and the lowest by Koohi et al.28 (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: 36% to 37%). 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: 47% to 52%). And in those studies that divided food insecurity to four categories of secure, insecure without hunger, insecure with moderate hunger, and insecure with severe hunger, the overall prevalence was 55% (95% CI: 52% to 58%).

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% to 62%); in studies that used SAIFH questionnaire (8 studies), the prevalence was 53% (95% CI: 45% to 61%); in studies that used Radmir/Cornell questionnaire (4 study), the prevalence was 67% (95% CI: 62% to 72%); and in studies that used food frequency questionnaire (4 studies), the prevalence was 24% (95% CI: 16% to 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.

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

<table>
<thead>
<tr>
<th>Author</th>
<th>Reference Year</th>
<th>Sample</th>
<th>Location</th>
<th>Population</th>
<th>Type FI*</th>
<th>Questionnaire</th>
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<td>Sharafkhani</td>
<td>12 2012</td>
<td>2439</td>
<td>Khoy</td>
<td>Household</td>
<td>FS/FI</td>
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<td>Bandar Anzali</td>
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<td>USDA-18</td>
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<td>Varamin</td>
<td>Household</td>
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<td>HFIAS</td>
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<td>Shiraz</td>
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<td>USDA-18</td>
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<td>7158</td>
<td>Total iran</td>
<td>Household</td>
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<td>HFIAS</td>
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<td>Mehriz</td>
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<td>Radimr/Cornell</td>
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<td>Radimr/Cornell</td>
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<td>Tehran</td>
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<td>USDA-18</td>
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<td>Ray</td>
<td>Mothers</td>
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<tr>
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<td>Parsavala</td>
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<td>200</td>
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<td>Dastgiri</td>
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<td>Individuals</td>
<td>FS/FI</td>
<td>USDA-6</td>
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<tr>
<td>Ostad rahimi</td>
<td>16 2006</td>
<td>300</td>
<td>Tabriz</td>
<td>Individuals</td>
<td>Ob hun/Hid hun</td>
<td>Food recall</td>
</tr>
</tbody>
</table>

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
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. 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, and 44% in Thailand. In a study on 370 households in Korea, 52.7% suffered from food insecurity. The prevalence of food insecurity in the US was reported about 11.1% in 2007, and 10% in Canada.

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 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.
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.49–52

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.53 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.10 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%.54

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.

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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.1 Food insecurity may have a negative influence on children’s relationships with their parents and cause anxiety and negative feelings of human worth.55

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.56 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%.6 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 needs. This plan should give priority to mid and low socioeco-

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