Dietary Assessment among School-Aged Children in Greece

Dr Lapousis George, Petsiou Elisavet

Abstract - **Healthy Eating Index developed to assess whether a person's diet is adjusted to the recommended healthy diet guidelines, and as a valid indicator it has been used for the assessment of food consumption. This research aims to evaluate the quality of food consumption to Greek students aged 10-14. The sample consisted of 431 students (204 boys and 227 girls) aged 10-14 years, which were chosen randomly and were not involved in any form of diet and 24 hours food questionnaire was used to recall from memory in the classroom. For the statistical analysis, it was used Multivariate Analysis of Variance (MANOVA). Results revealed that there was significant difference in age Wilks' $L=0,74$ $F_{(11,411)}=2,63$ $p<0,00$. There were statistically significant differences because of age for the variable grain consumption $F_{(4,421)}=4,74$ $p<0,05$, the variable consumption of meat $F_{(4,277)}=3,69$ $p<0,05$, the consumption of milk $F_{(4,421)}=6,71$ $p<0,05$, the intake of saturated fat $F_{(4,421)}=3,28$ $p<0,05$. Regarding gender, there were small but statistically significant differences in sodium consumption $F_{(4,421)}=8,08$ $p<0,00$. There were no statistically significant differences for the Healthy Eating Index by gender and the interaction of age with gender. In conclusion, many Greek young and teens consume foods that enhance the development of risk factors for cardiovascular diseases. Both young and teens regardless of their social and economic situation could benefit by increasing the consumption of fruit, vegetables, cereals and choosing foods with little saturated fat and reduced salt intake.**

Index Terms— **Cardiovascular diseases, diet, Healthy Eating Index, school, students.**

I. Introduction

Food availability has always affected human history. In developed countries, however, the concept of malnutrition has changed. The Greece until the end of the 2nd World War, had many problems that are still common even today in developing countries. From 1950 onwards, however, economic growth was accompanied by a reduction of premature mortality and increased incidence of coronary heart disease [01], [02]. It is recognized, however, more and more that the main factor influencing the trends are changing the dietary habits of a large and increasing part of the population, which is removed from the traditional Mediterranean diet adopting western eating habits and lifestyle. Consequently, the knowledge and the application of proper eating habits must employ both nutrition and public health professionals, as well as the general public.

There are considerable evidences for the role of the nutritional health. A review of these indications has become a publication of the National Council of US Research [03] and findings summarized in several publications [04], [05], [06], [07], [08], [09]. Substantial research activity has been developed in Greece, originally from the Greek partners of the Seven Countries Study [10] and later by several groups worked in the epidemiology of cardiovascular diseases and childhood diseases. Basics findings with particular reference to the current Greek reality are the following.

Energy intake has occasionally been associated with adverse health effects. In fact, for a given BMI, higher energy intake is associated with lower overall mortality, especially cardiovascular mortality. This is because, to remain stable the BMI, increased energy intake should be offset by increased energy consumption, which is largely determined by physical activity. It is also well known that the luck of physical activity and obesity that adversely affect health, the former by increasing the risk of cardiovascular disease, osteoporosis, colon cancer, and increasing the risk of non-insulin dependent diabetes mellitus, hypertension and dyslipidemia. In other words, between two people with the same BMI the person that consumes less food is more likely to be healthier than the one who consumes more food. Note that the male-type obesity is generally considered more morbid than the female obesity.

According to the NCEP guidelines, the first therapeutic intervention in dyslipidemias is the diet. The increased consumption of saturated fats and cholesterol are a part of the lifestyle and changes should also include the reduction of body weight, if necessary, and the increase of physical activity. The dietary treatment, when properly applied, is an intervention without dangers, the results of which have been accepted in many clinical studies [11].

Many countries have formulated their own dietary guidelines for foods [06] and the US Department of Agriculture-US Deparment of Health and Human Services [12] depicted in the shape of a pyramid and have repeatedly published. A group was organized in the US Harvard University, with a major contribution by Greek scientists, it has also developed an alternative pyramid, based on the principles of the traditional Mediterranean diet [07]. In Europe, many countries have drawn up their own dietary guidelines. A report to the European Parliament [13] observed that the traditional Mediterranean diet has many advantages over other dietary patterns. The dietary guidelines configuration for Europe is the subject of a project funded by the European Union.

A series of studies conducted in Greece the past twenty years provide evidence that many forms of cancer, coronary heart disease and other chronic diseases strongly associated negatively with basic elements of traditional Greek food [14], [01], [02], [15], [16], [17]. These findings are consistent with findings from other major investigations that preceded or followed the Greek investigations. Several studies in Greece showed significant changes in diet of Greek population [18], [19], [20], [21], [22]. These changes could be the target for

reversal. In addition, changes have been identified in biological parameters related to nutrition, such as obesity and blood lipid levels. These changes could also represent important intermediate objectives in any strategy for nutritional changes.

The role of nutrition and diet to reduce chronic diseases such as cardiovascular disease, diabetes and some kind of cancers has proved to be very important in many investigations. The Dietary Guidelines and Food Pyramid are eating a variety of foods, choosing a diet with low fat and cholesterol and moderate use of salt and sodium. The food consumption of the average person generally does not meet these conditions. Usually the diet is high in fat and saturated fat and low in fiber and carbohydrates. On the other hand, there are no regular reports to determine whether improved diet quality of individuals. For this reason, the US Department of Agriculture (USDA) constructed an index which is called Healthy Eating Index (Healthy Eating Index), so there is a simple and comprehensive assessment of the quality of the diet of a person. Before this work were designed some assessment tools, but which could not evaluate some portions of food, such as the consumption of fat and cholesterol. The Healthy Eating Index (SDS) but evaluates fully the quality of food.

The Healthy Eating Index developed to assess whether a person's diet is adjusted to the recommended healthy diet guidelines. Based on different aspects of a healthy diet and designed to give an assessment of the overall quality of the diet. It gives a picture of the food consumed by the people. The variety that must exist in their diet consists of 10 categories. The possible total score of Healthy Eating Index ranging from 0 to 100. The range of scores in each of the 10 food categories is from 0 to 10. In those subjects food intake agrees with the recommended levels, and then they take the maximum score of 10 points. A score of zero take those who do not consume any food from this food group nutrition pyramid, while the intermediate scores are calculated accordingly. The higher the score in the Healthy Eating Index, the best considered to be the person's diet because this diet better adapted and more consistent in the Dietary Guidelines and Food Pyramid.

Healthy Eating Index as a valid indicator [23] has been used for the assessment of food consumption [23], measuring dietary changes due to intervention programs in the school environment [24], monitoring the quality of nutrition in populations with low income [25] and to monitor changes in the quality of food in large national surveys related to diet [26], [23], [27], [28], [29], [30], [31]. Based on the above and the lack of similar studies in the Greek area and the limited data on young people and adolescents on the diet and eating habits, this research aims to evaluate the quality of food to Greek students aged 10-14.

II. METHOD AND PROCEDURE

A. Participants

The sample consisted of 431 students (204 boys and 227 girls) aged 10-14 years, which were chosen randomly and were not involved in any form of diet.

B. Measurements

Food questionnaire 24 hours

The completion of the questionnaire was to recall from memory in the classroom. The questionnaire aimed to describe students with as much detail and precision as possible, the type and quantity of food, the food and drink consumed throughout the previous day. It was recorded the type of food consumed and the amount of them in portions. The students used a wizard to encode portions of food. The guide was included photos of typical food portions that consumed frequently.

C. Calculation of the Healthy Eating Index

The Healthy Eating Index (HEI) was developed by using 24-h-recall and food-record data from the Continuing Survey of Food Intakes by Individuals (CSFII), a nation-wide survey conducted by the Agricultural Research Service of the US Department of Agriculture [32]. It consists of 10 equally weighted components, each representing different dietary recommendations from the food guide pyramid [32] and the 1995 Dietary Guidelines for Americans [33].

Each component has a maximum score of 10 (for perfect diet) and a minimum score of 0. Intermediate degrees are calculated proportionately. High component scores indicate intakes close to the recommended ranges or amounts and low component scores indicate less compliance with the recommended ranges or amounts. To obtain a total HEI score ranging from 0 (worst) to 100 (best) the scores from the 10 components are added.

The five first components of the HEI quantify the serving recommendations for the five food groups the grains, the vegetables, the fruits, the milk and the meat [34], [23]. The next four components of the HEI were nutrient based and were adapted from the Dietary Guidelines for Americans [35], [36]. A maximum score of 10 points was awarded for diets with <30% of energy from fat, <10% of energy from saturated fat, <300 mg cholesterol, and <2400 mg Na. The tenth component of the HEI was calculated by counting the total number of different foods and food groups consumed by the student [37]. The possible total score of HEI ranged from 0 to 100. The range of scores in each of the 10 food categories was of 0 to 10. The higher the score was the HEI, the better was the diet of the individual, because it is better adapted to the Dietary Guidelines [36] and the Food Pyramid.

III. STATISTICAL ANALYSIS

For the statistical analysis it was used descriptive statistics for each variable and multivariate analysis of variance (MANOVA) to examine possible differences in the combination of dependent Healthy Eating Index variables, and the ten sub-categories comprising the Healthy Eating Index (consumption of meat, milk, fruit, vegetables and cereals, intake of saturated fat, total fat, cholesterol, sodium and variety in the diet), gender (male, female) and age (10years, 11 years, 12 years, 13 years, 14 years). For the statistical analysis of the survey used the statistical package SPSS 20 (SPSS inc., Chicago, Illinois, USA) and a level of significance was set to $p < 0.5$.

IV. RESULTS

The results of descriptive statistics, number of participants and percentage of participants by age and sex are presented in

Table 1. . Participants by gender and age

	10 years		11 years	
	No	**%**	**No**	**%**
Males	55	26,96	49	24,01
Females	67	29,52	58	25,55
	12 years		**13 years**	
	No	**%**	**No**	**%**
Males	65	31,86	23	11,29
Females	58	25,55	25	11,01
	14 years			
	No	**%**		
Males	12	5,88		
Females	19	8,37		

It was applied Analysis of Variance of the dependent variables, Healthy Eating Index as well as the ten categories of which consists the Healthy Eating Index. Independent variable was the age (10 years, 11 years, 12 years, 13 years and 14 years) and gender (boys, girls). It was examined whether there are differences in Healthy Eating Index and their categories due to age and gender. The mean values and standard deviations of Healthy Eating Index and their categories by age and sex are shown in Tables 2, 3, 4.

Table 2. Mean values and standard deviations of Healthy Eating Index by age and gender.

Age (years)	N	HEI (MO) (TA)
Boys		
10	55	64,14 (11,18)
11	49	67,55 (10,39)
12	65	61,42 (10,56)
13	23	71,75 (8,63)
14	12	65,17 (9,56)
Girls		
10	67	68,15 (14,22)
11	58	66,24 (11,29)
12	58	65,03 (9,61)
13	25	67,49 (11,69)
14	19	64,36 (10,09)

Table 3. Mean values and standard deviations of the consumption of meat, milk, fruit, vegetables, grains, by age and gender.

Age years	N parti cipants	Meat Group (Mean) (SD)	Milk Group (Mean) (SD)	Fruits Group (Mean) (SD)	Vegetables Group (Mean) (SD)	Crain Group (Mean) (SD)
Boys						
10	55	6,79 (4,26)	6,49 (3,15)	2,14 (2,57)	3,35 (3,28)	6,54 (3,01)
11	49	7,90 (3,67)	5,85 (3,09)	1,59 (2,21)	3,92 (3,41)	6,22 (3,25)
12	65	7,60 (4,24)	4,84 (3,27)	1,56 (2,04)	3,51 (3,19)	4,01 (3,42)
13	23	9,56 (2,08)	7,25 (2,90)	1,75 (2,98)	4,76 (3,65)	6,66 (2,88)
14	12	7,50 (4,52)	4,05 (3,22)	2,98 (3,04)	3,52 (3,84)	7,34 (3,35)
Girls						
10	67	6,64 (4,37)	7,44 (3,16)	2,51 (3,06)	3,86 (3,71)	6,46 (3,29)
11	58	8,12 (3,40)	5,13 (3,07)	2,37 (3,05)	3,61 (2,45)	5,13 (3,60)
12	58	7,52 (4,12)	5,30 (3,21)	2,60 (2,92)	3,83 (3,29)	5,58 (3,52)
13	25	8,52 (3,49)	5,49 (2,86)	2,28 (3,38)	3,94 (3,02)	5,82 (3,44)
14	19	5,78 (5,07)	6,08 (3,70)	1,73 (3,18)	4,85 (3,74)	5,82 (3,21)

Table 4. Average values and standard deviations of the intake of saturated fat, total fat, cholesterol, sodium and variety in the diet by age and sex.

Age years	N partic ipants	Total fat (Mean) (SD)	Saturated fat (Mean) (SD)	Cholesterol (Mean) (SD)	Sodium (Mean) (SD)	Variety (Mean) (SD)
Boys						
10	55	9,56 (1,89)	2,71 (3,65)	7,61 (4,22)	10,00 (0,00)	9,45 (1,39)
11	49	9,69 (1,47)	3,49 (3,99)	9,30 (2,43)	10,00 (0,00)	9,56 (0,93)
12	65	9,78 (0,89)	2,75 (3,57)	8,60 (3,28)	10,00 (0,00)	8,73 (1,93)
13	23	9,83 (0,78)	3,69 (3,88)	8,55 (3,45)	10,00 (0,00)	9,67 (1,08)
14	12	9,63 (0,85)	5,83 (5,14)	7,50 (4,52)	10,00 (0,00)	9,47 (1,80)
Girls						
10	67	9,88 (0,47)	3,17 (4,02)	8,86 (3,08)	10,00 (0,00)	9,30 (1,38)
11	58	9,79 (0,92)	3,76 (4,38)	9,12 (2,79)	10,00 (0,00)	9,18 (1,47)
12	58	9,81 (0,96)	2,86 (3,88)	8,16 (3,77)	9,99 (0,00)	9,33 (1,30)
13	25	9,84 (0,75)	4,87 (4,22)	8,4 (3,74)	10,00 (0,00)	8,85 (1,87)
14	19	9,75 (0,74)	3,99 (4,59)	7,36 (4,52)	9,74 (0,75)	9,21 (1,57)

It was applied Multivariate Analysis of Variance (Manova). The dependent variables were the Healthy Eating Index, the consumption of meat, milk, fruit, vegetables, and

cereals, the intake of saturated fat, total fat, cholesterol, sodium and the variety in diet. Independent variables were the age (10 years, 11 years, 12 years, 13 years, 14 years) and gender (boys, girls). It was examined whether there were differences in the quality of nutrition, age, gender and because of age and gender interaction.

Table 5. The results of the Multivariate Analysis of Variance (Manova) for the dependent variables of age and gender.

(1		Τιμή	F	Sig.	Eta Squared
	Wilks' Lambda	0,96	1,45	0,67	0,38
Age	Wilks' Lambda	0,74	2,63	0,00	0,06
Age × Gender	Wilks' Lambda	0,83	1,74	0,00	0,04

Table 6. Percentage per category of Healthy Eating Index

Healthy Eating Index score	Frequency	Percentage
Best dietary (HEI>80)	39	9,05%
Needs improvement (50<HEI <80)	351	81,44%
Poor dietary (HEI <50)	41	9,51%

Based to Wilks 'L it was revealed a statistically significant difference in age Wilks' L=0,74 F(11,411)=2,63 p<0,00. The relationship of the combination of the dependent variables to the independent variable age was low (n2=0.06) (Table 4). Also it was revealed a statistically significant difference in the interaction of age and sex Wilks' L=0,83 F(11,411)=1,74 p<0,00. Then it was applied separate variance analysis, which indicated that there were small but statistically significant differences because of age for the variable grain consumption F(4,421)=4,74 p<0,05, the variable consumption of meat F(4,277)=3,69 p <0,05, the consumption of milk F(4,421)=6,71 p<0,05, the intake of saturated fat F(4,421)=3,28 p<0,05. Regarding gender, there were small but statistically significant differences in sodium consumption F(4,421)=8,08 p<0,00. There were no statistically significant differences for the Healthy Eating Index by gender and the interaction of age with gender.

V. DISCUSSION

The present study examined the quality of food for the students of primary school and high school. For this purpose was chosen to implement the Healthy Eeating Index, which includes the evaluation of the food contained in the main food groups and the variety of the food consumption. The previous indicators existed for assessing the quality of one's diet, mainly focused on the content of fat and oil containing foods consumed (Patterson, Haines, et al., 1994).

The results at this study revealed that boys had a HEI score of 65.17, while this score for girls was 66.47. By following the Healthy Eating Index instructions, a score of HEI over 80 represents a "good diet", while scores between 50 and 80 represents a diet that "Needs improvement", while a score below 50 represents the "Poor dietary". Accordingly results the diet of most students (approximately 81%) "Needs improvement" percentage of 9.05% of students according to the study had a "Best dietary", while 9.51% had a "Poor dietary". In a similar survey conducted in the United States to assess the quality of the nutrition [31], found similar results, with the total score of HEI ranging 63.8. The percentage of people of the same research that belonged to the "Best dietary" was 10%, while the percentage of people belonging to "Needs improvement" and the "Poor dietary" was 74% and 16 % respectively.

From the study results revealed that among the boys and girls who participated in the investigation there were no differences in the quality of dietary by following the instructions of the Healthy Eating Index. Differences existed in relation to the age and their diet of the young students and more specifically, we observe that with increasing of the age decreases the consumption of meat and dairy products. The HEI score for consumption of the fruits is the smallest of all food groups while in a good level was the consumption of meat and dairy products. The survey results are consistent with the results of other researchers [37], [38], indicating that the products contained in the group of fruit consumed in very small quantities, while, conversely, the meat is the product with the most consumption among young people and adolescents.

The development of the Greek economy and the attendant social and cultural changes that have taken place, have influenced the dietary habits of a typical Mediterranean country. Characteristic of these changes is the reduced consumption of green vegetables, cereals and pulses and increased consumption of meat, fat and ready meals [39], [40]. This trend that is away from the "Mediterranean diet", has resulted the high consumption of fat and low carbohydrate intake, thereby increasing the percentage of obese and overweight youth [41].

The lowest scores for categories of HEI had the students in the consumption of fruits (1.56 with the upper of 10) and the consumption of vegetables (3.35 with the upper 10). The girls had slightly higher average scores than boys (66.52 versus 63.81). All but two scores are in the food category of "Needs improvement". The highest average score of the categories of HEI for pupils, found in the category of sodium intake (10 with the upper 10), and total fat (9.88 with the upper 10), which means that the quantities of salt and total fat consumed by the participants students were the recommended.

The consumption of milk was also low (score 5.4) [23], similar to the Greek students' levels. About the categories of the HEI [31] quite a high score showed the category of cholesterol and variety in diet averaging 7.7 when the maximum score was 10. The results seem to agree with other

studies, according to which, among the categories of HEI, the highest score showed to be from the intake of cholesterol and variety in diet categories, with an average of 7,7 [31]. The lowest scores were at the fruit category, with a score of 3.8, which agrees with the scores of our investigation.

In conclusion, the Healthy Eating Index is an important tool for proper assessment of maintenance and design appropriate interventions related to nutrition in youth and adolescents to promote health. Many Greek young and teens consume foods that enhance the development of risk factors for cardiovascular diseases. Both young and teens regardless of their social and economic situation could benefit by increasing the consumption of fruit, vegetables, cereals and choosing foods with little saturated fat and reduced salt intake. Therefore the survey results show such figures give us a clear picture in understanding the quality of nutrition and dietary changes needed to improve the eating habits of young people and adolescents in Greece.

REFERENCES

[1]   [01] Trichopoulos, D., Ouranos, G., Day, N.E., Tzonou, A., Manousos, O., Papadimitriou, C., Trichopoulos, A. (1985). Diet and cancer of the stomach: a case-control study in Greece. International Journal of Cancer, 36, 291-297.

[2]   [02] Katsouyanni, K., Skalkidis, Y., Petridou, E., Polychronopoulou-Trichopoulou, A., Willett, W., Trichopoulos, D. (1990). Diet and peripheral arterial occlusive disease: the role of poly-, mono-, and saturated fatty acids. American Journal of Epidemiology, 133, 24-31.

[3]   [03] National Research Council (1989). Diet and Health: Implications for reducing chronic disease risk. National Academy Press, Washington DC, USA.

[4]   [04] Commission of the European Communities (1993). Reports of the Scientific Committee for Foods (Thirty-first series). Nutrient and energy intakes for the European Commission. Luxembourg, Office for Official Publications of the European Community.

[5]   [05] World Cancer Research Fund-American Institute for Cancer Research (1997). Food, Nutrition and the Prevention of Cancer: a Global Perspective.

[6]   [06] World Health Organization (1998). Preparation and use of food-based dietary guidelines. WHO Technical Report Series 880. WHO, Geneva.

[7]   [07] Willett, W.C. (1994). The dietary pyramid: does the foundation need repair? American Journal of Clinical Nutrition, 73, 336-342.

[8]   [08] Rimm, E.B, Ascherio, A., Giovannucci, E., Spiegelman, D., Stampfer, M.J., Willett, W.C. (1996). Vegetable, fruit and cereal fiber intake and risk of coronary heart disease among men. JAMA, 275, 447-451.

[9]   [09] Platz, E.A., Giovannucci E., Rimm, E.B., Rockett, H.R., Stampfer, M.J., Colditz, E.A., Willett, W.C. (1997). Dietary fiber and distal colorectal adenoma in men. Cancer Epidemiology Biomarkers and Prevention, 6, 661-670.

[10]   [10] Keys, A. (1980). Seven Countries: A Multivariate Analysis of Death and Coronary Heart Disease. Cambridge: Harvard University Press.

[11]   [11] Denke, M. A. (1995). Cholesterol lowering diets: A review of the evidence. Archives of Internal Medicine, 155, 17-23.

[12]   [12] US Department of Agriculture - US Department of Health and Human Services (1995). Nutrition and Your Health: Dietary Guidelines for Americans. Fourth Edition.

[13]   [13] Trichopoulou, A., ed. (1997). Nutrition in Europe: Nutrition policy and public health in the European Community and models for European eating habits on the threshold of the 21st century. Scientific and Technological Options Assessment (STOA), European Parliament, Directorate General for Research, Luxembourg.

[14]   [14] Manousos, O., Day, N.E., Tzonou, A., Papadimitriou, C., Kapetanakis, A., Polychronopoulou-Trichopoulou, A., Trichopoulos, D. (1985). Diet and other factors in the aetiology of diverticulosis: an epidemiological study in Greece. Gut 26, 544-549.

[15]   [15] Trichopoulou, A., Kouris-Blazos, A., Wahlqvist, M.L., Gnardellis, C.H., Lagiou, P., Polychronopoulos, E., Vassilakou, T. and

[16]   Trichopoulos, D. (1995a). Diet and overall survival in elderly people. British Medical Journal, 311, 1457-1460.

[16]   [16] Tzonou, A., Signorello, L.B., Lagiou, P., Wuu, J., Trichopoulos, D., Trichopoulou, A. (1999). Diet and cancer of the prostate: a case-control study in Greece. International Journal of Cancer 80, 704-708.

[17]   [17] Lagiou, P., Wuu J., Trichopoulou, A., Hsieh C.C, Adami, H.O., Trichopoulos, D. (1999). Diet and benign prostatic hyperplasia: a study in Greece. Urology, 54, 284-290.

[18]   [18] Trichopoulou, A., Efstathiadis, P. (1989). Changes of nutrition patterns and health indicators at the population level in Greece. American Journal of Clinical Nutrition 49, 1042-1047.

[19]   [19] Kafatos, A., Diacatou, A., Labadarios, D., Kounali, D., Apostolaki, J., Vlachonikolis, J., Mamalakis, G., Megremis, S. (1993). Nutrition status of the elderly in Anogia, Crete, Greece. American Journal of Clinical Nutrition 12, 685-692.

[20]   [20] Trichopoulou, A., Katsouyanni, K., Gnardellis, C. (1993). The traditional Greek diet. European Journal of Clinical Nutrition 47, S76-S81.

[21]   [21] Kafatos, A., Diacatou, A., Voukiklaris, G., Nikolakakis, N., Vlachonikolis, J., Kounali, D., Mamalakis, G., Dontas, A.S. (1997). Heart disease risk-factor status and dietary changes in the Cretan population over the past 30 y: the Seven Countries Study. American Journal of Clinical Nutrition 65, 1882-1886.

[22]   [22] Roma-Giannikou, E., Adamidis, D., Gianniou, M., Nikolara, R., Matsaniotis, N. (1997). Nutritional survey in Greek children: nutrient intake. European Journal of Clinical Nutrition, 51, 273-285.

[23]   [23] Bowman, S.A., Lino, M., Gerrior, S.A., Basiotis, P.P. (1998).The Healthy Eating Index: 1994-1996.CNPP-5 Washington, DC: US Department of Agriculture, Center for Nutrition Policy and Promotion.

[24]   [24] Dwyer, J.T., Hewes, L.V., Mitchell, P.D., Nicklas, T.A., Montgomery, D.H., Lytle, L.A., Snyder, M.P., Zive, M.M., Bachman, K.J., Rice, R., Guy S Parcel. (1996). Improving school breakfasts: effects of the CATCH Eat Smart Program on the nutrient content of school breakfasts. Preventive Medicine, 25, 413–422.

[25]   [25] Lin, B.H. (2005). Nutrition and health characteristics of low-income populations: Healthy Eating Index. Arlington, VA: US Department of Agriculture, Economic Research Service. Agriculture Information Bulletin 796-1, 1-4.

[26]   [26] Basiotis, P.P., Welsh, S.O., Cronin, F.J., Kelsay, J.L., Mertz, W. (1987). Number of days of food intake records required to estimate individual and group nutrient intakes with defined confidence. Journal of Nutrition, 117, 1638–41.

[27]   [27] Laparidis Konstantinos, Lapousis George, Petsiou Elisavet, Mougios Vasilis & Tokmakidis Savas (2008). Health-related Fitness Assessment in Greek Schoolchildren 12-16 Years Old. European Psychomotricity Journal, 1, 2, 29-37.

[28]   [28] National Center for Health Statistics-a (2002). The NHANES 1999-2000 Data files, data, docs, codebooks, SAS code. Hyattsville, MD. Internet:
http://www.cdc.gov/nchs/about/major/nhanes/nhanes99_00.htm (accessed 17 July 2007).

[29]   [29] National Center for Health Statistics-b (2002). The NHANES 1999-2000 public data release file documentation. Hyattsville, MD. Internet: http://www.cdc.gov/nchs/data/nhanes/gendoc.pdf (accessed 17 July 2007).

[30]   [30] Laparidis Konstantinos, Lapousis Georgios, Mougios Vassilis, Tokmakidis Savas & Petsiou Elisavet (2010). A school-based intervention program for improving the risk factors for cardiovascular disease at ages 12 to 16. Journal of Physical Education and Sport, 27, 2, 101-109.

[31]   [31] Basiotis, P.P., Carlson, A., Gerrior, S.A., Juan, W.Y., & Lino, M. (2002). The Healthy Eating Index: 1999-2000. U.S. Department of Agriculture, Center for Nutrition Policy and Promotion.CNPP-12.

[32]   [32] US Department of Agriculture, Agricultural Research Service. 1995–1996. (1998). Continuing Survey of Food Intakes by Individuals and 1994–1996 Diet and Health Knowledge Survey and related materials. Washington, DC: US Department of Agriculture, Agricultural Research Service,. (CD-ROM.) 101.

[33]   [33] US Department of Agriculture (1992). The food guide pyramid. Hyattsville, MD: Human Nutrition Information Service, (Publication HG252). 102.

[34]   [34] US Department of Health and Human Services, US Department of Agriculture (1995). Dietary guidelines for Americans. 4th ed. Washington, DC: US Government Printing Office.

[35]   [35] US Department of Agriculture - US Department of Health and Human Services. (1990). Nutrition and your health: Dietary Guidelines for Americans. Washington, DC: USDA - USDHHS. 105.

[36]   [36] USDA (1990). US Department of Health and Human Services: Nutrition and your health: dietary guidelines for Americans. Washington, DC: USDA/USDHHS.

[37]   [37] Kennedy ET, Ohls J, Carlson S, Fleming K. (1995). The Healthy Eating Index: design and applications. Journal of American Diet Association, 95, 1103–1108. 106.

[38]   [37] Munoz K. A., Krebs-Smith S. M., Ballard-Barbash R., Cleveland L. E. (1997). Food intakes of U.S. children and adolescents compared with recommendations. Pediatrics;100:323-329

[39]   [38] Munoz K. A., Krebs-Smith S. M., Ballard-Barbash R., Cleveland L. E. (1998). Errors in food intake article. Pediatrics;101:952-953

[40]   [39] Serra-Manjem, L., Ribas, L., Tresserras, R., Ngo, J., Salleras, L. (1995). How could changes in diet explain changes in coronary heart disease mortality in Spain? The Spanish paradox. American Journal of Clinical Nutrition, 61, (Suppl), S1351 –S1359.

[41]   [40] Planell, E., Sánchez, C., Montellano, M.A., Mataix, J., Llopis, J. (2003). Vitamin B6 and B12 and folate status in an adult Mediterranean population. European Journal of Clinical Nutrition, 57, 777 –785.

[42]   [41] Schroder, H., Marrugat, J., Vila, J., Covas, M.I., Elosua, R. (2004). Adherence to the traditional Mediterranean diet is inversely associated with body mass index and obesity in a Spanish population. Journal of Nutrition, 134, 3355–3361.

Dr Lapousis George is a professional school counselor in Physical Education and Sports Science. His research interests are the latest developments in Physical Education. He holds a MSc. and PhD degree in Physical Education and Sports Science from the Democritus University of Thrace Greece and a MSc. degree in the Science of Education Design from the University of Aegean, Greece. Dr Lapousis George is a professional school counselor in Physical Education and Sports Science. His research interests are the latest developments in Physical Education. He holds a MSc. and PhD degree in Physical Education and Sports Science from the Democritus University of Thrace Greece and a MSc. degree in the Science of Education Design from the University of Aegean, Greece.