Economic inequality in nutritional knowledge, attitude and practice of Iranian households: The NUTRI-KAP study

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Abstract

Background: Improper nutritional knowledge is one of the most important causes of nutritional problems, which can affect practice and cause more complications. The aim of this study was to assess the association between nutritional knowledge, attitude and practice (KAP) of Iranian households with socioeconomic status (SES).

Methods: The study population was 14,136 households (57 clusters of 8 individuals in each province) who lived in urban and rural regions of 31 provinces of Iran. The sample size of the study was selected using multi-stage cluster sampling technique. A structured questionnaire and interview with the qualified person in each family was used to collect data. The questionnaire included demographic, SES and nutritional KAP questions. Using principle component analysis, some variables including household assets, occupation and education level of the heads of the families and respondents and the number of family members were used to construct family SES. The SES was categorized as good, moderate and weak. Pearson’s Chi-square test was used to analyze categorical variables.

Results: The percentage of knowledge about growing up, acquiring energy and being healthy as reasons for eating food was 24.1%, 44.8% and 54.7%, respectively. Only 69.7%, 60.5% and 52.5% of the participants had knowledge of identification of meat and legumes, grain and dairy group, respectively. More than 97% of the participants had a favorable attitude toward importance of nutrition in health. The nutritional knowledge linearly increased with increasing SES. Families with good SES significantly consumed more fruit, vegetable, dairy group, red meat, chicken and poultry, fish and egg while sugar consumption was significantly higher in families with weak SES (p<0.05).

Conclusion: SES can influence the rate of nutritional KAP. Some policies should be considered to increase nutritional KAP especially in lower SES group in the society.

Keywords: Knowledge, Attitude, Practice, Socioeconomic Status, Nutrition.

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**Introduction**

Improper nutritional knowledge is one of the most important causes of nutritional problems, which can affect practice and cause more complications. It has been recommended that food choices and dietary behaviors can be impressed by knowledge about diet (1). To effectively improve healthy eating, it is necessary to understand the nutritional attitudes and beliefs of the general community (2).

Age, education level, gender and marital status can influence nutritional knowledge, attitude and practice (KAP) (3). The association of socioeconomic status (SES) with nutrition knowledge and beliefs has been confirmed (4). Many studies have found that nutrient intakes and dietary patterns of people in low SES groups threaten the general health and raise the risk of nutritional disease (5,6). People in Low SES group, due to lack of access to health care, improper living conditions, less knowledge and greater psychological stress, may be at a higher risk of poorer health conditions more than others (7-10). With respect to the association of SES index with health behaviors (11) and undesirable health consequences, it is of prime importance to evaluate the effect of SES index on health-related behaviors.

In this study, the association between nutritional KAP with SES was assessed among the Iranians in urban and rural regions of 31 provinces of Iran.

**Methods**

The study population consisted of 14,136 Iranian households who lived in urban and rural regions of 31 provinces, selected by multi-stage cluster sampling. Non-Iranian households were not included in the survey, and the households who were absent for tree times at the time of the interview were also excluded. The method of study has been published in a previous survey (12).

Mothers or any over 15-year old member of the households, who were in charge of cooking for the entire family, were considered as statistical units of the study. A structured questionnaire and interview with a qualified person in families was used to collect data. The questionnaire included demographic, SES and nutritional KAP questions. Nutritional knowledge questions inquired about main food groups, causes of consuming food, role of main food groups, sources of protein intake, and role of dietary fiber as well as nutritional attitude toward health-related behaviors and food choices. To assess the practice of the households, the household members were asked about the frequencies of different consumed foods.

SES was defined as good, moderate and weak. SES was an index that included household assets (house ownership, number of rooms in the house, having such equipment as TV, cell phone, car, freezer, washing machine, dish washing machine, phone, microwave, access to internet), occupation and education level of the heads of the families and the respondents and number of family members.

**Statistical Analysis**

Data were analyzed using the STATA Version 11.0 (STATA Corp, College Station, Tex.) (Survey analysis). The Pearson’s Chi-square test was used to analyze categorical variables. P-value less than 0.05 was considered as statistically significant.

**Results**

Table 1 demonstrates the nutritional knowledge of households based on SES. The percentage of nutritional knowledge was significantly higher in families with good SES and it linearly increased with family SES. Most people consumed food to prevent disease and be healthy (54.7%, 95% CI: 53.5, 56.0). More than half percent of households were aware of grain, meat and legumes, and dairy group (60.5%, 69.7%, and 52.5%, respectively). The percentage of knowledge about identification of fruit, vegetable and fat groups was less than half percent. About 73.1% of the households (95% CI: 71.9, 74.3) were familiar with the role of dairy group (growing...
and strengthen teeth and bones), although less than 10% of them were aware of the role of fruit groups in providing dietary fiber (8.6%, 95% CI: 7.1, 9.2). The percent of participants’ knowledge about legumes and soy, another source of protein, was 45.5% (95% CI: 44.2, 46.8) and 40.1% (95% CI: 38.8, 41.5), respectively. Only 10.1% of the participants were familiar with the concept of dietary fiber; among

| Nutritional knowledge                                                                 | SES       | Moderate | Weak     | p       |
|---------------------------------------------------------------------------------------|-----------|----------|----------|---------|
| Knowledge about the reason for eating food                                           | Good: 29.4| 22.7     | 20.1     | 24.1    | <0.001  |
|                                                                                      | (27.7,31.2)| (21.2,24.3)| (18.5,21.7)| (23.25,2) |
| Acquiring energy                                                                     | 51.6      | 42.8     | 39.9     | 44.8    | <0.001  |
|                                                                                      | (49.6,53.6)| (49.4,44.6)| (37.9,41.9)| (43.4,46.1)|
| Being healthy and preventing disease                                                 | 60.2      | 56.3     | 47.6     | 54.7    | <0.001  |
|                                                                                      | (58.3,62.1)| (54.5,58.1)| (45.5,49.7)| (53.5,56)|
| Knowledge about Identification of Food Group                                         | Grain, bread and pasta: 69 | 58.8 | 53.7 | 60.5 | <0.001 |
|                                                                                      | (67.2,70.8)| (56.9,60.6)| (51.6,55.8)| (59.2,61.8)|
| Meat, legumes and egg                                                                | 80.7      | 70.7     | 57.6     | 69.7    | <0.001  |
|                                                                                      | (79.2,82.2)| (69.7,72.4)| (55.6,59.7)| (68.5,71)|
| Dairy group                                                                          | 65.6      | 54.1     | 37.6     | 52.5    | <0.001  |
|                                                                                      | (63.7,67.4)| (52.9,55.9)| (35.8,39.5)| (51.2,53.7)|
| Fruits                                                                               | 55.2      | 41.2     | 28.4     | 41.6    | <0.001  |
|                                                                                      | (53.2,57.1)| (39.4,43)| (26.7,30.2)| (40.3,42.9)|
| Vegetables                                                                           | 62.7      | 49.9     | 35.4     | 49.4    | <0.001  |
|                                                                                      | (60.8,64.5)| (48.5,51.7)| (33.5,37.4)| (48.5,70)|
| Butter and cream belong to fat group                                                 | 36.3      | 26.5     | 25.7     | 29.5    | <0.001  |
|                                                                                      | (34.3,38.3)| (24.7,29.4)| (23.9,27.7)| (28.9,30.9)|
| Knowledge about the Role of Main Food Group                                         | Acquiring energy from grain group: 39.8 | 31.7 | 30.8 | 34.1 | <0.001 |
|                                                                                      | (37.9,41.7)| (30.3,33.5)| (29.2,32.7)| (32.9,35.4)|
| Acquiring protein from meat, legumes and egg to grow                                | 58.7      | 39.5     | 24.5     | 49.9    | <0.001  |
|                                                                                      | (56.8,60.5)| (37.7,41.3)| (22.9,26.3)| (39.8,42.2)|
| Consuming dairy group to grow and strengthen teeth and bones                        | 84.4      | 73.1     | 61.6     | 73.1    | <0.001  |
|                                                                                      | (82.9,85.8)| (71.5,74.7)| (59.6,63.6)| (71.9,74.3)|
| Knowledge about Other Sources of Protein Except Meat                                 | Acquiring any kinds of vitamins: 76.01 | 62.3 | 47.2 | 61.9 | <0.001 |
|                                                                                      | (74.3,77.7)| (60.5,64.1)| (45.1,49.8)| (60.5,63.2)|
| Consuming Fruit                                                                      | Acquiring minerals: 22.2 | 13.5 | 7 | 14.2 | <0.001 |
|                                                                                      | (20.5,24.1)| (12.2,14.9)| (6.1,18.1)| (13.3,15.2)|
| Knowledge about Dietary Fiber                                                        | Acquiring dietary fiber: 15.7 | 6.2 | 3.9 | 8.6 | <0.001 |
|                                                                                      | (14.4,17)| (5.5,7)| (3.4,5.5)| (7.1,9.2)|
| Knowledge about Other Sources of Protein Except Meat                                 | Acquiring any kinds of vitamins: 67.8 | 54.2 | 42.9 | 54.1 | <0.001 |
|                                                                                      | (66.6,69.6)| (52.5,56.1)| (40.9,44.9)| (53.6,56.3)|
| Knowledge about Dietary Fiber                                                        | Acquiring minerals: 30.3 | 22.4 | 11.1 | 21.6 | <0.001 |
|                                                                                      | (28.4,32.2)| (20.8,24.1)| (10.9,13.1)| (20.5,22.7)|
| Knowledge about Dietary Fiber                                                        | Acquiring dietary fiber: 24.8 | 13.8 | 7.6 | 15.4 | <0.001 |
|                                                                                      | (23.2,26.6)| (12.6,15.1)| (6.8,8.6)| (14.5,16.4)|

*95% CI)*; p<0.05; SES; Socioeconomic Status

Table 1. Nutritional Knowledge of the Households according to Socioeconomic Status: The NUTRI-KAP Survey

Med J Islam Repub Iran 2016 (16 October). Vol. 30:426.
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them, the most percentage of knowledge belonged to bowel movement.

The percentage of attitude is shown in Table 2. More than 97% of the participants had a favorable attitude towards the importance of nutrition and diet in health. Respectively, 90.3%, and 70.4% of the participants had a favorable attitude toward importance of nutritional requirements of children rather than adults and the necessity of equal food intake in both genders when there is few food. The percentage of a

| Attitude                                                                 | SES          | Good          | Moderate      | Weak         | Total       | p            |
|-------------------------------------------------------------------------|--------------|---------------|---------------|--------------|-------------|--------------|
| The importance of nutrition and diet in health                          | Agree        | 99.3          | 98            | 95.1         | 97.4        | <0.001       |
|                                                                         | No idea      | 0.4           | 0.5           | 2.6          | 1.2         |              |
|                                                                         | Disagree     | 0.3           | 1.6           | 2.4          | 1.4         |              |
| Importance of nutritional requirements of children rather than adults  | Agree        | 92.1          | 90.2          | 88.5         | 90.3        | <0.001       |
|                                                                         | No idea      | 1.4           | 0.8           | 4.2          | 2.1         |              |
|                                                                         | Disagree     | 6.5           | 7.3           | 9            | 7.6         |              |
| Necessity of equal food intake in both gender when there is few food    | Agree        | 80.1          | 70.3          | 60.6         | 70.4        | <0.001       |
|                                                                         | No idea      | 2.2           | 3.3           | 3            | 2.8         |              |
|                                                                         | Disagree     | 17.7          | 26.4          | 36.4         | 26.8        |              |
| Preferring fruit consumption than bread at time of hunger               | Agree        | 39.8          | 50.8          | 58.5         | 49.7        |              |
|                                                                         | No idea      | 3             | 2.8           | 3.3          | 3.1         |              |
|                                                                         | Disagree     | 57.1          | 46.4          | 38.2         | 47.2        |              |
| Preferring to consume steam cooked rice in cooked                       | Agree        | 68.2          | 64            | 63.2         | 65.1        |              |
|                                                                         | No idea      | 2.5           | 3.2           | 3.8          | 3.1         |              |
|                                                                         | Disagree     | 29.4          | 32.8          | 33           | 31.7        |              |
| Preferring consumption of fishes on tuna                               | Agree        | 86.3          | 82            | 73.1         | 80.5        | <0.001       |
|                                                                         | No idea      | 1.6           | 2.1           | 2.9          | 2.2         |              |
|                                                                         | Disagree     | 12.1          | 15.9          | 24           | 17.3        |              |
| Necessity of daily consumption of vegetables or salad                   | Agree        | 95.3          | 92.9          | 87.8         | 92          | <0.001       |
|                                                                         | No idea      | 0.9           | 1             | 3.2          | 1.7         |              |
|                                                                         | Disagree     | 3.8           | 6.2           | 9            | 6.3         |              |
| Need for milk consumption in any age besides children                  | Agree        | 93.1          | 87.8          | 83.3         | 88.1        | <0.001       |
|                                                                         | No idea      | 0.4           | 0.6           | 1.4          | 0.8         |              |
|                                                                         | Disagree     | 6.5           | 15.3          | 15.3         | 11.1        |              |
| Preferring whole meal bread on other kinds of bread                    | Agree        | 22.6          | 31.1          | 44.2         | 32.6        | <0.001       |
|                                                                         | No idea      | 3             | 2.6           | 6.1          | 3.9         |              |
|                                                                         | Disagree     | 74.5          | 66.3          | 49.8         | 63.5        |              |
| Drinking water in middle of eating food is undesirable because of lowering Performance of digestive system | Agree        | 73.5          | 68.5          | 57.6         | 66.5        | <0.001       |
|                                                                         | No idea      | 7.6           | 9.6           | 10.1         | 9.6         |              |
|                                                                         | Disagree     | 19            | 21.9          | 29.4         | 23.4        |              |
favorable attitude of the family with good, moderate and weak SES about preferring fruit consumption than bread at time of hunger was 39.8%, 50.8% and 58.5%, respectively. The percentage of participants who disagreed with consuming steam cooked rice was significantly higher in families with weak SES. About 80.5% of the participants had a favorable attitude toward preferring consumption of tuna fish and the lowest percentage was related to weak SES families. Households with good SES had a more favorable attitude about the necessity of daily consumption of vegetables or salad and the need for milk consumption in any age besides childhood period (95.3%, and 93.1%, respectively). The families with weak SES had the highest favorable attitude about preferring whole meal bread on other kinds of breads. The percentage of favorable attitude toward drinking water in the middle of eating food and the necessity of keeping body fitness in girls at puberty was 66.5% and 56.1%, respectively. When the participants were asked about the difference between nutrition fact of meat and mushrooms, only 25.4% agreed.

Table 3 demonstrates the practice of households based on SES. Most households consumed fruit, vegetable, milk, yoghurt, cheese and sugar daily. Consumption of

| Necessity of keeping body fitness in girls in puberty age | Agree | No idea | Disagree | p |
|-------------------------------------------------------|-------|---------|----------|---|
|                                                        | 69.1  | (67.4,70.7) | (4.3,5.9) | <0.001 |
|                                                        | 52.0  | (51.5,54.7) | (8.8,11.1) | |
|                                                        | 46.1  | (44.3,47.9) | (15.1,17.9) | |
|                                                        | 56.1  | (54.8,57.3) | (9.6,11.3) | |

| The nutrition fact of mushrooms and meat is different | Agree | No idea | Disagree | p |
|-------------------------------------------------------|-------|---------|----------|---|
|                                                        | 22.6  | (21.2,24.3) | (6.9,8.8) | <0.001 |
|                                                        | 22.6  | (22.2,25.7) | (9.2,11.2) | |
|                                                        | 10.2  | (9.3,11.3) | (13.4,16.3) | |
|                                                        | 14.8  | (14.2,17.5) | (10.2,13.1) | |
|                                                        | 25.4  | (24.3,27.5) | (19.1,22.2) | |
|                                                        | 37.3  | (35.5,39.1) | (28.8,32.6) | |
|                                                        | 37.5  | (35.7,39.4) | (22.9,26.6) | |
|                                                        | 33.5  | (32.4,34.4) | (17.2,20.2) | |

| *(%95% CI), p <0.05, SES; Socioeconomic Status |
|------------------------------------------------|

| Frequency of food consumption | SES       | Total | p          |
|------------------------------|-----------|-------|------------|
| Rice                         | Good      | Moderate | Weak | 47.7 | <0.001 |
| Daily                        | 55.9      | (53.7,58)* | 47.9 | (37.2,41.6) | (46.2,49.2) |
| weekly                       | 42.4      | (40.2,44.5) | 51.3 | (45.9,49.9) | 58.6 | (50.7,60.8) |
| Rarely /Never                | 1.8       | (1.2, 2.6) | 0.9 | (0.6, 1.2) | 2 | (1.6, 2.5) |
| Red meat                     | Daily     | 14.1      | (12.7,15.6) | 10.1 | (9.3,10.9) |
| weekly                       | 76.7      | (75.7,78.3) | 73 | (9.1,11.3) | 71.1 | (9.3,10.9) |
| Rarely /Never                | 9.2       | (8.2,10.3) | 16.9 | (15.5,18.3) | 30.7 | (28.8,32.6) |
| Viscera                      | Daily     | 1.4       | (1.2, 1.1) | 0.5 | (0.3, 0.8) | 0.4 | (0.2, 0.6) |
| weekly                       | 16        | (14.1,17.5) | 19.9 | (18.4, 21.5) | 18.6 | (17.1, 20.2) |
| Rarely /Never                | 82.5      | (81.8,84) | 79.6 | (78.8,81) | 81.1 | (79.5,82) |
| Chicken and poultry          | Daily     | 11.2      | (10.1,12.5) | 14.5 | (13.1,16.1) | 10.7 | (9.5,11.9) |
| weekly                       | 82.5      | (80.9,83.9) | 75.5 | (73.8,77.1) | 77.3 | (75.6,78.9) |
| Rarely /Never                | 6.3       | (5.6, 7.2) | 10 | (9.1,11) | 12.1 | (10.9,13.4) |
| Fish                         | Daily     | 1.6       | (1.3,2.1) | 2.5 | (1.9,3.14) | 1.4 | (1.2, 1.2) |
| weekly                       | 48.1      | (46.2,50.1) | 41.7 | (39.8,43.6) | 31 | (28.9,33.2) |
| Rarely /Never                | 50.3      | (48.3,52.2) | 55.8 | (53.9,57.7) | 67.6 | (63.5,69.8) | (38.9,41.6) | (57.9,60.8) | (56.5,59.3) |
Table 3. Cntd

| Food Group                  | Daily | Weekly | Rarely / Never | p  |
|-----------------------------|-------|--------|----------------|----|
| Tuna                        | 1.3   | (0.8,1.9) | (16.8,2.4) | <0.001 |
| Egg                         | 27.7  | (25,9,29.5) | (61,9,65.9) | <0.001 |
| Legumes                     | 21.6  | (20,23.3) | (71,27,7)    | 0.0017 |
| Fruit                       | 86.7  | (85,2,88) | (10,2,12,7)   | <0.001 |
| Vegetable and salad         | 67    | (65,1,689) | (5,2,31,9)   | <0.001 |
| Milk, yoghurt and cheese    | 90.8  | (89,6,91,8) | (29,9,33,5) | <0.001 |
| Butter and cream            | 31.6  | (39,9) | (38,1,41,8) | <0.001 |
| Sugar                       | 80.7  | (79,8,82,3) | (26,7,30,3) | <0.001 |
| Nuts                        | 18.3  | (16,9,19,8) | (38,3,4,2) | <0.001 |
| Synthetic juice             | 41.6  | (39,7,43,5) | (41,6,11,6) | <0.001 |
| Dough                       | 39.9  | (37,8,42) | (46,5,50,5)  | <0.001 |

Nutritional knowledge, attitude and practice in Iran
Families with good SES significantly co-
items such as viscera, tuna, nuts and syn-
thetic juice were rarely or never consumed. Families with good SES significantly con-

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Discussion

The aim of this study was to assess the association between nutritional KAP with SES among Iranian households. Our results revealed that SES could impress nutritional KAP. The best knowledge in all items was seen in families with good SES index and it linearly increased with family SES.

Households with weak SES had the best favorable attitude toward the difference between mushroom and meat nutrition fact, preferring whole meal bread on other kinds of breads and preferring fruit consumption than bread at time of hunger. The consumption of food items such as red meat, chicken and poultry, fish, egg, dairy group, fruit, vegetable and nuts was significantly higher in households with good SES index while the other items including rice, tuna, legumes and sugar were consumed the most in weak families.

These findings are supported by other surveys that have shown that more intake of fruit and vegetable are related to more diet costs, and diet rich in fat and sugar is contributed to lower costs (13,14). Findings from a survey on 4,356 US adults suggested that better SES index independently promotes the possibility of adequate fruits and vegetables intake and overall diet quality. They also reported that nutritional knowledge and belief can affect the positive association between SES and diet quality indicators(4). As it is confirmed in other studies, the socio-demographic variation in intake can be associated with nutritional knowledge as a partial mediator in improving diet. The result of this study also revealed that healthy eating was significantly associated with knowledge and possibility of meeting current recommendations for fruit, vegetable and fat intake (15). The association of SES and dietary knowledge or income and diet is supported by other studies (16-19). Another way that SES can influence diet is related to food purchasing differences. A study on Australians in 2000 showed that food purchasing differences due to household income is related to diet via food-cost concern (20). Food purchase decisions due to a person’s attitude toward food price can influence diet quality. Based on this survey, people who care about food price were more likely to live in low-income, food-insecure households, they had low education, were tenants and did not own homes, and were service workers. They were more susceptible to diseases such as overweight, high blood pressure, heart disease and diabetes than the others (21).

Our results showed higher consumption of food items such as sugar, tuna and lower consumption of nuts and protein sources such as meat, fish, egg and dairy product in families with weak SES, which can be associated with an increased rate of some diseases. Thus, implementing measures to guide people in the line of healthier nutrition is necessary and it can help decrease the rate of diet-related diseases, especially in low SES households.

Conclusion

With respect to the increasing nutritional disease and the important role of dietary behaviors, increasing nutritional KAP may be a way to change life style and health related behaviors, but it is not enough. Therefore, targeted policies should be coupled with efforts to promote diet and nutritional KAP for those people with unfavorable socio-economic status. Some cost-effective strategies should be presented for the low-income groups in the society to neutralize the negative effect of income on food purchasing patterns and health related life style.

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Conflict of interests
There was no conflict of interest in this survey.

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