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Original Article

Do Iranian Female-headed Households Have Lower Socio-economic and Nutritional Status Compared to Male-headed ones?

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ABSTRACT

Background and Objectives: Poverty and risk of nutritional vulnerability of female-headed households (FHHs) are usually higher than male-headed households (MHHs). This study aimed at comparing the socio-economic status, and food and nutrient intake of FHHs and MHHs based on the data from Comprehensive Study on Household Food Consumption Patterns and Nutritional Status of Iran (2001-2003).

Materials and Methods: In this cross-sectional study, the samples were urban and rural households of the country, which were determined by the Statistics Center of Iran using systematic cluster method. The socio-economic and demographic characteristics of households were asked by interview and observational techniques, and recorded in data forms. The dietary data were collected using three consecutive 24-hour recalls completed by nutrition experts. For the purpose of this study, FHHs and MHHs were compared in terms of socio-economic characteristics, consumption pattern and nutritional status.

Results: From 7158 households of the study, 5.5% were female-headed including 116 rural (1/6%) and 280 urban (3.9%) households. Educational and occupational status among FHHs were significantly lower than among MHHs ($p<0.05$); however, in terms of average total expenditure per capita, accommodation type, and lodging facilities such as electricity and water consumption, no significant differences were observed between FHHs and MHHs. In contrast, MHHs enjoyed more facilities. The significant difference in food consumption among the urban households was only found in fruits and sweets, and in the rural areas, in oils and fats group ($p<0.05$). In FHHs, calcium, Vitamin C and thiamin intake was lower than in male-headed group. In the rural areas, the retinol and energy intake posted a lower and higher level, respectively, over MHHs ($p<0.05$).

Conclusions: In spite of lower socio-economic level among FHHs, the differences in food and nutrient intake were only seen in fruits, calcium, Vitamin C and retinol intake, especially in the rural areas. Therefore, in the diet of these households, energy dense foods should be partly replaced by foods providing nutrients such as Ca, Vitamin C and retinol.

Keywords: Female-headed households, Food consumption patterns, Nutritional status, Family structure, Socio-economic status

Introduction

During the mid-seventies, the number of female-headed households (FHHs) began to raise both in the developed and developing countries. After 1978, the definition of FHHs has changed, and researchers considered a broader concept in defining the structure of the family according to gender, which in turn

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included power, authority, acceptance, and financial accountability within the households (1). In recent years, researchers and critics have sought policies to identify differences in family structure as a result of demographic and social changes. Despite the difficulty in defining FHHs, it is believed that these families are more economically disadvantaged than the male-headed households (MHHs). There is considerable variation in the nature and extent of gender inequality across countries, making it difficult to generalize that disparities between women and men are systematically larger below the poverty line. The evidence surrounding the incidence of poverty in FHHs is also found to be country- and case-specific (2). FHHs are usually disadvantaged in terms of access to land, livestock, other assets, credit, education, health care, and extension services. For instance, in Zimbabwe, FHHs have 30-50% smaller landholdings than MHHs. There are similar findings on Malawi and Namibia. But there is disagreement as to whether or not they are poorer than MHHs in terms of income and poverty (3).

Several factors intensify higher risk of poverty in FHHs in the communities where MHHs or both FHHs and MHHs are considered a social norm. These households are smaller but often have a higher overload (the number of people who contribute to family welfare than those who do not). Adult women typically have lower average earning than men. In addition, women have more time restrictions due to childcare and house responsibilities, which lead to less money–making capability (4-10). Several studies have shown that some of these factors could place FHHs at higher risk of food insecurity and nutritional susceptibility (11-14). However, studies in Ecuador (1), Dominican (9) and Kenya (15) have shown that despite the lower income of female-headed families, the money spent for food, the nutritional pattern, and child growth registered no difference as compared to the male counterparts.

As changes in the socio-economic and cultural structure of the families have increased rapidly (16-17), and as the number of FHHs is on the rise, the health and nutritional status of these families has drawn the attention of scientific, social and health communities. Hence, the current study has been conducted in order to determine and compare the socio-economic status, food patterns and nutritional status among the Iranian families of different structures (male and female) in the framework of the Comprehensive Study on Food Consumption Patterns and Nutritional Status of IR Iran.

Materials and Methods

This cross-sectional and observational study, comprising of both descriptive and analytical components, was conducted according to the Comprehensive Study on Food Consumption Patterns and Nutritional Status of the country in 2001-2003. The data were collected by interview and observational techniques. This study was based on the secondary use/analysis of data from the comprehensive study.

Sampling and sample size: The studied population was rural and urban families of the whole country. The sample was determined by the Statistics Center of Iran (SCI) using cluster systematic method. Based on daily energy intake with the standard deviation of 250 Kcal and maximum acceptable error of 50 Kcal as the main studied trait, the sample size of 96 households in each province was calculated, which was then increased to 108 households for covering subject missing. After determining the urban and rural clusters according to the block list of households, all of those living in blocks were identified, and the households were selected.

After coordination with the Ministry of Health and Medical Education, Nutrition Community Office, and the Police, necessary permits for the project were taken. Identification of each household was done before the research team visited the home and informed consent was taken. The sample size was calculated so that it was valid in the whole country, and could also be generalized to the provinces. The minimum sample size in each province (for clusters of three families) was 108. Due to the larger sample size in more populous provinces, the sample clusters as large as 6 households were taken to consideration, too. Therefore, the ratio of the total sampling was obtained equal to 0.5 in 1000, with at least 108 households in each province (18).

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Socio-economic and demographic evaluation: Assessment of the socio-economic status of FHHs was done using indirect method. In the first visit, the overall profile of the members of family, such as family, gender, length and details of residency, relation with the head, the educational level and employment status of the family head, and available facilities were asked by the interviewers and were recorded in the data forms.

The educational status of the family head was divided into 4 groups: 1) illiterate, 2) literate with elementary knowledge, 3) secondary school and under diploma, and 4) diploma and upper diploma. The employment status was divided into 7 groups: 1) workers, 2) farmers and ranchers, 3) independent workers and employers, 4) driver and shopkeeper, 5) teacher, military, employee, 6) student, housewives and unemployed, and 7) retired and pensioner.

The marital status was categorized into married and divorced/widowed. The residence was defined as living in rural and urban areas. The infrastructure areas, number of rooms, and the whole expenditure were demonstrated per capita according to the size of the family. Individual ownership of a dwelling unit was divided into property owner, rent or mortgage.

Evaluation of the food group consumption and nutrient intake: Information about food consumption in the country was collected from winter 2000 until 2002 using the same method in urban and rural areas and different seasons by completing 24-hour questionnaires, which contained records of food consumption in three consecutive days. These questionnaires were completed by nutrition experts using recall and weighing methods. Type, quantity and price of the food, number of people in households, and the number of family members of the family with separate eating occasions were asked from the person responsible for cooking, and recorded. Food was weighed using a Soehnle scale with a precision of 5g and weight capacity of 10 kg. After coding and calculating the weight of each food eaten, analysis of the data and determining the nutritional value of the food pattern of households were done using an especially designed software program in MS ACCESS. The revised edition of the Iranian Food Composition Table was used to calculate the intake of nutrients (19).

Food pattern was defined as consumption of food groups (including bread and cereals, vegetables, fruits, meat, eggs, dairy, fats, Sugar, sweets, beverages and other foods). Nutritional value was calculated according to the energy level, intake of carbohydrates, protein, fat, fiber, calcium, Iron, riboflavin, niacin, Vitamin C and Vitamin A and the proportion of macronutrients in energy production. The mean daily requirement of each nutrient as per capita in household was calculated adopting the recommendations of WHO/FAO 2002 (20).

Statistical analysis: Data analysis was done using the SPSS software (ver. 11.5). Descriptive data are presented as the mean and SD and in the form of frequency table. Normality of quantitative data was tested by Kolmogorov–Smirnov's test and non-parametric tests were used as necessary. Differences between the qualitative variables and the means were assessed by Chi-square and t- or Mann-Whitney test, respectively.

Results

Among the 7158 households (2496 rural and 4662 urban households participating in the comprehensive study between 2000 and 2002), 5.5% were female-headed including 116 rural and 280 urban households. Mean ± SD of age of the head among the rural and urban households was 45.4 ± 14.4 and 46.0 ± 13.4, respectively, and no significant difference was found. The mean age of head was significantly higher in FHHs than MHHs in the rural and urban areas (Figure 1-A). The average household size in urban families (5 persons) was significantly less than rural ones (5.5 persons). The size of the FHHs in both rural and urban areas was significantly lower than in MHHs, and in the whole country, the size of FHHs was on average one person less than that of MHHs ($p<0.05$) (Figure 1-B).

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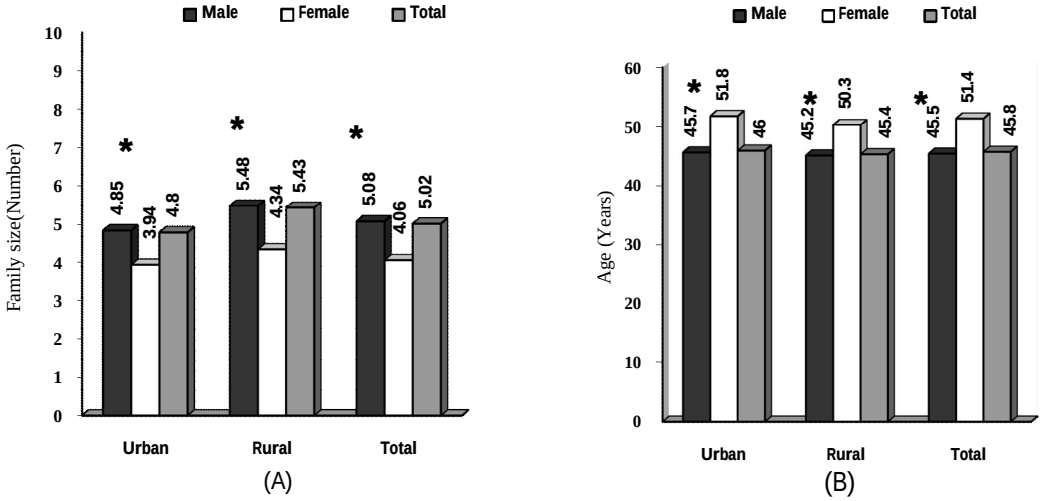

* Significant difference between the male and female-headed households in urban, rural, and total (P<0.001)

Figure 1. Comparison of A) mean of age and B) family size in MHHs and FHHs in the rural and urban areas of Iran.

Table 1 shows the marital status, educational level and occupation of household head in MHHs and FHHs in the rural and urban areas of Iran. 99% of the male family heads were married while only 14% of female heads were married and in 86% of FHHs, the heads were widowed, divorced, or unmarried. Forty-seven MHHs were excluded from the analysis because of missing data on marital status of their heads.

Table 1. Comparison of the marital status, educational level and occupation of head in male and female-headed households based on the rural and urban areas of Iran

Socioeconomic variables N (%)	Urban area (n= 4662)		Rural area (n= 2496)		Total (n= 7158)	
	Male Headed (n=4382)	Female Headed (n=280)	Male Headed (n=2380)	Female Headed (n=116)	Male Headed (n=6762)	Female Headed (n=396)
Marital status						
Married	4311(99.0)	37(13.2)	2323(98.4)*	19(16.4)	6634(98.8)	56(14.1)
Widow/widower	20(0.5)	223(79.6)	22(0.9)	86(74.1)	42(0.6)	309(78.0)
Divorced	3(0.1)	11(3.9)	3(0.1)	5(4.3)	6(0.1)	16(4.0)
Unmarried	20(0.5)	9(3.2)	13(0.6)	6(5.2)	33(0.5)	15(3.8)
Educational level						
Illiterate	623(14.2)*	128(45.7)	767(342)*	88(75.9)	1390(20.6)	216(54.5)
Primary school	503(11.7)	50(17.9)	451(18.9)	11(9.5)	964(14.3)	61(15.4)
Secondary school, Diploma and upper	1836(41.9)	76(27.1)	930(39.1)	16(13.8)	2766(40.9)	92(23.2)
Unknown	1397(31.9)	26(9.3)	230(9.7)	0(0)	1627(24.1)	26(6.6)
Occupation of head						
worker	931(24.9)*	18(29.5)	510(23.0)*	5(13.9)	1441(24.2)	23(23.7)
Farmer and simple worker	146(3.9)	5(8.2)	970(43.8)	19(52.8)	1116(18.7)	24(24.7)
Independent employed and driver	756(20.2)	19(31.1)	307(13.9)	7(19.4)	1063(17.8)	26(26.8)
Shopkeeper and employer	801(21.4)	6(9.8)	175(7.9)	2(5.6)	976(16.4)	8(8.2)
Employee, teacher and military	1053(28.1)	11(18.0)	243(11.0)	3(8.3)	1296(21.7)	14(14.4)
Other	59(1.6)	2(3.3)	9(0.4)	-	68(1.1)	2(2.1)

Significant difference between the male and female-headed households (*P<0.01, †P<0.001, ‡P<0.05)

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Illiteracy rates in female heads were two times higher than in their male counterparts. The number of male heads of the households with diploma and upper was almost 3.5 times more than in the female ones. The highest illiteracy rate in both groups of heads was reported in rural areas.

Comparison of the classification of the family head´s job by gender shows that the highest age (%) of independent free worker was in female heads. In MHHs, the highest frequency was related to simple non-professional workers. The prevalence of two occupational classes as shopkeepers, entrepreneurs and employees, teachers and military in MHHs was 1.5 to 2 times more than in FHHs. The most frequent main jobs in the rural areas in both MHHs and FHHs were farmers and ranchers, and in the urban areas, they were employees, teachers and military in MHHs, and independent free and simple workers in FHHs.

The economic status of MHHs and FHHs was compared indirectly based on variables such as living facilities, ownership of residential units, home surface area, and number of rooms in urban and rural areas. The property ownership in urban and rural areas was mostly owned, free and in return for services in order of frequency. From this point of view and also in terms of drinking water provision, there were significant differences between the urban and rural areas but there was no significant difference between MHHs and FHHs. Therefore, the results are not presented separately. The differences between MHHs and FHHs in terms of accommodation facilities and utilities are given in Table 2.

In cities, facilities such as water, natural gas, landline, electricity, bathroom and kitchen of MHHs and FHHs were not different. However, FHHs in rural areas had fewer facilities such as electricity, landline and bathroom than MHHs. The average per capita home surface area in FHHs in rural and urban areas was higher than in MHHs (Figure 2-A). The household expenditures in cities were more than in rural areas (388402±2263698 vs. 214717±312199 Rials, $p<0.001$); however, but there was no significant difference between the rural and urban MHHs and FHHs in this regard.

Table 2. Comparison of the facilities and utilities in male and female-headed households based on the rural and urban areas of Iran

Facilities and utilities of households N (%)	Urban area (n= 4662)		Rural area (n= 2496)		Total (n= 7158)	
	Male Headed (n=4382)	Female Headed (n=280)	Male Headed (n=2380)	Female Headed (n=116)	Male Headed (n=6762)	Female Headed (n=396)
Electricity	4338(99.0)	278(99.3)	2312(97.1)*	107(92.2)	6650(98.3)	385(97.2)
Phone	3128(71.4)	198(86.5)	844(35.5)	31(26.7)	3972(58.7)	229(57.8)
Gas	3114(71.1)	190(67.6)	147(6.2)	6(5.2)	3261(48.2)	196(49.5)
Water	4258(97.2)	269(96.1)	1913(80.4)‡	92(25.5)	6171(91.3)	361(91.2)
Bathroom	4047(92.4)	251(8.6)	1041(58.9)	50(43.1)	5448(89.6)†	301(76.0)
Kitchen	4100(93.6)	257(91.8)	1826(76.7)	81(69.8)	5926(87.6)	338(85.4)
Car	1346(30.7)	35(12.5)	391(16.1)	7(6.0)	1730(25.6)‡	42(10.6)
Motorcycles	711(16.2)	22(7.6)	542(22.3)	12(10.3)	1241(18.4)‡	34(8.6)
Black and white TV	670(15.3)*	60(21.4)	896(37.6)	42(36.2)	1566(23.2)	102(25.8)
Color TV	3766(85.9)	216(78.2)	1372(57.6)	59(50.9)	5138(76.0)	278(70.2)
Automatic washing machine	1428(32.6)	72(25.7)	145(6.1)‡	4(3.4)	1573(23.3)	76(19.2)
Manual washing machine	1455(33.2)	81(28.9)	468(19.7)‡	8(6.9)	1923(28.4)	89(22.5)
Vacuum cleaner	3076(70.2)	166(59.3)	660(27.7) ‡	15(12.9)	3736(55.2)‡	181(45.7)
Sewing machine	3536(80.7)	200(71.4)	1587(66.7)	56(48.3)	5123(75.8)‡	256(64.6)
Fridge	4198(95.8)	266(95)	2161(90.8)	97(83.6)	6359(94.0)†	363(91.7)
Freezer	1815(41.4)	103(36.8)	324(13.6)	6(5.2)	2136(31.6)†	109(27.5)
Gas cooker with oven	1343(30.6)	67(23.9)	148(6.2)	5(4.3)	1491(22.0)†	72(18.2)
Gas cooker without oven	2853(65.1)	196(70.0)	1998(85.9)	97(83.6)	4851(71.7)	293(74.0)
Radio	3427(78.2)	191(68.2)	4136(0.3)	68(58.6)	4863(71.9)	259(65.4)
Computer	228(5.2)	15(5.4)	3(0.1)	0(0)	231(3.2)	15(3.8)
Internet	107(2.4)	8(2.9)	0(0)	0(0)	107(1.6)	8(2.0)

Significant difference between the male and female-headed households (*P<0.01, †P<0.001, ‡P<0.05)

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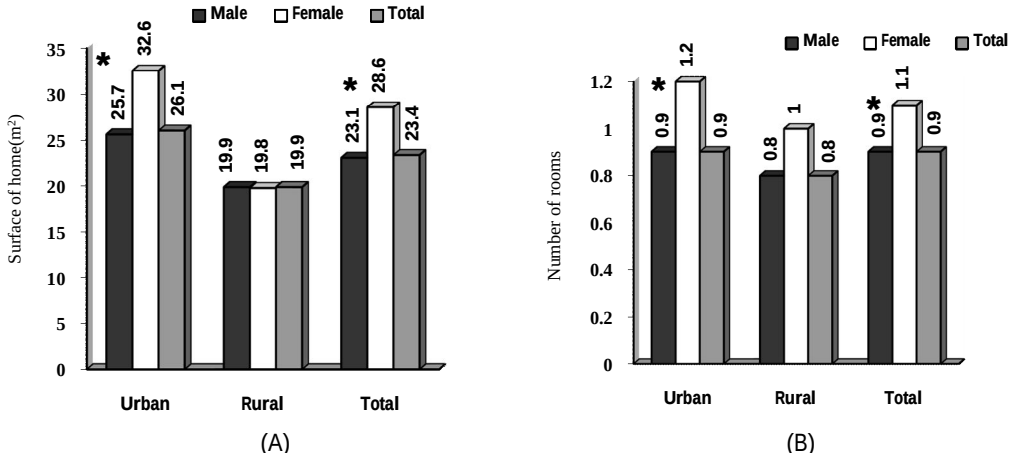

*Significant difference between the male and female-headed households in urban, and total (P<0.001)

Figure 2. Comparison of per capita A) Surface of home and B) the number of rooms in MHHs and FHHs in the rural and urban areas of Iran

Consumption of food groups and estimated nutrient intake in MHHs and FHHs are presented in Tables 3 and 4, respectively. Based on the results presented in Table 3, there were differences in consumption of fruits, sweets and soft drinks. The average consumption in these three food groups in FHHs was significantly lower than in MHHs. The average sugar, fat and oil consumption in FHHs in rural and urban areas was higher than in MHHs, and the difference was significant in rural areas.

The intake of thiamine, Vitamin C and calcium of FHHs was lower than that of MHHs. While the percent of energy requirements met in rural FHHs was higher, deficiency of calcium and Vitamin C was more prevalent in FHHs than MHHs, and this difference was significant in the urban and rural areas ($p<0.05$).

Table 3. Comparison of Mean (±SE) of daily per capita food group consumption of male and female-headed households in the rural and urban areas of Iran

Food groups (gr)	Urban area (n= 4662)		Rural area (n= 2496)		Total (n= 7158)	
	Male Headed (n=4382)	Female Headed (n=280)	Male Headed (n=2380)	Female Headed (n=116)	Male Headed (n=6762)	Female Headed (n=396)
Bread and cereals	413.1±2.2	415.5±8.3	517.0±3.6	529.1±16.4	449.7±2.0	448.8±8.0
Beans	18.3±0.3	16.9±1.1	19.9±0.5	24.2±2.8	18.9±0.3	19.1±1.1
Vegetables	239.0±2.0	243.8±7.7	209.9±2.6	213.9±12.2	228.7±1.6	235.0±6.6
Fruits	161.0±2.4*	136.7±8.5	110.3±2.9†	69.4±9.6	143.1±2.0†	116.9±6.8
Meats	69.9±0.8	70.2±3.3	52.1±1.0	46.3±4.5	63.7±0.6	63.2±2.7
Eggs	21.8±0.3	22.4±1.4	19.5±0.4	18.9±1.7	21.0±0.3	21.3±1.1
Milk and dairy products	142.5±1.9	131.7±6.9	134.1±2.7	126.4±13.4	139.5±1.6	130.2±6.3
Fats and oils	45.3±0.4	47.1±1.9	45.9±0.5*	51.1±2.5	45.5±0.3	48.3±1.5
Sugar	54.0±0.6	54.5±2.3	68.9±0.9*	78.0±4.6	59.2±0.5	61.4±2.2
Sweets	9.5±0.3†	6.4±1.0	5.4±0.3‡	2.5±0.9	8.1±0.2†	5.3±0.8
Dried fruits and nuts	4.1±0.2*	3.2±0.5	3.3±0.2	3.4±0.9	3.8±0.1	3.3±0.4
Drinks	34.6±1.0*	25.6±2.9	19.8±0.9	14.8±3.0	29.4±0.8*	22.5±2.2
Others	38.6±0.6	40.5±2.6	31.1±0.7	26.8±2.9	35.9±0.5	36.5±2.0

Significant difference between the male and female-headed households (*P<0.05, †P<0.001, ‡P<0.01)

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Table 4. Comparison of Mean (±SE) of daily per capita nutrient intake of male and female-headed households in the rural and urban areas of Iran

Nutrients	Urban area (n= 4662)		Rural area (n= 2496)		Total (n= 7158)	
	Male Headed (n=4382)	Female Headed (n=280)	Male Headed (n=2380)	Female Headed (n=116)	Male Headed (n=6762)	Female Headed (n=396)
Energy (% of requirement)	106.5±0.4	107.4±1.8	123.2±0.6*	131.7±3.7	112.4±0.4	114.5±1.7
Carbohydrates (gr)	402.9±1.7	397.6±6.6	472.5±2.7	486.1±13.3	427.4±1.5	423.5±6.4
Fat (gr)	73.2±0.5	73.3±2.1	70.4±0.6	73.7±2.9	72.2±0.4	73.4±1.7
Fiber (gr)	11.7±0.1	11.7±0.3	12.3±0.1	12.7±0.5	11.9±0.1	12.0±0.2
Protein (% of requirement)	123.2±0.5	119.3±2.0	142.5±0.9	144.5±4.8	130.0±0.5‡	126.7±2.1
Calcium (% of requirement)	59.1±0.4‡	52.1±1.2	57.0±0.5†	50.5±1.9	58.3±0.3†	51.6±1.0
Iron (% of requirement)	77.5±0.4	76.3±1.8	85.1±0.6	81.8±3.2	80.2±0.4	77.9±1.6
Thiamin (% of requirement)	142.3±0.7	136.9±2.7	171.8±1.3	163.4±5.3	152.7±0.7‡	144.7±2.5
Riboflavin (% of requirement)	87.2±0.6	84.0±2.2	81.9±0.7	79.4±3.0	85.4±0.4	82.6±1.8
Vitamin C (% of requirement)	161.0±1.8†	141.0±5.5	119.8±2.1†	94.0±7.8	146.4±1.4‡	127.3±4.7
Retinol (% of requirement)	144.7±2.7	140.5±9.6	103.1±2.6†	80.4±7.6	130.1±2.0	122.9±7.3
Vitamin B6 (% of requirement)	19.5±0.1	19.5±0.4	23.5±0.2	23.4±0.8	20.9±0.1	20.7±0.4

Significant difference between the male and female-headed households (*P<0.01, †P<0.001, ‡P<0.05)

Discussion

The present study showed that the frequency of FHHs in rural areas is more than in urban areas. The level of education in FHHs was significantly lower than in MHHs, and female family heads had a lower job level. However, this did not result in lower consumption of most of foods or lower nutritional status. The main difference in food pattern was in the consumption of fruits of FHHs compared to MHHs. Examination of the nutrient intake of the households showed micro-nutrient deficiencies of calcium, Vitamin C and thiamin. The energy intake in rural areas depending on the requirement and the amount of fat and oil consumption was even higher in FHHs. Therefore, in FHHs, energy was fulfilled more than nutrients (cell satiety) (21). In other words, in FHHs, nutrition insecurity (nutrient deficiency) was present more than food insecurity (based on energy intake). In the study done on continuing consumer expenditure survey, 204 out of the 1140 surveyed households were female-headed (18%) (22, 23). This amount is 3 times more than the amounts obtained from the food consumption patterns and nutritional status in Iran. Due to changes in bio-social patterns in modern societies, the number of FHHs in both developing and developed countries is on the rise. Between 1970 and 1988, the number of FHHs in America increased to more than double from 3.4 million to 8.1 million. In Iran, over a period of ten years, the age (%) of FHHs jumped from 4.5 during 1992-95 to 5.5 during 2000-2002 (24).

Previous studies have shown that, on average, FHHs spend less than MHHs on food per person (22-23, 25). In the study in 1990s, it was determined that, the average monthly amount that FHHs spend on food per person was 76% of the male-headed ones (26). Another study, which compared single-headed (mostly female) households to couple-headed ones, posted similar results. On average, single-headed households spent 85 dollars for every person on food in a month that was about 90% of the cost for two-headed households. In another study, FHHs, on average, would spend 89.37 dollars and MHHs would spend 105.31 dollars in a month for each person (23). In the rural and urban FHHs participating in the Comprehensive Study of Food Patterns and Nutritional Status (27), the total monthly expenditure was not reported less than that of MHHs. The allocation of a greater proportion of the family expenditure to food and nutrition in FHHs could be one of the reasons for the relatively equal consumption of food groups and intake of nutrients. However, most probably the greater part of their income is assigned to food and nutrition. The money spent on food is determined by the family's

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socioeconomic status, especially education and income level. The lack of a male breadwinner in FHHs is one of the main reasons for low levels of income in these families. Another reason is low education level of female-heads. In the present study, more than half of the FHHs were illiterate, while 12% of women in MHHs did not have a diploma. Education is closely related to income level and the expenditure of food. Education, regardless of income, affects food expenditure. In one study, it was found that in households with similar incomes, the female-heads, who did not finish high school, probably assume a lower monthly fee for food than those who had diploma (23). People with higher education are more attentive towards their food choices, food safety and nutritional health, and applying for nutritional services with high quality. Size of FHHs is generally smaller, and therefore, they are less able to take advantage of buying massive packages of food. Fewer size and different structure of family are correlated with lower food cost. In the present study, the size of FHHs was less than that of MHHs while the age in FHHs was more than in MHHs. The MHHs in Vietnam tend to have larger families compared to FHHs, too. However, FHHs in Vietnam pay slightly higher calorie prices compared to MHHs (28). Population and housing census data (24) shows that from the whole population living in Iran, 8.4% of the households are female-headed, and their population ratio is 5.2%, indicating that less family size households is headed by women. The results of Tshediso study (29) in South Africa showed that household size and the age and employment status of the head of household significantly explain variations in the likelihood of being poor. In Myanmar, FHHs' income was significantly influenced by training attendance and schooling years of the household head. In MHHs, age of the household head, number of income sources and irrigation water are highly linked with the average per capita income (30). In Bangladesh, by estimating the generalized threshold model, Mallik and Rafi found no significant differences in food security between the MHHs and FHHs, especially among the indigenous ethnic groups. Consistent with our findings, this finding challenges the conventional idea that FHHs are more vulnerable to food insecurity (31).

Food patterns and preferences of FHHs can be different from others due to the special circumstance of these households. For example, usually MHHs spend more than 40% of the cost on food groups like bread, milk, cereal, and miscellaneous while females in this group will be assigned a lower-cost. FHHs have different income allocation pattern in comparison to MHHs due to the lack of effect of MHH on food patterns or expenditure decisions. The study conducted by the Economic Research Center of USA suggested that regardless of income and education differences, women in MHHs significantly consume more red meat than women in FHHs (32). In another study, it was shown that children in FHHs consumed more high-calorie foods, and were more susceptible to obesity (25). In Iranian FHHs, mean consumption of fruits was significantly lower than in MHHs while mean consumption of fats and oils in these households in rural and urban areas was higher in comparison to MHHs, which could be due to subsidized food in this group, the role of this group in energy production and filling attributes, and also the fact that oils and fats used in cooking would be cheaper than any other food groups.

The data used in this study was collected more than one decade ago, and it is too much for a society such as Iran, which has been experiencing lot of changes in terms of socioeconomic status in the last decade. This can be accounted as one important limitation of this study. Also, because of lacking reliable data on income, we used some other indicators such as education, occupation, and number of rooms for estimating SES (Socio-economic status) which made impossible the comparison between FHH income in our country (Iran) and other countries.

Based on the present findings, it seems that the nutritional vulnerability of Iranian FHHs in terms of energy adequacy is not higher than that of MHHs. However, quality of their dietary intakes should be taken into consideration. In the diet of these households, energy dense foods should be partly replaced by foods providing nutrients such as Ca, Vitamin C and retinol. With this target, it is recommended that they consume more fruits rich in Vitamin A and C and dairy products as Ca sources. Also large scale studies on association of household

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food expenditures with food consumption are urgently recommended in male and female headed households.

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