



DIET QUALITY IN A SAMPLE OF ROMANIAN HIGH-SCHOOL STUDENTS

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The aim of this study was to investigate the diet quality within a sample of Romanian adolescents, considering some major factors influencing the food patterns: gender, age, body weight, and place of residence. The sample was composed by 495 high-school students (270 girls, 225 boys), aged 14–19 years. The methods included anthropometric measurements to determine subjects' weight status, using the international cutting points for age and sex established by T.J. Cole & T. Lobstein, and two standardized instruments: the KIDMED test to assess the adherence to the Mediterranean Diet in children and young people and a short dietary diversity questionnaire. Only body weight influenced significantly the general score of KIDMED test. When considered individually, the test items have shown significant impact of sex, age and body weight, but none of residence area. No statistically significant differences were found regarding the general distribution of food groups consumed per day. General vulnerabilities in adolescent population must be addressed with responsibility and a sense of urgency: low regular consumption of fish (18.99%), low regular consumption of nuts (18.59%), high daily consumption of sweets and candy (59.39%), high weekly consumption of fast food (38.99%), low dietary diversity (56,36%).

Key words: diet quality, dietary diversity, KIDMED test, globalization, adolescents.

INTRODUCTION

The interest in a balanced diet of adolescents is motivated by the broad consensus on the possibility and necessity of preventing a series of immediate or long-term implications. Inappropriate (either quantitatively or qualitatively) dietary intakes could lead to a deficient growth and development, a delay in sexual maturation and numerous health problems from mineral deficiency to serious malnutrition. The last decades have brought an unprecedented increase in the prevalence of overweight and obesity among the young population along with generalization of sedentary leisure activities and globalization of fast food. Long-term effects on late-life health include the increased risk of cardiovascular diseases and type 2 diabetes and adult obesity (metabolic syndrome) (Milici, 2010). While some weight control practices are necessary, those driven only by body dissatisfaction and without medical supervision could end up in partial or full-syndrome eating disorders. As the western unrealistic beauty ideals gain global adhesion, not only the well-established eating disorders (Anorexia

Nervosa, Bulimia Nervosa, and Binge Eating) but also the disordered eating behaviors (skipping breakfast, fasting, emotional eating, laxative abuse, steroid use) have displayed an alarming tendency to spread worldwide.

Romania is no exception. Moving to a market economy meant the exposure of population to an abundance of products. While the poor have been constrained to turn toward cheap unhealthy food (fresh, organic vegetables and fruits, fish, and healthy oil having prohibitive prices), for the middle and upper-middle class peoples the challenge was to manage their prosperity, to express their affluence otherwise than by eating whatever and however much they wanted until the fat belly became a high-status mark, despite the risk of metabolic syndrome brought on by central obesity (Milici, Rus, 2011). As food scarcity was a neuralgic issue during communism era, some poor eating habits like overeating could be seen as a perverse result of long-time deprivation. This presumption leaves space for the education agenda: where the food consumption is not determined by poverty, teaching people to choose wisely, in line with their nutritional needs, seems a reasonable strategy even though extremely optimistic. Besides the economic

variable, a multitude of social, psychological, and cultural factors influence eating habits and food choices.

Previous researches on Romanian teenagers have shown that the installation of preobesity and obesity increased as frequency during the last decades, especially among children aged 7–8 years (Glavce, 2006). Even since the first grade, children start having irregular eating patterns (Stan *et al.*, 2006). The traditional agricultural diet was replaced by the western one, along with the temporary destruction of meals and food content (Tanasescu *et al.*, 2009). More than three-quarters of adolescents (girls and boys) do not respect the balanced distribution of meals throughout the day; more than half of adolescents buy daily or almost daily unhealthy snacks from the school kiosks; chocolate, biscuits and wafers and other sweets are on top their preferences. In normal and overweight categories, girls clearly dominate the weight control practices; while even the normal weight girls engage in weight control practices, overweight boys are less willing to do the same, declaring themselves to a greater extent satisfied with their appearance. The disordered eating patterns are the combined outcome of external constraints (school curriculum, availability of food in the school area) and personal choices (dietary preferences or management strategies of body dissatisfaction and weight control) (Neagu, Milici, 2013; Neagu, 2014; Milici, Rovillé-Sausse, 2016). As for the appeal to “comfort food” in distress condition (especially sweets) studies have identified an increased female vulnerability (Milici, Neagu, 2016). Overweight and obesity run in the families, particularly in those with a high socio-economic status, where they range

from 50% to 80%; the research revealed that the overweight children have at least one overweight parent (the father, in most of the cases) (Milici *et al.*, 2007).

The aim of this study was to investigate – twenty-five years away from the regime change – the diet quality within a sample of Romanian adolescents, using standardized tools that allow analysis of the results in a global context and considering some major factors influencing the food patterns: gender, age, body weight, and place of residence.

MATERIALS AND METHODS

The sample, not representative of the entire country, was selected during a cross-sectional survey carried as part of my Ph.D. research out in two urban centers (Bucharest and Ploiești), between June of 2013 and May of 2015.

It included 495 high-school students (270 girls, 225 boys), aged 14–19 years ($M = 16.69$; $SD = 1.17$). The average age of the female subsample was 16.69 years ($SD = 1.24$), while the average age of the male subsample was 16.70 years ($SD = 1.09$).

Body height and weight were measured in order to determine the subjects’ weight status; for every participant, the body mass index and the age in months were calculated, after which the correspondence with the adult BMI was identified by using the international cutting points for age and sex established by T. J. Cole & T. Lobstein (2012). In accordance with the O.M.S. criteria, a body weight diagnosis was finally made for each subject (Table 1).

Table 1

Distribution of the respondents by age group, sex, place of residence, and body weight class

Age groups	Girls		Boys		Total	
	N	%	N	%	N	%
14–15 yrs. (early adolescence)	52	19.26	30	13.33	82	16.56
16–17 yrs. (middle adolescence)	139	51.48	146	64.89	285	57.57
18–19 yrs. (late adolescence)	79	29.26	49	21.78	128	25.85
Place of residence	N	%	N	%	N	%
Bucharest	130	48.15	157	69.78	287	57.98
Ploiești	140	51.85	68	30.22	208	42.02
Body weight class	N	%	N	%	N	%
Underweight	59	21.85	28	12.44	87	17.58
Normal weight	204	75.56	155	68.89	359	72.53
Overweight and obesity	7	2.59	42	18.67	49	9.90

From an omnibus questionnaire of 88 items focusing on the theme of adolescents’ lifestyle

(nutrition, sleep, physical activity, smoking, alcohol consumption, and body image), in the present study,

we chose two instruments: the KIDMED test and a short dietary diversity questionnaire.

The KIDMED test, developed and validated by Serra-Majem *et al.* (2001), is largely used to assess the adherence to the Mediterranean Diet in children and young people (aged 2–25 years). The Mediterranean Diet is considered one of the healthiest diets in the world, due to its “low content of saturated fatty acids and a high content in monounsaturated fatty acids, as well as high amounts of fiber and complex carbohydrates, and important amounts of antioxidants” (García Cabrera *et al.*, 2015: 2391). It is based on the high consumption of vegetables and fruit, cereals and whole grains, low-fat dairy products (cheese and yogurt), nuts, fish, red meat in low amounts, olive oil as the main fat, and little quantities of wine for adults (Donini *et al.*, 2015). 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 4). Scoring ranges from 0 to 12. A score of ≤ 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.

When investigating the dietary diversity, a simple construction of the index was preferred. The Romanians do not have the tradition of dividing food into servings so a calculation based on the number and size of the portions was doomed to failure due to reporting errors. The Dietary Diversity Score proposed by Kant *et al.* (1993) that counts the number of food groups (fruits, vegetables, meat/fish/eggs, cereals, milk & dairy products) consumed per day and assigns each one a point (the maximum score is 5) was considered feasible. Eating less or up to 3 food groups reveals a poor diet, 4 food groups a medium quality diet and 5 food groups an optimal diet.

RESULTS AND DISCUSSION

Mediterranean Diet Quality Index (KIDMED)

Within the whole sample, only a small percentage (5.25%) was characterized by high

adherence to the Mediterranean Diet. Most of the participants are almost equally divided between a poor adherence (47.88%) and a medium adherence (46.87%) to these dietary principles.

In their meta-analysis of the studies using the Kidmed test, carried out from January 2004 to January 2014, García Cabrera *et al.* (2015: 2390) noted that the overall percentage of high adherence was 10% and that of the low adherence was 21%. Referring to these data, we can say that our results show that Romanian adolescents have a diet twice as bad as the general average, with only 5.25% subjects characterized by high adherence and 47.88% subjects characterized by low adherence. However, we are in the proximity of the Greeks (a country with a tradition of fish and olive oil consumption), as shown by the study conducted by Farajian *et al.* (2011), who found 46.8% of low adherence, 48.9% of medium adherence and 4.3% of high adherence.

Although the boys have a tendency to adhere in a smaller proportion to them, recording more scores of less than or equal to 3 points in comparison with girls (50.67% vs. 45.56%), the difference was not statistically significant, $X^2(2) = 1.29$, $p = 0.524$.

The impact of age on the adhesion was also not statistically significant, $X^2(4) = 8.12$, $p = 0.09$, even if a slight tendency for the high scores to decrease with age was noticed: 9.76% of the adolescents aged 14–15 years recorded scores above 8 points as compared to only 3.13% of the adolescents aged 18–19 (Table 2).

An influence of body weight upon the distribution of KIDMED scores was noticed, $X^2(4) = 9.92$, $p = 0.04$. The underweight subjects displayed the highest percentage of scores under 3 points, while the overweight subjects registered the highest percentage of scores above 8 points. Most of the normal weight adolescents showed a medium adherence by recording scores between 4 and 7 points.

This finding in complete contradiction with the literature should be interpreted with caution to avoid misleading conclusions. Only because among the overweight subjects the study registered the highest percentage of KIDMED scores above 8 points this does not imply that their diet is actually the best. The test does not differentiate between low and fat cheese, between hypo and hypercaloric

fruits, between olive oil salads and oil-fried foods. No to mention the possibility of the deliberate lying: subjects know what is desirable and respond accordingly.

No impact of the residence on diet adherence was found, $X^2(2) = 0.01$, $p = 0.99$ (Table 3). In both cities, the distribution of the scores was similar: the highest percentage of participants registered scores less than or equal to 3 (48.08% in Bucharest and 47.60% in Ploiești), followed by a

close percentage of participants who scored between 4 and 7 points (46.69% in Bucharest and 47.12% in Ploiești). The lack of impact of residence area on the adherence to this diet should be seen as a sign of homogeneity in the urban environment, even if the size difference between the two cities is significant: Bucharest is the capital of Romania and largest city of the country, with 1,883,425 inhabitants according to the 2011 census, while Ploiești is the 9th most populous city, with 209,945 inhabitants according to the 2011 census.

Table 2

Distribution of KIDMED score by sex and age group (%)

Score	Total	Girls	Boys	14–15 yrs.	16–17 yrs.	18–19 yrs.
≤ 3 points	47.88	45.56	50.67	40.24	51.58	44.53
4–7 points	46.87	48.89	44.44	50.00	43.51	52.34
≥ 8 points	5.25	5.56	4.89	9.76	4.91	3.13

Table 3

Distribution of KIDMED score by body weight and residence (%)

Score	Underweight	Normal weight	Overweight & obesity	Bucharest	Ploiești
≤ 3 points	52.87	47.35	42.86	48.08	47.60
4–7 points	42.53	48.47	42.86	46.69	47.12
≥ 8 points	4.60	4.18	14.29	5.23	5.29

Table 4

Distribution of responses to KIDMED test in the total sample

KIDMED test	Scoring	%
Takes a fruit or fruit juice every day	+1	64.04
Has a second fruit every day	+1	36.57
Has fresh or cooked vegetables regularly once a day	+1	66.46
Has fresh or cooked vegetables more than once a day	+1	29.90
Consumes fish regularly (at least 2–3/week)	+1	18.99
Goes >1/ week to a fast food restaurant (hamburger)	-1	38.99
Likes pulses and eats them >1/week	+1	44.85
Consumes pasta or rice almost every day (5 or more per week)	+1	14.55
Has cereals or grains (bread, etc) for breakfast	+1	83.84
Consumes nuts regularly (at least 2–3/week)	+1	18.59
Uses olive oil at home	+1	72.93
Skips breakfast	-1	16.97
Has a dairy product for breakfast (yoghurt, milk, etc)	+1	83.84
Has commercially baked goods or pastries for breakfast	-1	21.41
Takes two yoghurts and/or some cheese (40 g) daily	+1	42.63
Takes sweets and candy several times every day	-1	59.39

When considered individually, the test items revealed some positive trends – high daily consumption of dairy products for breakfast (83.84%), high daily consumption of cereals for breakfast (83.84%), low rate of skipping breakfast (16.97%) – but also a couple of vulnerabilities within the whole sample: low regular consumption of fish (18.99%), low regular consumption of nuts (18.59%), high daily consumption of sweets and candy (59.39%), high weekly consumption of fast food (38.99%) (Table 4).

While the milk and dairy products are well-represented in the traditional diet (Milici & Neagu, 2014), fish consumption is not, and that constitutes a feature that significantly differentiates the Romanian diet from the Mediterranean one. With an annual consumption of 4.09 kg per capita in 2014, Romania is in the queue of the list of European countries, more than three times below the average European consumption (18 kg) or world consumption (19 kg). Basically, most Romanians are occasional fish consumers and this is due both to the lack of a tradition in sea fishing and to the special economic conditions (Neagu, 2013).

The olive oil consumption is also quasi-nonexistent in our tradition. The high percentage of those reporting its use (72.93%) came as a surprise. Maybe we should not be too optimistic and treat these reported data also as “wishful reality”.

In spite of real receptiveness (not consumer preferences constitute the real obstacle), the high (almost prohibitive) price of fish, olive oil and even fresh vegetables and fruits (especially for those living in the city, without a source of supply in the rural area) explains the poor adherence to this diet.

The individual items also indicated statistically significant differences by gender (Table 5). Sex influences the daily consumption of fresh or cooked vegetables, $X^2(2) = 10.01$, $p = 0.002$, with 72.6% of girls vs. 59.1% of boys reporting such habit. It also influences weekly consumption of fast food,

$X^2(2) = 7.99$, $p = 0.005$, for which boys express a clear tendency when compared to girls (45.8% vs. 33.3%). Not least, it has an impact on daily consumption of sweet products, which is significantly higher among the girls in comparison with boys (63.70% vs. 54.20%), $X^2(2) = 4.57$, $p = 0.03$.

Age influences the daily consumption of a second fruit, as this was decreasing from 50.00% in the participants aged 14–15 years to 32.98% in the participants aged 16–17 years and 35.94% in the participants aged 18–19 years, $X^2(2) = 7.98$, $p = 0.02$. It also affects the consumption of fresh or cooked vegetables more than once a day, $X^2(2) = 10.70$, $p = 0.0005$, with fluctuating tendencies: 35.37% of the participants aged 14–15 years, 24.21% of the participants aged 16–17 years and 39.06% of the participants aged 18–19 years reported this habit (Table 5).

Body weight has a clear impact on some food practices (Table 6). The daily consumption of a fruit or fruit juice was increasing with BMI, $X^2(2) = 6.92$, $p = 0.03$, being reported by 52% of the underweight adolescents, 65.46% of the normal-weight adolescents and 73.47% of the overweight and obese ones. The daily consumption of a second fruit every day was similarly influenced, $X^2(2) = 18.57$, $p = 0.0001$, as reported by 20.69% of the underweight adolescents, 37.60% of the normal-weight adolescents and 57.14% of the overweight and obese ones. An opposite trend was observed for sweet products, with the daily consumption decreasing with BMI, $X^2(2) = 6.18$, $p = 0.05$, as reported by 66.67% of the underweight adolescents, 59.61% of the normal-weight adolescents and 44.90% of the overweight and obese ones.

No statistically significant differences were found considering the place of residence (Table 6).

Table 5

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

KIDMED test	Girls	Boys	14–15 yrs.	16–17 yrs.	18–19 yrs.
Takes a fruit or fruit juice every day	64.44	63.60	69.51	64.21	60.16
Has a second fruit every day	36.70	36.40	50.00	32.98	35.94
Has fresh or cooked vegetables regularly once a day	72.60	59.10	70.73	64.91	67.19
Has fresh or cooked vegetables more than once a day	30.40	29.30	35.37	24.21	39.06
Consumes fish regularly (at least 2–3/week)	17.00	21.30	19.51	19.65	17.19
Goes >1/ week to a fast food restaurant (hamburger)	33.30	45.80	36.59	39.65	39.06
Likes pulses and eats them >1/week	48.10	40.90	43.90	43.86	47.66

Table 5
(continued)

KIDMED test	Girls	Boys	14–15 yrs.	16–17 yrs.	18–19 yrs.
Consumes pasta or rice almost every day (5 or more per week)	12.60	16.90	14.63	15.79	11.72
Has cereals or grains (bread, etc) for breakfast	81.90	86.20	85.37	84.21	82.03
Consumes nuts regularly (at least 2–3/week)	17.80	19.60	21.95	16.49	21.09
Uses olive oil at home	73.30	72.40	76.83	73.68	68.75
Skips breakfast	18.50	15.10	18.29	14.74	21.09
Has a dairy product for breakfast (yoghurt, milk, etc.)	85.60	81.80	85.37	82.81	85.16
Has commercially baked goods or pastries for breakfast	23.00	19.60	26.83	20.70	19.53
Takes two yoghurts and/or some cheese (40 g) daily	43.70	41.30	41.46	40.00	49.22
Takes sweets and candy several times every day	63.70	54.20	53.66	61.75	57.81

Table 6
Distribution of responses to KIDMED test by body weight and residence (%)

KIDMED test	Underweight	Normal weight	Overweight and obesity	Bucharest	Ploiești
Takes a fruit or fruit juice every day	52.87	65.46	73.47	60.98	68.27
Has a second fruit every day	20.69	37.60	57.14	39.02	33.17
Has fresh or cooked vegetables regularly once a day	62.07	67.97	63.27	67.94	64.42
Has fresh or cooked vegetables more than once a day	25.29	29.53	40.82	31.01	28.37
Consumes fish regularly (at least 2–3/week)	16.09	18.38	28.57	20.21	17.31
Goes >1/ week to a fast food restaurant (hamburger)	37.93	40.39	30.61	40.07	37.50
Likes pulses and eats them >1/week	44.83	46.24	34.69	47.39	41.35
Consumes pasta or rice almost every day (5 or more per week)	20.69	13.09	14.29	13.59	15.87
Has cereals or grains (bread, etc.) for breakfast	83.91	83.84	83.67	83.97	83.65
Consumes nuts regularly (at least 2–3/week)	18.39	18.66	18.37	20.21	16.35
Uses olive oil at home	70.11	73.82	71.43	75.26	69.71
Skips breakfast	22.99	15.32	18.37	17.42	16.35
Has a dairy product for breakfast (yoghurt, milk, etc.)	85.06	84.68	75.51	83.62	84.13
Has commercially baked goods or pastries for breakfast	18.39	23.40	12.24	23.00	19.23
Takes two yoghurts and/or some cheese (40 g) daily	33.33	45.13	40.82	39.37	47.12
Takes sweets and candy several times every day	66.67	59.61	44.90	58.19	61.06

DIETARY DIVERSITY SCORE

Most of respondents have a poor diet, eating less or up to 3 groups per day: 8.28% consumed 1 food group, 15.35% consumed 2 food groups and 32.73% consumed 3 food groups over a 24 h period. However, no statistically significant differences in the distribution of scores were found when considering: sex, $X^2(4) = 6.60$, $p = 0.16$; age, $X^2(8) = 8.18$, $p = 0.42$; body weight, $X^2(8) =$

$= 13.23$, $p = 0.10$; and the place of residence, $X^2(4) = 1.58$, $p = 0.81$ (Table 7).

In the total sample, the meat, fish, and eggs category occupied the first place in the food group hierarchy (83.43%), while the fruit category came second (70.10%). Vegetables and dairy products were almost equally represented (68.89% and 68.48%), followed at a considerable distance by the cereals group (37.37%) (Table 8).

While, in comparison with girls, boys tend in higher proportions to eat meat, fish and eggs

(88.44% vs. 79.26%), milk and dairy products (72.00% vs. 65.56%), vegetables (70.67% vs. 67.41%) and cereals (41.33% vs. 34%), and in a lower percentage fruits (69.78% vs. 70.37%), no statistically significant differences in the distribution by sex of these food preferences were registered, $X^2(4) = 1.46$, $p = 0.83$.

A similar distribution by age was also identified, $X^2(8) = 1.41$, $p = 0.99$.

In four of five food groups, the percentages of overweight subjects were higher in comparison to the other classes: meat, fish, eggs (91.84), fruits

(81.64), vegetables (73.47) and cereals (38.78). However, BMI did not decisively influence the distribution of the food groups consumed over the 24-hour, $X^2(8) = 13.23$, $p = 0.10$.

Fruits were consumed in higher proportion in Ploiesti than in the capital (74.52% vs. 66.90%) and so were the milk and dairy products (69.23% vs. 67.94%), but again the place of residence registered an insignificant influence upon the general distribution of food groups consumed per day, $X^2(4) = 3.34$, $p = 0.50$.

Table 7

Number of food groups consumed over the 24-hour according to sex, age group, body weight class, and place of residence

	Girls	Boys	14–15 years	16–17 years	18–19 years	Underweight	Normal weight	Overweight and obesity	Bucharest	Ploiești	Total
1 food gr.	10.37	5.78	9.76	9.82	3.91	8.05	8.36	8.16	8.01	8.65	8.28
2 food gr.	16.30	14.22	14.63	13.33	20.31	19.54	15.04	10.20	14.29	16.83	15.35
3 food gr.	33.33	32.00	29.27	33.33	33.59	40.23	30.64	34.69	32.75	32.69	32.73
4 food gr.	26.30	28.00	29.27	25.96	28.13	20.69	29.81	18.37	26.83	27.40	27.07
5 food gr.	13.70	20.00	17.07	17.54	14.06	11.49	16.16	28.57	18.12	14.42	16.57

Table 8

Prevalence of daily food groups consumption according to sex, age group, body weight class, and place of residence

	Girls	Boys	14–15 years	16–17 years	18–19 years	Underweight	Normal weight	Overweight and obesity	Bucharest	Ploiești	Total
Fruits	70.37	69.78	70.73	69.12	71.88	65.52	69.64	81.63	66.90	74.52	70.10
Vegetables	67.41	70.67	67.07	68.07	71.88	64.37	69.36	73.47	71.08	65.87	68.89
Meat, fish, eggs	79.26	88.44	89.02	83.16	80.47	79.31	83.29	91.84	86.76	78.85	83.43
Cereals	34.07	41.33	39.02	37.89	35.16	34.48	37.88	38.78	40.07	33.65	37.37
Milk, dairy products	65.56	72.00	63.41	69.82	68.75	64.37	70.19	63.27	67.94	69.23	68.48

CONCLUSIONS

The general poor adherence of the participants to the Mediterranean Diet does not constitute an unpredictable result, given that some characteristics of it (such as the fish or olive oil consumption) are quasi-nonexistent in our food tradition. However, even the price for these products remains highly prohibitive, other components of the diet (such as fruits, vegetables, nuts, and dairy products) have been poorer represented than expected.

The overall poor dietary diversity is another alarming issue; the reliance on proteins of animal origin comes with increased risk of cancer, osteoporosis, heart disease, cardiovascular disease and obesity and should be immediately addressed.

The measures aimed to correct or improve adolescents' diet should consider gender, age, and

body weight vulnerabilities; they have to reduce the fast food preference among the boys, and sweets consumption among girls; they have to promote an increased consumption of healthy whole grains, fresh fruits, and vegetables in both genders.

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