www.jnsd.tums.ac.ir

Original Article Open Access

Knowledge, attitude and practice of Iranian population regarding fast foods, soft drinks, salt and oil: NUTRI-KAP survey

Zeinab Ahadi[1], Ramin Heshmat[1], Zahra Abdollahi[2], Mostafa Qorbani[3], Gita Shafiee[1,4], Zeinab Tiznobeyk[2], Vahab Rezvani[2], Maryam sanaei[1], Maryam Ghaderpanahi[4], and Forouzan Salehi [2*]

[1] Chronic Diseases Research Center, Endocrinology and Metabolism Population Sciences Institute, Tehran University of Medical Sciences, Tehran, Iran
[2] Community Nutrition Department, Ministry of Health and Medical Education, Tehran, Iran
[3] Department of Community Medicine, Alborz University of Medical Sciences, Karaj, Iran
[4] Endocrinology & Metabolism Research Center, Endocrinology and Metabolism Clinical Sciences Institute, Tehran University of Medical Sciences, Tehran, Iran

Article History
Received:
14/04/2015
Revised:
29/05/2015
Accepted:
19/06/2015

Keywords:
Knowledge,
Attitude,
Practice,
Fast foods,
Soft drinks,
Salt,
Oil

A B S T R A C T

Background: The aim of this study was to survey Knowledge, attitude and practice (KAP) of fast foods, soft drinks, salt and oil in urban and rural regions in Iran. In this cross–sectional study, 14,136 persons who was responsible for cooking in family participated from both rural and urban areas of 31 provinces of Iran (2011-2012).

Methods: The sampling method was the single-stage cluster sampling with equal size clusters at households in each province. The data were gathered using a structured questionnaire covering demographic variables, knowledge, attitude and practice about fast foods, soft drinks, salt, and oil by interviewing qualified samples.

Results: Households in urban areas had higher correct knowledge level and favorable attitude toward fast foods, soft drinks, salt and oil than households in rural areas. The consumption of sausage, junk food, soft drink and synthetic juice was higher in rural ($p<0.05$). While consumption of pizza, sandwich and non-alcoholic beverage was significantly higher among in urban regions ($p<0.05$). Respectively, solid and liquid oil were consumed frequently in rural and urban ($p<0.05$). In both of two areas, more than 95% of respondents stated to consume iodized salt ($p=0.04$).

Conclusion: The results of our study indicated that the nutrition KAP of Iranian population was acceptable. It showed that earlier nutritional educations were effective and helpful.

Introduction

Nowadays, non-communicable diseases (NCDs) such as cardiovascular diseases, cancers, diabetes and chronic lung disease are main cause of mortality in the world wide. In 2008, almost two third of the total death were due to NCDs (1). Iran is undergoing epidemiological transition and the burden of NCDs has increased rapidly (2). In Iran NCDs are estimated to account for 76% of all deaths in 2014 (3). Risk factors of

Corresponding author:
Dr Forouzan Salehi.
Address: Community Nutrition Department, Ministry of Health and Medical Education, Tehran, Iran.
Email: salehi46@yahoo.com

NCDs are mostly preventable and these factors are tobacco use, improper diet, inactivity as well as consumption of alcohol (4). In recent years, consumption of fast food and soft drinks has been increased (5, 6). Fast food can lead to higher energy intake because of large portion size and taste preferences for sugar, salt, and fat. Previous studies showed that fast food consumption is linked to obesity, diabetes, and insulin resistance (7, 8). On the other hand, increasing consumption of soft drinks may be related to insulin resistance, risk abdominal obesity, high triglyceride levels, and low levels of high-density lipoprotein cholesterol (HDL-C), hypertension and impaired glucose tolerance (9). These impacts are associated to higher caloric intake, the great sugar content (10).

Also, studies showed that Salt in different countries is almost consumed more than the amount of recommended dietary (11, 12). Data showed that value of salt intake in Iran is in line with most of the countries around the World, and it is higher than recommended daily intake (13). The excessive use of salt is an important risk factor of blood pressure levels, hypertension and cardiovascular diseases (14), and because of increase in calcium excretion is caused to osteoporosis (15).

Previous studies showed that hydrogenated oil is the most important used oil in Iran with average 14g per 1000 kcal, which is double more than in developing countries (16, 17). While, according to recommendation of WHO, SFA is used less 10 per cent total energy for preventing from cardiovascular diseases (18). Hydrogenated oil is source of saturated fatty acids and trans fatty acids that excessive dietary fat intake can be an important risk factor for obesity, cardiovascular diseases and some of cancers (1, 19, 20).

Earlier studies showed that the better nutrition knowledge is related to better dietary habits (21-23). So it is necessary to know the knowledge level of population to determine the eating habits. To our knowledge, no study was assessed the KAP status toward fast food, soft drinks, salt and oil among Iranian population in urban and rural regions. And, due to the increase of chronic diseases and the role of diet as a modifiable factor, furthermore the comprehensive study about the consumption of these foods has not been done yet in Iran, the important of this study is clear. So the aim of current study was to investigate the KAP level about fast food, soft drinks, salt and oil in urban and rural areas in Iran.

Methods

The study participants were 14,136 persons who were selected from households in urban and rural areas in 31 provinces of Iran by single-stage cluster method with equal-sized clusters. The number of clusters was 57 in each province, and each cluster consisted of 8 people. This study's method has been described in detail previously, so here it is explained briefly (24). Exclusion criteria included non-Iranian families, collective households such as dormitories, boardinghouse, nursing home, barracks and so on and be absence of qualified person after 3 times of interviewer's reference.

Data was gathered by using a structured questionnaire covering demographic variables, knowledge, attitude and practice about fast foods, soft drinks, salt, and oil by interview with mother or any member of the household over 15 years (male or female) who is responsible for cooking in family. The questionnaire was tested for validity and reliability in designing phase (24).

The demographic variables were included sex and family head and respondent age. Knowledge status was assessed by twelve questions, eight questions about harmful effects of frequent consumption of fast food and soft drink, and four questions about oil. Questions were about the best oil for cooking, and frying, and the most harmful oil (animal and solid oil). Participants' attitude was evaluated with nine questions about fast food, beverages, oils, and salt. Frequency of consumption of sausage, pizza, junk food, sandwich, soft drink, non-alcoholic beverage, and synthetic juice was assessed by eleven questions. Also, type of oil and salt were asked in practice.

Statistical analysis

Data were analyzed by STATA version 11.0 (STATA Corp, College Station, Tex.).The qualitative variables were reported as percentages and 95% confidence interval (CI). The Pearson's Chi-square test was used to analyze categorical variables P value less than 0.05 was considered as statistically significant.

Results

The demographic characteristics of family heads and respondents based on region are listed in Table 1. Mean age of respondents was

Table 1. Household's characteristics based on region: The NUTRI-KAP survey

	Urban	Rural	Total	P value
Sex of family head				
Male	88.1(87.3,88.9) *	90.1(89.1,91.1)	88.8(88.2,89.5)	0.002
Female	11.9(11.1,12.7)	9.9(8.94,10.9)	11.2(10.6,11.8)	
Age of family head				
20 – 39	32.8(31. 7,33. 9)	37.5(36.0,39.1)	34.5(33.6,35.4)	<0.001
40- - 64	52.1(51.0,53.2)	46.3(44.8,47.8)	50.1(49.2,51.0)	
0ver 65	15.1(14.3,16.0)	16.1(14.8,17.5)	15.5(14.8,16.2)	
Sex of respondent				
Male	2.5 (2.2,2.9)	2.0(1.6,2.5)	2.3(2.1,2.6)	0.06
Female	97.5(97.1,97.8)	98.0(97.5, 98.5)	97. 7(97.4,97.9)	
Age of respondents				
Under 20	2.1 (1.8,2.4)	4.7 (4.2,5.4)	3.0(2.7,3.3)	<0.001
20-39	49.5(48.3,50.6)	56.9(55.2,58.5)	52.1(51.1,5.0)	
40-64	40.8(39.7,41.9)	32.7(31.1,34.3)	37.9(37.0,38.8)	
0ver 65	7.7(7.1,8.3)	5.8(5.0,6.6)	7.0(6.5,7.5)	

*(%(95% CI)), P-value<0.05

Table 2. The correct knowledge of households about fast food, soft drink and oil based on region: The NUTRI-KAP survey

Correct knowledge	Urban	Rural	Total	P value
Harmful effects of fast food				
Overweight and obesity	35.2 (33.6,36.9) *	24.7 (22.8,26.8)	31.5 (30.2,32.8)	<0.001
Liver diseases	6.5 (5.7,7.3)	5.7 (4.6,7.1)	6.2 (5.6,6.9)	0.3
Cancer	20.4 (19.1,21.9)	15.0 (13.3,16.9)	18.5 (17.4,19.7)	<0.001
Cardiovascular diseases	14.3 (13.2,15.5)	12.1 (10.6,13.9)	13.5 (12.6,14.5)	0.03
Harmful effects of soft drink				
Obesity	33.6 (32.0,35.2)	26.3 (24.2,28.6)	31.0 (29.7,32.3)	<0.001
Osteoporosis	41.4 (39.8,43.1)	37.7 (35.4,39.9)	40.1 (38.7,41.4)	0.008
Anorexia and malnutrition	20.7 (19.3,22.2)	17.39 (15.6,19.4)	19.5 (18.4,20.7)	0.008
Dental caries	12.0 (11.0,13.0)	8.3 (7.2,9.6)	10.7 (9.9,11.4)	<0.001
knowledge of oil				
The best oil for cooking	80.3 (79.1,81.4)	71.4 (69.3,73.4)	77.1 (76.1,78.2)	<0.001
The best oil for frying	76.3 (75.0,77.6)	62.2 (59.9,64.5)	71.4 (70.1,72.6)	<0.001
The most harmful oil (Animal oil)	33.9 (32.3,35.4)	28.6 (26. 6,30.7)	32.0 (30.8,33.2)	0.0001
The most harmful oil (Solid oil)	81.8 (80.5,83.0)	71.7 (69.4,73.8)	78.2 (77.1,79.3)	<0.001

*(%(95% CI)), P-value<0.05

39.7±14.4 years, and the majority of them were woman in two regions (94%).

Table 2 shows correct knowledge of households about fast food, soft drink and oil based on region. The correct knowledge about harmful effects of fast food was significantly better among urban households than rural except knowledge about liver diseases that was low and same in both regions (p= 0.3). The correct knowledge about harmful effects of soft drink was significant higher in urban regions (p<0.05). Most Iranian households (40.1%, 95%CI: 38.7, 41.4) knew that osteoporosis is as harmful effects of soft drink. Respectively, 77.1% (95%CI: 76.1, 78.2), and 71.4% (95%CI: 70.1, 72.6) of Iranian households were aware of best oil for cooking and frying and level of correct knowledge was better among urban compared to rural families. Approximately 78% (95%CI: 77.1, 79.3) of participants knew solid oil as a

Table 3. Attitude of households about fast food, soft drink, oil and salt based on region: The NUTRI- KAP survey

Attitude		Urban	Rural	Total	P value
Attitude of fast food					
Preference of traditional food on fast food	Agree	4.5 (3.9,5.1)*	3.5 (2.8,4.3)	4.1 (3.7,4.6)	0.0001
	No idea	1.0 (0.8,1.3)	2.1 (1.6,2.8)	1.4 (1.2,1.7)	
	disagree	94.5 (93.9,95.1)	94.4 (93.4,95.2)	94.5 (93.9,95.0)	
Being improper Junk food and potato chips as snack for children	agree	95.4 (94.8,95.9)	91.7 (90.5,92.7)	94.1 (93.5,94.6)	<0.001
	No idea	1.2 (1.0,1.5)	1.9 (1.5,2.4)	1. 5 (1.2,1.7)	
	disagree	3.4 (3.0,3.9)	6.5 (5.5,7.5)	4.5 (4.1,5.0)	
Attitude of soft drink					
Preference of dough on soft drink	agree	5.3 (4.7,5.9)	5.0 (4.2,5.9)	5.2 (4.7,6.0)	0.2
	No idea	0.8 (0.6,1.1)	1.3 (0.8,2.0)	1.0 (0.8, 1.3)	
	disagree	93.9 (93.2,94.5)	93.7 (92.7,94.7)	93.8 (93.3,94.4)	
Not healthy dietary drink	agree	64.0 (62. 6,65.5)	54.4 (52.2,56.5)	60.6 (59.4,61.8)	<0.001
	No idea	19.5 (18.3,20.7)	25.1 (23.2,27.1)	21. 5 (20. 5,22.5)	
	disagree	16.5 (15.5,17.6)	20. 6 (19.0,22.2)	18.0 (17.1,18.9)	
Drinking water instead of soft drink during thirst	agree	95.3 (94.7,95.9)	93.6 (92.5,94.5)	94.7 (94.2,95.2)	0.008
	No idea	0.6 (0.4,0.9)	0.8 (0.5,1.2)	0.7 (0.5,0.9)	
	disagree	4.1 (3.6,4.6)	5.6 (4.8,6.6)	4.6 (4.2,5.1)	
Attitude of oil					
Being improper solid oil for cooking	agree	85.1 (84.1,86.0)	75.3 (73.4,77.0)	81.6 (80.6,82.5)	<0.001
	No idea	2.1 (1.8,2.6)	3.0 (2.4,3.7)	2.4 (2.1,2.8)	
	disagree	12.8 (11.9,13.7)	21.8 (20.1,23.5)	16.0 (15.1,16.9)	
Attitude of salt					
Not adding salt while eating	agree	76.3 (75.0,77.7)	71.2 (69.2,73.1)	74.5 (73.4,75.6)	<0.001
	No idea	1.6 (1.4,2.0)	1.3 (1.0,2.0)	1.5 (1.3,1.7)	
	disagree	22.0 (20.7,23.4)	27.6 (25. 7,29.5)	24.0 (23.0,25.1)	
using refined and Iodized salt for cooking	agree	4.4 (3.9,5.1)	3.2 (2.6,4.0)	4.0 (3.6,4.5)	0.0007
	No idea	2.5 (2.0,3.0)	1.5 (1.1,2.0)	2.1 (1.8,2.6)	
	disagree	93.1 (92.2,93.9)	95.3 (94.4,96.1)	93. 9 (93.2,94.5)	
Not being better bulk salt because being cheaper	agree	91.6 (90.8,92.3)	92.3 (91.4,93.2)	91.8 (91.3,92.4)	0.4
	No idea	2.4 (2.0,2.9)	2.0 (1.6,2.7)	2.3 (2.0,2.7)	
	disagree	6.0 (5.4,6.6)	5.7 (5.0,6.4)	5.9 (5.4,6.3)	

*(%(95% CI)), P-value<0.05

harmful oil but only 32% of them knew that animal oil is a harmful oil.

The results of attitude have been shown in Table 3. Totally, only 4% of households had favorable attitude about preference of traditional food on fast food. About 94% (95%CI: 93.9,

Table 4. Practice of households about fast food and soft drink based on region: The NUTRI- KAP survey

Practice Frequency of consumption		Urban	Rural	Total	P value
Practice of fast food					
Sausage	Daily-weekly	10.6 (9.7,11.4) *	12.0 (10.8,13.3)	11.1 (10.4,11. 8)	<0.001
	Rarely	45.2 (43.7,46.7)	36.0 (34.1,37.9)	41.9 (40.8,43.1)	
	Never	44.3 (42.8,45.8)	52.0 (50.0,54.1)	47.0 (45.8,48.2)	
Pizza	Daily-weekly	8.1 (7.3,8.9)	5.8 (5.0,6.8)	7.3 (6.7,7.9)	<0.001
	Rarely	41.8 (40.2,43.4)	22.2 (20.3,24.2)	34.8 (33.6,36.1)	
	Never	50.1 (48.5,51.8)	72.0 (69.8,74.1)	57.9 (56.5,59.3)	
Junk food	Daily-weekly	27.3 (26.1,28.5)	33.6 (31.7,35.5)	37.6 (36.2,39.0)	<0.001
	Rarely	35.1 (33.9,36.4)	31.9 (30.2,33.6)	34.0 (33.0,35.0)	
	Never	37.6 (36.2,39.0)	34.5 (32.6,36.5)	36.5 (35.4,37.7)	
Sandwich	Daily-weekly	18.2 (17.0,19.4)	13.3 (11.9,14.7)	16.4 (15.6,17.4)	<0.001
	Rarely	36.2 (34.8,37.6)	31. 6 (29.6,33.6)	34.6 (33.4,35.7)	
	Never	16.4 (15.6,17. 7)	34.6 (33.4,35.7)	49.0 (47.7,50.3)	
Practice of soft drink					
Soft drink	Daily-weekly	29.0 (27.7,30.4)	34.5 (32.6,36.4)	31.0 (29.9,32.1)	<0.001
	rarely	45.8 (44.3,47.2)	45.3 (43.4,47.2)	45.6 (44.4,46.7)	
	never	25.2 (24.0,26.5)	20.2 (18.7,21.9)	23.5 (22.5,24.5)	
Non-alcoholic beverage	Daily-weekly	29.6 (28.3,30.9)	25.4 (23.6,27.3)	28.1 (27.0,29.1)	<0.001
	rarely	34.8 (33.4,36.1)	31.7 (29.9,33.6)	33.7 (32.6,34.8)	
	never	35.7 (34.2,37.2)	42.9 (40.6,45.3)	38.2 (37.0,39.6)	
Synthetic Juice	Daily-weekly	31.3 (30.0,32.6)	39.7 (37.9,41.6)	34.3 (33.2,35.4)	<0.001
	rarely	37.7 (36.3,39.1)	37.8 (36.0,39.7)	37.8 (36.7,38.9)	
	never	31.0 (29.6,32.4)	22.5 (20.8,24.2)	28.0 (26.9,29.1)	

*(%(95% CI)), P-value<0.05

95.0) of them agreed with being improper junk food and potato chips as snack for children. Respectively, 64% (95%CI: 62.6, 65.5) and 54.4% (95%CI: 52.2, 56.5) of households in urban and rural families had favorable attitude about not healthy dietary drink. Approximately, 81% (95%CI: 80.6, 82.5) of households expressed favorable attitudes toward being improper solid oil for cooking. The percent of favorable attitude about using refined and iodized salt for cooking was only 4% (95%CI: 3.6, 4.5). However, the favorable attitude about not adding salt while eating was 74.5% (95%CI: 73.4, 75.6).

Practice toward fast food and soft drink among household in urban and rural areas are given in Table 4. Most households in rural regions consumed sausage, junk food, soft drink and synthetic juice daily-weekly and in urban areas, pizza, sandwich and non-alcoholic beverage were consumed daily-weekly.

Practice of households about type of oil and salt based region has been shown in Table 5. Liquid oil was main oil for cooking and frying among Iranian households (61.0%, 95%CI: 59.8, 62.2). Significantly, families in urban areas used

Table 5. Practice of households about oil and salt based on region: The NUTRI-KAP survey

Practice		Urban	Rural	Total	P value
Practice of oil					
Type of oil in cooking	Solid oil	27.3 (26.0,28.7) *	44.0 (41. 9,46.2)	33.2 (32. 1,34.4)	<0.001
	Liquid oil	67.1 (65.7,68.5)	49.8 (47.7,52.0)	61.0 (59.8,62.2)	
	others	5.6 (5.1,6.2)	6.2 (5.3,7.2)	5.8 (5.3,6.3)	
Type of oil in frying	Solid oil	17.3 (16.3,18.4)	30.6 (28. 7,32.5)	22.0 (21.0,23.0)	<0.001
	Liquid oil	80.2 (79.0,81.3)	66.1 (64.0,68.0)	75.2 (74.1,76.2)	
	others	2.5 (2.1,3.1)	3.4 (2.8,4.2)	2.8 (2.5,3.3)	
Practice of salt					
Type of salt	Iodized salt	95.0 (94.5,95.5)	95.7 (94.6,96.5)	95.2 (94.8,95.7)	0.4
	Non-iodized salt	1.5 (1.3,1.8)	1.3 (1.0,1.7)	1.4 (1.2,1.7)	
	Both of them	3.5 (3.1,4.0)	3.0 (2.3,4.0)	3.3 (2.9,3.8)	

*(%(95% CI)), P-value<0.05

liquid oil for frying compared to households in rural regions (80.2% vs. 66.1%). In both of two regions, more than 95% (95%CI: 94.8, 95.7) of respondents stated to use iodized salt. Fifty-two percent and 56.6% of households in urban and rural areas always put saltshaker at the table, respectively (p<0.05).

Discussion

We assessed knowledge, attitude and practice about fast food, soft drink, oil and salt among Iranian population in urban and rural regions. Our findings showed that very rural households were less aware about harmful effects of fast food. About attitude, the most of rural households preferred consumption of fast food to traditional food as well as junk food consumption was more favorable. Sausage and junk food consumption was higher among in rural areas; pizza and sandwich consumption in urban regions.

To the best of our knowledge, this is the first study to assess the KAP of Iranian Population regarding fast foods, soft drinks, salt and oil in urban and rural of all provinces in Iran. In our study, less pizza and sandwich consumption in rural areas may be because of less access. Some studies indicated that consumption fast food affects its availability (25,26). In a cross-sectional study, in the Northeast Spain among 1,491 men and 1,563 women was reported that 10.1 % of them ate fast food at least once per month (27) According to the Continuing Survey of Food Intakes by Individuals (CSFII 1994–6), almost one fourth of adults in the US ate fast food (28). Results of a comparative survey of fast food consumption among various countries in 2004 showed that 34% of the North Americans and only 8% of Europeans ate at takeout restaurants at least once per week (27). In the present study, the percent of sausage, pizza and sandwich consumption were 11.1%, 7.3%, and 16.4%, respectively (in daily-weekly group). The results of study was done among 21,111 Iranian school students aged 6–18 years in urban and rural regions was showed that the consumption frequency of snacks such as salty, fatty or sweet was twice a day(29). In our survey, 37.6% of all households reported that ate junk food daily weekly.

Our findings showed that correct knowledge about harmful effect of soft drink was significantly higher in urban areas. The more percentage of households in rural had favorable attitude about soft drink. In practice, mean of the soft drink consumption as daily weekly was 30% and 33% in urban and rural areas, respectively. Results of study that was performed among Tehrani adolescents was showed that 85% of adolescents knew that consuming soft drink and beverages caused overweight or obesity, but in practice only 4.5% of them did not drink them (30). In other study, also there is a gap between knowledge and practice in Tehrani adults (31). However, in the present study, we did not see a sizeable difference between knowledge and practice in the whole country. Actually, in our study, according to other studies (32, 33), higher

knowledge caused good nutritional performance. Therefore, for promoting nutritional, education and the increasing of knowledge level can be a proper aim.

Results about salt were showed that just 4% of households had favorable attitude about using refined and iodized salt for cooking. However, in practice, the prominent of consumed salt of households was iodized salt (95%). This difference may be due to the availability of iodized salt in the whole country. In both areas, half of households always put saltshaker at the table. With regarding to cardiovascular diseases of prevalence in Iran (46%) (3), and these results of the present study were showed the necessity of intervention and more education in society.

About oil, results revealed that knowledge and attitude is better in urban than rural areas. For frying and cooking, solid and liquid oil was consumed more by rural and urban households, respectively. The results of previous study showed that type of fat most frequently consumed by 73.8% of adolescents's families was hydrogenated solid fat (29). In HHPC study was conducted among students, parents and school staff in Iran, 47.7% of students, 48.2% of parents, and 50.4% of school staff was aware that liquid vegetable oils were the best type of oil and the frying is not a proper way for preparation food (34). Similar to our study, the percentages for solid oil in rural areas was higher. This finding reveals need for more education especially in rural areas.

The one of limitations of our study was its cross sectional design, which caused restriction of assuming causal relationships. The current study had some strength. The large national sample size was the major strength of this study representing the Iranian population in urban and rural areas in each province. To the best knowledge of authors, this is the first study that evaluated the KAP of Iranian Population regarding fast foods, soft drinks, salt and oil in urban and rural of all provinces in Iran.

Conclusion

The results of our study indicated that the nutrition KAP of Iranian population was acceptable. It showed that earlier nutritional educations were effective and helpful.

Conflict of interest

The authors declared no conflict of interest.

References

1. Alwan A, MacLean DR, Riley LM, d'Espaignet ET, Mathers CD, Stevens GA, et al. Monitoring and surveillance of chronic non-communicable diseases: progress and capacity in high-burden countries. The Lancet. 2010;376(9755):1861-8.
2. Naghavi M, Abolhassani F, Pourmalek F, Lakeh MM, Jafari N, Vaseghi S, et al. The burden of disease and injury in Iran 2003. Popul Health Metr. 2009;7(1):9.
3. Iran (Islamic Republic of). http://www.who.int/nmh/countries/irn_en.pdf?ua=1: World Health Organization; 2014 [cited 2014].
4. Bloom DE, Cafiero E, Jané-Llopis E, Abrahams-Gessel S, Bloom LR, Fathima S, et al. The Global Economic Burden of Non-communicable Diseases. Geneva: World Economic Forum; 2012.
5. Plaza I, Mariscal R, Ros-Jellici J, Munoz M, Otero J, Madero R, et al. The Fuenlabrada study: lipids and lipoproteins in children and adolescents. Revista Espanola de Cardiologia. 1988;42(7):444-58.
6. Shahid R. Integrating Spatial Analysis and System Dynamics to Model Childhood Overweight and Obesity Prevalence. 2014. (Dissertation)
7. Prentice AM, Jebb SA. Fast foods, energy density and obesity: a possible mechanistic link. Obes Rev. 2003;4(4):187-94.
8. Moore LV, Diez Roux AV, Nettleton JA, Jacobs DR, Franco M. Fast-Food Consumption, Diet Quality, and Neighborhood Exposure to Fast Food: The Multi-Ethnic Study of Atherosclerosis. Am J Epidemiol. 2009 January 1, 2009.
9. Grundy SM, Cleeman JI, Daniels SR, Donato KA, Eckel RH, Franklin BA, et al. Diagnosis and management of the metabolic syndrome an American Heart Association/National Heart, Lung, and Blood Institute scientific statement. Circulation. 2005;112(17):2735-52.
10. Jürgens H, Haass W, Castaneda TR, Schürmann A, Koebnick C, Dombrowski F, et al. Consuming fructose-sweetened beverages increases body adiposity in mice. Obes Res 2005;13(7):1146-56.
11. Brown IJ, Tzoulaki I, Candeias V, Elliott P. Salt intakes around the world: implications for public health. Int J Epidemiol. 2009;38(3):791-813.
12. Cappuccio FP, Capewell S, Lincoln P, McPherson K. Policy options to reduce population salt intake. BMJ. 2011;343:4995.
13. Alireza Khosravi M, Reza Malekzadeh M, Sarrafzadegan N. Advocacy strategies and action plans for reducing salt intake in Iran. Arch Iran Med. 2012;15(5):320.
14. Organization WH. Creating an enabling environment for population-based salt reduction strategies: report of a joint technical meeting held by WHO and the Food Standards Agency, United Kingdom, July 2010. 15. Chan A, Poon P, Chan E, Fung S, Swaminathan R. The effect of high sodium intake on bone mineral content in rats fed

a normal calcium or a low calcium diet. Osteoporos Int. 1993;3(6):341-4.
16. Mozaffarian D, Abdollahi M, Campos H, Houshiarrad A, Willett W. Consumption of trans fats and estimated effects on coronary heart disease in Iran. Eur J Clin Nutr 2007;61(8):1004-10.
17. Esmaillzadeh A, Azadbakht L. Consumption of hydrogenated versus nonhydrogenated vegetable oils and risk of insulin resistance and the metabolic syndrome among Iranian adult women. Diabetes Care. 2008;31(2):223-6.
18. Organization WH. Prevention of cardiovascular disease: pocket guidelines for assessment and management of cardiovascular risk:(WHO/ISH cardiovascular risk prediction charts for the European Region). 2007.
19. Joint F, Consultation WE. Fats and fatty acids in human nutrition. Proceedings of the Joint FAO/WHO Expert Consultation. 2008.
20. Organization WH. Diet, nutrition and the prevention of chronic diseases: report of a joint WHO/FAO expert consultation: Diamond Pocket Books (P) Ltd.; 2003.
21. De Vriendt T, Matthys C, Verbeke W, Pynaert I, De Henauw S. Determinants of nutrition knowledge in young and middle-aged Belgian women and the association with their dietary behaviour. Appetite. 2009 Jun;52(3):788-92.
22. Dickson-Spillmann M, Siegrist M. Consumers' knowledge of healthy diets and its correlation with dietary behaviour. J Hum Nutr Diet. 2011 Feb;24(1):54-60.
23. Dickson-Spillmann M, Siegrist M, Keller C. Development and validation of a short, consumer-oriented nutrition knowledge questionnaire. Appetite. 2011 Jun;56(3):617-20.
24. Azemati B, Heshmat R, Sanaei M, Salehi F, Sadeghi F, Ghaderpanahi M, et al. Nutritional knowledge, attitude and practice of Iranian households and primary health care staff: NUTRIKAP Survey. J Diabetes Metab Disord. 2013;12(1):12.
25. Powell LM, Bao Y. Food prices, access to food outlets and child weight. Econ Hum Biol. 2009;7(1):64-72.
26. Sharkey JR, Johnson CM, Dean WR, Horel SA. Association between proximity to and coverage of traditional fast-food restaurants and non-traditional fast-food outlets and fast-food consumption among rural adults. nt J Health Geogr.. 2011;10(1):37.
27. Schröder H, Fïto M, Covas MI. Association of fast food consumption with energy intake, diet quality, body mass index and the risk of obesity in a representative Mediterranean population. Br J Nutr. 2007;98(06):1274-80.
28. Bowman SA, Vinyard BT. Fast food consumption of US adults: impact on energy and nutrient intakes and overweight status. J Am Coll Nutr. 2004;23(2):163-8.
29. Kelishadi R. Childhood overweight, obesity, and the metabolic syndrome in developing countries. Epidemiol Rev. 2007;29(1):62-76.
30. Mirmiran P, Azadbakht L, Azizi F. Dietary behaviour of Tehranian adolescents does not accord with their nutritional knowledge. Public Health Nutr. 2007;10(09):897-901.
31. Mohammadi F MP, Bayegy F, Azizi F. Correlation between knowledge, attitude and practice regarding the role of nutrition in non communicable diseases. Pajoohesh dar Pezeshki. 2002;26:199. (Persian)
32. Darmon N, Drewnowski A. Does social class predict diet quality? Am J Clin Nutr. 2008;87(5):1107-17.
33. Axelson ML, Federline TL, Brinberg D. A meta-analysis of food-and nutrition-related research. J Nutr Educ. 1985;17(2):51-4.
34. Kelishadi R, Pour MH, Zadegan NS, Kahbazi M, Sadry G, Amani A, et al. Dietary fat intake and lipid profiles of Iranian adolescents: Isfahan Healthy Heart Program–heart health promotion from childhood. Prev Med. 2004;39 (4):760-6.