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Original Article

Socio-economic Differences in Dietary Intakes: The Comprehensive Study on Household Food Consumption Patterns and Nutritional Status of I.R. Iran

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ABSTRACT

Background and Objectives: An association between socioeconomic status (SES) and poor health has been recognized. Inequalities in nutrition have been associated with inequalities in health. This study aimed to identify the social variability in the food and nutrient intake of Iranian households.

Materials and Methods: This study was conducted in the framework of the Comprehensive Study on Household Food Consumption Patterns and Nutritional Status of I.R. Iran during 2001-2003. Households were selected by cluster systematic sampling method in urban and rural areas. SES was assessed through in-depth interviews. Assessment of food and nutrient intake was done using three consecutive 24-hour diet recalls completed by trained nutritionists. Some of the socio-economic variables were extracted by factor analysis as indicators of SES.

Results: Among the 7158 studied households, 2496 (34.9%) were rural and 4662 (65.1%) were urban dwellers. Consumption of the food groups, including bread and cereals, vegetables, fruits, meats, eggs, milk and dairy products, sugar and sweets, was significantly different by the level of education, occupation ($P<0.001$) and living conditions ($P<0.05$). These factors explained 70% of variance in SES. In higher quintile of SES, consumption of bread and cereals, as well as sugar and sweets significantly decreased and meats, vegetables and fruits was increased. Intake of protein, calcium, vitamin C, riboflavin and retinol was higher in the third quintile of SES as compared to the first quintile ($P<0.05$).

Conclusions: Based on our findings, an unhealthier dietary intake may exist among the households belonging to lower socio-economic level in Iran. This calls for appropriate policy making and intervention(s).

Keywords: Socio-economic status, Food and nutrient intakes, Factor analysis, Household

Introduction

An association between socioeconomic status (SES) and poorer health has been recognized (1-3) and inequalities in nutrition have been associated with inequalities in health (4). Many studies have reported social differences in food consumption as well as in quantity and quality of the diet composition. On average, a higher socio-economic level has been associated with healthier dietary patterns in the developed countries. A healthier dietary pattern is believed to include a higher consumption of fruit and vegetables and a lower intake of fat and meat. Thus, people with a higher socio-economic level tend to show a higher consumption of vegetables, fruits and fiber products, and a lower consumption of meat, meat products, and fats than people with a lower socio-economic level (5).

On the other hand, persons of low socio-economic status are one group of concern in terms of nutrition-related

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health and food security. For example, in previous study on the Australian populations, those of lower SES have been shown to consume a greater proportion of their energy as refined sugars, and have a diet higher in fat density, lower in fiber and a range of micronutrients density (6). Few studies in this regard have been undertaken in the developing countries (7).

The nutrition transition in Iran is occurring rapidly, secondary to rapid change in fertility and mortality patterns and to urbanization. The transition is occurring against the backdrop of lack of sustained economic growth. There is considerable imbalance in food consumption with low nutrient density characterizing diets at all income levels, over-consumption evident among more than a third of households and food insecurity among 20% (8). Two large-scale National Comprehensive Studies on Household Food Consumption and Nutritional Status in Iran were conducted between 1993 and 2004 with ten years interval, using similar methodologies. Data on national household-level food consumption surveys indicated considerable imbalances in diet with high prevalence of both under- and over-consumption (9,10). This study aimed to identify the social variability in food and nutrient intake in Iranian households.

Materials and Methods

This study was conducted in the framework of the Comprehensive Study on Household Food Consumption Patterns and Nutritional Status of I.R. Iran during 2001-2003 (10). The households were selected by cluster systematic sampling method in urban and rural areas from 28 provinces. Based on daily the energy intake with standard deviation of 250Kcal and maximum acceptable error of 50Kcal 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. The sample in each province was spread over all the four seasons to capture the seasonal variability. Demographic and economic status of the households was obtained from the interviews about the variables such as age, sex, educational and occupational level of the head and other members of household, size of family, expenditure, and some characteristics of residency and living conditions. Food and nutrient intake was assessed using three consecutive 24-hour diet recalls completed by trained nutritionists. All of the foods and drinks consumed by the households were recorded based on meals and snacks. Special food items (bread, fats and oils, and sugar containers) as major contributors to energy intake were weighed by a weighing scale (Soehnle) and recorded. The interviewee was usually chosen from among the household members who were responsible for the preparation and cooking. The revised edition of the Iranian food composition table was used to calculate the intake of nutrients (11).

In addition to assessing the association of each SES variable with the food groups consumed and the nutritional status of households, it was necessary to find a single variable or criterion for categorizing the households based on SES. Therefore, from all of the socio-economic variables, some of them were extracted by factor analysis as indicators of SES, and their associations with the food groups consumed and the nutrient intake of households were analyzed. To identify the major indicators of SES, the principal component analysis (PCA) method and varimax with Kaisar Normalization was used, and the factors were rotated by orthogonal transformation. The natural interpretation of the factors in conjunction with Eigenvalues >1 and the Scree test determined whether a factor should be retained. The Eigenvalues of the factors dropped substantially after the third factor, and remained more similar to each other after the fourth factor. Three derived factors for SES were: 1) living conditions (by 25% of variance), 2) per capita number of rooms and residency area (by 24% of variance), 3) educational and occupational level (by 20% of variance). Total monthly expenditure was treated as an independent factor. These factors could explain about 70% of variance in SES. KMO (Kaiser-Meyer-Olkin) measure of sampling adequacy (MSA) was 0.686 and 0.662 in urban and rural areas, respectively with significant Bartlett's test of Sphericity ($p<0.0001$).

The factor score for each SES indictor was calculated by summing the SES variables weighted by their factor loading, and each participant received a factor score for each identified SES indicator. The whole population was divided into three categories (tertiles) according to the factor scores extracted. The first, second and third tertiles were considered as low, medium and high socio-economic groups, respectively. Statistical analysis was done using SPSS software (ver.16). Differences in food and nutrient intakes between the socio-economic categories were analyzed using ANOVA followed by Tukey post hoc test.

The mean intake of food groups per capita in each household was computed as the average of the whole amounts eaten during the 3 days of interview. Regarding the nutrients, we used the Iranian revised food composition table to estimate the nutrient content of each food item. We also calculated the mean daily requirement of each nutrient as per capita in household adopting the recommendations of WHO/FAO 2002 (12). Then we divided the intake of each nutrient to the requirement, and expressed it as a percentage of requirements, which is met based on the different SES groups.

Results

Among the 7158 studied households, 2496 (34.9%) were rural and 4662 (65.1%) were urban. Table 1 shows that the mean daily consumption of the food groups including bread and cereals, vegetables, fruits, meats, eggs, milk and dairy products, sugar and sweets is significantly different by the residential area (P<0.05).

Table 1. Comparison of the per capita mean daily consumption of food groups in the urban and rural households: The Comprehensive Study on Household Food Consumption Patterns and Nutritional Status of I.R. Iran

Food groups	Mean (±SE) of per capita consumption (gr/day)		
	Urban (n=2496)	Rural (n=4662)	Total (n=7158)
Bread and cereals	413.5±2.1*	518.7±3.5	450.2±1.9
Beans	18.6±0.5	20.3±0.5	19.1±0.5
Vegetables	239.1±1.9*	210.4±2.6	229.3±1.5
Fruits	160.8±2.3*	108.2±2.8	142.5±1.8
Meats	70.0±0.8*	52.6±0.5	64.3±0.6
Eggs	22.2±0.4	19.5±0.3	21.6±0.4
Milk and dairy products	142.3±1.8	134.1±2.7	139.6±1.5
Fat and oils	45.9±0.3	46.7±0.2	46.2±0.3
Sugar	54.1±0.4*	69.6±0.6	59.5±0.5
Sweets	9.5±0.2*	5.9±0.1	8.3±0.2
Nuts	4.6±0.1	3.2±0.0	4.1±0.1

***** Significant difference between urban and rural areas (p<0.001)

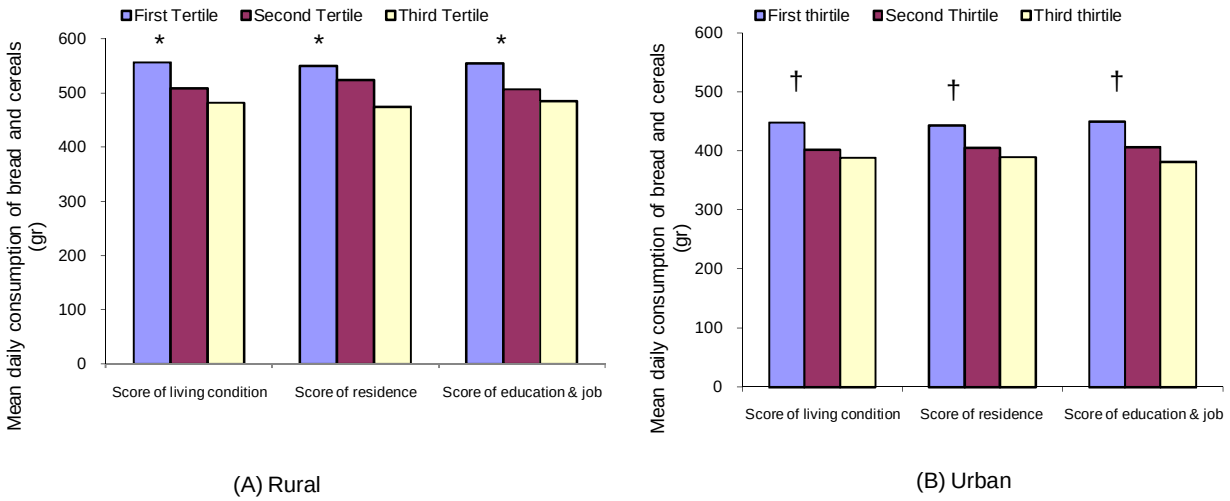


Figure 1. Comparison of the per capita mean daily consumption of bread and cereal group in A) rural and B) urban households by different socio-economic status: The Comprehensive Study on Household Food Consumption Patterns and Nutritional Status of I.R. Iran

***** Significant difference between the groups in rural areas (p<0.001)

† Significant difference between the groups in urban areas (p<0.001)

In higher Tertiles of SES, consumption of bread and cereals, as well as sugar and sweets was significantly decreased, while the consumption of meats, vegetables and fruits was increased. Figures 1-3 show the intake of bread and cereals, fruits, and vegetables, respectively. As shown, there are significant differences among the rural and urban areas, and within each area, the different categories of SES show significant different intakes. The mean intake of bread and cereals in each category in rural areas is higher than the intakes in the same category in urban areas. This is in the reverse direction about the intake of fruits and vegetables. The mean intake of these foods in each category in rural areas is much lower than in urban areas.

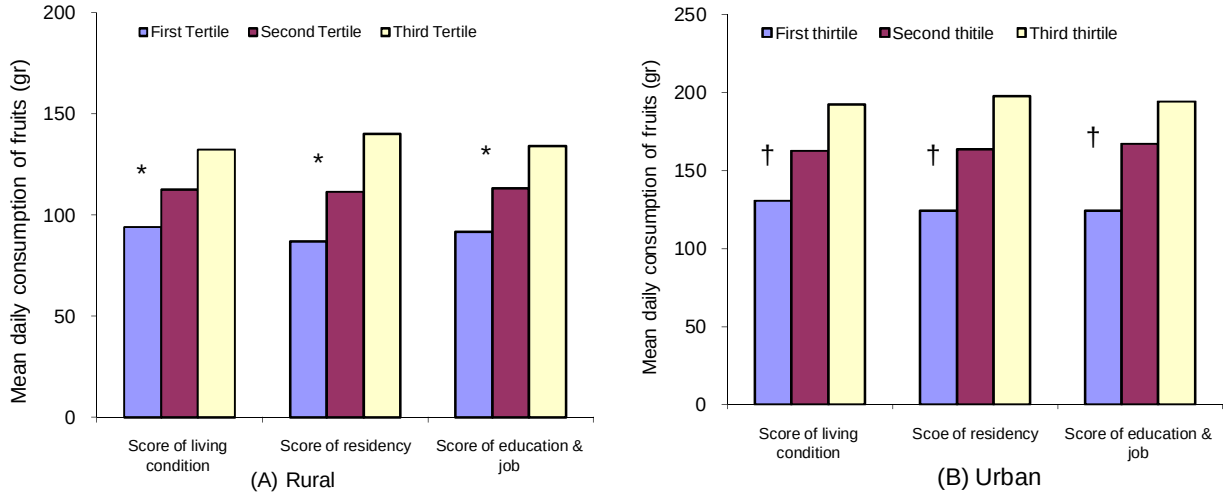


Figure 2. Comparison of the per capita mean daily consumption of fruit group in A) rural and B) urban area households by different socio-economic status: The Comprehensive Study on Household Food Consumption Patterns and Nutritional Status of I.R. Iran

***** Significant difference between the groups in rural areas ($p<0.01$)

† Significant difference between the groups in urban areas ($p<0.001$)

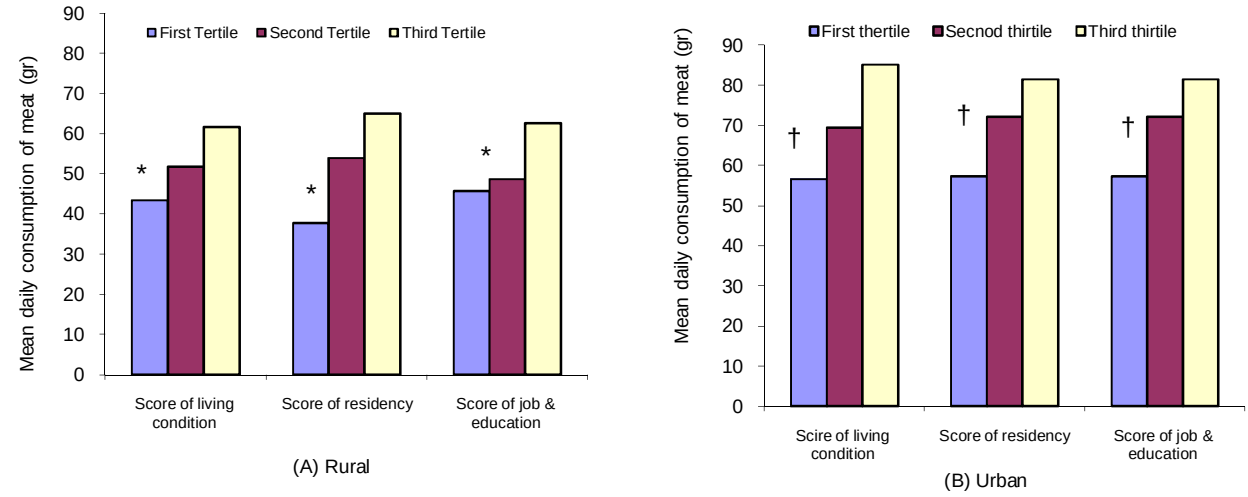


Figure 3. Comparison of the per capita mean daily consumption of meat group in A) rural and B) urban area households by different socio-economic status: The Comprehensive Study on Household Food Consumption Patterns and Nutritional Status of I.R. Iran

***** Significant difference between groups in rural areas ($p<0.001$)

† Significant difference between groups in urban areas ($p<0.001$)

Tables 2 and 3 show the ratio of intake/requirement of different nutrients. There is a trend of increasing ratio from the SES category 1 to 3 for all the nutrients except for iron and thiamin. The reason is that more than 50% of iron intake is from the bread and cereals group. The intake of this food group is much higher in the lower SES groups. Hence, though these SES groups have a higher intake of iron, the quality is not as good as the same amount consumed by the higher SES groups.

Table 2. Comparison of the per capita mean daily intake/requirement of nutrients in urban area households by different socio-economic status: The Comprehensive Study on Household Food Consumption Patterns and Nutritional Status of I.R. Iran

Mean intake (% of need)	Tertile of living condition			Tertile of residency			Tertile of education & job		
	1st	2nd	3rd	1st	2nd	3rd	1st	2nd	3rd
Energy	107±26	106±27	107±28	110±28*	106±26	104±27	108±28	106±26	107±28
Protein	121±34*	123±36	128±39	130±39*	123±36	119±34	124±36	124±36	124±37
Iron	74±26*	75±27	79±31	80±31*	76±28	73±25	78±28*	77±29	74±27
Calcium	54±22*	60±23	65±28	57±24*	60±25	61±26	55±22*	60±25	64±26
Retinol	128±183*	144±172	161±211	125±181*	144±183	165±186	125±159*	149±207	157±181
Vitamin C	139±131*	165±114	184±135	138±107*	168±122	182±123	138±104*	167±124	183±124
Thiamin	151±49*	141±47	137±46	153±50*	141±46	135±44	151±50*	142±45	136±46
Riboflavin	79±32*	88±34	96±44	82±36*	89±37	92±40	79±35*	89±38	95±39

***** Significant difference between the groups in urban areas ($p<0.001$)

Table 3. Comparison of the per capita mean daily intake/requirement of nutrients in rural area households by different socio-economic status: The Comprehensive Study on Household Food Consumption Patterns and Nutritional Status of I.R. Iran

Mean intake (% of need)	Tertile of living condition			Tertile of residency			Tertile of education & job		
	1st	2nd	3rd	1st	2nd	3rd	1st	2nd	3rd
Energy	126±33*	122±31	121±30	127±33*	125±30	116±28	126±32	121±32	121±29
Protein	145±44	141±44	142±43	149±46*	144±41	133±39	145±43	140±45	142±41
Iron	84±31	84±30	85±33	89±33*	86±31	78±28	87±33*	83±30	83±30
Calcium	57±25	57±26	57±24	57±27	57±24	57±23	55±24*	56±26	60±24
Retinol	89±108*	106±123	115±139	82±122*	105±125	123±123	83±94*	98±11	128±156
Vitamin C	101±87*	124±106	136±113	89±74*	121±102	150±120	98±86*	114±91	148±123
Thiamin	185±65*	170±60	160±54	184±68*	176±59	154±50	179±64*	170±61	165±56
Riboflavin	80±35	83±36	83±32	80±37	82±33	84±32	79±33*	80±37	86±33

***** Significant difference between the groups in rural areas ($p<0.001$)

Discussion

This study determined the socio-economic indicators that account for the differences in the food and nutrient intake of Iranian households. The most variance in SES was explained by the scores of living condition (by 25% of variance), and then the per capita measurement of house and number of rooms (by 24% of variance). These two components have been identified as important indicators of SES in I.R. Iran formerly. Whereas type of residency (own house, resting, etc) did not produce significant variance in SES or show effect on food and nutrient intakes.

Among the SES variables, education and job are two important factors that explain the most difference in the dietary food and nutrient intakes. In the present study, these two variables made one component in SES, and had a significant association with the consumption of food groups and nutritional status. With increasing educational and occupational level of the heads of households, consumption of high-calorie and lower nutrient dense groups (such as breads and cereals, sugar and sweets) decreased, and consumption of high-protein, vitamin and mineral groups (such as meat, vegetables and fruits) increased. It is evident that higher intake of retinol and vitamin C is due to higher consumption of vegetable and fruit groups (13-17).

A large-scale Meta-analysis covering 15 European countries also found that higher levels of education were positively associated with higher consumption of vegetables and fruits (2,3); and a similar conclusion was reached in a Danish study in which fruit and vegetable intake was measured as high (18,19). Higher levels of education may also increase the ability to obtain or to understand health-related information, in general, or dietary information, in particular, needed to develop the health-promoting behaviors and beliefs in the field of food habits. Analyses, which have taken education, occupation, income, and employment status into account, have shown that usually education is the strongest determinant of socio-economic differences. The other socio-economic variables have a similar but weaker effect than education on food consumption (4, 20). In Germany, adults with a low level of education report that they consume energy-dense foods more frequently – and fruit and vegetables less frequently – than adults with a high education level. High levels of physical work activity among adults with a low education level may partly explain why they consume more energy-dense foods (21).

In a study on Tehranian adolescents, Omidvar et al. (22) showed that by increasing the level of parental education, the consumption of all food groups increased. Previous studies on the income and expenditure of Iranian urban and rural households have also found that high educational and occupational level associated not only with increased income and consumption of meat, vegetable, fruit and egg, but also with the increased consumption of sugar and fast foods (23). In contrast, Esghinia et al (24) and Rezazadeh et al. (25) recently found a significant increasing trend toward healthy dietary habits with the increase in socioeconomic status.

In some Arab countries, food consumption pattern has dramatically changed as a result of sudden increase in income from oil revenue. It is believed that food subsidy policy has adversely affected the food habits in the Gulf States by encouraging the intake of fat, sugar, rice, wheat flour and meat. Socio-cultural factors such as religion, beliefs, food preferences, gender discrimination, education and women's employment all have a noticeable influence on the food consumption patterns in this region (26).

In a study in Karachi city, in which four different socio-economic Strata (low, low middle, upper middle, and high class) were defined on the basis of monthly income, the highest intake of calories consumed belonged to the low middle socio economic class. This was in contrast to what was found in the high class. This finding was attributed to the fact that people belonging to high SES were found to be generally more diet conscious. They adapt dietary restrictions more than the people of low middle SES.

Conducting a large-scale study at national level could be accounted as the major strength of the present research (27). A potential limitation of our study is the bias that can be derived from the over-reporting of consumption among those with higher levels of education. It is believed that the higher the education level, there is more knowledge about healthy food items. However, this may lead to exaggeration in their true consumption of these items (28,29), though it can not fully account for the apparent differences among the SES groups. No significant difference was found in terms of fat consumption between the SES groups, whereas for many years, lower fat consumption has been recommended to the people in I.R. Iran. Although the data used in the present study are rather old, it is necessary to provide some scientific documents from the last decade for comparing to the data of current studies after introduction of the targeted subsidies through cash transfer in 2010.

Based on our findings, an unhealthier dietary intake may exist among the households belonging to lower socio-economic level in Iran. This calls for appropriate policy and intervention(s) and efforts aimed at improving the nutrition-related health in high-risk groups.

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