What do high school students eat?
A gender, residence, and body mass index perspective

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Abstract: *The article presents the results of a quantitative marketing research conducted on students from six high schools regarding their eating behaviour at school and at home during the school year and holidays. The purpose of this research is to identify what kind of products students consume on their way to school, during breaks and on their way back from school, what kind of food they eat at home during weekdays and weekends, the complementary behaviours while eating and their eating behaviour in their free time. Results are presented cross tabulated with gender, residence status and body mass index.*

Key-words: *quantitative research, eating behaviour, gender and residence status segmentation*

1. Introduction

Research shows students learn better when they are well nourished. Healthy eating has been linked to higher grades, better memory, more alertness, faster information processing and improved health leading to better school performance (Zied, 2007). Conversely, unhealthy eating habits can negatively affect learning (Adolphus, 2013).

So how healthy do Romanian students eat? The purpose of this research is to identify what kind of products students consume on their way to school, during breaks and on their way back from school, what kind of food they eat at home during weekdays and weekends, the complementary behaviours while eating and their eating behaviour in their free time.

2. Literature review

The latest research in public health care and nutrition makes the law that governs healthy eating in school and high school units (law 123 from 2008) seem obsolete in terms of its content and the latest marketing research is based on the premise that the law is also outdated since its implementation. Thus, the work of J.

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Keon (2010) draws attention to the danger of consuming animal-derived milk. Milk consumption is associated with high levels of fat and cholesterol, iron deficiency, diabetes and ovarian cancer.

In their article, "Red meat consumption and mortality: results from two prospective cohort studies" (2012), Pan et. al describe a long-term study (28 years) on a sample large (120,000 people) which demonstrated that meat consumption from mammals is related to an increased risk of cardiovascular disease, certain types of cancer and metabolic diseases.

Romania ranks 10th in the world in consumption of milk per capita per year, with 266.19 litter (Food and Agriculture Organization, 2007). This statistic also includes dairy products and other products that contain processed milk. When it comes to consuming meat, Romania ranks 53 in the world with 64.7 kg per capita per year in 2009, of which 33 kg of pork and 3.3 kg of animal fats (Food and Agriculture Organization, 2009). EU residents on average eat 36.86 kg of pork per year. Even if meat consumption is below the European average, consumption of animal and vegetable fats is above the European average.

Romanians consume 200 kg of grain per year, including pastries and bread, the European average is 109 kg of grain per year. Romanians consume on average less than 7 kg of oranges, 5 kg of apples and 2 kg of pears, against a European average of 57 kg of oranges, apples and pears (Gândul, 2012).

Studies on all age groups from kindergarten to high school showed that the behaviour of children and teenagers when it comes to food consumption may be influenced if necessary motivation is added. Thus, kindergarten and primary school children associate healthy food with the heroes of cartoons and comics (Wansink et al., 2012), and for students in middle school and high school, eating fast food is "at hand" in terms of time. If healthy food might seem more convenient, and eating fast food may seem less accessible, students would change their consumption behaviour (Hanks et al., 2012).

An unbalanced diet has long-term consequences on health. One of the indicators that contribute to describe the health status of the population of Romania is the number of patients that leave the hospital, by class of diseases. In 2007, the most common reasons for which Romanians were admitted to hospital are related to respiratory diseases (616,000 people), cardiovascular diseases (609,000 people), digestive diseases (464,000 persons), pregnancy and childbirth (384,000 people) and tumours (325,000 people). Of these classes of diseases, the ones associated with an unbalanced diet are cardiovascular diseases, digestive diseases and tumours. For all classes of diseases, since 1993, the number of patients has increased. The number of patients diagnosed for endocrine, nutritional and metabolic diseases has doubled by 2007 compared to 1993. The number of patients suffering from diabetes has increased by 64%, and for those diagnosed with tumours has increased by 80% (Pop, 2009).

3. Material and methods

To capture the eating behaviour of high school students, the author developed a nineteen-question quantitative questionnaire. The questionnaire was printed out and distributed into six high schools as follows: "Andrei Şaguna" National College in Braşov, "Remus Răduleţ" Technical College in Braşov, "Andrei Bîrseanu" Economic College in Braşov, "Emil Racoviţă" College in Braşov, "Radu Negru" National College in Făgăraş, and "Nicolae Iorga" National College in Vălenii de Munte. The questionnaires were distributed to students with the help of sports teachers from all six high schools. These six high schools were not chosen randomly, but with a precise segmentation in mind: the author managed to include in the sample individuals in such a way that the urban–rural distribution and the females–males distribution match the population's distribution. 991 questionnaires were introduced in the data base.

The sampling method used is non-random but produced a balance between male and female students. Thus the distribution is 49% male students to 51% female students.

Another identification variable is the urban area versus the rural area. This variable is important for the research as students from rural areas are believed to have a different eating behaviour as they need to travel further to reach their high-schools and thus they eat earlier in the morning and later in the afternoon as opposed to their counterparts that live in the city. The distribution is 61.5% urban students to 38.5% rural students. The population's distribution is 56% urban to 44% rural (INSSE, 2011).

The school - gender cross distribution and the school - residence status cross distribution are shown in the following tables.

		School						Total
		Remus Răduleţ	Andrei Şaguna	Andrei Bîrseanu	Nicolae Iorga	Radu Negru	Emil Racoviţă	
Gender	Male	86.21%	41.27%	56.13%	39.00%	36.50%	44.95%	49.04%
	Female	13.79%	58.73%	43.87%	61.00%	63.50%	55.05%	50.96%

Table 1. *The sample segmented between school and gender*

		School						Total
		Remus Răduleţ	Andrei Şaguna	Andrei Bîrseanu	Nicolae Iorga	Radu Negru	Emil Racoviţă	
Residence status	Urban	46.49%	85.71%	64.15%	28.00%	85.42%	70.00%	61.47%
	Rural	53.51%	14.29%	35.85%	72.00%	14.58%	30.00%	38.53%

Table 2. *The sample segmented between school and residence status*

The third identification variable was body mass index (BMI). Students were asked to give their weight and height, thus body mass index was calculated using the following formula:

$$BMI = weight/(height)^2$$

Students were divided into four categories: obese - with BMI above 30, overweight - with a BMI between 25 and 29.99, normal – with a BMI between 18.50 and 24.99 and underweight with a BMI below 18.50.

The BMI label - gender cross distribution is shown below.

		BMI category				Total
		Obese	Overweight	Normal	Underweight	
Gender	Male	1.18%	14.93%	70.14%	13.74%	100.00%
	Female	0.66%	6.39%	70.48%	22.47%	100.00%
Total		0.91%	10.50%	70.32%	18.26%	100.00%

Table 3. *The sample segmented between gender and body mass index category*

4. Results and discussions

The first direction of research was the food and beverage consumption habits of students on their way to school, at school and on their way back from school. The following charts include the mean values for how often different segments of high school students consume food on their way to school (left) and on their way back from school (right). The questions were designed as ordinal variables so that a small mean translates into a high frequency of occurrence and a high mean translates into a low frequency of consumption.

The first segmentation variable was residence status. As all students have their classes in the morning starting at 8 o'clock, the author supposed that students that commute from rural areas are not likely to have time to eat properly at home and thus have to buy food on their way to school (figure 1, left table). All means are smaller for rural students as opposed to urban students. On their way back from school (figure 1, right table) the difference between rural and urban students is less obvious as the means are closer for all groups of food products. Water and sandwiches have the highest frequency of consumption and fresh or dried fruits and coffee the lowest frequency of consumption.

The second segmentation variable was students' gender. Male students consume more fizzy drinks, more sandwiches and more chips, snacks, and crackers than females on both their way to school and back from school. Female students

consume more water and more fruits than male students. Both categories consume the same amount of coffee and fresh pastry and pretzels.
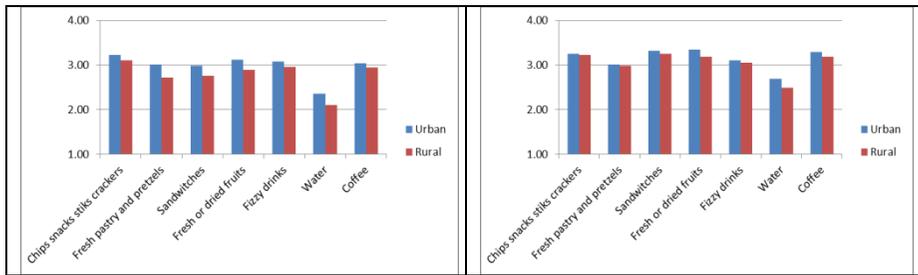

Fig. 1. *What students consume on their way (left) and on their way back from school (right) crossed with residence*
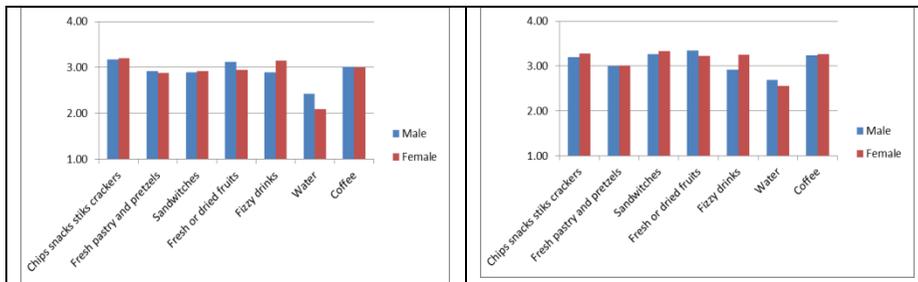

Fig. 2. *What students consume on their way (left) and on their way back from school (right) crossed with gender*
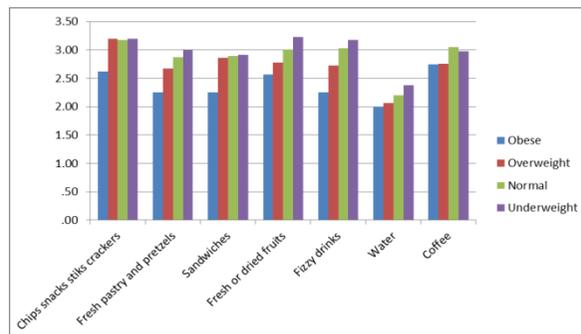

Fig. 3. *What students consume on their way to school crossed with BMI category*

The third segmentation variable is body mass index category. As one may notice the frequency of consumption is positively correlated with body mass index. Independent samples Student test were performed for all categories of foods and

beverages, and there's a significant difference between obese and normal weight students only in the consumption of fizzy drinks (significance level of 0.037).

The second question was a multi-choice question on what products students consumed during breaks in the past week. The results are shown in percentages of students who consumed the tested groups of food in the week previous to the research in the following charts using the segmentation variables: residence, gender and BMI category.

The most consumed products are homemade sandwiches, water and tea, pastry pretzels near school, fizzy drinks and coffee. The percentage of fresh and dried fruits is roughly the same, 37%. Male and female students consume homemade sandwiches to the same extent, female students drink more water and tea but male students drink more fizzy drinks. Female students consume more fresh and dried fruits but also more pastry pretzels. The consumption of coffee is the same for both residence and gender variables.

Obese and overweight students eat more pastry pretzels and drink more fizzy drinks than normal weighted students.
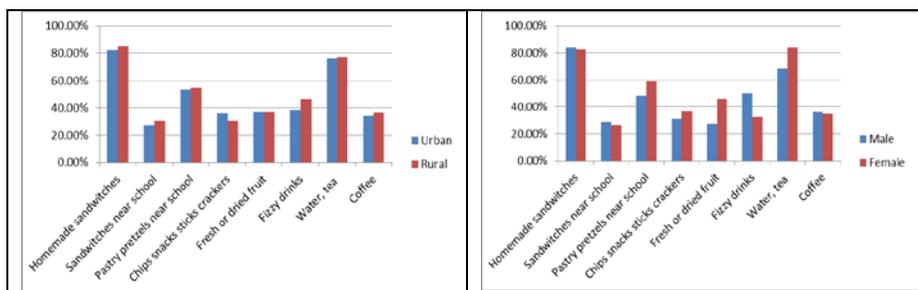

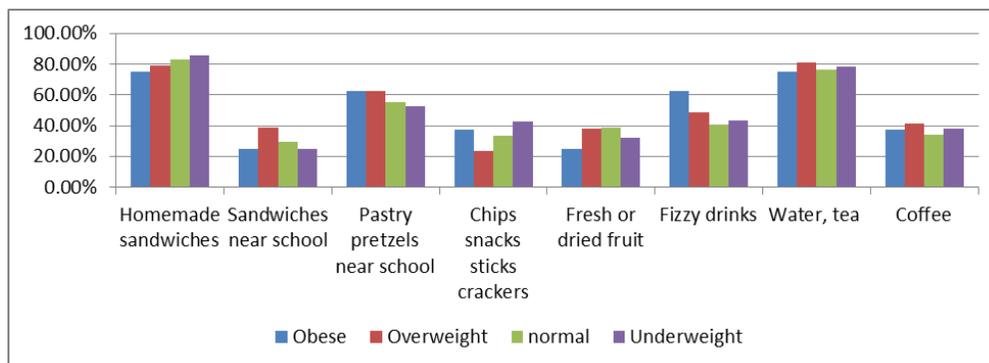Fig. 4. *What students consume on breaks crossed with residence (left) and gender (right)*

Fig. 5. *What students consume on breaks crossed with BMI category*

The meals students eat at home during the school year were analysed next. The first thing to be noted is that nearly all students from urban areas eat at least two meals per day and 75.25% of students eat three meals per day. In rural areas, 70.81% of students eat three meals per day. The following two tables include the data gathered from urban and rural students. 1 o'clock the following day was recorded as 25 so that the mean could be computed.

Although means for both rural and urban areas are close for all three meals (10 to 11 for the first meal, 16.00 to 17 for the second meal and 19 to 20 for the third), one may see that the standard deviation for rural students is larger than urban students for the first meal. This translates into a flatter distribution that means that students from rural areas eat more chaotic than urban students supposedly because of commuting.

	1st meal	2nd meal	3rd meal
Respondents	594	584	447
Mean	10.221	16.016	19.338
Std. Deviation	3.7643	2.4623	1.9213
Minimum	5.0	9.0	11.0
Maximum	22.0	23.0	25.0

Table 4. *Indicators for meals during weekdays for urban students*

	1st meal	2nd meal	3rd meal
Respondents	370	362	262
Mean	10.592	16.523	19.760
Std. Deviation	4.0501	2.4385	1.6726
Minimum	4.5	8.0	12.0
Maximum	18.0	24.0	25.5

Table 5. *Indicators for meals during weekdays for rural students*

The groups of food students eat at home in the week prior to the research are shown in the charts below cross tabulated with two segmentation variables: gender and residence. The question was designed as an ordinal variable so that a small mean translates into a high frequency of occurrence and a high mean translates into a low frequency of consumption. Male students eat bread and pastries, meat, milk and dairy products and fats more often than female students, whereas female students eat sweets, fresh fruit and fresh vegetables more often that male students. Urban students eat meat and milk and dairy products more often than rural students,

whereas rural students eat bread fruit and vegetables and sweets more often than urban students.

The lowest means that translate into high frequency of consumption are found for bread and pastries, meat, sweets, milk and dairy products and fresh fruit. The highest means are found for fats, fresh vegetables and cooked vegetables.
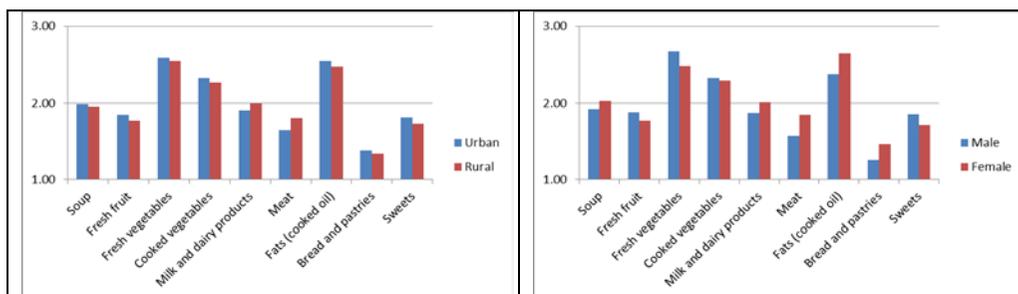

Fig. 6. *What students eat at home crossed with gender (left) and residence (right)*

When it comes to complementary behaviours while eating, the means show that students use their phones and tablets, listen to music and watch television, in this order. The question was designed as an ordinal variable so that a small mean translates into a high frequency of occurrence and high mean translates into a low frequency of occurrence. Female students use their phones and tablets, listen to music, watch television and eat while standing more often than male students. Male students sit at their computers more often.
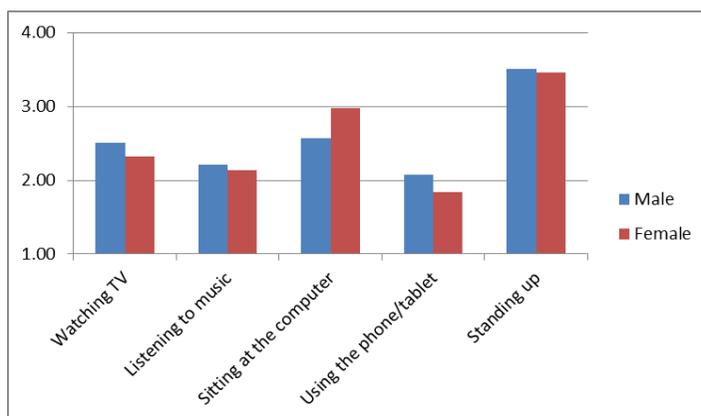

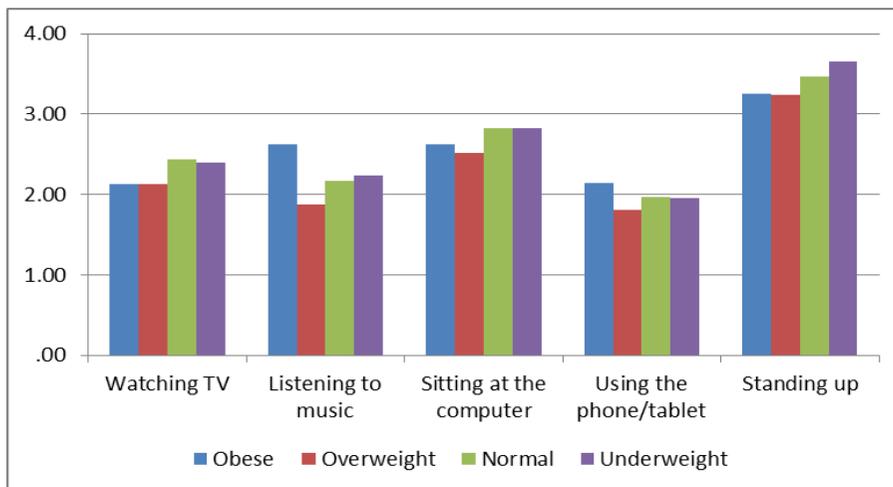Fig. 7. *Complementary behaviours while eating crossed with gender*

Fig. 8. *Complementary behaviours while eating crossed with BMI category*

The analysis of complementary behaviours crossed with BMI categories reveals that even though obese and overweight students eat while watching TV and while using their phones more frequently than normal students, there are no significant differences between their means.

The following questions involved the behaviour of students during weekends and holidays. The first thing to be noted is that all students from urban areas eat at least two meals per day and 91.85% of students eat three meals per day. In rural areas, all students eat two meals per day and 93% eat three meals per day. The following two tables include the data gathered from urban students and semi-urban students. 1 o'clock the following day was recorded as 25 so that the mean could be computed.

Although the means are close for all three meals (10 o'clock for the first meal, 14.30 to 15 o'clock for the second meal and 20 o'clock for the third), one may see that the standard deviations are far smaller than in the case of meals during weekdays. This means that students from both urban and rural areas eat more organized.

	1st meal	2nd meal	3rd meal
Respondents	589	584	541
Mean	10.264	14.798	19.532
Std. Deviation	1.6327	1.7421	1.5293
Minimum	3.0	11.0	13.0
Maximum	18.0	22.0	25.0

Table 6. *Indicators for meals during weekends for urban students*

	1st meal	2nd meal	3rd meal
Respondents	374	374	348
Mean	10.019	14.603	19.461
Std. Deviation	1.5542	1.8907	1.4935
Minimum	4.0	12.0	15.0
Maximum	19.0	23.0	27.0

Table 7. *Indicators for meals during weekends for rural students*

When students go out on weekends and holidays they consume the following products in descending order: ice-cream (seasonal product, the research was conducted in September), fizzy drinks, pizza, sandwiches, shaorma and coffee. Male students spend on average 40 lei with a standard deviation of 24 lei and female students spend on average 29 lei with a standard deviation of 15 lei. The difference is statistically significant. There's no statistic difference between urban students and semi-urban students.
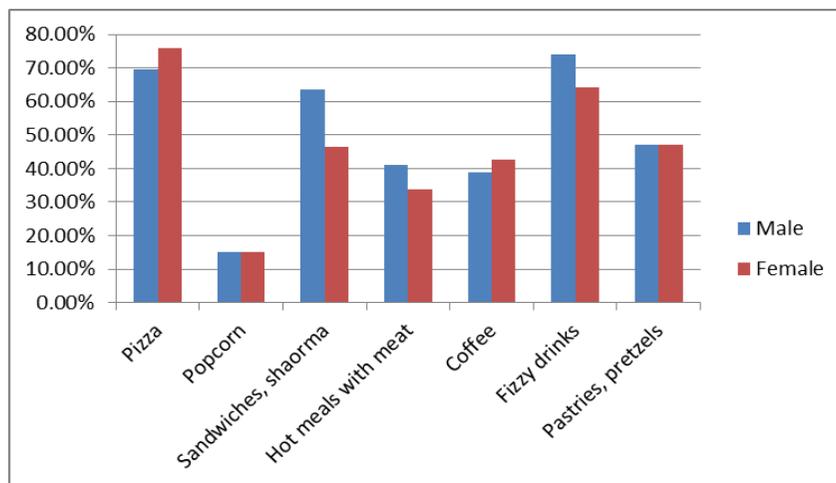

Fig. 9. *What students consume when they go out crossed with gender*
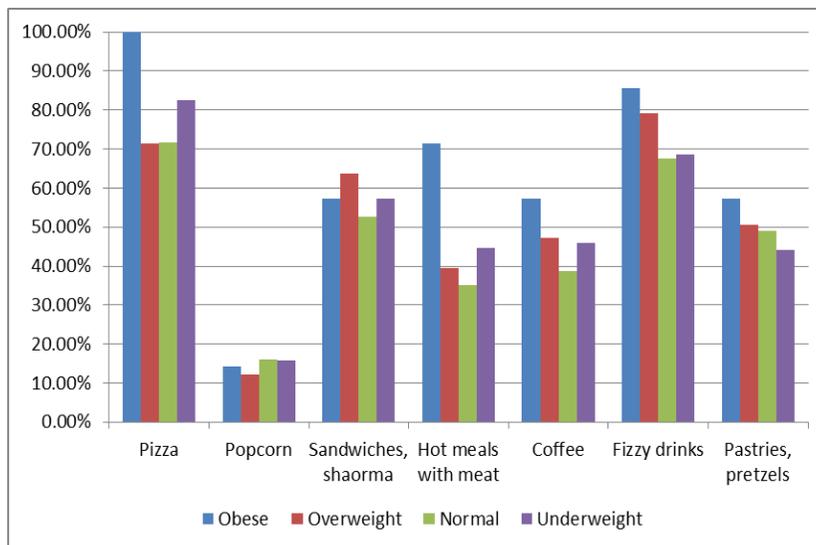
Fig. 10. *What students consume when they go out crossed with BMI category*

Obese students eat significantly more pizza, hot meals with meat and drink significantly more coffee and fizzy drinks than normal weighted students. The differences between any other BMI categories are not significant.

The research took place during the first semester of the school year. The current legislation states that all students should have attended their general physician in order to go to school. Thus the author found useful to ask the students when was the last time they went to see their general physician. The mean is 3.4 months with a standard deviation of 4.8 months and a maximum of 59 months. 21% of students have not seen their general physician in the months prior to the beginning of the school year and 6.2% of students haven't seen theirs in a year or more. The difference between urban students and rural students is significant (significance level of 0.03)

The last two questions were how much physical activity they undertake at school, outside school and if they considered they eat healthy. The results are shown in the following figures cross tabulated with the gender. As supposed, male students do more physical activity than female students (the median for males is "much", the median for females is "so and so"), with five times more females answering "very little". The difference between the two groups is significant (significance level of 0.001). 88% of male students do sports in school compared to 80% females, and the difference is significant.

The same pattern applies when students were asked how healthy they considered they eat. Only 2% of females answered "very healthy" compared to 6.4% males. The difference is significant (significance level of 0.002).
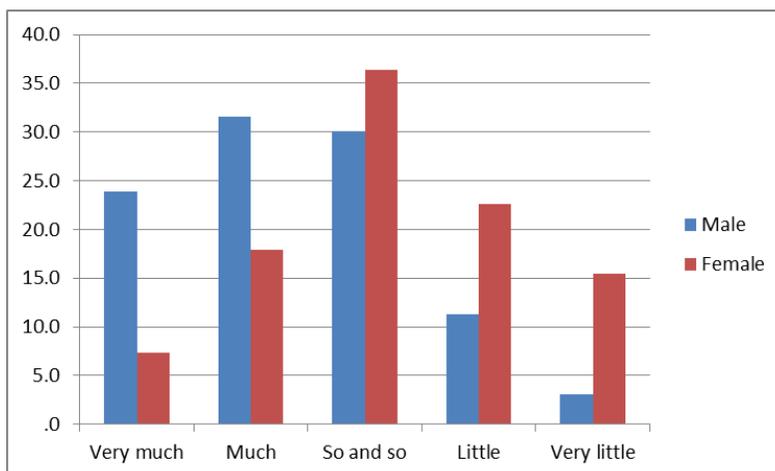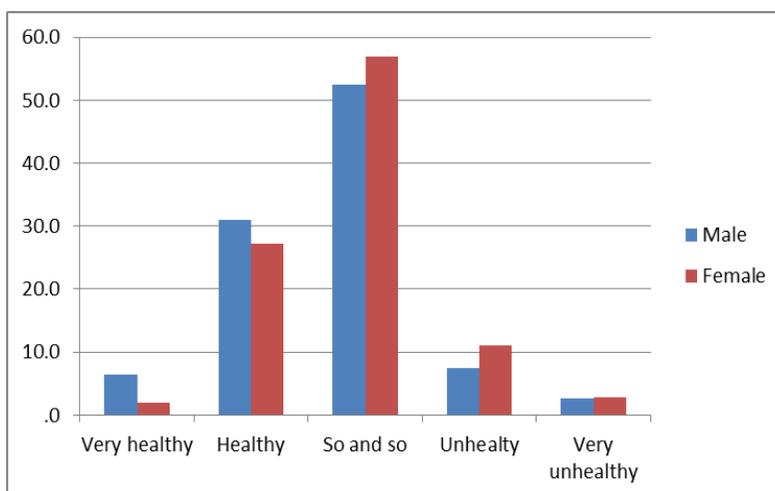
Fig. 11a. *Physical activities outside school*

Fig. 11b. *How healthy students believe they eat crossed with gender*

5. Conclusions

The first direction of research was the eating behaviour related to school. As they spend more time commuting, rural students consume more food and beverages on their way to and from school. Male students consume more food and beverages on their way to school, but females consume more pastries and coffee on their way

back from school, products that are associated with socializing among peers. During school breaks most students eat homemade sandwiches and generally female students eat and drink healthier than male students. More than 50% of males drink fizzy drinks and more than 40% of females drink coffee at school.

The time of students' meals is a source of great concern. Students eat very chaotic and that translated into large standard deviations for the time of their meals, rural students having significantly larger standard deviations due to commuting. 75% of students eat three meals per day.

At home students eat bread and pastries, meat, soups, milk, and dairy products. Fresh fruit is the least consumed category for all segments. Besides eating poorly and at irregular time, students engage in complementary activities while eating: using their phones and tablets, listening to music, watching TV and eat while standing.

Taking into account all the information given by students in the questionnaire, the most striking fact is that most of them answered that they believe they eat "healthy" and "so and so". Besides the bad habits and unhealthy behaviour, students also lack information about healthy nutrition at their age.

The limitation of this quantitative research comes from the fact that the sampling is not random, and thus the results cannot be extrapolated to the whole researched population. Also, the reasons why students choose certain groups of food and beverages were not taken into account at this point. Further research is needed to map the whole behaviour of students with details on buying behaviour, reasons for choosing certain products and their attitudes towards a healthy life style.

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