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Food Insecurity after Cash Transfer Program in Rural Areas of Tehran: A Mixed Method Study

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ABSTRACT

Background: Cash transfer (CT) is one of the strategies used by many developing countries to improve food security and nutritional status of lower socio-economic groups. This study aims to assessing household food insecurity (HFI) and viewpoints of women after CT program in rural population of Tehran province by both quantitative and qualitative methods. **Methods**: After making arrangements with rural health centers of Shahid Beheshti University of Medical Sciences and Health Services, 250 households were selected from five rural of Iran with different socio-economic status (SES) by cluster sampling. Locally adapted Household Food Insecurity Access Scale (HFIAS), food frequency, and SES questionnaires were completed, and height, weight, and waist circumference of adult females were measured. .Data on families' coping strategies were collected through 7 focus-group discussions. **Results:** The frequency of mild, moderate, and severe HFI was 22.3, 22.3, and 16.0%, respectively. SES negatively affected HFI (P<0.001), and HFI negatively influenced food-group consumption (P<0.001). Most of the women reported strategies like borrowing from family and friends, skipping meals, and eating less food by mothers. **Conclusions**: It seems that in spite of CT program, the prevalence of HFI among Iranians in rural areas was relatively high and consumption of food groups in FI households was low.

Keywords: *Food assistance; Social support; Food security; Qualitative research*

Introduction

Despite significant progress in global hunger reduction over the last few decades, food insecurity (FI) and under nutrition remain a serious problems in many countries (Food and Agriculture Organization, 2017, IFPRI, 2016). The majority of foods in Asia and Iran are produced by smallholder farmers (Food and Agriculture Organization, 2014) who are affected by FI the most (Herrero *et al.*,

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2010, World Bank, 2007). Hence, the small farm sector is a crucial entry point for policy interventions to improve food security and nutrition (Sibhatu and Qaim, 2017).

Villagers constitute 25.9% of the population in Iran, the majority of whom are farmers (Statistical Center of Iran, 2016). Previous studies in Iran have shown that rural households have a lower level of food security compared to urban ones, and their vulnerability to FI is higher due to lower access, consumption, stability, and sustainability (Ahmadi-Firouzjaie *et al.*, 2015). Based on the findings of two studies on rural families in Northwest and Northeast of Iran (using a 6-item short-form questionnaire), 59.3% and 40.9% of the studied households suffer from FI, respectively (Dastgiri *et al.*, 2011, Gholami *et al.*, 2013). The prevalence of different degrees of FI are estimated as high as 75% among rural female-headed Iranian households using Household FI access scale (HFIAS) (Saadi and Moadab, 2013).

Cash transfer (CT) programs have been implemented by many developing countries to improve food security and nutritional status of lower socio-economic groups. The programs might modify consumption patterns, increase consumer welfare, efficiency, and productivity, and reduce waste of resources and inequity (DFID and UKaid, 2011, Mahendra, 2009). However, they pose an unnecessary burden on the public budget and are economically inefficient because their benefits are often not received by the poor. Furthermore, a large part of food subsidies is “leaked” to high-income people due to improper targeting (Karami *et al.*, 2012).

The subsidy targeting program through CT in Iran was also known as the subsidy reform plan established in 2010, which influenced the quality of social life as well as nutritional status of Iranian households. The goal of this reform was to replace subsidies on food and energy (80% of total) with targeted social assistance, in accordance with a five-year economic development plan and a move towards free market prices in five years (Hasan, 2010, Vafaei-Yeganeh *et al.*, 2011).

Studies in different countries have shown that CTs can reduce FI in the short-to medium-term. However, sustainable beneficiaries requires a broader anti-FI strategy, in which CTs are properly integrated into broader national social protection system and linked to economic interventions (Burchi and Strupat, 2016, Tiwari *et al.*, 2016). There are limited data on food security and nutritional status of rural households after subsidy targeting CT program in Iran (Doshmangir *et al.*, 2015, Esmaeili *et al.*, 2013, Hajipour and Fallsolyman, 2016, Hosseini *et al.*, 2017). Policymakers tend to make decisions supported by models from which potential effects, trends, and behavioral policies emerge (Giraldo *et al.*, 2008). Thus, the aim of the present mixed method study is to assess food security status and viewpoints of women. Thus, the aim of the present mixed method study was to assess food security status and viewpoints of women after targeted subsidy through CT program in the people living in rural areas of Tehran province in 2015.

Material and Methods

Study design and participants: This was a cross-sectional study using both quantitative and qualitative methods to assess household food security status, dietary intakes, and viewpoints of women in rural areas regarding cash transfer program. The study population was selected from the households of rural areas of Tehran with different socio-economic status (SES). According to the main purpose of the project, non-Iranian and urban households have not been included in the study.

Quantitative study: After making arrangements with rural health centers of Shahid Beheshti University of Medical Sciences and Health Services (5 counties of Shemiranat, Damavand, Firouzkooh, Varamin and Pakdasht), 250 households were selected by systematic cluster sampling. The women in households were invited to rural health center as the breadwinner by healthcare workers, and informed consent was obtained from them. Data were collected from September to the end of October 2015 (6 weeks) by four teams with two interviewers each. Before

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the beginning of main research, a pilot study was carried out in rural areas outside the sample to localize, identify, and resolve the weaknesses of the questionnaires.

During the quantitative study, trained nutritionists collected data such as dietary intakes, food security, and socioeconomic and weight status through interviews at subject's home. Locally-adapted HFIAS was used to measure food security (Coates *et al.*, 2007, Deitchler *et al.*, 2010, Mohammadi *et al.*, 2011, Salarkia *et al.*, 2014).

SES of households including age, sex, educational, and occupational levels of the head and other members of the household, family size, income, expenditure, and some characteristics of residency and living conditions were asked with a questionnaire.

Height, weight, and waist circumference of adult females were measured, and body mass index (BMI) was calculated by the ratio between weight and height (m^2) and classified based on cut off values recommended by NIH as follows: underweight: BMI<18.5; normal weight: 18.5<BMI<24.9; overweight: 25.0<BMI<29.9; and obese: BMI≥30 kg/m^2. A waist circumference of ≥88 cm in women was considered abdominal obesity (Expert Panel on the Identification Treatment of Overweight and National Heart, 1998).

A validated food frequency questionnaire was used to assess food consumption of rural women (Hosseini Esfahani *et al.*, 2010, Mirmiran *et al.*, 2010) by face-to-face interviews. Then, data were checked and reviewed before any processing for any defect or mistake. The values of home scales were converted to equivalent weight in grams. Dietary intake was defined as the consumption of bread and cereals, legumes, vegetables, fruits, meat, egg, milk and dairy products, fats, sugar and sweets groups.

Qualitative study: The aim of this part of mixed method study was to discover the views, perceptions and experiences of women's dwelling in rural areas of Tehran (capital of Iran) involved in cash subsidy program. A focus-group discussion (FGD) was applied to explore the participant's experiences regarding this program using the moderator guide with some questions. Six FGDs were formed in the 6 rural areas of Tehran with a rural population rate of 148000.

The participants were invited to the health centers, and sessions were conducted by three researchers including one coordinator and two note-takers using FGD guide. Each session lasted one hour, the interviews were audio-recorded and transcribed word by word, and non-verbal communications and interactions were also noted. **Table 1** shows the FGD moderators' guide. Women were questioned about their views regarding household's possible food consumption modifications concerning quantity, quality, methods of purchasing, strategies to combat FI and the rate of women's satisfaction from targeted subsidies.

After each session, data were analyzed using constant comparative analysis. Data collection and data analysis were performed simultaneously, in line with the aims of study. The process of data analysis was carried out using open and axial coding stages proposed by Strauss and Corbin's approach (Corbin *et al.*, 2014).

Triangulation was used in all the phases including data gathering methods (FGD, observation, memoing, and documents) to reach varied information. All FGDs were instantly transcribed and documented. It was also achieved by presenting procedures, decisions, and the context in which the research was done, enabling other researchers to assess suitable contexts with regarding findings.

Ethical consideration: This study was approved by Ethical Committee and Research Council of Shahid Beheshti University of Medical Sciences with approval number of 2004. The study's goals were clarified for the participants, and their informed consent was obtained for completing questionnaires and conducting FGDs.

Data analysis: The level of household's FI was determined on the basis of the number of affirmative responses the participants had provided to statements on more severe conditions and/or experiences (Coates *et al.*, 2007). HFIAS scores categorized households into four levels of FI: food-

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secure, mildly-insecure, moderately -and severely -insecure.

The intake of nutrients was calculated using the revised edition of the Iranian food composition table (Sarkissian *et al.*, 1980). The mean intake of food groups and the average of the entire amount consumed were calculated for each female participant during the 3 days of interview.

Statistical analyses were performed using SPSS version 21 (SPSS Inc., Chicago, IL, USA). Chi-squared test was used for analyzing differences in qualitative variables, and ANOVA was used for analyzing differences in quantitative variables. Structure Equation Modeling (SEM) conducted through IBM SPSS AMOS (version 23) was used for modeling the relationship between SES, FI, and food group consumption in rural households of Tehran province. Goodness of fit indices for the proposed model and path coefficients were estimated using maximum likelihood. The t-values greater than 2 were considered significant. The $\chi 2$/df ratio of 2.00 or less and goodness of fit indices (GFI, AGFI, CFI) close to 0.95 and RMSEA values of 0.08 or less were considered good fit (Hooper *et al.*, 2008, Norris, 2005.).

Interview transcriptions were reviewed and imported into the qualitative software, MAXQDA 11, for open and axial coding (Lewins and Silver, 2007). Participants' main views were identified, open codes and similar codes in line with research goals were classified by two researchers, and main themes emerged based on purpose.

Results

From the 332 households surveyed, 10 were female-headed. There was no statistically significant difference between secure and insecure households in terms of gender. **Table 2** shows socio-economic characteristics of the families based on their food security status. Mean ± SE of age of the households' head was 42.1±0.7 year. FI was significantly related to low level of education, job status of the head, little food, total expenditures, family size, floor area, and the number of rooms in rural areas (P<0.05). There was no significant relationship between weight and food security of the rural women. The frequencies of mild, moderate, and severe food-insecure households were 22.3, 22.3, and 16.0%, respectively. The prevalence of FI was significantly higher in rural areas in the south (lower SES including Varamin, Pishva, Gharchak, and Pakdasht) compared with the north (higher SES including Shemiranat, Damavand, and Firouzkooh,) of Tehran province (**Figure 1**).

Figure 2 demonstrates the average share of food, housing, clothing, utilities, education, recreation, transport and miscellaneous expenditures in rural households of Tehran. The average cost of food is about half the household's cost, and following that are the costs of housing, utilities, and clothing, respectively.

Mean ± SE of BMI and waist circumference of the studied women were 28.7±0.4 kg/m^2 and 92.0±3.3 cm, respectively. Moreover, the prevalence of underweight, overweight, and obese subjects were 2.8, 33.3 and 38.2% in women in rural areas. No significant differences were found in weight of women based on their residence or food security.

There was low consumption of vegetables, fruits, meat, milk, and dairy products and high consumption of egg in food-insecure households compared to secure ones (P<0.05). Eating bread and cereals, legumes, fats and oils, sugar and sweets was not different in terms of the food security status of the household (**Table 3**); however, the amount of rice consumed by food-secure households was significantly higher than moderate and severe cases (In food-secure, mild, moderate, and severe food-insecure households: 157.7±9.8, 138.2±11.5, 126.2±11.9, and 122.4±15.5 g/day, respectively, P<0.05).

SEM revealed that SES negatively affected household FI (P<0.001), and FI negatively influenced the food group consumption (P<0.001). In other words, with increasing SES components (age, educational level, the head's job, total and food expenditure, place of residence, number of rooms, and family size), FI decreased; as a result, food group consumption (including bread and cereals, legumes, meat, eggs, milk and dairy

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products, fruits, vegetables, fat and oils, sugar and sweets) increased; however, SES did not directly influence the food group consumption of rural women.

Based on the participants' statements, the main codes were categorized into two main themes: modification in buying foods (including quality and quantity of purchased foods), the strategies to oppose FI, and satisfaction from subsidies allocation.

Modification in buying foods: The majority of women stated the amount of purchased foods have been changed after targeted subsidy plan. This change encompassed both quality and quantity of food. Regarding the quality of foods, because of increase in prices, families were forced to replace some of the foods with lower quality and price. This was apparently evident in protein foods, fruits, and dairy products such as meat, fish, nuts, seasonal (summer) fruits, milk and yogurt. These replacements also included the legumes, eggs, soybeans, cheap rice, and chicken liver or gizzard instead of meat or chicken. As participants expressed:

"We use soy, vegetable or bean in pasta and the other foods instead of meat. We have done this during recent years."

"People have gone towards saving money. For example, if they cooked 4 cups of rice previously, now, they mix 2 cups of rice with legumes or consume it with bread to fill the belly."

"When we cannot afford to buy some kinds foods, we replace them with other things like egg."

"We bought red meat in the past, but now, we grind chicken gizzard and consume it in several meals, and we purchase chicken liver."

In addition, they were forced to buy frozen meat, non-fresh vegetables and fruits. As women stated:

"Previously, we bought and shared a sheep with 2 to 3 households, but now we are forced to have frozen meat."

"Food consumption is much reduced. We can't buy fruits with high quality and we select non-fresh vegetables and fruits."

The amount of some foods, like bread, oils, egg, potato, soybean, and fast food increased following the targeted subsidy program. As they pointed out:

"We have to buy the bread as we did in the past, because we can't remove bread from our tables; the children need to consume bread."

Despite higher consumption of bread, they tried to avoid the throwing away bread because of its high price. As they expressed:

"We buy higher amounts of bread but keep it in the freezer to consume later. Previously, we threw out more bread."

Because of high cost of rice, they ate more bread compared to the past, and the consumption of oils changed following targeted subsidies program regarding preparing fried foods. They believed liquid oil was less durable than solid oils, and for this reason, the consumption of liquid oil was high.

"When we fried food, more oil is consumed in preparing foods. We buy liquid oils because its price is less than solid oil."

"The amount of liquid oil is high because it is like water and has to be used in large quantities."

"We eat bread and Khoresht (a generic term for stew dishes in Persian cuisine with combination of food items) prepared with large amount of oils."

The consumption of eggs was increased following targeted subsidies. As they said:

"The price of egg is less than other foods. When we can't afford to buy some foods, we buy eggs."

Some of the participants stated their consumption of eggs increased because of having poultry at home:

"We previously did not eat eggs, but now, we use more eggs in our foods because we have poultries at home, and they are not necessary to buy."

The majority of people bought meat and fish alternately because of their high price. They said that they consume fish only in winter or replace fish with canned or frozen fish. They preferred to put aside fish from their household basket. As some participants pointed out:

"Since provision of subsidies, we have not eaten fish due to its price. We try to replace canned fish with fresh fish."

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"We rarely eat fish. If we want to eat fish, we buy it in winter."

Because potato provides a lot of energy, its consumption increased after targeted subsidies especially in families with children.

Considering high price of meat, the majority of people replaced it with soybean. Soybean has low price in Iran's market, and due to people's knowledge regarding soybean being a rich resource of protein, its consumption increased between Iranian people during the recent years. As participants expressed:

"We eat less red meat and replace it with wax beans or soybeans. We also use soy instead of grounded meat in spaghetti and other foods."

In contrast, the increase in some foods, the consumption of number of food items also decreased after targeted subsidy. The majority of women pointed out a significant decrease in buying dairy products especially milk, vegetables, nuts, vegetables, rice and fruits. They stated decrease in consumption of milk and dairy products due to increase in their price. As the rural women said:

"My husband bought lots of milk daily before receiving subsidies, but now, the price of milk has increased, and we buy one kilo of unpacked milk every day."

"When packed milk was sold, it had a reasonable price and we bought it, but its sales are reduced, and the price of other types of milk is high; so, we are forced to buy milk rarely."

Despite being aware of the benefits of consuming vegetables and fruits, they said that their consumption has decreased after the targeting of subsidies:

"We used to buy more vegetables, for example, one kilo, but now half a kilo is bought. We try to buy as many vegetables as we."

They preferred to buy basic food items; fruit consumption was limited to the times they had having guests. Buying fresh fruits, especially seasonal fruits, was decreased because of their price. A women pointed out:

"Even if we would like to buy fruits, we aren't able to prepare, and we just look at them because they are very expensive especially summer fruits."

They expressed eating nuts was restricted to ceremonies like Nowruz. They preferred to eat nuts only when they had guests or during traditional feasts.

Interestingly, in many of the studied villages, very little agricultural or livestock activity has been done, and the villagers depend more on buying from shops than producing what they need.

Strategies to reduce FI: Despite all the obstacles for households to prepare foods, there were some strategies to combat FI in families. These strategies were often implemented by women; they had to deal with shortcomings following the payment of subsidies. In summary, these strategies included:

- **Contentment and reduction of food consumption**

"If we have money to buy foods, we prepare more foods, but if we have less money, we have to save and eat less. We are not able to buy the amount of food we need."

- **Decreasing consumption of food items such as red meat**

"Recently, we have had less money, and therefore, do not buy the things we need. In this situation, we eliminate some foods like red meat."

- **Eating less foods by mothers in food-shortage conditions**

"Meat consumption has changed. Mothers take a smaller amount of meat and the rest is divided between husband and kids because mothers love kids; but, the mother should eat to be healthy."

- **Buying foods from weekly markets**

"We eat too much fruits. Here, weekly (Tuesday) market is held, and we buy one or two types of fruits once a week."

- **Skipping main meals such as dinner**

"When we do not have money, we just eat bread. The number of times we cook is reduced; we may prepare for a meal and eat twice or do not eat dinner most of the time."

- **Consuming some food items when having guests**

"We do not eat chicken as usual, we live in a poor neighborhood, and that's why we save

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chickens or meat and even fruits for guests."

- Borrowing money or non-cash purchasing of foods

"When we do not have enough money to buy foods, we borrow money from neighbors, relatives, and friends, or get foods from shopkeepers and pay later."

Satisfaction with subsidy allocation: Despite CT given to the household head, majority of people were not satisfied with this policy. They believed their living condition was better when they received food subsidy. Much of the people's dissatisfaction was related to rising cost of the commodities such as food and fossil fuel.. A number of women in a similar statement pointed out:

"We prefer not to pay subsidy and the price of food and other products will. A few years ago, condition was much better than now. Everything was cheaper; with this amount of money, we can't buy things as before."

"If the subsidies are discontinued, and instead, the price of food and other commodities decrease, we are more satisfied."

They stated subsidies are just useful for people with no income, workers, and tenants, whereas for other people, it is hard to prepare food. As one woman remarked:

"That's fine for us because my husband has no income. Subsidies are like salary for some people, and we could not afford the living expenses. We should pay installments, medical expenses, house rent, and bills of electricity, water and gas by subsidies."

Table 1. Focus -group discussion regarding moderators' guide.

Questions	Probes
- Does the amount of purchased foods have changed since the implementation of subsidy program? - How do the amounts of purchased foods change? - Do the type and quality of purchased foods have changed since the implementation of the program? - Has your food consumption changed compared to before the subsidy project was implemented? How about your husband and children? - Are there any foods which were removed or their consumption increased compared to before the subsidy project?	-Which foods? -Please describe the status of bread, oil, meat, poultry, fish, egg, dairy products, fruits, vegetables -If necessary, give an example

Table 2. Socio-economic and anthropometric characteristics of studied households based on their food security after CT program in rural Tehran

Variables	Food-secure (n=115)	Food insecure status			Total
		Mild (n=76)	Moderate (n=41)	Severe (n=34)	
Age of the head (year)	41.64±1.02[a]	43.28±1.49	42.76±1.69	40.68±1.72	42.10±0.70
Family size	3.53±0.10	3.65±0.13	3.78±0.11	4.06±0.18[c,d]	3.70±0.06
Per capita floor area (m^2)	30.51±1.82	26.54±2.72	27.10±3.82	21.22±2.44[c]	27.37±1.33
Per capita number of rooms	0.72±0.03	0.63±0.05	0.57±0.03[c]	0.50±0.04[c]	0.63±0.02
Food expenditure (*Thousand rials*)	434±28	347±22[c]	371±28	257±29[c]	373±15
Total expenditure (*Thousand rials*)	972±66	885±89	786±62	627±57[c]	857±37
Body mass index ($kg/m^{2)}$	28.54±0.43	28.74±0.61	29.68±1.37	27.53±0.80	28.68±0.40
Educational level of the head					
Illiterate	4 (22.4)[b, f]	5 (27.8)	5 (27.8)	4 (22.2)	18 (5.4)
Primary school	43 (37.1)	31 (26.7)	28 (24.1)	14 (12.1)	116 (35.0)

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Secondary school	39 (35.5)	28 (23.3)	27 (22.5)	26 (21.7)	120 (36.3)
High school diploma and higher	45 (58.4)	10 (13.0)	13 (16.9)	9 (11.7)	77 (23.3)
Occupation of the household head					
Unemployed, student, housekeeper	11 (24.4)[f]	8 (17.8)	12 (62.7)	14 (31.1)	45 (13.6)
laborer, farmer, animal husbandry	41 (30.1)	36 (26.5)	34 (25.0)	25 (18.4|)	136 (41.0)
Freelancer, shopkeeper, driver	55 (50.9)	23 (21.3)	16 (14.8)	14 (13.0)	108 (32.5)
Employee, teacher/tutor	24 (57.1)	7 (16.7)	11 (26.2)	0 (0.0)	42 (12.7)
Manager, doctor, pilot, employer	0 (0.0)	1 (1.4)	0 (0.0)	0 (0.0)	1 (0.3)

[a]: Mean±SE; [b]: n(%); [c]: Significant difference with food secure group by ANOVA (P<0.01); [d]: Significant difference with mild food-insecure group by ANOVA (P<0.05) ; [f]: Significant difference between different groups by Chi-square test.

Table 3. Mean (±SE) of food group consumption (g/day) of studied women based on their household food security status after CT program in rural Tehran.

Food groups	Food- secure (n=128)	Food insecure status			Total (n=318)
		Mild (n=72)	Moderate (n=70)	Severe (n=48)	
Bread and cereals	390.6±20.8	411.9±28.0	392.7±30.2	411.8±35.5	399.1±13.5
Legumes	35.4±3.3	35.2±3.3	40.2±5.3	34.4±5.1	36.3±2.0
Vegetables	517.8±28.4	402.2±27.8*	425.0±30.3*	546.5±59.3	475.4±17.4
Fruits	534.5±35.1	341.4±36.2*	357.2±38.5*	292.7±46.1*	415.2±20.4
Meats	43.6±2.5	29.8±3.0*	26.0±2.6*	30.2±3.9*	34.6±1.5
Egg	16.8±1.1	21.8±2.6	23.6±2.6*	20.7±2.9	20.0±1.0
Milk and dairy products	395.0±25.5	313.4±25.0*	266.1±28.6*	207.2±31.6*	319.8±14.5
Fat and oils	32.0±2.3	25.4±2.6	34.2±5.0	31.6±4.1	30.9±1.7
Sugar and sweets	56.5±11.4	46.3±11.0	34.9±2.9	31.7±4.8	45.7±5.3

* Significant difference with food-secure group by ANOVA (p<0.05)

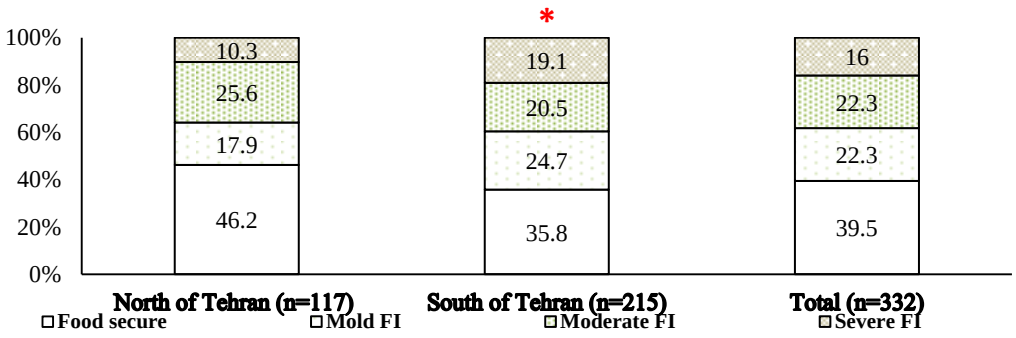

Figure 1. Comparison of food security status following CT program between North and South rural households of Tehran. * Significant difference in food security status with rural areas in North of Tehran province (P<0.05)

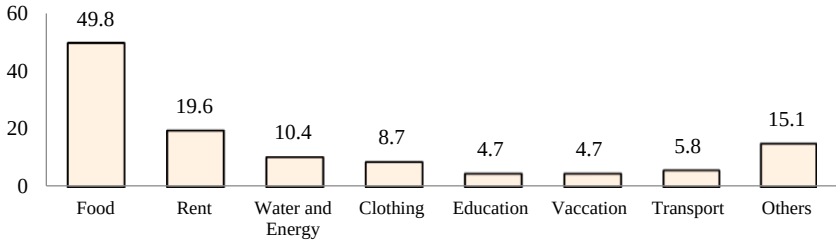

Figure 2. Share of various household expenditures from total expenditure after CT program in rural households of Tehran

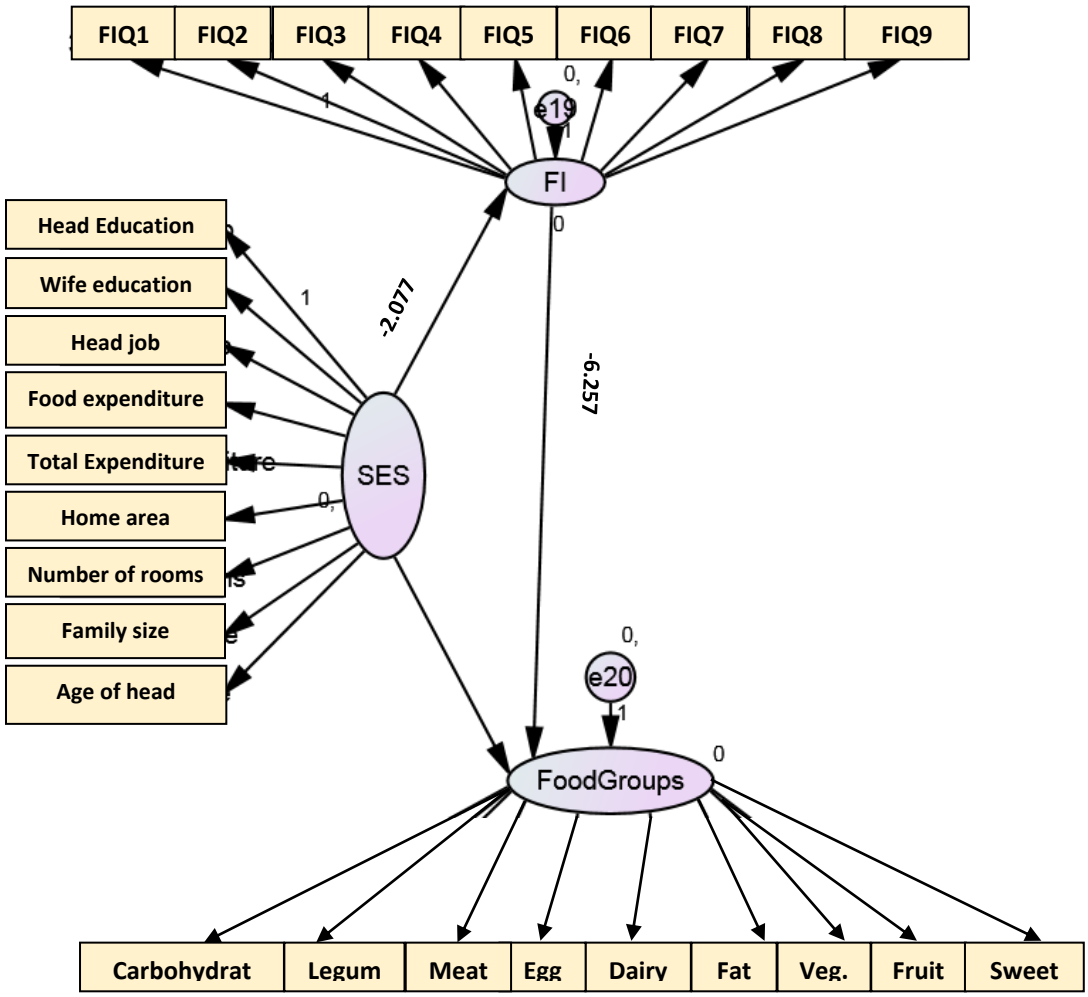

Figure 3. Structural equation modeling of the relationship between SES, FI, and food group consumption in rural household of Tehran province, Iran. RMSEA=0.079; CFI=0.754; $\chi 2$/df ratio=2.128; t value SES→FI, t value= -2.077, FI →Food Groups t value= -6.257; $P< 0.001$

Discussion

The findings suggested that after CT program, the prevalence of FI in rural areas of Tehran province was relatively high (about 60%), and consumption of some important food groups in food-insecure households was low. CT program in Iran raised negative and positive viewpoints in women based on its impacts on inflation and household expenditures.

The estimated prevalence of FI in the present study is somewhat higher than previous studies in rural areas of Iran (Dastgiri *et al.*, 2011, Gholami *et al.*, 2013); however, short-form questionnaire was used for measuring FI in studies whose degree of FI cannot be determined. A study in Pakistan showed that one-fourth of the rural households were suffered from FI, and farm households perceived an increase in food prices, crop diseases, lack of irrigation water, and health expenses as major livelihood risks. Furthermore, the results of logistic regression indicated that family size, monthly income, food prices, health expenses, and debt were main factors influencing food security in rural households (Ahmed *et al.*, 2017).

In this study, FI was related to low level of

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education, the household head's job, lower food, total expenditures, family size, floor area, and the number of rooms in rural areas. These results were in line with the findings of studies (Ahmed *et al.*, 2017, Gebre, 2012), which also found a negative association between increase in household size and food security status. The association between food security and economic factors was also indicated in projects by (Ahmadi-Firouzjaie *et al.*, 2015, Dastgiri *et al.*, 2011, Gholami *et al.*, 2013). Predictors of FI in rural and urban areas were similar. Heads of food-secure households had higher education level and higher job position compared with heads of food-insecure households. Income and expenditures were lower in food-insecure households compared with food-secure ones (Mohammadi *et al.*, 2011).

In Urban areas, FI went from 43.6% before CT to 56.5% after the program, which was not much different from rural areas. Food expenditures constituted half of the total expenditure in both urban and rural areas, and the share of energy and other expenditures was higher after CT program (Mohammadi-Nasrabadi, 2015, 2016). However, lower household expenditures might be attributed to lower education in rural areas compared to urban ones.

Using the 2010 National Survey on Households' Vulnerability to Food Insecurity data in Niger, Boukary (Gambo Boukary *et al.*, 2016) found that asset and social safety net indicators positively affected families' resilience. In the present study, education and job status of the head and his/her spouse along with the place of residence are the most important factors regarding FI.

Inconsistent with findings of this research, Olson and Strawderman (Olson and Strawderman, 2008) found the association between FI and obesity in a cohort of 622 healthy childbearing women living in a 10-county rural area of upstate New York. However, the findings were in line with those in other developing countries, such as Malaysia, with the same degree of development (Mohammadi *et al.*, 2013, Shariff and Khor, 2005).

In this qualitative study, using the following strategies was reported to compensate for FI: Contentment and reduction in food consumption, decreasing food items such as red meat, eating less foods by mothers in food-shortage conditions, buying foods from weekly markets, skipping main meals such as dinner, consumption of some food items only when having guests, borrowing money or non-cash purchasing of foods. In a study in Colombia, women coped with difficulties in food access in similar ways, such as borrowing money from family, friends, and neighbors, buying from store's layaway service, or using products from their own farms (Burkhardsmeier *et al.*, 2017). Developing effective home gardens along with related education, especially women empowerment, can also contribute to producing some nutritious food items in Iranian rural households.

Evaluating studies on CT in Sub-Saharan Africa (Burchi and Strupat, 2016, Tiwari *et al.*, 2016), Bangladesh (Ahmed *et al.*, 2009), and India (Raghunathan *et al.*, 2017) indicated the positive effect on increasing households' calorie intake and food security as well as the welfare of the household. However, monetary transfers should account for at least 20% of consumption by the poor. Moreover, CTs alone cannot positively impact nutrition knowledge and nutrition/hygienic practices, and had limited effects on diet and nutrition. Findings of a cross-country analysis highlighted the importance of a robust design and implementation of a program to achieve the intended results. A relatively generous, regular, and predictable transfer increases the quantity and quality of food and reduces the prevalence of FI; however, a smaller, lumpy, and irregular transfer does not impact food expenditures (Tiwari *et al.*, 2016). In order for CTs to have long-lasting effects on nutrition, they must be complemented by other interventions such as nutrition education, food supplements for vulnerable groups, and specific economic policies (Burchi and Strupat, 2016).

he lack of data on food security status and expenditure of households before CT program in

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rural areas make it difficult to evaluate the effects of CT in rural population. This study was conducted only in Tehran province, and the results in small and provinces in longer distance may not be t similar to the findings of this study. Therefore, similar studies in small rural areas are suggested. Under-reporting of income and household expenses is also a common limitation in such studies which reduces the validity of the findings. The impact of inflation and the exact influence of intensification of sanctions against Iran in relation to CT program were not addressed.

Conclusion

In this study, for the first time, FI model was presented by SEM in rural Iranian households. A negative relationship was identified between SES and FI as well as FI and food group consumption. Therefore, to improve rural household's food security and nutritional health in Iran, in addition to cash transfer program, education and professional skills should be improved and more resources should be gathered in order to acquire more assets.

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Authors' contributions

Haghighian-Roudsari A mostly contributed to the qualitative phase and analyzed the data; Mohammadi-Nasrabadi F and Omidvar N contributed to quantitative phase of the research in addition to supervising it; Khoshfetrat MR, Mirzadeh-Ahari Z and Fadavi G contributed to gathering and analyzing data; Mehrabi Y was the statistic counselor.

Conflict of interest

The authors declared no conflict of interest.

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References

Ahmadi-Firouzjaie A, Shabanali-Fami H, Motiee N & Mohammadi-Nasrabadi F 2015. Designing a Model for Improving Household Food Security in Small-Scale Farming Systems of Mazandran Province, Iran. In *Faculty of Agricultural Economics and Development, Department of Agricultural Development and Management*. University of Tehran: Tehran.

Ahmed A, Quisumbing A, Nasreen M, Hoddinott JF & Bryan E 2009. Comparing Food and Cash Transfers to the Ultra Poor in Bangladesh. International Food Policy Research Institute: Washington, D.C.

Ahmed U, Ying L, Bashir M, Abid M & Zulfiqar F 2017. Status and determinants of small farming households' food security and role of market access in enhancing food security in rural Pakistan. *PLOS ONE* **12 (10)**: e0185466.

Burchi F & Strupat C 2016. The Impact of Cash Transfers on Food Security in Sub-Saharan Africa: Evidence, Design and Implementation. (ed. 15). German Development Institute/ Deutsches Institut für Entwicklungspolitik (DIE), Briefing Paper: Bonn, German.

Burkhardsmeier B, Rhodes E, Girard AW, Yount KM & Hines D 2017. Experiences of Household Food Insecurity in Rural Colombia: Qualitative Analysis of Women Smallholder Farmers. *FASEB Journal.* **31 (1_supplement)**: 791.722-791.722.

Coates J, Swindale A & Bilinsky P 2007. Household Food Insecurity Access Scale (HFIAS) for Measurement of Food Access: Indicator Guide FANTA Project: Washington, DC.

Corbin J, Strauss A & Strauss A 2014. Basics of qualitative research. Sage.

Dastgiri S, Sharafkhani R, Gharaaghaji-Asl R & Ghavamzadeh S 2011. Prevalence, influencing factors and control of food insecurity: a model in the northwest of Iran.

[DOR: 20.1001.1.24767417.2023.8.4.11.3]

[DOI: 10.18502/jnfs.v8i4.14010]

Asia Pacific journal of clinical nutrition. **20 (4)**: 613-617.

Deitchler M, Ballard T, Swindale A & Coates J 2010. Validation of a Measure of Household Hunger for CrossCultural Use. Food and Nutrition Technical Assistance II Project (FANTA-2): Washington, DC.

DFID & UKaid 2011. DFID Cash Transfers Literature Review. (ed. E. p. P. D. 2011). Department for International Development, UKaid: London, UK.

Doshmangir L, Doshmangir P, Abolhassani N, Moshiri E & Jafari M 2015. Effects of targeted subsidies policy on health behavior in Iranian households: A qualitative study *Iranian journal of public health* **44 (4)**: 570-579.

Esmaeili A, Karami A & Najafi B 2013. Welfare effects of alternative targeted food subsidy programs in Iran. *Food security.* **5 (3)**: 451-456.

Expert Panel on the Identification Treatment of Overweight OiAU & National Heart L, Blood Institute, National Institute of Diabetes, Digestive, Kidney Diseases (US), 1998. Clinical Guidelines on the Identification, Evaluation, and Treatment of Overweight and Obesity in adults: The Evidence Report. *Obesity research.* **6 (suppl 2)**: S51-S209.

Food and Agriculture Organization 2014. The state of food and agriculture: Innovation in family farming Food and Agriculture Organization of the United Nations: Rome.

Food and Agriculture Organization 2017. The state of food security and nutrition in the world 2017. Food and Agriculture Organization of the United Nations: Rome.

Gambo Boukary A, Diaw A & Wünscher T 2016. Factors Affecting Rural Households' Resilience to Food Insecurity in Niger. *Sustainability.* **8**: 181-191.

Gebre G 2012. Determinants of food security among households in Addis Ababa city, Ethiopia. *Interdisciplinary description of complex systems.* **10 (2)**: 159-173.

Gholami A, Sani TR, Askari M, Jahromi ZM & Dehghan A 2013. Food Insecurity Status and Associated Factors among Rural Households in North-East of Iran. *International Journal of Preventive Medicine.* **4 (9)**: 1018-1024.

Giraldo P, Betancur MJ & Arango S 2008. Food Security in Development Countries: A systemic perspective. Facultad de Minas: Medellín – Colombia.

Hajipour M & Fallsolyman M 2016. The effects of targeted subsidies on misery index in urban and rural settlements of Iran regions *International journal of humanities and cultural studies* **3(2)**: 714-725.

Hasan i 2010. Ministry of Commerce and Targeting Subsidies. Ministry of Commerce: Tehran.

Herrero M, et al. 2010. Smart investments in sustainable food production: Revisiting mixed crop-livestock systems. *Science.* **327**: 822-825.

Hooper D, Coughlan J & Mullen M 2008. Structural equation modelling: guidelines for determining model fit. *Electronic journal of business research methods.* **6 (1)**: 53-60.

Hosseini Esfahani F, Asghari G, Mirmiran P & Azizi F 2010. Reproducibility and relative validity of food group intake in a food frequency questionnaire developed for the Tehran Lipid and Glucose Study *Journal of epidemiology.* **20 (2)**: 150-158.

Hosseini S, Pakravan-Gharvadeh M, Salami H & Flora C 2017. The impact of the targeted subsidies policy on household food security in urban areas in Iran. *Cities.* **63**: 110-117.

IFPRI 2016. Global nutrition report 2016; From promise to impact: Ending malnutrition by 2030. International Food Policy Research Institute: Washington, DC.

Karami A, Esmaeili A & Najafi B 2012. Assessing effects of alternative food subsidy reform in Iran. *Journal of policy modeling.* **34 (5)**: 788–799.

Lewins A & Silver C 2007. Using software in qualitative research: A step-by-step guide. Sage: Los Angeles.

Mahendra S 2009. Poverty insights. Institute of Development Studies, University of Sussex: Brighton.

[DOR: 20.1001.1.24767417.2023.8.4.11.3]

[DOI: 10.18502/jnfs.v8i4.14010]

Mirmiran P, Hosseini Esfahani F, Mehrabi Y, Hedayati M & Azizi F 2010. Reliability and relative validity of an FFQ for nutrients in the Tehran Lipid and Glucose Study. *Public health nutrition.* **13 (5)**: 654 - 662

Mohammadi-Nasrabadi F 2015. Evaluation of Subsidy Targeting Program through Cash Transfer on Food Security and Expenditure of Urban Population in Tehran: a Mixed Method. Nationa Nutrition and Food Technology Research Institute, Academy of Medical Sciences: Tehran, IR Iran.

Mohammadi-Nasrabadi F 2016. Impact of cash transfer onfood security: A Review *Nutrition and food sciences research.* **3 (2)**: 3-10.

Mohammadi F, et al. 2013. Is household food insecurity associated with overweight/obesity in women? *Iranian journal of public health.* **42 (4)**: 380-390.

Mohammadi F, et al. 2011. Validity of an adapted Household Food Insecurity Access Scale in urban households in Iran. *Public health nutrition.* **15 (1)**: 149-157.

Norris A 2005. Path Analysis. In *Statistical Methods for Health Care Research* (ed. B. Munro and W. Connel), pp. 377-404. Lippincott Williams & Wilkins: Massachusetts.

Olson CM & Strawderman MS 2008. The relationship Between Food Insecurity and Obesity in Rural ChildbeRelationship aring Women. *Journal of rural health.* **24 (1)**: 60-66.

Raghunathan K, Chakrabarti S, Avula R & Kim SS 2017. Can conditional cash transfers improve the uptake of nutrition interventions and household food security? Evidence from Odisha's Mamata scheme. *PLoS ONE* **12 (12)**: e0188952.

Saadi H & Moadab HV 2013. Assessment of female-headed household's food security and the affecting factors; case study: women in Razan city. *Women in development and politics.* **11 (3)**: 411-426.

Salarkia N, Abdollahi M, Amini M & Neyestan iR 2014. An adapted Household Food Insecurity Access Scale is a valid tool as a proxy measure of food access for use in urban Iran. *Food security.* **6 (2)**: 275-282.

Sarkissian N, Rahmanian M, Azar M, Mayourian H & Khalili S 1980. Food composition table of Iran. In *131*. National Nutrition and Food Technology Research Institute: Tehran.

Shariff Z & Khor G 2005. Obesity and household food insecurity: evidence from a sample of rural households in Malaysia. *Europian journal of clinical nutrition.* **59 (9)**: 1049-1058.

Sibhatu KT & Qaim M 2017. Rural food security, subsistence agriculture, and seasonality. *PLoS ONE.* **12 (10)**: e0186406.

Statistical Center of Iran 2016. 2016 National census of population and housing Statistical Center of Iran (In Farsi). Available at: amar.org: Tehran.

Tiwari S, et al. 2016. Impact of Cash Transfer programs on Food Security and Nutrition in sub-Saharan Africa: A Cross-Country Analysi. *Global food sSecurity* **11**: 72-83.

Vafaei-Yeganeh R, MousaviNik SH & Tabatabaei-Yazdi R 2011. Assessment of the yearly Budjet Bill of Iran, 2012; Targeted subsidies. Research center of Parliment: Tehran.

World Bank 2007. World development report 2008: Agriculture for development. pp. 1-168. World Bank: Washington, DC.

[DOR: 20.1001.1.24767417.2023.8.4.11.3]

[DOI: 10.18502/jnfs.v8i4.14010]