



## WESTERNIZATION *VERSUS* MEDITERRANEANISATION IN THE DIET OF TEENAGERS FROM BUCHAREST

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Puberty is one period of physiological and psychological transformation which makes them very vulnerable to food imbalance, which is also part of the factors of major risk to develop a chronic disease. Globalization in all its aspects, led to westernization of eating habits, which is associated with the obesity epidemic and associated chronic diseases. As a reaction, the scientific community emphasizes the health benefits of the Mediterranean Diet and its prophylactic effect against chronic diseases, linking the Mediterranean diet with the quality of diet. The objective of this research was to evaluate the existence of the “westernization” or “mediterraneanisation” tendencies in the diet of teenagers from Bucharest, in the context of the Romanian nutritional transition. In 2005, 2011 and 2014, investigations were carried out in colleges of the Bucharest area. Each girl and each boy were weighed and measured in order to determine their nutritional state by the body mass index (BMI). In 2005, a food consumption survey was carried out, in order to evaluate the westernization tendencies in the diet of teenagers. In 2011 and 2014, each young person made the KIDMED test, in order to evaluate the mediterraneanisation tendencies in the diet of teenagers.

*Key-words:* teenagers, westernization of diet, mediterraneanisation of diet.

### INTRODUCTION

The history of human alimentation is marked by successive evolutions through its process of adaptation at environmental changes and of living modes, all these satisfying the physiological needs and a life in good health. Some authors refer to nutritional transitions in order to characterize the most noticeable evolutions<sup>1,2</sup>. These evolutions take place relative to various regions and societies at different (and in general long) time periods and have contributed to an important modification of the epidemiological profile<sup>3</sup>. The actual nutritional transition is for the first time a global phenomenon even if it is characterized by non-synchronicity<sup>4-6</sup>. According to Kennedy, Nantel and Shetty (2004), nutrition transition is a dynamic process of both mass global change and local differentiation. Signaling a global inadaptation of the societies, it bears important consequences on the health status

of the population. The phenomenon of moving away from the traditional diets in order to come closer to so called “western” diets is associated with an increase in overweight and obesity, and consequently in the rates of hypertension, diabetes, hypercholesterolemia and of mortality by cardiovascular diseases (cardiomyopathy, cerebrovascular accident) and of certain cancers (especially breast and colon)<sup>4-6</sup>. As a reaction, the scientific community emphasizes the health benefits of the Mediterranean Diet and its prophylactic effect against chronic diseases, linking the Mediterranean diet with the quality of diet. The relatively recent observation of a causal link between “western” diets and inflammation and/or endothelial dysfunction is a subject of great interest, both of which being associated with a risk for chronic diseases<sup>16</sup>. On the contrary, the absence of this effect with regard to the traditional Mediterranean diet (consisting mainly of cereals, vegetables, fruit and olive oil), and the unanimous opinion that it largely meets the recommendations for nutritional balance, led to its

association with the concept of food quality<sup>17,18</sup>. The aforementioned association and its media coverage are strong enough to assert in the literature that there is a new trend towards the “Mediterraneanization” of food in the world<sup>19</sup>.

The impact of the nutritional transition on children and teenagers is already the subject of many debates. In Romania too, childhood and juvenile obesity has become a recognized public health problem<sup>9</sup>. Our previous studies confirmed the recent increase in prevalence of overweight and obesity.

BMI population trend in the socio-economic transition period is ascending (our 1992–2013 survey). This trend dominates for the male sex between 8 and 18 years of age, being much more pronounced in the urban environment between 8 and 14 years, and in rural areas between 15 and 18 years of age. For girls, there is an upward trend in the average BMI population from the age of 7–8 years, with more pronounced differences between urban and rural areas since the age of 13. Exceptions are the 18-year-old girls, for whom there is a slight downward trend, much more accentuated in rural areas<sup>15</sup>.

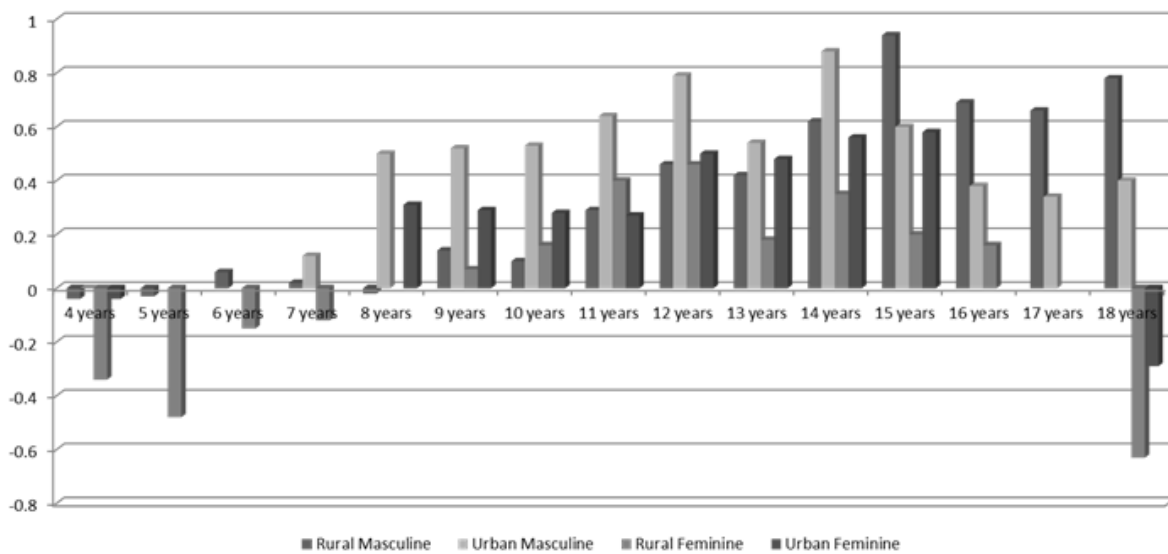


Figure 1. The evolutionary trend of the difference between the average BMI values, at national level, by age and gender – 1992–2013.

The current study presents the partial results of our research regarding the behavioral and weight dynamics of children and adolescents from Bucharest during the period of socio-economic transition in Romania. Using the data provided by the National Institute of Statistics regarding the mean annual consumption for adult population, but also for children and adolescents, our analysis of the model of food consumption confirmed that the traditional Romanian model is the Western diversified model that is characteristic for the

Western European countries and also for most countries in Central Europe<sup>13</sup> (Table 1).

### OBJECTIVES

The objective of this research was to evaluate the existence of the “westernization” or “mediterraneanisation” tendencies in the diet of teenagers from Bucharest, in the context of the Romanian nutritional transition.

Table 1

The types of model consumption (Gerard Ghersi-Source de date: FAO)

Models of food consumption	Subtypes	Typical foods
Western type	Mediterranean	C, LS, FV, GV
	Scandinavian	PS, LT, F
	Diversified	CR, FV, GA, ME, LT, GV, SH

Table 1

(continued)

Models of food consumption	Subtypes	Typical foods
Traditional agricultural types	Grains	C
		C, LS
		C, GV, FV
		C, LS, FV
	Roots	R, LS
		R, LS, FV
		CR
	Grains and roots	CR, LS
		CR, LS, FV
Traditional mixt types	Japanese	C, R, PS
	Pastoral	C, LT
	Uruguayan	C, ME

C = cereals, R = roots and tubers, LS = leguminous, FV = fruits and vegetables, PS = fish, ME = meat and eggs, SH = sugar and honey, F = fats, GV = vegetable fats, GA = animal fats, LT = milk and dairy products.

## MATERIAL AND METHODS

This work is based on three pilot studies, with an application of a questionnaire (including KIDMED test), a set of anthropometric measurements, and a daily dietary inquiry during one week. The data was gathered in 2005, 2011 and 2014, when investigations were carried out in colleges of the Bucharest area. In 2005, using a representative sample (cluster sampling) comprising 783 subjects, with 281 adolescents and 502 parents on two age-levels of reference (156 subjects in the age group 14–15 years and 125 subjects in the age group 18–19 years), a food consumption survey was carried out, in order to evaluate the westernization tendencies in the diet of teenagers. In 2011 and 2014, we used a representative sample (cluster sampling) comprising 510 subjects, with 170 adolescents and 340 parents on the same two age-levels of reference. Each young person made the KIDMED test in 2011 and 2014, in order to evaluate the mediterraneanisation tendencies in the diet of teenagers.

We evaluated the models of food consumption for each age group and sex after the standardization of the mean food consumption for each child taking into account the intake quantities per week. The estimation of the portions was realized with reference to the measures used in the family (a cup of, a plate of, etc). In order to compare the real intake with the recommended one, we used the dietary equivalents and the mean daily intake

recommended by age and sex as prescribed by the Institute of Public Health for the Romanian population. For the statistical analysis of food consumption patterns, foods were grouped into 10 food categories which were estimated in grams per person per day and as relative value (the mean recommended daily intake being the reference value of 100): cereal products (in flour equivalent), milk and dairy products (in milk equivalent), meat and processed meat (in meat equivalent), fish and fish preparations (equivalent in fish), eggs, sweets (in sugar equivalent), roots and tubers (potatoes), dried leguminous, vegetables and fruits. For the new available foods, such as chips, snacks, pastries, soft drinks and sweet cereals for breakfast, we did not have the equivalent food intake and the mean recommended daily intake.

Data analysis was performed using the EpiInfo package and the R-language for statistical computation software (version 2.11.1)<sup>14</sup>. In order to identify the underlying factors and produce a reduction of the initial variables to a relevant set of latent variables which best correlates with the patterns of food consumption, exploratory factor analysis was performed with all the variables concerning the food consumption (the 10 alimentary category together with the additional two other variables for sweet drinks and processed food). The analysis was performed separately on different age and income categories. The patterns of food consumption were analyzed in relation to nutritional

transition. We used the principal components decomposition method in order to extract the initial set of uncorrelated factors. Kaiser criterion and Scree-plot were used according to the situation in order to identify the ‘optimal’ number of factors retained. In order to enhance the interpretation of the outcome, the factors were rotated orthogonal by using the Varimax method. In the interpretation of the factors we used a cut point of 0.5 of the absolute factor loading value.

Only the components showing an eigenvalue greater than 1.5 were retained<sup>12</sup> (Table 2). The first factor which explains most of the variability in the data was interpreted in relation to the nutritional transition. All the retained factors were taken into consideration in order to analyze the pattern of food consumption. The factor loading indicates the importance of one food or food group in the definition of the pattern.

Table 2

The percentages of the total variance for the entire data represented by the first components

	Cumulative proportions of factors with eigenvalue>1.5	F1 % Proportion	F2 % Proportion	F3 % Proportion
14–15 years Income Low	43.83%	16.24%	14.54%	13.05%
14–15 years Income Medium	48.59%	21.14%	16%	11.45%
14–15 years Income High	56.73%	18.13%	15.83%	12%
17–18 years Income Low	38.50%	14.62%	12.61%	11.27%
17–18 years Income Medium	39.47%	14.62%	13.18%	11.67%
17–18 years Income High	37.57%	15.28%	11.41%	10.88%

Table 3

Scoring for KIDMED test for children and adolescents<sup>21</sup>

KIDMED test	Scoring
Takes a fruit or fruit juice every day	+ 1
Has a second fruit every day	+ 1
Has fresh or cooked vegetables regularly once a day	+ 1
Has fresh or cooked vegetables more than once a day	+ 1
Consumes fish regularly (at least 2–3/week)	+ 1
Goes >1/ week to a fast food restaurant (hamburger)	– 1
Likes pulses and eats them >1/week	+ 1
Consumes pasta or rice almost every day (5 or more per week)	+ 1
Has cereals or grains (bread, etc) for breakfast	+ 1
Consumes nuts regularly (at least 2–3/week)	+ 1
Uses olive oil at home	+ 1
Skips breakfast	– 1
Has a dairy product for breakfast (yoghurt, milk, etc)	+ 1
Has commercially baked goods or pastries for breakfast	– 1
Takes two yoghurts and/or some cheese (40 g) daily	+ 1
Takes sweets and candy several times every day	– 1

Regarding the KIDMED test, it was developed and validated by Serra-Majem *et al.* (2001)<sup>21</sup>, and is largely used to assess the adherence to the Mediterranean Diet in children and young people (aged 2–25 years). The 16-questions of the KIDMED test evaluate different aspects of the daily food intake: 4 items denote a negative connotation (consumption of fast food, baked goods or pastries,

sweets, and skipping breakfast) and are assigned a value of –1, while other 12 items denote a positive connotation (consumption of olive oil, fish, fruits, vegetables, cereals, nuts, pulses, pasta or rice, dairy products, and yoghurt) and are assigned a value of +1 (Table 3).

Scoring ranges from 0 to 12. A score of  $\leq 3$  indicates a very poor adherence, a score of 4–7

indicates a medium quality of diet that requires improvement, while a score of  $>8$  corresponds to an optimal Mediterranean diet<sup>21</sup>.

## RESULTS AND DISCUSSIONS

The relevant literature on the topic shows a recent change in the emphasis of the dietary recommendations from nutrients to patterns of dietary intake, following the idea that people do not eat specific nutrients, but specific foods<sup>5-7</sup>. The World Health Organization is supporting these recommendations suggesting now that dietary allowances for populations should be based on foods instead of nutrients<sup>8</sup>. It is considered that the patterns of diet may provide a more comprehensive measure of dietary exposure for epidemiological

research<sup>10</sup>, and that are highly influenced by socioeconomic factors<sup>11</sup>. Wirfalt *et al.* showed that dietary patterns were related to age, ethnicity, and income. In order to analyze the food consumption model as dependent on the income level and relative to the recommended intake for children and adolescents, we used a graphical representation for 10 food categories that were estimated in daily grams per person and as a relative value (with the mean daily intake recommended as the reference value of 100).

The vegetable products were represented on the right side of the graphic, meanwhile the animal products on the left side. The graphics do not include drinks and the processed food as snacks, chips, and cereals for breakfast, pastry products since in 2005 we didn't have their nutritional equivalents.

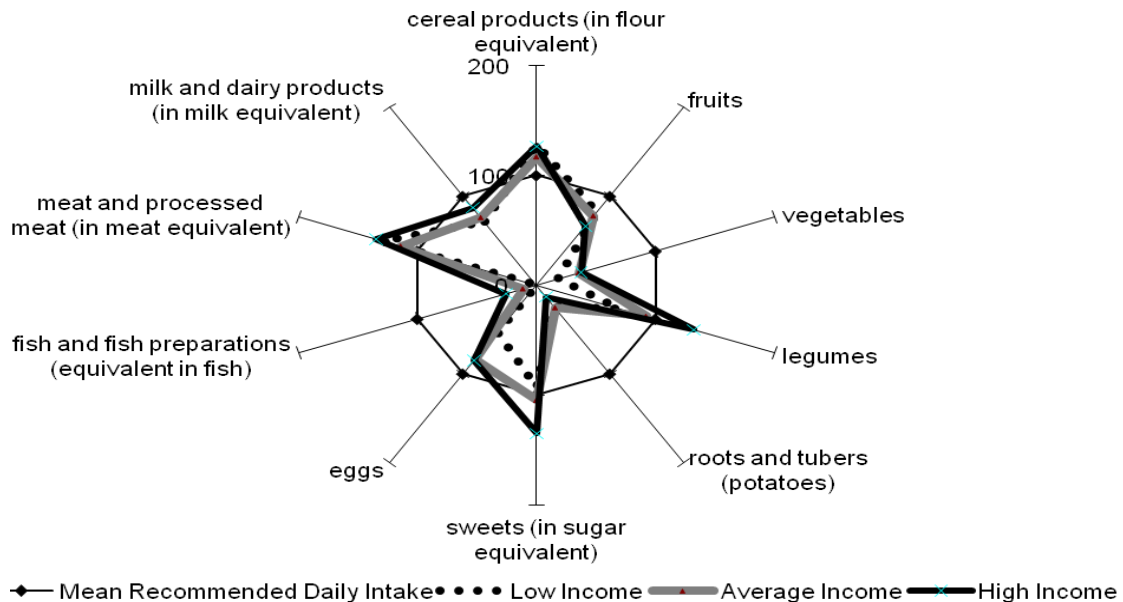


Figure 2. Model of food consumption for 14–15 years old boys.

For the 14–15 years old adolescents the food consumption is centered on grains, sweets and, as a seasonal characteristic, leguminous (Figs. 2 and 3). For boys, we can see also an increase in meat consumption (Fig. 2). This age group has the most unbalanced model of food consumption, that could be explained not only by the seasonal deficiencies but also by the psychological factors involved at this age, and partially by the daily schedule in Romanian schools (the afternoon classes associated with the parents' working schedule made dinner the main meal of the day and the only one were the entire family gathers). The energetic intake is

completed by an increase in consumption of soft drinks and processed products (chips, snacks, pastry, cereals for breakfast) regardless of family income level (which confirms the impact of psychological factors on food consumption of this age group). There are significant statistical differences between the three income categories regarding the consumption of legumes and eggs, for both sexes.

For the 17–18 years old adolescents, for boys, we retain a tendency for grains, sweets and meat; the consumption begins to modify with the addition of fruits and dairy products (Fig. 4) (with a

significant statistical difference between the three levels of income). For girls, the consumption is centered on sweets, with a significant difference

between the income levels, on fruits and leguminous, meat and dairy products, while the consumption of grains showing a low value (Fig. 5).

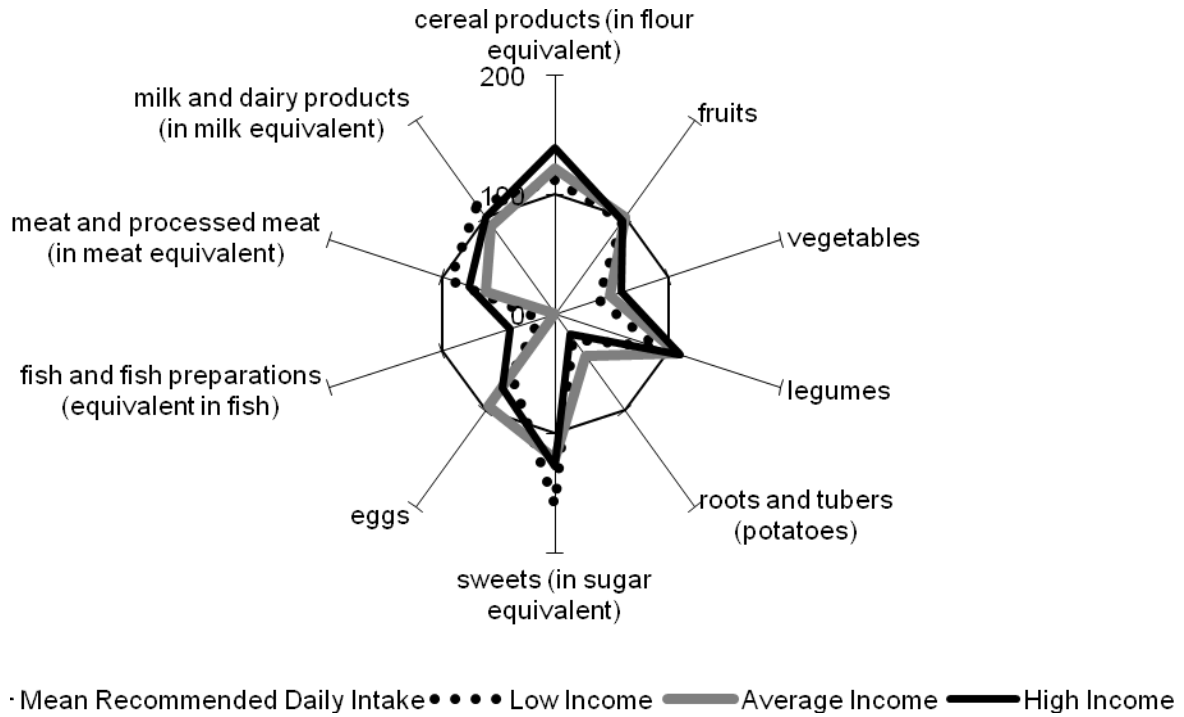


Figure 3. Model of food consumption for 14–15 years old girls.

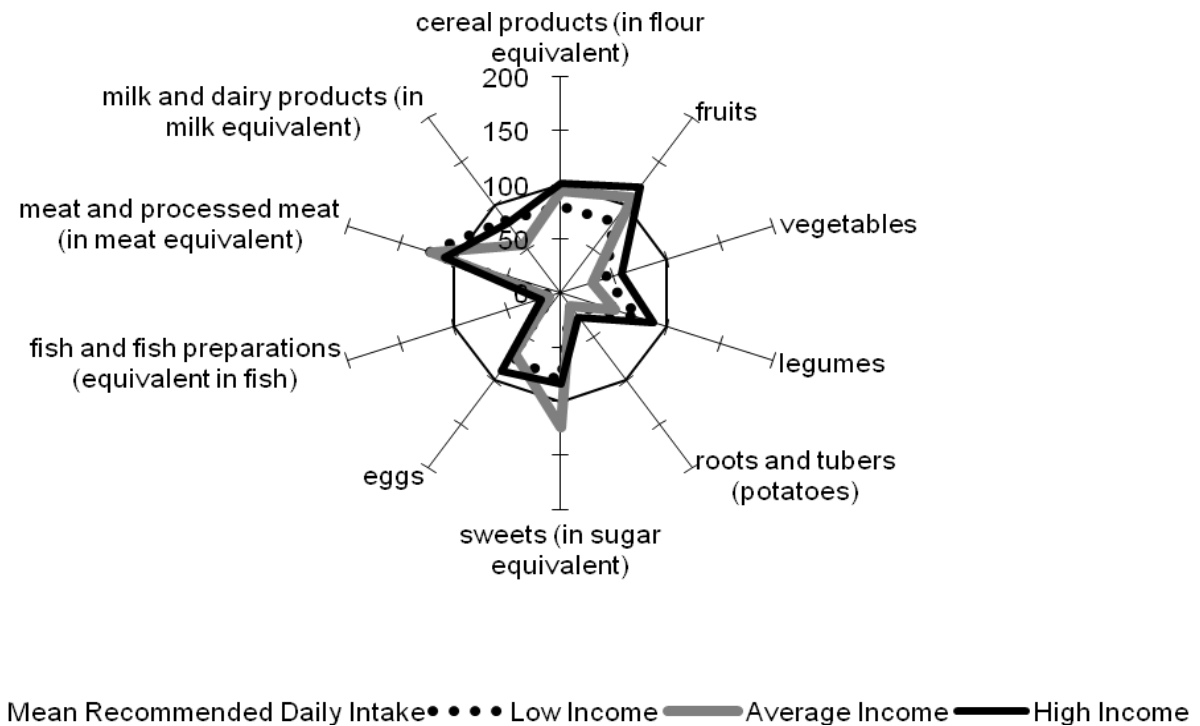


Figure 4. Model of food consumption for 17–18 years old boys.

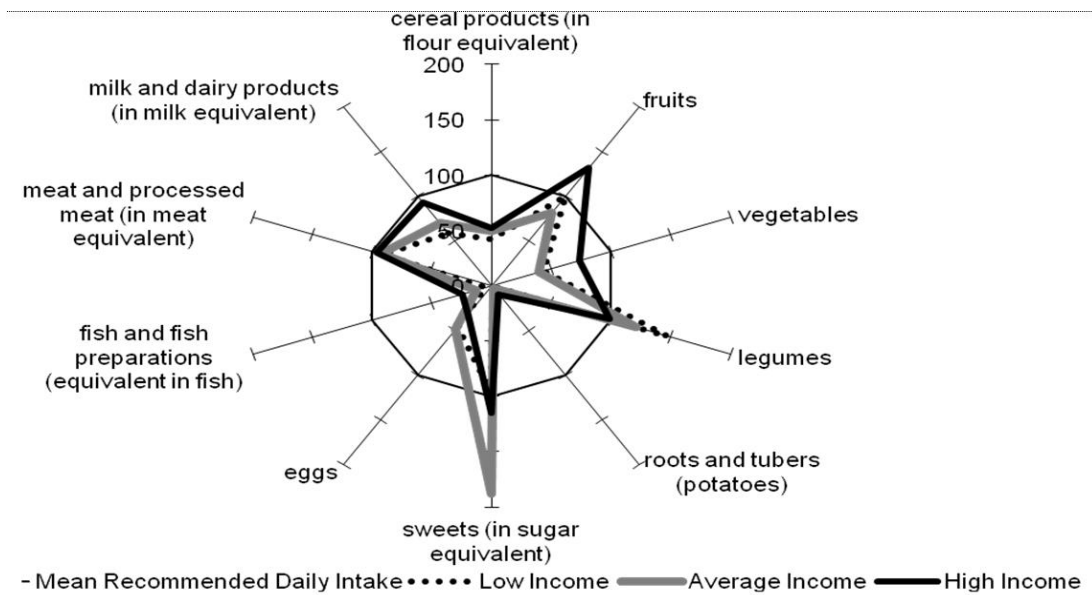


Figure 5. Model of food consumption for 17–18 years old girls.

The energetic intake is compensated by an increase in soft drinks consumption and processed foods (chips, snacks, pastry, breakfast cereals), lower for adolescents from families with high levels of income.

The first 3 components resulted from the exploratory factor analysis, which explained most of the variability between individual dietary consumptions (Table 2) were interpreted as an evidence of the nutritional transition impact on the pattern of food consumption for the adolescents, given that among food items with the highest correlation scores on the first 3 components we found the new available foods, commonly associated with the nutrition transition, as chips,

snacks, patisseries, cereals for breakfast, sweet and carbonated drinks (grouped in the category “sugary drinks and processed products”). The differences in their consumption between different income categories, was in 17–18 years old group (Diagram 2), age when discernment is already formed, but not in the age group of 14–15 years (Diagram 1), probably due to psychological factors involved.

Taking into account all the components having an eigenvalue greater than 1.5, besides the impact of the nutritional transition on the pattern of food consumption, it is also confirmed a traditional diet that is focused mainly on cereal products, milk products, eggs, fruits and vegetables.

Diagram 1

The Varimax correlations for 14–15 years old adolescents

14–15 years low income	F1	F2	F3	14–15 years average income	F1	F2	F3	14–15 years high income	F1	F2	F3
Eggs	0.84			Processed food and sweet drinks	0.79			Milk Products	0.83		
Tubers	0.74			Leguminous	0.73			Processed food and sweet drinks	0.77		
Meat	0.53			Eggs	0.61			Tubers	0.68		
Fruits		0.81		Tubers		0.87		Fruits		0.79	
Milk Products		0.77		Vegetables		0.70		Eggs		0.75	
Vegetables			0.88	Fruits			0.82	Leguminous		0.75	
Processed food and sweet drinks			0.74	Cereal Products			0.78	Fish			0.88
								Sweets			0.83

Diagram 2

The Varimax correlations for 17/18 years old adolescents

17–18 years low income	F1	F2	F3	17–18 years average income	F1	F2	F3	17–18 years high income	F1	F2	F3
Cereal Products	0.75			Processed food and sweet drinks	0.65			Milk products	0.63		
Meat	0.74			Sweets	0.62			Cereal products		0.78	
Fruit	0.69			Vegetables		0.93		Leguminous		0.75	
Milk Products	0.60			Tubers		0.57		Vegetables			0.86
Processed food and sweet drinks		0.80		Eggs			0.82	Fruits			0.81
Tubers			0.80								
Vegetables			0.65								

In the 2011 sample, the scores obtained from the Kidmed index show that 49.60% of adolescents from 2011 and 42.98% of adolescents from 2014 have a very bad diet, and 43.90% adolescents from 2011 respective of 50.31% of adolescents from 2014 have a diet that requires a need for improvement (Fig. 6). By sex, statistical analysis showed a significant difference between girls and boys (Kruskal-Wallis test,  $p = 0.02$  for 2011 and  $p = 0.04$  for 2014).

The analysis of the responses to the Kidmed test shows a reduced consumption of fish, vegetables, pasta, integral rice, dried fruits. On the other hand, we note that in percentage of 40.64% Romanian adolescents in 2011 and 39.27% in 2014 go to fast-food, a habit that, although in decline, was much less frequently encountered in 2005, according to our studies (Table 4).

There are differences in detail between girls and boys: girls eat more frequently fruits, vegetables, yoghurts and cheeses and boys eat cereals or derivatives more frequently, breakfast pastries and more frequently fast food (46.2% vs 36.5%) (Table 4). The mean score obtained for the Romanian sample on the Kidmed test was, in 2011 3.6 ( $\sigma = 2.5$ ), and in 2014 3.89 ( $\sigma = 2.3$ ), which corresponds to a diet of a very poor quality for the analyzed age groups (statistical analysis: Bartlett and Kruskal-Wallis), but also marks a slight tendency to improve its the quality, in just three years. This tendency of raising quality of the diet between 2011 and 2014 is due to the increase in the percentage of boys with the average quality, and the percentage of girls with the optimal quality level of the diet (Fig. 6). In terms of diet, it is mainly due to increased consumption of fruit, fish, olive oil, and the consumption of dairy products and cereals at breakfast (Fig. 7).

Table 4

Distribution of responses to KIDMED test by sex and age group (%)

KIDMED test	Boys (2011)	Girls (2011)	Total (2011)	Boys (2014)	Girls (2014)	Total (2014)
Takes a fruit or fruit juice every day	54.4%	60.7%	57.49%	70.65%	60.7%	70.04%
Has a second fruit every day	38.8%	32.3%	35.03%	41.87%	38.3%	40.89%
Has fresh or cooked vegetables regularly once a day	61.8%	70.1%	65.78%	67.03%	70.1%	68.42%
Has fresh or cooked vegetables more than once a day	26.6%	29.9%	28.07%	26.9%	28.4%	27.94%
Consumes fish regularly (at least 2–3/week)	18.3%	16%	16.84%	21.98%	25.72%	24.29%
Goes >1/ week to a fast food restaurant (hamburger)	46.2%	36.5%	40.64%	44.2%	37.5%	39.27%
Likes pulses and eats them >1/week	38.1%	45.8%	41.71%	39.4%	47.9%	43.72%
Consumes pasta or rice almost every day (5 or more per week)	15.8%	22%	18.98%	13.6%	18.2%	14.17%
Has cereals or grains (bread, etc) for breakfast	85.4%	74.6%	79.14%	87.2%	79.13%	84.62%
Consumes nuts regularly (at least 2–3/week)	22.4%	16.4%	18.98%	20.8%	17.5%	19.03%
Uses olive oil at home	65.1%	70.6%	67.38%	68.4%	79.2%	77.33%
Skips breakfast	19.9%	21.4%	20.7%	21.2%	19.7%	20.7%
Has a dairy product for breakfast (yoghurt, milk, etc)	80%	82.6%	80.75%	83%	85.9%	83.4%
Has commercially baked goods or pastries for breakfast	22.2%	17.9%	20.86%	21.3%	18.7%	21.05%
Takes two yoghurts and/or some cheese (40 g) daily	35.9%	52.2%	44.39%	35.9%	50.1%	43.32%
Takes sweets and candy several times every day	56.1%	58.2%	56.95%	58.2%	62.4%	61.54%



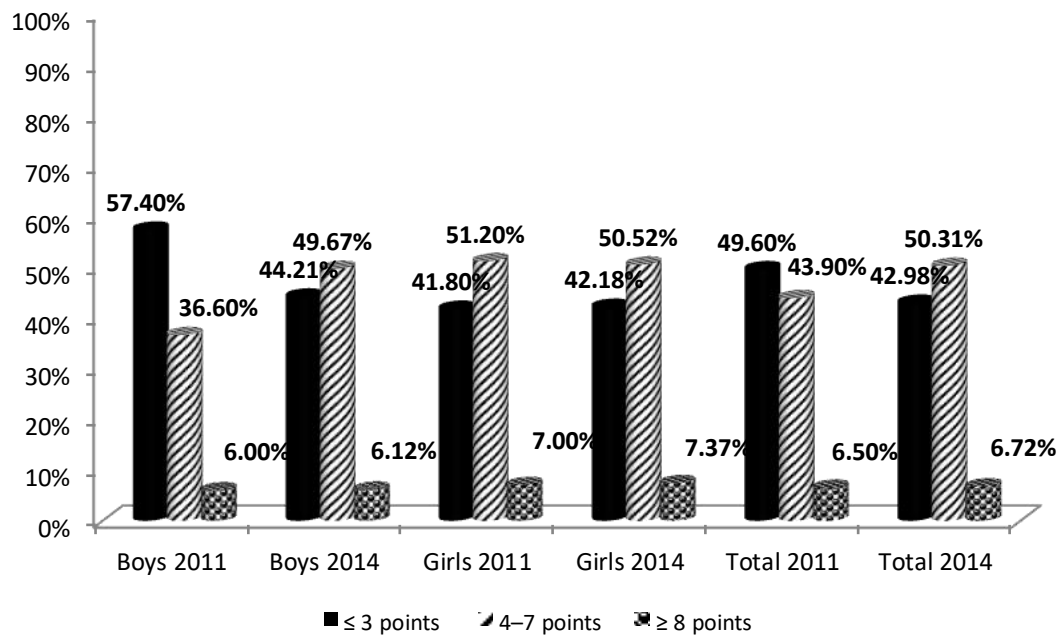


Figure 6. Distribution of KIDMED score by sex and year of study (%).

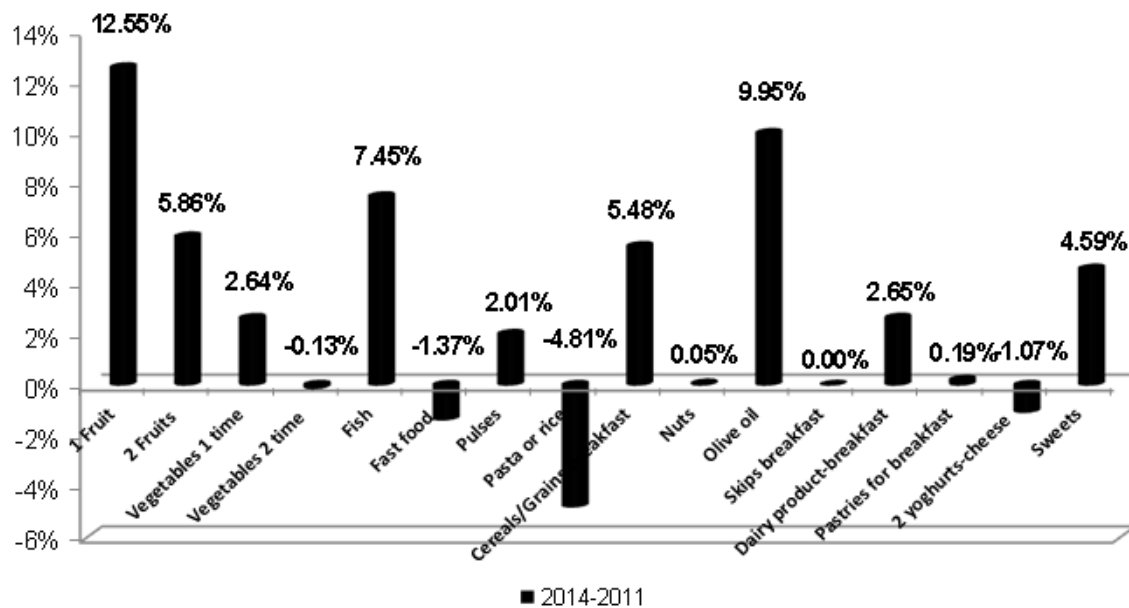


Figure 7. The difference in responses (%) of the KIDMED test between the 2014 and the 2011 year of study.

## CONCLUSIONS

From a general point of view, in the context of the Romanian nutritional transition, we can say that the model of food consumption for children and adolescents from Bucharest remains of a traditional type (diversified Western type). According to our studies, in 2005 we could already see some

characteristic elements of the “westernization” tendencies in the food consumption pattern of adolescents, for all age categories analyzed. Our studies also revealed that in 2005 there was also an effect of income on children’s food consumption pattern. The high level of income was associated with lower consumption of sweet drinks and processed products. However, between 2011 and

2014, there are signs of a slight tendency of “mediterraneanisation” tendencies in the diet of teenagers from Bucharest. For the 14–15 years age group, psychological factors are also involved in the nutritional behavior model. Adolescents need to be regarded as a distinct segment of the population and it is important to realize and address their specific health and lifestyle problems.

Further research studies should be carried out to highlight issues of concern and their possible solutions in this population.

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