Major Dietary patterns and related factors among workers of Oil Terminal Company in Kharg Island, Iran

Delaram Ghodsi[1], Shahryar Eghtesadi[2] ,Mohammad Khalili[3,] *, Bahram Rashidkhani[1], Shima Jazayeri[2] ,Farzad Shidfar[2], Mohammadreza Vafa[2], Maryam Shirinzadeh[1] , Sima ghorabi[1]

[1]Department of Community Nutrition, Faculty of Nutrition and Food Sciences, Shahid Beheshti University of Medical Sciences, Tehran, Iran
[2]Department of Nutrition, School of Public Health, Iran University of Medical Sciences, Tehran, Iran
[3]Neurosciences Research Center, Tabriz University of Medical Sciences, Tabriz, Iran

*Corresponding Author: email address:Khalili_mohamad@yahoo.com (M. Khalili)

ABSTRACT

This study was conducted to identify the dietary patterns among workers of Oil Terminals Company and to assess their association with socio-demographic and lifestyle factors.The sample size (392) was estimated by considering minimum correlation (r=0.2) between variables. This cross-sectional study was conducted in a representative sample of workers selected by a stratified random-sampling method (alloffices of the company). The head of company provided a list of workers, and the proportionof each center was specified via ni=ki/N × n [ni=number of participants from each center, ki=number of each center workers, N=number company workers, n= sample size (392)].Dietary pattern was identified by valid food frequency questionnaire containing 168 food items with specific serving size consumed by Iranians. Major dietary patterns analyzed by factor analysis. General characteristics across tertiles were compared by ANOVA and chi-square tests were used where appropriate. In addition, we used multivariate logestic regression tests to assess the relationship between demographic, socioeconomic and lifestyle variables and the adherence to the dietary patterns. Two major dietary patternswere extracted: "Healthy pattern" characterized by high consumption of fruits, fish, yellow vegetables, potato, garlic, whole cereals, yogurt drink, and salt. The second one named "unhealthy pattern" characterized by high consumption of soft drinks, sugar, mayonnaise, sweets, eggs, butter, and processed meat, high- fat dairy products, organ meat, French fries, refined cereals, snacks and artificial juice. Work hours were positively correlated (b=0.14; $p<0.01$) and being single (b=-0.4, $p<0.05$) and full time work in comparison with part-time work (b=-0.5, $p<0.01$) was negatively correlated with healthy dietary pattern, whereas age (b=-0.3, $p<0.05$), dieting (b=-0.4, $p<0.01$) and history of hyperlipidemia had negative correlation (b=-0.41, $p<0.01$) with unhealthy dietary pattern.Our findings show the association between socio-demographic, lifestyle factors and dietary patterns of the workers.

Keywords: Dietary pattern; Food frequency; Work status; Healthy; Factor analysis; Worker.

INTRODUCTION

In the past, nutritional studies were interested in assessing individual effects of nutrient and food on health and illness. Today, mix of nutrients and food which called dietary pattern, looking for interaction and synergic effects of nutrients on disease risk [1]. There are various approaches such as factor analysis to identify diet pattern. In dietary pattern analysis, food as groups is involved in analysis. Results of dietary pattern analysis are sample specific and affected by subjective characteristics [2]. More studies suggest that main dietary patterns depended on some factors such as environmental and socioeconomic situation. So in western countries, association between nutrition and physical activity to do work, fatigue, accident rate, disease and productivity is reported [3-5].

Some studies were carried out to evaluate effects of some social and economic factors on dietary

pattern [6, 7]. Because of the effect of oil on economy of Iran, and special environment of Kharg Island and the effect of nutritional status of worker on work capacity, study of nutritional status of this is very important.

This study was conducted to identify dietary patterns in workers of Oil Terminals Company and to assess their association with some social, demographic and lifestyle factors.

METHODS

Participants and assessment of diet

This cross-sectional study was conducted in Kharg Island on Oil Terminals Company male workers in the south of Iran during 12 months between December 2010 and December 2011. This company plays a major role in oil exportation. The sample size (392) was estimated by considering minimum correlation (r=0.2) between variables. This cross-sectional study was conducted in a representative sample of workers selected by a stratified random-sampling method (all offices of the company).The head of company provided a list of workers, and the proportion of each centerwas calculated via ni=ki/N × n [ni=number of participants from each center, ki=number of each center workers, N=number company workers, n=sample size (392)] [8]. Finally, with the use of a randomized numerical table, a representative sample of male workers was selected. For the purpose of study and collection of data, we used Food Frequency Questionnaire (FFQ) with 168 food items. This questionnaire contains 168 food items with specific serving size consumed by Iranians and had good relative validity for several nutrient intake in Iranian; so as reported [9], Age and energy adjusted correlation coefficients between 24-h dietary recalls (repeated for 12 months) and FFQ ranged from 0.14 (vitamin A) to 0.71 (phosphorus) in men (r = 0.53) and from 0.11 (β-carotene) to 0.60 (fiber) in women (r = 0.39). Energy adjusted reproducibility coefficients varied from 0.41 (monounsaturated fat) to 0.79 (protein) in men (r = 0.59) and from 0.41(vitamin A) to 0.74 (saturated fat) in women (r = 0.60).

We asked participants to report their frequency of consumption of given serving of each food item during the previous year on a daily, weekly, or monthly basis. Then serving size of consumed food was converted to grams per daily intake by household measures and food items grouped into predefined food groups based on nutrient context similarity.

Physical activity measurements

A validated self-report questionnaire [10] includes nine MET levels as hour/day (MET-h-d) or metabolic equivalents used for this reason. For calculating physical activity level, the MET-time was calculated by multiplying time of each activity by MET value of each activity and then daily physical level was determined by sum of all levels.

Social, Demographic and lifestyle data

Social, demographic variables including age (years), duration of employment in Kharg (years), work status (full- time, part -time) marital status (married or not), education status (under diploma, diploma and university), smoking status (currently smoking or not), supplement use (yes, no), dieting (whether or not the respondent had gone on a diet during the previous year), history of diabetes, hypertension and hyperlipidemia (whether or not diagnosed by a physician) were recorded for all subjects.

Statistical methods

Data was analyzed using SPSS software (SPSS Inc., Chicago IL. Version13).*P* value less than 0.05 considered as statistically significant. Major dietary patterns based on the 39 food groups (Table 1) were identified by factor analysis, so principal component analysis and Varimax rotation was then applied to simplify the factor structure. General quantitative (age, Duration of employment, fisical activity level and working hours) and categorical characteristics(marital status, work status, university degree, supplement use, dieting, currently smoker, history of diabetes, history of hypertension and history of hyperlipidemia) across tertiles were compared by ANOVA and chi-square tests respectively. In addition, multivariate logestic regression was used to assess the relationship between demographic, socioeconomic and lifestyle variables and the adherence to the dietary patterns

RESULTS

A total of 392 individuals in this study were male, 40 persons (11%) were single and 92 (25%) had history of hyperlipidemia. The mean ± SD of age was 44±10.3 years. Two main dietary patterns emerged with factor analysis. Based on food grouping in Table 1, the two factors explained percentage of the whole variation in original food groups. Food group loadings are shown in Table 2. Food groups with greater loading on a given factor were used to interpret the factor. The first pattern named "Healthy pattern" characterized by high consumption of fruits, fish, yellow vegetables, potato, garlic, whole cereals, yogurt drink, and salt. The second one named "unhealthy pattern" characterized by high consumption of soft drink, sugar, mayonnaise, sweets, eggs, butter, and processed meat, high fat dairy products, organ meat, French fries, refined cereals, snacks and artificial juice.

Table 1: Food grouping used in the dietary pattern analysis

Food groups	**Food items**
Processed meats	Sausages
Red meats	Beef,lamb, calf, chopped k meat, Hamburguer
Organ meats	Beef and calf liver
Poultry	Chicken
Fish and other seafood	Canned tuna fish, every kind of fish, shrimp
Eggs	Eggs
Carbonated drinks	Coca-cola, other carbonated beverages, low-energy carbonatedbeverages
Butter	Butter
Margarine	Margarine
Low fat dairy products	Skim or low-fat milk, yogurt and white cheese
High fat dairy products	Whole milk, chocolate milk, whole yogurt, cream, ice cream, cream cheese, other cheese
Fruits	Oranges, tangerine, lemon, lime, grapefruit, banana, apple, pear, strawberry, peach, cherries, fig, melon, watermelon,cantaloupe, raisins or grapes, kiwi, plum,apricots, cherries,nectarine,mulberry, plums, persimmons, pomegranates, date, tinned fruits
Fruit juices	Apple juice, orange juice, grapefruit juice, lemon juice, other fruit Juices
Cruciferous vegetables	Cabbage, cauliflower, Brussels, sprouts, kale
Yellow vegetables	Carrots
Tomatoes	Tomatoes, tomato sauce, tomato pasta
Green leafy vegetables	Spinach, lettuce
Other vegetables	Cucumber, mixed vegetables, eggplant, celery, green peas,green beans, green pepper, turnip, corn, squash, zucchini, mushrooms, onions
Legumes	Beans, peas, lima beans, broad beans, lentils, soy
Garlic	Garlic
Potatoes	Potatoes
French fries	French fries
Whole grains	Dark breads (Iranian), barley bread, barley, bulgur
Refined grains	White breads (lavash, baguettes), noodles, pasta, rice, toasted bread, sweet bread, white flour, biscuits
Snacks	Potato chips, corn puffs, crackers, biscuits, popcorn
Nuts	Peanuts, almonds, pistachios, walnuts, hazelnuts, roasted seeds
Mayonnaise	Mayonnaise
Dried fruit	Dried figs, dried dates, dried mulberries, other dried fruit
Olive	Olives, olive oils
Hydrogenated fats	Hydrogenated fats, animal fats
Vegetable oils	Vegetable oils (except for olive oil)
Sugars	Sugars, candies, Iranian confectioneries (gaz, sohan, noghl), Jam, jelly, honey,Chocolates
Sweets and desserts	cookies, cakes, confections,caramels
Yogurt drink	Yogurt drink
Tea	Tea
Cofee	Cofee
Pickles	Pickles

In addition to two mentioned patterns, another pattern recognized. But it was discarded because of very low variance. Demographic and life style characteristics of subjects by tertile of dietary pattern are shown in Table 3. People in highest tertile of healthy dietary pattern were older than people in lowest one (46±8 *vs.* 42±8 years; $p<0.01$), most of them were married (32% *vs.* 27%; $p<0.01$) and had full -time work status (28% *vs.* 26%; $p<0.05$). In contrast, subjects in highest tertile of unhealthy pattern were younger (40±10 *vs.* 49±7 years; $p<0.01$) and lowest of them were married (28% *vs.* 32%; $p<0.01$). There was no difference between social characteristics in tertiles of healthy pattern. Most participants in top tertile of unhealthy diet had university education (14.7% *vs.* 8.3%; $p<0.05$). Subjects in highest tertile of healthy diet had less history of hypertension in comparison with those in lowest tertile (10 % *vs.* 11.5%) but the differences were not significant. In contrast, most of the subjects in the lowest tertile of unhealthy diet significantly followed specific diet (19% *vs.* 3%; $p<0.01$) and had history of hyperlipidemia (9.1% *vs.* 8%; $p<0.01$) in comparison with those in highest tertile.

Table2: Factor loading matrix for the major dietary patterns identified by using F.F.Q data.

Food groups	Factor 1(Healthy dietary pattern)	Factor2(Unhealthy dietary pattern)
other vegetables	0.67	-
fruits	0.65	0.26
legumes	0.64	-
fish	0.52	-
yellow vegetables	0.52	-
dried fruits	0.5	0.38
tomato	0.47	-
poultry	0.44	-
green vegetables	0.44	-
potato	0.42	-
high fat dairy products	0.32	0.42
processed meat	0.31	0.53
snacks	0.3	0.25
garlic	0.29	-
salt	0.29	-
Whole wheat cereals	0.26	-
organ meats	0.24	0.24
yogurt drink	0.24	-
coffee	0.2	-
artificial juice	0.2	0.27
Tea	-	-
Olive oil	-	-
Nuts	-	-
red meat	-	-
hydrogenated fats	-	-
French fries	-	-
Margarine	-	-
low fat dairy products	-	-
cruciferous vegetables	-	-
soft drinks	-	0.55
sugars	-	0.5
mayonnaise	-	0.49

Values <0.2 were excluded for simplicity.

Table 3: Major characteristics of study participants according to tertiles of dietary patterns

	tertiles of "Healthy" dietary pattern			tertiles of "Unhealthy" dietary pattern		
Variables	**T1**	**T2**	**T3**	**T1**	**T2**	**T3**
Age(year)†	42(8)	42(10)	46(8)**	49(7)	44(10)	40(10)**
Marital status:married(%)#	27	30	32**	32	29	28**
Duration of employment in kharg (year)†	15(1.4)	13(1.2)	18(2.2)	15(1.3)	13(1.1)	11(1.2)
work status (full time)(%)#	26	28	28*	30	32	27
University degree(%)#	13	14	7.3	8.3	12.8	14.7*
Working hours†	11(1.3)	11(1.2)	11(1.3)	11(1.4)	11(1.7)	11(2.2)
Supplement use(%)#	1	2	2.4	2.6	1.3	1.3
Dieting(%)#	8.6	10.4	11	19	7	3**
Physical activity&(MET/h/d)†	1.8(0.3)	1.8(0.2)	1.7(0.1)	1.8(0.3)	1.9(0.2)	1.8(0.2)
Currently smoker(%)#	8.3	7.7	10.4	8.8	8.9	8.9
History of diabetes(%)#	6.7	7.5	7.2	9.1	6.7	5.6
History of hypertension(%)#	11.5	11	10	11	9	12
History of hyperlipidemia(%)#	7.7	9.8	7.7	9.1	7.7	8**

Data are presented as n (%) or mean (standard deviation).
† ANOVA tests. # Chi-square tests
* Means are significantly different: P< 0.05.
** Means are significantly different: P< 0.01.
&MET – metabolic equivalent task: 1 MET= energy expenditure of sitting quietly or approximately 1 kcal per kg body weight per h

Table 4: Factors associated with the adherence to major dietary patterns among participants.

	Healthy dietary pattern		**Unhealthy dietary pattern**	
	b	**CI (95%)**	**b**	**CI (95%)**
Age	0.2	0.1 to 0.29	-0.3*	-0.43 to 0.19
Single‡	-0.4*	-0.5 to 0.23	-0.42	-0.51 to 0.09
Physical activity (MET) †	0.23	0.11 to 0.35	-0.23	0.31 to 0.19
Duration of residence in Kharg (years)	0.43	0.16 to 0.65	-0.35	-0.43 to -0.24
Full time Work‡	-0.5**	-0.65 to 0.19	-0.11	0.00 to 0.22
Work hours/day	0.14**	-0.05 to 0.31	-0.42	-0.62 to- 0.13
Currently smoker‡	0.43	0.12 to 0.63	0.21	0.08 to 0.32
Supplement use‡	0.56	0.34 to 0.68	0.23	0.04 to 0.39
Dieting‡	0.32	0.25 to 0.49	-0.4**	-0.54 to 0.09
History of diabetes‡	0.12	0.08 to 0.25	-0.4	0.00 to 0.29
History of hypertension‡	0.23	0.12 to 0.38	0.24	0.19 to 0.38
History of hyperlipidemia ‡	0.34	0.23 to 0.57	-0.41**	-0.64 to 0.05

Data were djusted for all variables shown in the table and energy intake (kJ/day) and BMI (Body Mass Index) and analysed by multivariate logestic regression.
b= Multivariate Logestic Regression coefficient (A positive coefficient implies a higher adherence to the pattern).
CI= Confidence interval.
* Means are significantly different: P< 0.05.
** Means are significantly different: P< 0.01.
† MET – metabolic equivalent task: 1 MET= energy expenditure of sitting quietly or approximately 1 kcal per kg body weight per h.
‡ Yes in comparison with No.

Covariance analysis in Table 4 showed that work hours were positively (β=0.14, CI (95%) =-0.05 to 0.31, p<0.01) correlated with healthy dietary pattern. In addition, being single in comparison with being married (b=-0.4, CI (95%) =-0.5 to 0.23, p<0.05) and full time work in comparison with part time work (b=-0.5, CI (95%) = -0.65 to 0.19, p<0.01) negatively correlated with healthy dietary pattern. Age was negatively correlated with unhealthy dietary pattern (b=-0.3, CI (95%) =-0.43 to 0.19; p<0.05). Also history of hyperlipidemia (b=-0.41, CI (95%) = -0.64 to 0.05, p<0.01) and dieting (b=-0.4; CI (95%) = -0.54 to 0.09, p<0.01) had negative correlation with unhealthy dietary pattern.

DISCUSSION

As mentioned in Table 2, we defined two major dietary patterns in oil company workers in Kharg Island: health pattern included high consumption of fruits, vegetables, legumes, fish, poultry, potatoes, and unhealthy pattern consisted of high consumption of soft drink, processed meat, sugar, mayonnaise, butter, high fat dairy products and snacks.

Healthy pattern identified in our study was similar to food patterns identified in different populations which used factor analysis for extracting dietary pattern [11], identified 3 major dietary patterns: healthy pattern (high in fruit, vegetable, poultry, fish), western pattern (high in refined grain, red meat, butter, processed meat, high-fat dairy products, sweets) and Iranian dietary pattern (high in refined grains, potato, tea, whole grains, hydrogenated fat) which healthy pattern and western pattern were similar to those of our study.

There was a difference between their western pattern and ours. In our study organ meats were loaded in healthy pattern. This occurred because our samples were men and there is higher tendency for the consumption organ meats in Iranian men than women. There are somewhat similarities between the healthy dietary pattern identified in our study and patterns labeled as "Prudent" or "Vegetables" [12-14]. Our healthy dietary pattern was also similar to some other studies [14, 15].

In other words, unhealthy dietary pattern identified in our study is very similar to other studies [14, 16].In the current study, healthy dietary pattern was inversely related to work hours, marriage status and work status in Kharg Island. On the other hand unhealthy dietary pattern was inversely related to age which was similar to other studies [17, 18]. In some studies traditional dietary pattern was directly related to greater age [19], that shows older people tend to consume their traditional food. Generally, young people tend to consume more unhealthy foods such as processed meat, mayonnaise, Cola, sweets, confectionary, refined cereals, snacks and French fries). On the other hand, as age increases, people show more concern regarding to their health status and learn to choose a healthy pattern.

Full -time work in Kharg Island was negatively associated with a healthy pattern. Because of island's status and some other geographic characteristics and food culture of island, people who have full-time work or are resident in the island show less tendency to healthy dietary pattern. Thus, Lack of land fertility, cost and climate problems of food transportation may lead to less consumption of fruits and vegetables in full-time or resident workers of island in compared to part-time workers.

The results suggested that being single was negatively correlated with healthy dietary pattern compared to marriage status that was similar to Sanches study [20]. Some studies in Iran showed the role of women on choosing food pattern [19]. Because of the influence of women on food preparing and cooking [19], and their information about determining food pattern, couples are more likely to use healthier meals than single population who showed less intent to healthy pattern.

In this study, dieting had a negative correlation with unhealthy dietary pattern and our findings are comparable with results of Quartromoni study [17], because most of women with healthy dietary pattern had specific diet. Furthermore, Pala showed that less of men and women with meat and pasta dietary pattern, also

most of men and women with salad and olive oil diet pattern followed specific diet [13].

In the current study, negative correlation between history of hyperlipidemia and unhealthy dietary pattern was observed. Similarly to our study, Vam Dam reported that American men in highest quartile of western dietary pattern (similar to our unhealthy diet) are less likely to have hyperlipidemia [21].

Some limitations should be considered in the interpretation of results. First, as since this study has cross sectional design and we cannot infer causality.Secondly: measurement errors as limitation of FFQ. In summary, as our hypotheses, the relations represent that following of dietary patterns is dependent to life style, demographic and work status. If our results are confirmed in future studies with large population and compared with results of public population, these data should be considered in designing creative nutritional intervention strategies.

CONCLUSION

Our findings revealed that dietary patterns of workers were related to social, demographic status and health situations.Work hours affected positively, while full time work and being single were negatively correlated with healthy dietary pattern and with increasing age following unhealthy dietary pattern decreased. Also, type of dietary pattern was affected by history of chronic diseases such as hyperlipidemia, because people with hyperlipidemia were less likely to consume unhealthy dietary pattern. According factors that affect tendency to specific dietary pattern; it is recommended that these factors should be considered in nutritional education and dietary recommendation for specific groups.

ACKNOWLEDGMENT

This study was conducted by a grant from research and development office of Iranian Oil Terminals Company. The authors thank all who participated in or collaborated with the present study.

REFERENCES

1.Yang EJ, Kerver JM, Song WO. Dietary patterns of Korean Americans described by factor analysis. Journal of the American College of Nutrition.24(2):115-21, 2005.

2.Jacques PF, Tucker KL. Are dietary patterns useful for understanding the role of diet in chronic disease? The American journal of clinical nutrition.73(1):1-2, 2001.

3.Dall TM, Fulgoni III VL, Zhang Y, Reimers KJ, Packard PT, Astwood JD. Predicted national productivity implications of calorie and sodium reductions in the American diet. American Journal of Health Promotion.23(6):423-30, 2009.

4.Kozie KD, Anderson RK. Productivity, diet, and environmental contaminants in bald eagles nesting near the Wisconsin shoreline of Lake Superior. Archives of Environmental Contamination and Toxicology. 20(1):41-8, 1991.

5.Steele P, Dobson A, Alexander H, Russell A. Who eats what? A comparison of dietary patterns among men and women in different occupational groups. Australian Journal of Public Health. 15(4):286-95, 1991.

6.Smith AM, Baghurst KI. Public health implications of dietary differences between social status and occupational category groups. Journal of epidemiology and Community Health. 46(4):409-16, 1992.

7.Rezazadeh A, Rashidkhani B, Omidvar N. Association of major dietary patterns with socioeconomic and lifestyle factors of adult women living in Tehran, Iran. Nutrition. 26(3):337-41, 2010.

8.Ahmadvand A, Sepehrmanesh Z, Ghoreishi F, Afshinmajd S. Prevalence of psychiatric disorders in the general population of kashan, iran. Archives of Iranian medicine. 15(4):205, 2012.

9.Mirmiran P, Hosseini Esfahani F, Mehrabi Y, Hedayati M, Azizi F. Reliability and relative validity of an FFQ for nutrients in the Tehran Lipid and Glucose Study. Public health nutrition. 13(05):654-62, 2010.

10.Aadahl M, Jorgensen T. Validation of a new self-report instrument for measuring physical activity. Med Sci Sports Exerc. 35(7):1196-202, Jul2003.

11.Hosseini Esfahani F, Mirmiran P, Djazayeri S,

Mehrabi Y, Azizi F. Change in food patterns and its relation to alterations in central adiposity in tehranian of district 13 adults. Iranian Journal of Endocrinology and Metabolism. 10(4):299-312, 2008.
12.Fung TT, Willett WC, Stampfer MJ, Manson JAE, Hu FB. Dietary patterns and the risk of coronary heart disease in women. Archives of Internal Medicine. 161(15):1857, 2001.
13.Pala V, Sieri S, Masala G, Palli D, Panico S, Vineis P, et al. Associations between dietary pattern and lifestyle, anthropometry and other health indicators in the elderly participants of the EPIC-Italy cohort. Nutr Metab Cardiovasc Dis. 16(3):186-201, Apr2006.
14.Hu FB, Rimm EB, Stampfer MJ, Ascherio A, Spiegelman D, Willett WC. Prospective study of major dietary patterns and risk of coronary heart disease in men. The American journal of clinical nutrition. 72(4):912-21, 2000.
15.Pala V, Sieri S, Masala G, Palli D, Panico S, Vineis P, et al. Associations between dietary pattern and lifestyle, anthropometry and other health indicators in the elderly participants of the EPIC-Italy cohort. Nutrition, metabolism and cardiovascular diseases. 16(3):186-201, 2006.
16.Lopez-Garcia E, Schulze MB, Fung TT, Meigs JB, Rifai N, Manson JAE, et al. Major dietary patterns are related to plasma concentrations of markers of inflammation and endothelial dysfunction. The American journal of clinical nutrition. 80(4):1029-35, 2004.
17.QUATROMANI PA, Copenhafer DL, D'AGOSTINO RB, Millen BE. Dietary patterns predict the development of overweight in women:: The Framingham Nutrition Studies. Journal of the American Dietetic Association. 102(9):1239-46, 2002.
18.Barker ME, McClean SI, Thompson KA, Reid NG. Dietary behaviours and sociocultural demographics in Northern Ireland. Br J Nutr. 64(2):319-29, Sep 1990.
19.Esmaillzadeh A, Azadbakht L. Major dietary patterns in relation to general obesity and central adiposity among Iranian women. The Journal of nutrition. 138(2):358-63, 2008.
20.Sánchez-Villegas A, Delgado-Rodríguez M, Martínez-González MÁ, De Irala-Estevez J. Gender, age, socio-demographic and lifestyle factors associated with major dietary patterns in the Spanish Project SUN (Seguimiento Universidad de Navarra). European journal of clinical nutrition. 57(2):285-92, 2003.
21.van Dam RM, Rimm EB, Willett WC, Stampfer MJ, Hu FB. Dietary patterns and risk for type 2 diabetes mellitus in US men. Annals of Internal Medicine. 136(3):201, 2002.