The comparison of food patterns and food expenditures in different socioeconomic statuses of Iranian households

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Research Article

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Abstract

Background: Food and nutrition have an undeniably important role in the occurrence of social inequalities in the health of people in society. The household income level, food prices, and the amount of money spent on food are effective factors in food choices and people's health. Our objective was to determine and compare households' food patterns based on food prices and their income in different socioeconomic statuses (SES).

Method: 125 households were randomly selected from five of the Kermanshah city districts based on the SES, including very poor, poor, middle, rich, and very rich. Data were collected using a personal information questionnaire, SES questionnaire, semi-quantitative weekly food purchase registration questionnaire, outdoor food purchase registration questionnaire, and a medium and long-term food purchase reminder questionnaire. The relationship between SES and households' income with the amount spent for each food group was performed by Spearman's nonparametric correlation technique.

Results: The average total cost of households for food per day was 2.51±0.18 $. The highest and lowest daily food expenditures were related to the protein group (39.9%) and the dairy group (3.8%), respectively. Also, dairy and starch groups were the most expensive and cheapest food groups with 5.5 and 0.45 cents per unit. Households in the first SES spent 75.2% of their total income on food and there was a direct and significant correlation between SES, education, and income level with energy, macronutrients, and fiber ($p<0.001$).

Conclusion: Our findings showed that SES can influence the amount and type of nutrients purchased by households. The households usually met their nutritional requirements by overeating, resulting in food insecurity and cellular starvation. Increasing nutritional knowledge and making the right decisions by food policymakers may reduce food insecurity at the community level.

Introduction

According to the latest estimates of the Food and Agriculture Organization (FAO), about 10% of people in the world suffer from malnutrition. Severe food insecurity in 2017 was 6.9% in Asia, 8.9% in Latin America, 1.4% in North America and Europe, and 29.8% in Africa, which has increased in all parts of the world compared to the previous year [1, 2]. One of the goals of the third-millennium development is to reduce poverty and hunger in the world, and food security as one of the goals of national development is considered as the most important approach against hunger [3]. In the same way, the production and supply of food and accessibility to adequate, healthy, and desirable food for all members of society are one of the national development programs of the country In Iran [2]. Several studies have shown a direct association between SES and chronic diseases. SES is inversely associated with risk behaviors for chronic diseases including cardiovascular diseases, diabetes, hypertension, renal disease, and dental caries [4–7]. According to recent studies, obesity and diabetes have become more prevalent in the poor and low-income groups of society due to inequality in access to a healthy diet [8, 9]. It seems that health

care expenditures are directly related to the level of food insecurity, with the health care expenditures increased by 16%, 32%, and 76% in households with mild, moderate, and severe food insecurity, respectively [10]. According to research conducted in the United Kingdom, Spain, France, and the Netherlands, following a healthy diet is more expensive in terms of preparation costs, and thus having limited financial resources is one of the reasons that low-income people follow dietary guidelines less than high-income people [11, 12]. For example, following dietary guidelines and consuming 3–4 servings of fruits and vegetables each day, increases the expense of diet by up to 100%. In this regard, it has been observed that the amount of fruit and vegetable intake is closely related to the economic level of countries, as in high-income countries, fruit and vegetable consumption is 5.42 servings/day and in low-income countries is 2.14 servings/day [13].

Based on the world map of food security, different countries are divided into very high-risk, high-risk, middle-risk, and low-risk spectrums and according to this division, Iran is in a high-risk situation [14]. It seems that consuming foods by individuals just meets their daily needs in quantitative terms but the content of consumed foods is not commensurate with their cellular needs, and family members can only meet their body's requirements for micronutrients through overeating. Despite various education programs to increase the nutritional knowledge of individuals, Iranian households do not have a reasonable feeding pattern and prioritize abdominal satiety over the consumption of nutritious foods, resulting in insufficient iron and calcium intake through diet. Besides, the consumption of milk and dairy products, eggs, vegetables, and fruits by Iranians is 25%, 20%, and 25% less than the required amount, respectively [14, 15]. On the other hand, the consumption of sugar, oil, and salt is more than the recommended amounts [16, 17]. Different studies conducted in Iran to investigate the causes of this problem have revealed an inverse relationship between the amount of food calorie and its cost, suggesting that severe dietary cost restrictions by low-income groups lead to the formation of calorie-dense/poor nutrient food pattern [11, 14]. Numerous socioeconomic studies show that food prices strongly affect food purchasing decisions by low-income groups. Polls on purchasing motivations in consumers indicated that, in addition to taste, appearance, and ease of consumption, food price is also one of the main factors influencing people's food choices [18]. Studies in Iran reveal that people who pay more for their diet have a healthier diet than people who eat lower cost diet and there is a positive and significant relationship between income and micronutrient intake [19, 20]. The intake of some food groups such as meats, dairy products, fruits, and vegetables, decreases whenever food costs rise, and this significant association is relatively strong, particularly in the case of meat consumption. By increasing the income, the intake of vitamin A, B12, folate, and minerals such as zinc and iron rises [14, 19].

Furthermore, low SES can stimulate appetite as well as calorie intake and may affect the nutritional status of individuals by influencing their food purchases [21]. Due to the recent poor economic situation of some people in Iran and its impact on their nutritional status, this study was carried out with the aim of determining and comparing the food pattern of households in different SES based on food costs.

Methods

Study Design and Subjects

This cross-sectional, descriptive-analytical study was designed and conducted in 2019 in Kermanshah-Iran. In the present study, after determining the SES of Kermanshah city neighborhoods by a health economist, five of the city districts were selected. These five districts were categorized into very poor, poor, middle, rich, and very rich and samples were taken equally from each of these socioeconomic quintiles. In this way, 60 households from each district were randomly selected (total households = 300) and all of the steps and objectives of the study were completely explained to the family's head. After his/her consent, the whole family entered the study process and an informed consent form was obtained from them. After applying the inclusion criteria, 150 eligible families attended the education sessions and 125 of them completed the training step. The inclusion criteria for participants were as follows: willingness to participate in the study and filling the written informed consent, living permanently in Kermanshah city, eating with the family, lack of following a specific diet, and capability to communicate with the research team. Moreover, the exclusion criteria were reluctance to cooperate by each member of the family, changing the residence place of each family member to another city, and moving of each family member due to going to sanatorium, barracks, hospital, and, etc. All participants were in close contact with members of the research team, and all steps were performed by the research team with the exception of the weekly food purchases recording, which was completed by participants. This study was approved by the ethics committee of Kermanshah University of medical sciences with code No. IR.KUMS.REC.1398.1019 and conducted in accordance with the Declaration of Helsinki.

Data Collection

Data collection tools include a personal information questionnaire (age, sex, marital status, etc.), a socioeconomic questionnaire whose validity and reliability have already been confirmed by previous studies (26), a weekly food purchase registration questionnaire, an outdoor food purchase registration questionnaire, and medium and long term food purchase reminder questionnaire that their validity and reliability of the purchase registration questionnaires were confirmed by several experts in statistics, health economics, and nutrition sciences.

The semi-quantitative food purchase registration questionnaire was used to evaluate the amount, type, and price of food purchases and consisted of two tables and a long-term food recall questionnaire. Households were asked to record the type, amount, and price of the food they bought and consumed during a week in the food registration questionnaire, and mention their food consumption if it was more than a week. In addition, family members recorded the foods they purchased outside the home, such as at restaurants, schools, etc. The family's head was asked about the foods purchased for long-term use such as nuts, rice, beans, frozen foods, etc. The food purchase reminder questionnaire recorded the amount, cost, and frequency of purchases. The energy and nutritional content of food items were then calculated for each family using the upgraded version of the specialized Nutritionist IV software.

Statistical analysis

In the present study, households were divided into five equal groups (quintiles) based on their SES. The normality of data was analyzed using the Kolmogorov-Smirnov test. Also, the quantitative and qualitative variables were reported as mean ± standard deviation, and number (percentage). Spearman's nonparametric correlation analysis was performed to measure the linear relationship between SES and households' income with the amount spent for each food group. All analyses were performed using SPSS software version 25 and in all analyzes, the significance level was considered equal to 0.05.

Results

Demographic information

A total of 125 Kermanshah households participated in this cross-sectional study. Finally, after excluding 6 households, 119 households including 401 people were able to complete the study successfully (Fig. 1). The mean age and monthly income of participants were 34.56 ± 17.88 years and 4,855,462 Tomans (about 180 $). Also, there were 2 households (1.7%) with pregnant mother and 4 households (3.4%) with breastfeeding mother. The number of households with 4 people was the highest (34.4%), while the number of households with more than 6 people was the lowest (3.4%). As shown in Table 1, the poor neighborhood had the most people (96 people, or 23.9%), while the very rich neighborhood had the lowest people (63 people, or 15.7). In terms of education level, the majority of household heads were illiterate (39.5%), and only two people had a doctorate (1.7%). Households with a monthly income of less than one million Tomans (37 $) had the lowest frequency (9.6 percent) among all households, while households with a monthly income of 2-3.9 million Tomans (74–148 $) had the highest frequency 40. (33.6%) (Table 1).

Table 1
The Baseline Characteristics of Categorical Variables

Variables	Status	N (%)
Socioeconomic status of residence	Very poor	87 (21.7)
	Poor	96 (23.9)
	Middle	80 (20)
	Rich	75 (18.7)
	Very rich	63(15.7)
Number of household members	2 person	28 (23.5)
	3 person	37 (31.1)
	4 people	41 (34.4)
	5 people	9 (7.6)
	≥ 6	4 (3.4)
Education level of the head of the household	Illiterate	47 (39.5)
	≤ 5 years	35 (29.4)
	6–9 years	25 (21)
	10–12 years	10 (8.4)
	≥ 13 years	2 (1.7)
Household income level	No income or ≤ 1 million Tomans (≤ 37 $)	9 (7.6)
	1-1.9 million Tomans (37–74 $)	29 (24.4)
	2-3.9 million Tomans (74–148 $)	40 (33.6)
	4-5.9 million Tomans (148–222 $)	18 (15.1)
	≥ 6 million Tomans (≤ 222 $)	23 (19.3)
Private house	Has	82 (68.9)
	Does not have	37 (31.1)
Number of home bedrooms	Does not have	4 (3.4)
	1 bedroom	53 (44.5)
	2 bedrooms	49 (41.2)
	≥ 3 bedrooms	13 (10.9)

Variables	Status	N (%)
Freezer	Has	63 (52.9)
	Does not have	56 (47.1)
Washing machine	Has	80 (67.2)
	Does not have	39 (32.8)
Dishwasher	Has	15 (12.6)
	Does not have	104 (87.4)
Computer	Has	45 (62.2)
	Does not have	74 (37.8)
Internet access	Has	73 (61.3)
	Does not have	46 (38.7)
Television	Has	117 (98.3)
	Does not have	2 (1.7)
Motorcycle	Has	7 (5.9)
	Does not have	112 (94.1)
Personal car	Has	71 (59.7)
	Does not have	48 (40.3)
Toaster	Has	30 (25.2)
	Does not have	89 (74.8)
Hooded kitchen	Has	41 (34.5)
	Does not have	78 (65.5)
Travel abroad	Has	7 (5.9)
	Has not	112 (94.1)

Socioeconomic status of households

In this study, the first SES (level 1) was the lowest, while the fifth SES (level 5) was the highest. The study was completed by 24 households in the first four SES levels (levels 1–4) and 23 households in the fifth level. In addition, there were 63 (level 1), 75 (level 2), 80 (level 3), 96 (level 4), and 87 (level 5) individuals in each SES.

The amounts of costs and purchase of food groups

According to Table 2, the average total cost of food for households per day was 68085 ± 4975 Tomans (2.51 ± 0.18 $). The protein group had the highest daily food cost of 27200 Tomans (1 $) (39.9%), while the dairy group had the lowest cost of 2619 Tomans (9.7 cents) (3.8%). The dairy group with 1496 Tomans (5.5 cents) per unit was the most expensive and the starch group with 124 Tomans (0.45 cents) per unit was the cheapest food group. The dairy (827 ± 77) and protein (9013 ± 855) groups had the lowest and highest mean cost per person, respectively. Moreover, starch group had the highest mean number of daily purchasing units per household with 60 ± 6.2 in comparison to other food groups. As well, the starch group was the most purchased food group, with a mean purchase of food unit per person of 19.2 ± 1.5, while the dairy group was the least purchased, with 0.77 ± 0.2. In general, the protein group had the highest percentage (39.9%), while the dairy group had the lowest percentage (3.8%) of the total cost (Table 2).

Table 2
The amount of purchase and cost of food groups

Food groups	Mean cost [a]	Mean cost/unit	Mean cost/person	Mean number of daily purchasing units per household	Mean purchase of food units per person	Percentage from total (%)
Dairy	2619 ± 214 [b]	1496 ± 481	827 ± 77	1.7 ± 0.47	0.77 ± 0.2	3.8
Vegetables	9030 ± 467	696 ± 42	2908 ± 154	15.26 ± 0.8	4.9 ± 0.5	13.2
Fruits	8740 ± 796	1074 ± 74	2792 ± 268	8.7 ± 2.7	3.2 ± 0.8	13
Starch	12005 ± 406	124 ± 8	3884 ± 166	60 ± 6.2	19.2 ± 1.5	17.7
Protein	27200 ± 2280	1383 ± 95	9013 ± 855	21.5 ± 2.5	1.4 ± 0.4	39.9
Miscellaneous (Fats, Sweets, etc.)	8491 ± 812	253 ± 17	2830 ± 272	36.6 ± 5.5	11.6 ± 1.2	12.4
Total	68085 ± 4975	5026 ± 717	22254 ± 1792	-	-	100

Note: [a] Costs are calculated for one day; [b] The unit of cost is Tomans (Each 1000 Tomans is equal to 3.7 cents

The daily cost of food from the total income

Based on Table 3, the lowest mean total food cost per day was related to households in the first SES with 39879 Tomans (1.4 $), and the highest was related to fifth SES with 110338 Tomans (4.08 $) per day. Households in the first SES spent 75.2% of their total income on food, while those in the second, third, fourth, and fifth levels spent 67.8%, 53.4%, 45.3%, and 34.9%, respectively.

Table 3
Different food costs at socioeconomic quintiles

Variables	Socioeconomic Quintiles [a]					r	P [b]
	1	2	3	4	5		
Mean total food cost/day	39879 ± 1613 [c]	55782 ± 2815	59622 ± 2065	78576 ± 2997	110338 ± 4913	0.64	< 0.001 [d]
Mean percentage of food cost/income	75.2 ± 5.07	67.8 ± 9.26	53.4 ± 6.28	45.3 ± 4.33	34.9 ± 4.78	-0.44	< 0.001
Mean cost of starch group/day	9532 ± 474	11672 ± 962	10918 ± 353	13028 ± 372	14996 ± 520	0.49	< 0.001
Mean cost of vegetable group/day	5634 ± 557	7546 ± 644	9451 ± 516	10969 ± 620	11659 ± 480	0.48	< 0.001
Mean cost of fruit group/day	4207 ± 321	5461 ± 488	8447 ± 688	8839 ± 556	17495 ± 981	0.56	< 0.001
Mean cost of meat group/day	14197 ± 927	22223 ± 960	19775 ± 1179	32586 ± 1728	48091 ± 1597	0.52	< 0.001
Mean cost of dairy group/day	1585 ± 116	1815 ± 178	2920 ± 243	2933 ± 250	3897 ± 264	0.36	< 0.001
Mean cost of fats and sweets group/day	5373 ± 207	7062 ± 368	6108 ± 452	10218 ± 713	14196 ± 840	0.38	< 0.001

Note: [a]1: very poor; 2: poor; 3: medium; 4: rich; 5: very rich; [b] P-value was obtained by Spearman's nonparametric correlation and $P < 0.05$ were considered as statistically significant; [c] The unit of cost is Tomans (Each 1000 Tomans is equal to 3.7 cents); [d] There is a strong correlation.

Furthermore, the mean total cost of food per day and the mean cost of all food groups during a day had a direct and significant correlation with the households' SES ($p < 0.001$). Besides, there was a significant and inverse correlation between the cost percentage for food from the total income of households and their SES ($p < 0.001$, $r= -0.44$).

In the fifth SES, the mean cost for the starch group, which included bread, cereal, and rice, was approximately 1.57 times higher than the first level, 2.06 times higher for the vegetable group, 4.15 times higher for the fruit group, 3.39 times higher for the meat group, 2.46 times higher for the dairy group, and 2.64 times higher for the fat and sweets group. The results showed that the percentage of food

expenditures from the total household income in the first SES was 2.15 times higher than the fifth SES households (Table 3).

The relationship between SES, education, income levels, and nutritional intake

As shown in Table 4, there was a direct and significant correlation between SES, education, and income levels and energy, fiber, protein, and carbohydrate intake ($p < 0.001$). On the other hand, the correlation between SES and income levels with fat intake was direct and significant ($p < 0.001$), whereas the correlation between education level was not significant ($p = 0.075$).

Table 4
The relationship between SES, education, income levels, and the amount of energy, fiber, and macronutrients intake.

Variables	Socioeconomic status		Education level		Income level	
	r	P [a]	r	P [a]	r	P [a]
Energy	0.462	< 0.001	0.294	< 0.001	0.421	< 0.001
Protein	0.445	< 0.001	0.364	< 0.001	0.447	< 0.001
Carbohydrate	0.427	< 0.001	0.273	0.003	0.403	< 0.001
Fat	0.359	< 0.001	0.164	**0.075**	0.307	< 0.001
Fiber	0.484	< 0.001	0.383	< 0.001	0.464	< 0.001

[a] P-value was obtained by Spearman's nonparametric correlation and $P < 0.05$ were considered as statistically significant.

Discussion

Food security is one of the most important and effective factors in a country's economic development, and no one can claim to have a healthy and dynamic society without it [22]. According to the FAO definition, food security exists when all people, at all times, have physical and economical access to sufficient, safe, and nutritious food that meets their dietary needs and food preferences for an active and healthy life. Thus, food security is based on four key elements including food availability, access to food, utilization, and stability [23]. In terms of food security, in addition to the fact that households must have access to adequate and healthy food 24 hours a day, they must also maintain diversity and balance in order to meet all of their macronutrients and micronutrients requirements. The purpose of food security is not to satisfy apparent hunger, but to meet all nutritional demands that humans require for proper organ and cell function [24]. To achieve this goal, households should have good knowledge about food units and be able to properly spend the portion of their income allocated to food purchases. Our findings revealed that, when compared to other food groups, the protein group accounts for a larger part of overall average household food expenditure, accounting for about 39.9% of food expenditure. However, the

protein group had the lowest mean purchase of food units per person in comparison to other food groups and this amount was lower than the daily recommended values in a balanced diet, which is 2–3 servings per day. Meats and plant protein sources have high nutritional value and provide protein requirements as well as certain micronutrients such as iron, zinc, vitamin A, and vitamin B12. As a result, the cost of protein has a direct relationship with the household's diet quality and food security [25]. The majority of the body's iron and vitamin B12 requirements are met by consuming red meat and other animal-derived proteins. A decrease in these micronutrients consumption can lead to a wide variety of health problems for individuals, including anemia and vulnerability to infections [26]. As well, the reduction in zinc and vitamin A intake might have an impact on several metabolic processes in the body. According to various studies, vitamin A plays an important role in the visual and the immune systems, and its deficiency causes anemia via immobilizing iron in the reticuloendothelial system, reducing hematopoiesis, and increasing susceptibility to infections [27, 28]. Likewise, zinc, as a cofactor of different enzymes, plays a critical role in the body's metabolic processes such as RNA and DNA synthesis and its deficiency can interrupt protein synthesis, gene expression, cell division, skeletal growth, gonad development, appetite, and immunity [29, 30].

In some countries, particular food groups, such as protein and dairy, are more expensive than others, depriving low-income households of these foods. Additionally, the population in these regions has lower social and economic levels, which limits their nutritional options even more. In this situation, the best solution is to improve households' knowledge of food units and alternative food groups so that they may manage their limited income to purchase suitable food alternatives at a lower cost.

Dairy, protein, and fruits were the most expensive food groups in comparison to others in terms of cost/unit, while the starch group had the lowest mean cost per unit. Nevertheless, the starch group accounted for approximately one-fifth of the household's food expenditure (17.7%), demonstrating the significance of starches and carbohydrate resources in the household food basket. It seems that when the price of food groups per unit decreases, the purchase and consumption of them increases. Different investigations have demonstrated that bread, cereals, and rice are the most important source of energy in the Iranian diet [31]. Since the most of flour used to make bread in Iran is white flour, many of the minerals and essential elements found in wheat bran are removed. Due to government subsidies, the price of bread in Iranian society is cheaper than other carbohydrate sources, hence most people with low SES and income consume it as their main food, resulting in nutritional deficiencies and many chronic diseases in the long-term. Several investigations have reported that consumption of a high carbohydrate diet is associated with the increased risk of mortality [32, 33]. However, carbohydrate consumption is influenced by a variety of factors, including geographical, social, cultural, and economic properties, so that the percentage of energy derived from carbohydrates is higher in low-income societies than those in high-income societies [32].

Our findings indicated that the mean percentage cost for the miscellaneous group from total household food expenditure was lower than the mean cost percentage of the vegetable (13.2%), close to the fruit (13%), and much higher than dairy (3.8%) groups. The miscellaneous group, including fats and sweets,

decreases the quality of the diet due to the lack of essential nutrients. Since a high consumption of fats and sweets increases the risk of cardiovascular disease and diabetes, it seems that raising the price of fats and sweets will reduce the incidence of these diseases.

On the other hand, the mean cost per unit for the dairy, vegetable, fruit, and fat groups was 1496 ± 481, 696 ± 42, 1074 ± 74, and 253 ± 17 Tomans, respectively. This significant difference indicates the effect of food price on a household's food choices, so that the most expensive mean cost/unit, which is related to the dairy group, had the lowest mean number of daily purchasing units per household (1.7 ± 0.47). The dairy group had the lowest percentage of the total amount cost on food with 3.8%, while the protein group with 39.9% had the highest total cost. With the deterioration of household economic situation, the amount spent on the most expensive food group (dairy group) declines, depriving the poor part of society of dairy resources with high nutritional value. Dairy is an important source of nutrients such as protein, calcium, and B vitamins, particularly riboflavin [34]. According to The American Heart Association/American College of Cardiology guidelines, adults should intake 2–3 servings of dairy per day [35, 36]. Dairy products have important compounds including lactose, various bioactive peptides and fatty acids such as caseins, whey proteins, milk polar lipids (MPL), α-linolenic acid (ALA), conjugated linoleic acids (CLA), palmitic acid, and some important micronutrients like calcium, phosphorous, magnesium, riboflavin, and vitamin D. As well, they have different physiological functions including anti-carcinogenic, anti-inflammatory, anti-oxidative, anti-adipogenic, anti-hypertensive, anti-hyperglycemia, and anti-osteoporosis [37–40]. However, all of the health-promoting advantages of dairy on people may be lost or decreased if dairy products are decreased or eliminated from households' food baskets due to high prices and low purchasing ability.

In recent years, with the cessation of dairy subsidies in Iran, the amount of milk consumption has decreased even more [41, 42]. It may be inferred that inappropriate food and nutrition policies, as well as a failing to pay attention to improving nutritional knowledge and culture, have resulted in a decrease in dairy intake as the main source of human calcium among lower-income households.

Besides, following the dairy and protein groups, the fruit group had a relatively high cost/unit (1074 ± 74 Tomans) and only accounted for 13% of the cost of the household food basket, demonstrating that a higher price could affect food group intake. With a decrease in fruit consumption, a substantial part of households' intake of vitamins and fiber would decrease, possibly leading to malnutrition among vulnerable groups such as children and pregnant women in the future [43].

When the price of foods with high nutritional value increases, the tendency to consume foods with lower nutritional value rises, resulting in a poorer-quality diet that just satisfies calorie requirements and causes abdominal satiety without meeting cellular needs. Long-term persistence of this situation may lead in several chronic diseases such as obesity, metabolic syndrome, diabetes, and so on. However, by improving household nutritional knowledge through proper education and substituting cheaper foods with high nutritional value in the household food basket with expensive ones, the incidence of chronic diseases associated to malnutrition and its side effects may be prevented.

In the present study, increasing the SES of the households significantly raised the daily mean total food expenditure, suggesting that higher SES improves food security. The same results were not observed for the SES and the percentage of food cost from total income, so that by increasing the SES, the percentage of food cost from total income significantly decreased. The main explanation for the inconsistency of these parameters is the significant difference in household income between low and high SES, which causes people in higher SES to spend a smaller percentage of their income on food. In this way, households with lower income, which are also at lower SES, spend three-quarters (75.2%) of their income on food. Spending a large portion of the income on food, reduces the cost of other essential life necessities such as health care, education, and culture in these households causing the children of these families to be in a lower SES in the future.

Also, there was a direct and significant relationship between SES, education, and income levels with the amounts of energy, protein, carbohydrate, and fiber intake. Numerous studies have shown that SES may affect food security, so that low-income households experiencing the most food insecurity, leading problems in growth, health, and nutrition [44, 45]. Similarly, Eşturk and Oren reported that enhancing the education level of heads of households (university graduates) raises the chances of food security in their families by 5.6 times [45]. On the other hand, Davis et al., revealed that the homemaker's educational level had no significant effects on household food expenditures, but his/her higher nutritional knowledge can improve the efficiency of food purchasing activities [46].

It seems that when the family members' educational level increases, they will have much more job opportunities and, as a consequence, will also earn more money. Also, SES and educational level might have an impact on healthy eating habits. Thus, in our investigation, the relationship between education and fat intake was not significant. People with a higher level of education have better nutritional knowledge and skills, and they can better manage their limited income in terms of nutrition so that their families do not experience food insecurity.

Similarly, SES levels can affect the development of healthy eating patterns, so that when family members, particularly heads of households, have a higher social and cultural level, their food choices alter, and they buy and consume less fat. Nevertheless, some factors, such as a community's eating habits and culture, can affect the formation of food patterns. In addition, the economic situation, the local culinary culture and the geographical location of the residence can all affect eating habits [47, 48].

Different studies have revealed that households do not properly use available food sources due to a lack of knowledge on how to choose, cook, and store food. Besides, misconceptions and poor eating habits can threaten the intake of adequate nutrients at the household level. This highlights the necessity of ongoing nutrition education in improving eating habits and promoting a healthy food culture [49, 50].

Conclusion

According to the findings of this study, there was a direct and significant relationship between SES and food basket of Kermanshah city households. The majority of the food was purchased in excess of what

was required, while some were purchased in insufficient quantities. Food insecurity and insufficient cellular access to nutrients may happen as a result of inappropriate dietary patterns. Despite having access to all food groups, households may experience food insecurity due to a lack of knowledge about healthy food choices and the choosing of foods with low nutritional value. A part of this food insecurity seems to be related to the high price of healthy foods, since some parts of society can't afford high nutrient density food [21, 51]. Because food policies can improve access to desirable foods, food and nutrition policymakers should pay close attention to this critical issue. Furthermore, in order to improve the quality (rather than quantity) of households' diets, appropriate economic strategies such as targeted subsidies and reducing the price of healthy foods might be beneficial. However, more comprehensive studies at the national level should be conducted to investigate the consequences of poor SES on nutrition and food insecurity.

Abbreviations

SES: Socioeconomic statuses; FAO: Food and Agriculture Organization; MPL: Milk polar lipids; ALA: α-linolenic acid; CLA: conjugated linoleic acids.

Declarations

Ethics approval and consent to participate

Informed consent was obtained from all subjects using protocols approved by the Ethics Committee of Kermanshah University of medical sciences with code No. IR.KUMS.REC.1398.1019 and conducted in accordance with the Declaration of Helsinki.

Consent for publication

All of the authors agreed for publication.

Availability of data and materials

The data that support the findings of this study are available from the corresponding author upon reasonable request.

Competing interests

The authors declare that they have no competing interests.

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Authors' contributions

Nachvak SM, Gholami MS, Saber A, designed and conducted the research; Mostafai R, Sharifi Najafabadi M, Kabiri SS, analyzed the data and wrote the paper; Nachvak SM, Moludi J, contributed to manuscript revision; Saber A had primary responsibility for the final content and all authors contributed to critical revisions and approved the final manuscript.

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Figures

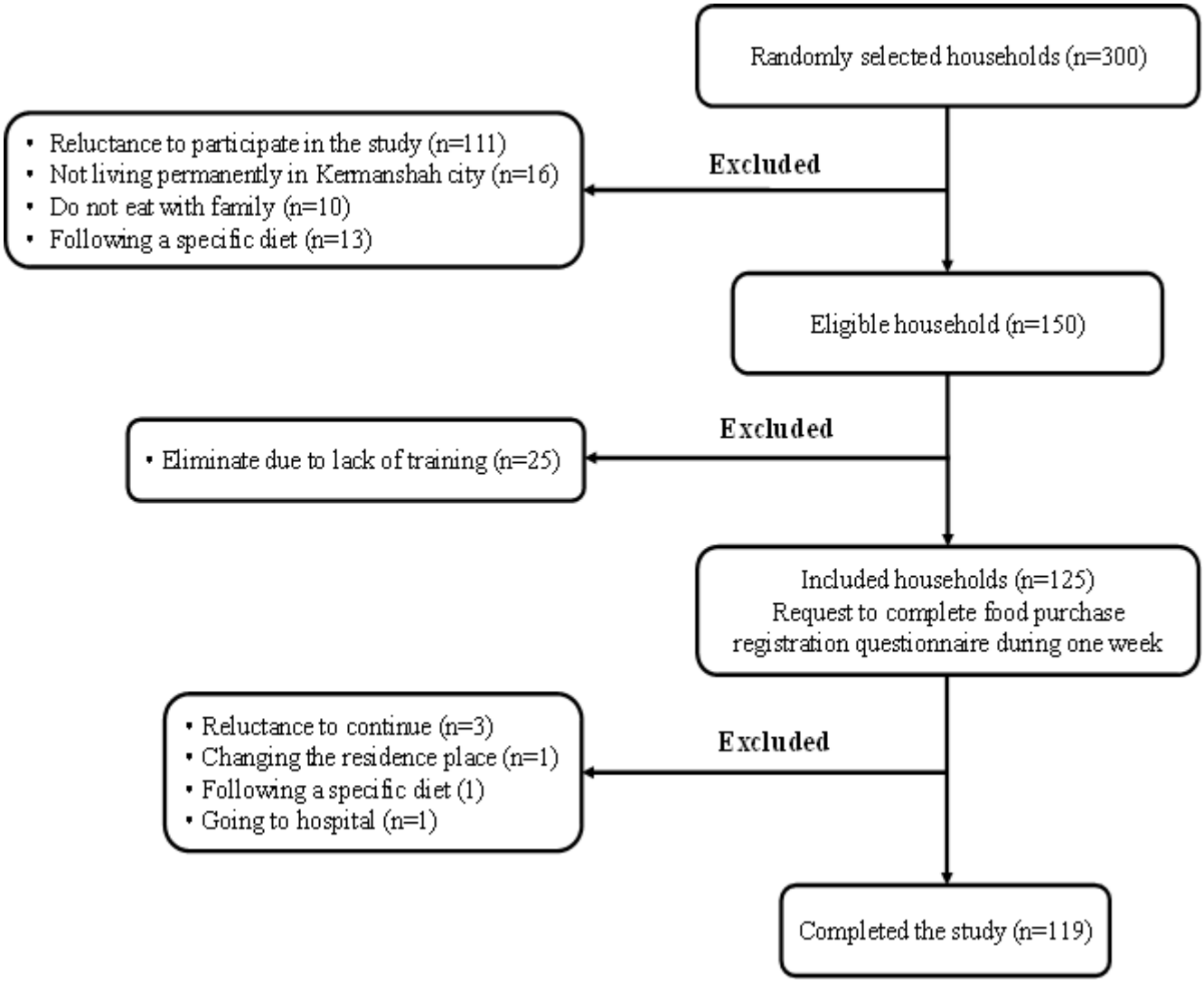

Figure 1

Flowchart with inclusion and exclusion criteria of participants.