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THE RELATIONSHIP BETWEEN THE BMI VALUE OF CHILDREN AND THE FINANCIAL SITUATION OF FAMILIES, AS WELL AS THE AGE OF CHILDREN

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ABSTRACT

Aim:

The research aimed to establish whether the family's financial situation had an impact on the BMI values of the children studied, to determine the link between the family's financial situation, the child's age and the frequency children were given selected foodstuffs, as well as to verify whether the frequency of consumption of selected foodstuffs has an impact on children's BMI values.

Methods:

BMI values were calculated for each child. Dietary habits were studied using a developed proprietary questionnaire. The questionnaire contained a list of products from 12 food groups, wherein vegetables and fruit were analysed separately, but without a division into those rich in vitamin C and carotene.

Results:

Analysis of the study group according to financial situation showed, to name a few, that the median consumption of fish, cold meats and potatoes among children from families declaring their financial situation as average was lower than that in the remaining groups.

Children with a good financial situation consumed eggs and poultry statistically significantly more often than those with an average financial situation, and significantly less often - cakes and biscuits. Children over 11 years old consumed ready sauces (ketchup, mayonnaise) more often than younger children.

Conclusion:

The consumption of particular foodstuffs was affected by the families' financial situation and the age of children. Children from families with an average financial situation consumed vegetables less often than the remaining children. Despite there being no effect of the frequency of particular foodstuffs consumption on BMI, one in five people were overweight. It is crucial that the healthy lifestyles and proper diet programmes are implemented in educational establishments.

Keywords: age, children, economic status, nutrition

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INTRODUCTION

Shaping dietary habits is dependent on many factors. Some of the most important are social and economic conditions,1,2 which are the subject of research of many scientists. Numerous studies indicate that a low socio-economic status is linked to limited access to appropriate healthcare and also determines individual abnormal dietary behaviours.3,4

In households, it is parents who take the decisions regarding the purchase of particular foodstuffs, the dishes served and the types of dishes prepared for children to take to school.2 This means that children are dependent to a large degree on their parents for the composition of their diet. Children gain experience and behaviours through modelling themselves on others, the food available in the home, and parental behaviours, all of which are important in a child's development and also have an impact on their adult life.1 As they grow older, children gain new skills, develop greater autonomy and shape their own dietary behaviours, while at the same time being subject to pressure from their peer group. One critical period is puberty, that is the period when children often partake in experimentation of their own accord. This can lead to the refusal to accept some groups of food, thus forcing parents to change dietary behaviours, which does not mean that these changes are beneficial or appropriate. Despite the increase in the popularity of a healthy lifestyle, there is a strong tendency towards unhealthy behaviours. Excessive amounts of sweet snacks, consumption of energy drinks and the elimination of milk from the diet, as well as low consumption of fruit and vegetables, increase the frequency of the occurrence of excess body weight, with a simultaneous deficiency in nutrients and an increase in the frequency of chronic illnesses.5,6

A key factor affecting dietary choices and the type of food purchased is the family's financial situation. The standard of living is dependent to a large degree on income. A poorly balanced diet is particularly noticeable among low-income families.1

Research conducted by the Central Statistical Office showed that in 2022, the financial situation of Polish families worsened in real terms due to the high level of inflation, despite the increase in average earnings.7 According to 2024 CBOS research, in describing their financial situation and how they manage money, over half of respondents admitted that they live at an average level – described by the phrase 'There's enough money for day-to-day expenses, but I need to save up for more serious expenses'.8

The standard of living was also affected by the coronavirus pandemic, the war beyond Poland's eastern border and steadily rising inflation. In 2022, there was a drop in the consumption of basic foodstuffs, in particular fish, fruit and animal fats. In 2023, there was a drop in the consumption of sugar, margarine, vegetable fats and pasta. Concurrently, the actual average consumption of vegetables per month fell by 0.5 kilograms per person.7,9

A correctly balanced diet should contain foodstuffs from all 12 food groups. The main source of energy in the diet should be cereal products, and the daily diet should include milk and dairy products, while every meal should have vegetables and fruit.1

RESEARCH OBJECTIVES

The research aimed to establish whether the family's financial situation had an impact on the BMI values of the children studied, to determine the link between the family's financial situation, the child's age and the frequency children were given selected foodstuffs, as well as

to verify whether the frequency of consumption of selected foodstuffs has an impact on children's BMI values.

Study design

The research was conducted of 2023 among children attending schools within the jurisdiction of the city of Bielsko-Biała. Anthropometric measurements were carried out on each child and BMI values were then calculated. The pupils' age was calculated on the basis of their date of birth, taking into account divisions according to calendar years.11 The BMI value was calculated for each pupil, and ranked according to the WHO reference values.12,13,14,15 The research on dietary habits was conducted using a proprietary questionnaire developed.

The questionnaire contained a list of products from 12 food groups, wherein vegetables and fruit were analysed separately, but without a division into those rich in vitamin C and carotene. The questionnaire additionally took into consideration the consumption of: dinner dishes (dumplings, pancakes), fast food dishes (toasties, pizza, hamburgers), snacks (crisps), nuts, cakes and biscuits, chocolate, sweetened drinks (cola, Fanta, sprite), and juices (ready juices in boxes). Analysis was also conducted on the consumption of poultry and red meat (beef, pork), as well as fish, high quality ham, cold meat products (sausages, frankfurters, meat pastes, black pudding), and ready sauces (such as ketchup and mayonnaise). To facilitate the interpretation of the results on the frequency of the consumption of selected food products, the variables were recoded.16

Study group

The research was conducted on 677 pupils aged 7-18 years old. 59 questionnaires were not taken into consideration in the analysis, including 30 for health reasons (allergies, lactose intolerance). In total, 618 questionnaires were included in the analysis. The analysis included 290 boys and 328 girls. For statistical purposes, the participants were divided into 3 research groups: pupils up to 9 years old, pupils aged 9-11 years old, and pupils above 11 years old (Table 1).

The questionnaire included the possibility to individually define the family's financial situation by selecting one of five possibilities.17

For statistical purposes, due to the extremely small number of responses in the financial situation category the money is not enough for the cheapest food and clothes and the money is enough for the cheapest food and clothes, these were merged with the category we live frugally and there are problems with larger purchases.

Study Statistical analysis

The statistical analysis was conducted in the R statistical environment version 3.6.0, the PSPP programme and MS Office 2019, for analysis of pupils divided into groups according to gender and age. For all of the analysed variables, the minimum, maximum, median and average values were calculated. The level of significance adopted in the research was $p = 0.05$.

Study Ethics Committee permission

The research was approved by the Ethics Committee and was granted written approval no. 2023/3/18/E/21 of 14.03.2023, in accordance with the Helsinki declaration.

RESULTS

In the study group, 73.6% of pupils had the correct body weight, with more than 20% of participants having excess body mass. In terms of financial situation, over 60% of the participating families declared that they are in a good situation, and 25.6% declared a very good financial situation (Table 1).

Analysis of the study group according to financial situation showed that the median consumption of fish, cold meats and potatoes among children from families declaring their financial situation as average was lower than that of the remaining groups. Median consumption across the different age groups showed that youngsters over 11 years old

consumed fish, chocolate and jam less often than the other groups, although they more often consumed sugar and sweetened drinks. Analysis of BMI values and the frequency of consumption of poultry, eggs, vegetables, sugar, cakes, biscuits, snacks and sweetened drinks showed that these differed statistically significantly between groups selected according to the family's financial situation. There were also statistically significant differences between groups divided according to age with regard to the consumption of red meat, fish, eggs, ready sauces, chocolate and tea (Table 2).

Analysis of the results showed differences between BMI values and the frequency of consumption of vegetables among children with an average, good and very good financial situation. Children in all groups (very good, good and average financial situation) ate vegetables with the same frequency (3 times a week), but children from families with a very good financial situation had higher BMI values than the remaining children. In terms of the consumption of eggs, poultry, cakes and biscuits, statistically significant differences were noted between children with an average financial situation and those with a good financial situation. Children with a good financial situation ate eggs and poultry more often than children with an average financial situation. Children with an average financial situation ate cakes and biscuits more often than children with a good financial situation. Children with a good financial situation statistically significantly less often consumed snacks than those with a very good and average financial situation (Table 3). In the groups divided according to the families' financial situation, there were statistically significant differences in the frequency of the consumption of selected foodstuffs, but that these did not affect the BMI values (Table 4).

The median consumption of eggs and red meat among children in every age group was 3.00. However, it was found that despite the identical medians, children over 11 years old statistically significantly consumed eggs and red meat less often than children aged 9.1-11 years old. The children over 11 years old consumed ready sauces statistically significantly more often than those aged up to 9 years old. A pairwise comparison test showed that children over 11 years old statistically significantly consumed fish and chocolate less often than younger children (Table 5).

DISCUSSION

Dietary preferences are shaped during the process of upbringing and socialisation, although genetic and environmental factors also play a role.16

In recent times there have been changes to the lifestyle and dietary habits of adolescents. A slim figure is considered to be a synonym of success, happiness, elegance and also a good education. This powerful promotion of slimness may be a trigger factor for anorexia and bulimia.5 Contemporary culture, characterised mainly by the phenomenon of consumption, is a defining factor in young people's identity. Due to the variety and wide availability of high-calorie food and dishes, there is an increased risk of the phenomenon of excessive body weight, which has a tendency to continue into adulthood.18,19

Young people in Poland are characterised by higher indicators of unhealthy behaviours in comparison to young people from other countries. At the same time, the most important period for shaping correct dietary habits and a healthy lifestyle is the teenage years, combined with the possibility to copy the behaviour of other family members.20

Analysis of the research results taking into account the age of the participants showed differences in the frequency of consumption of individual foodstuffs. At the same time, it was shown that children over 11 years old consumed ready sauces, i.e. ketchup and mayonnaise, more often than younger children. The frequency of the consumption of selected foodstuffs was also dependent on families' financial situation – children from families with a very good financial situation more often consumed sugar and sweetened drinks, while children from

families with an average financial situation more often consumed snacks. It was also shown that children from families with an average financial situation consumed vegetables less often than the remaining children. The differences were statistically significant; however they did not affect BMI values. Despite the lack of an impact of the frequency of consuming foodstuffs on BMI, one in four of the research participants were found to have incorrect body mass, of which one in five were overweight.

Research conducted in 2015-2016 in Polish schools by the Supreme Audit Office confirmed that incorrect body weight affects one in five pupils.21

Research into adolescents from Eastern Poland conducted by Hemeniuk et al. did not find such a numerous group with incorrect body mass. Among 150 pupils from primary, middle and high schools, as many as 77% had the correct body mass. Both excessive and insufficient body mass affected one in ten participants.22

Incorrect body mass is not only a problem among children and adolescents in Poland. In Finland, for example, analysis was conducted of body mass and height measurement data collected during doctor's appointments in children's clinics or in school healthcare centres in the years 2014-2022. In children aged between two and sixteen years old, excessive body mass was found in 29% of boys and 18% of girls, of which 13% (9% of boys and 4% of girls) were obese. This research also analysed the children's families' financial situation. The multivariate analysis conducted by the authors showed an increase in the occurrence of excessive weight and obesity in children living in rural areas and in those from families with low socio-economic status.23

The link between family income, food shortages and excessive weight has also been found in children in the USA. The family's financial situation was determined on the basis of the family's total income in US dollars for the previous 12 months. The research showed a higher frequency of excessive weight in children from low-income families suffering from food shortages.24

It is difficult to compare the above research results with those of this study and of other Polish researchers, amongst others due to the differences in determining the families' financial situation (e.g. various currencies) and the dietary status of the participants. It is a fact that poverty and a lack of food security are serious problems in the contemporary world, as well as being determinants of children's health.25

It can clearly be seen that American children from families with a low socio-economic status are more at risk of becoming overweight than other children.26 In children who have experienced food shortages, the risk of suffering from excessive weight, or even obesity, is 1.5-1.68 times higher in comparison to children that have not experienced poverty.27

In 2023, the situation of households in Poland was better than in previous years. Average incomes increased, while actual expenses decreased by 1.8% compared to expenses in 2022. However, the subjective assessment of a household's financial situation does not always correlate with the family's actual income. In 2023, 29.3% of Polish families had a monthly income per family member below 2000 PLN, while 51.3% had an income of between 2000-4000 PLN, and 19.4% had an income above 4000 PLN. At the same time, in a subjective assessment of families' financial situation, 54% of respondents described it as 'good' or 'quite good', while 41.1% described it as 'average'.9

In analysing the financial situation of Polish families, other authors demonstrated that 45% of respondents consider their financial situation to be good, while 35% consider it to be very good.22 In our research, somewhat different results were obtained. A very good financial situation was selected by 25.6% of the children's parents, while 60.7% chose a good financial situation.

It is well-known that higher income allows for greater freedom in dietary choices, as well as in the way of spending free time.28

American research conducted among overweight adolescents aged 13-17 years old from environments with a low economic status showed that peers also have a negative impact on dietary choices. This translates into the consumption of high-calorie food that is deficient in nutrients, which has a detrimental effect on teenagers' body mass. The researchers also showed that adolescents mistakenly interpret issues related to health food, associating it with eco-friendly food, which can contain, for example, high amounts of sugar.29 Our research did not demonstrate an impact of the frequency of the consumption of selected groups of food products on body mass. It can therefore be supposed that this is related to the dietary choices made by parents. However, it was found that older children consumed ready sauces such as mayonnaise or ketchup more often than the remaining research participants. The participants' high consumption of this type of foodstuff, as well as of sweetened products and snacks, demonstrates a lack of education related to a correctly balanced diet.

In Poland, the majority of schools have so-called school tuck shops that offer a very wide range of products, including sandwiches, buns and water, but also chocolate bars, sweets, jellies, biscuits, corn chips, crisps, juices and fruit drinks. While it is true that there are rules regulating the amount of sugar in food products, in reality the permitted levels are very high. For semi-sweetened and sweetened bread products it is 15 grams of sugar in 100 grams of ready-to-eat product, and for dairy products (yoghurts, flavoured milk, processed cheese) it is 13.5 grams in 100 grams of ready-to-eat products.30 Assuming that one teaspoon of yoghurt is 15 grams, with 4.3 grams of sugar, then for every 7 teaspoons of yoghurt there are around 3 teaspoons of sugar.

Analysis of the available literature did not reveal research addressing the financial situation of families in the context of incorrect body mass in the form of its deficiency. It should be remembered that both excessive and insufficient body mass have negative consequences. Excessive weight and obesity bring the risk of numerous circulatory system diseases, diabetes and problems with the bones and joints.31 Children suffering from obesity are more often subject to bullying and social exclusion. This group also more often has lower self-esteem in comparison to their peers, as well as dissatisfaction with their body image.32

Food deficiencies are particularly important in the teenage years, when changes occur in the body related to intensified growth, but also when puberty can have a detrimental effect on subjective feelings related one's own body image. This can lead to decisions being taken on applying restrictive diets. Sometimes, young people do not eat any meals, despite feeling hungry, thinking that in this way they will achieve a slim figure that will ensure them success and popularity.29

In the available literature, analysis of issues related to parents' knowledge and rational dietary habits, in particular the calorie content of dishes, shows that one in three parents do not know what the recommended proportion of individual nutrients is in the daily calorie intake.15

This is confirmed by our research, which found too infrequent consumption of vegetables (only 3 times a week) and too frequent consumption of snacks, sweetened drinks and sugar. In all the study groups, the median consumption of wholemeal bread was 0, while for fast food it was 4, indicating consumption once a month.

Analysis of the dietary patterns of teenagers showed that the consumption of fruit and vegetables is below the recommended level.33

Research on the European population in 36 countries conducted in 2015-2017 as part of the fourth round of COSI showed that 42.5% of children consumed fresh fruit daily, while 7.5% never consumed fresh fruit or ate it less often than once a week. One in four participants

ate vegetables daily, while 14% did not eat them at all or ate them less often than once a week. Meanwhile, 5.2% of participants consumed salty snacks daily. One in ten consumed sweets daily, while they were not present at all in the diet of one in three participants. The most sweets are consumed by children in Spain (56.7%) and Portugal (67.8%).16

A significant problem around the world is the use by parents of a system of rewards with sweets or 'favourite' dishes.34 However, our research did not analyse this issue.

As they grow older, young people become responsible for their actions in various aspects of life, including dietary habits and physical activity.22

Marketing that promotes mainly food and drinks with a low nutritious value has a direct impact on knowledge about diet, and models of consumption and health related to diet.16

CONCLUSIONS

The consumption of particular foodstuffs was affected by the families' financial situation and the age of children. Children from families with an average financial situation consumed vegetables less often than the remaining children. Despite there being no effect of the frequency of particular foodstuffs consumption on BMI, one in five people were overweight. It is crucial that the healthy lifestyles and proper diet programmes are implemented in educational establishments.

Disclosures

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TABLE 1 Study groups characteristics

Gender and age group		**Number**	**Percentage**
Boys		290	46.90%
	up to 9 years old	*100*	*34.5%*
	9.1-11 years old	*71*	*24.5%*
	over 11 years old	*119*	*41%*
Girls		328	53.10%
	up to 9 years old	*78*	*23.8%*
	9.1-11 years old	*122*	*37.8%*
	over 11 years old	*128*	*39%*
BMI scores		Number	Percentage
Underweight (below the 5th percentile)		34	5.50%
Correct (5th-85th percentile)		455	73.60%
Overweight (85th-95th percentile)		64	10.40%
Obese (above the 95th percentile)		65	10.50%
Financial situation		Number	Percentage
Very good: there is enough money for everything without saving		158	25.60%
Good: we live frugally and there is enough money for everything		375	60.70%

Average:		
we live frugally and there are problems with larger purchases	64	10.40%
the money is enough for the cheapest food and clothes	19	3.10%
the money is not enough for the cheapest food and clothes	2	0.30%

TABLE 2 Dependencies between BMI values and the frequency of the consumption of selected food products and the family's financial situation, and the frequency of the consumption of selected food products and study participants' age.

Analysed variable	Financial situation	*Min*	*Max*	*Me*	*p*	Age group	*Min*	*Max*	*Me*	*p*
BMI	very good	12.79	30.62	18.73	**0.002**					
	good	12.90	36.71	18.00						
	average	13.27	23.91	17.67						
Cereal products – flakes	very good	0.00	5.00	3.00	0.097	up to 9 years old	0.00	5.00	3.00	0.987
	good	0.00	5.00	3.00		9.1 - 11 years old	0.00	5.00	3.00	
	average	0.00	5.00	4.00		over 11 years old	0.00	5.00	3.00	
Cereal products – wholemeal bread	very good	0.00	5.00	0.00	0.746	up to 9 years old	0.00	5.00	0.00	0.071
	good	0.00	5.00	0.00		9.1 - 11 years old	0.00	5.00	0.00	
	average	0.00	5.00	0.00		over 11 years old	0.00	5.00	0.00	
Groats, rice, pasta	very good	0.00	4.50	2.00	0.517	up to 9 years old	0.00	5.00	2.00	0.990
	good	0.00	5.00	2.00		9.1 - 11 years old	0.00	4.50	2.00	
	average	0.00	4.00	2.00		over 11 years old	0.00	4.50	2.00	
Milk and dairy products	very good	0.50	5.00	4.00	0.052	up to 9 years old	0.00	5.00	4.00	0.058
	good	0.00	5.00	4.00		9.1 - 11 years old	0.00	5.00	4.50	
	average	0.50	5.00	4.00		over 11 years old	0.50	5.00	4.00	
Red meat	very good	0.00	5.00	3.00	0.507	up to 9 years old	0.00	5.00	3.00	**0.049**
	good	0.00	5.00	3.00		9.1 - 11 years old	0.00	5.00	3.00	
	average	0.00	5.00	3.00		over 11 years old	0.00	5.00	3.00	
Poultry	very good	0.00	5.00	4.00	**0.049**	up to 9 years old	0.00	5.00	4.00	0.254
	good	1.00	5.00	4.00		9.1 - 11 years old	2.00	5.00	4.00	
	average	0.00	5.00	4.00		over 11 years old	0.00	5.00	4.00	
Fish	very good	0.00	3.00	2.00	0.461	up to 9 years old	0.00	4.00	2.00	**0.001**
	good	0.00	4.00	2.00		9.1 - 11 years old	0.00	4.00	2.00	
	average	0.00	4.00	1.00		over 11 years old	0.00	4.00	1.00	
Cold meats	very good	1.50	4.00	2.50	0.631	up to 9 years old	1.50	4.00	2.50	0.972
	good	1.50	4.00	2.50		9.1 - 11 years old	1.50	4.00	2.50	
	average	1.50	4.00	2.00		over 11 years old	1.50	4.00	2.50	
High quality hams	very good	0.00	5.00	4.00	0.688	up to 9 years old	0.00	5.00	4.00	0.364
	good	0.00	5.00	4.00		9.1 - 11 years old	0.00	5.00	4.00	
	average	1.00	5.00	4.00		over 11 years old	0.00	5.00	4.00	
Eggs	very good	0.00	4.00	3.00	**0.006**	up to 9 years old	0.00	4.00	3.00	**0.024**
	good	0.00	4.00	3.00		9.1 - 11 years old	0.00	4.00	3.00	

Analysed variable	Financial situation	*Min*	*Max*	*Me*	*p*	Age group	*Min*	*Max*	*Me*	*p*
	average	1.00	4.00	3.00		over 11 years old	0.00	4.00	3.00	
	very good	0.00	5.00	5.00		up to 9 years old	0.00	5.00	5.00	
Butter	good	0.00	5.00	5.00	0.287	9.1 - 11 years old	0.00	5.00	5.00	0.055
	average	0.00	5.00	5.00		over 11 years old	0.00	5.00	5.00	
	very good	0.00	4.00	3.00		up to 9 years old	0.00	4.00	3.00	
Cream	good	0.00	4.00	3.00	0.066	9.1 - 11 years old	0.00	4.00	3.00	0.956
	average	0.00	4.00	3.00		over 11 years old	0.00	4.00	3.00	
	very good	0.00	3.00	2.00		up to 9 years old	0.00	3.00	2.00	
Fats	good	0.00	3.00	2.00	0.615	9.1 - 11 years old	0.00	3.00	2.00	0.703
	average	0.00	3.00	2.00		over 11 years old	0.00	3.00	2.00	
	very good	0.00	3.00	2.00		up to 9 years old	0.00	3.00	2.00	
Olive oil, oil	good	0.00	3.00	2.00	0.388	9.1 - 11 years old	0.00	3.00	2.00	0.179
	average	0.00	3.00	2.00		over 11 years old	0.00	3.00	2.00	
	very good	0.00	5.00	4.00		up to 9 years old	0.00	5.00	4.00	
Potatoes	good	0.00	5.00	4.00	0.240	9.1 - 11 years old	0.00	5.00	4.00	0.946
	average	0.00	5.00	3.00		over 11 years old	0.00	5.00	4.00	
	very good	1.00	5.00	4.00		up to 9 years old	0.00	5.00	4.00	
Vegetables	good	0.00	5.00	4.00	**0.024**	9.1 - 11 years old	0.00	5.00	4.00	0.168
	average	0.00	5.00	4.00		over 11 years old	0.00	5.00	4.00	
	very good	0.00	5.00	4.00		up to 9 years old	0.00	5.00	4.00	
Fruit	good	0.00	5.00	4.00	0.585	9.1 - 11 years old	0.00	5.00	4.00	0.445
	average	3.00	5.00	4.00		over 11 years old	0.00	5.00	4.00	
	very good	0.00	5.00	1.00		up to 9 years old	0.00	4.00	1.00	
Dry legume seeds	good	0.00	5.00	0.00	0.437	9.1 - 11 years old	0.00	5.00	0.00	0.600
	average	0.00	4.00	0.00		over 11 years old	0.00	5.00	0.00	
	very good	0.00	5.00	5.00		up to 9 years old	0.00	5.00	4.00	
Sugar	good	0.00	5.00	4.00	**0.024**	9.1 - 11 years old	0.00	5.00	4.00	0.531
	average	0.00	5.00	5.00		over 11 years old	0.00	5.00	5.00	
	very good	0.00	4.00	1.50		up to 9 years old	0.00	4.00	1.50	
Cakes, biscuits	good	0.00	5.00	1.50	**0.007**	9.1 - 11 years old	0.00	5.00	1.50	0.153
	average	0.00	4.00	1.50		over 11 years old	0.00	4.00	1.50	
	very good	0.00	5.00	4.00		up to 9 years old	1.00	5.00	4.00	
Chocolate	good	0.00	5.00	4.00	0.250	9.1 - 11 years old	0.00	5.00	4.00	**0.001**
	average	0.00	5.00	4.00		over 11 years old	0.00	5.00	3.00	
	very good	0.00	5.00	3.50		up to 9 years old	0.00	5.00	4.00	0.850
Jams	good	0.00	5.00	3.00	0.613	9.1 - 11 years old	2.00	5.00	4.00	
	average	2.00	5.00	4.00		over 11 years old	0.00	5.00	3.00	
Dinner dishes (fritters, dumplings, pancakes)	very good	0.00	3.33	1.33		up to 9 years old	0.00	2.67	1.33	
	good	0.00	2.67	1.33	0.214	9.1 - 11 years old	0.00	3.33	1.33	0.877
	average	0.33	2.67	1.33		over 11 years old	0.00	2.67	1.33	
Ready sauces (ketchup, mayonnaise)	very good	0.00	4.00	3.00		up to 9 years old	0.00	4.00	3.00	
	good	0.00	4.00	3.00	0.864	9.1 - 11 years old	0.00	4.00	3.00	**0.049**
	average	0.00	4.00	3.00		over 11 years old	0.00	4.00	3.00	
Snacks	very good	0.00	4.00	2.00	**0.001**	up to 9 years old	0.00	4.00	1.33	0.130

Analysed variable	Financial situation	*Min*	*Max*	*Me*	*p*	Age group	*Min*	*Max*	*Me*	*p*
	good	0.00	4.00	1.33		9.1 - 11 years old	0.00	4.00	2.00	
	average	0.00	4.00	2.00		over 11 years old	0.00	4.00	1.33	
	very good	0.00	5.00	3.00		up to 9 years old	0.00	5.00	3.00	
Juices	good	0.00	5.00	3.00	0.354	9.1 - 11 years old	0.00	5.00	3.00	0.308
	average	0.00	5.00	3.00		over 11 years old	0.00	5.00	3.00	
	very good	0.00	3.25	1.00		up to 9 years old	0.00	3.00	1.00	
Fast-food	good	0.00	3.25	1.00	0.514	9.1 - 11 years old	0.00	3.25	1.00	0.175
	average	0.00	3.00	1.00		over 11 years old	0.00	3.25	1.00	
Sweetened	very good	0.00	4.00	2.00		up to 9 years old	0.00	3.50	1.50	
drinks	good	0.00	3.50	1.50	**0.022**	9.1 - 11 years old	0.00	4.00	1.50	0.146
(cola, sprite)	average	0.00	4.00	1.50		over 11 years old	0.00	4.00	2.00	
	very good	0.00	5.00	2.50		up to 9 years old	0.00	2.50	2.00	
Tea	good	0.00	2.50	2.50	0.594	9.1 - 11 years old	0.00	2.50	2.50	**0.035**
	average	0.00	2.50	2.00		over 11 years old	0.00	5.00	2.50	

p – statistical significance; *Min* – minimum result; *Max* – maximum result; *Me* – median

TABLE 3 Detailed analysis of the dependencies between the variables, taking into account the families' financial situation.

Analysed variable	Financial situation		p	
	very good	good	0.131	
BMI	very good	average	0.001	**
	good	average	0.029	*
	very good	good	0.988	
Poultry	very good	average	0.095	
	good	average	0.016	*
	very good	good	0.454	
Eggs	very good	average	0.443	
	good	average	0.021	*
	very good	good	0.939	
Vegetables	very good	average	0.003	**
	good	average	0.021	*
	very good	good	0.023	*
Sugar	very good	average	1.000	
	good	average	0.615	
	very good	good	0.303	
Cakes and biscuits	very good	average	0.189	
	good	average	0.006	**
Snacks	very good	good	0.001	***
	very good	average	1.000	

	good	average	0.001	**
Sweetened drinks (cola, sprite)	very good	good	0.049	*
	very good	average	1.000	
	good	average	0.093	

p – statistical significance * $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$;

TABLE 4 Detailed analysis of the dependencies between the frequency of the consumption of foodstuffs and BMI values.

Explained variable	Model				Regression coefficient			
	R^2	F	df	p	Predictor	β	t	p
BMI	0.01	1.29	587	0.140				
					Cereal products - flakes	0.04	0.85	0.396
					Cereal products - wholemeal bread	0.09	1.88	0.061
					Groats, rice, pasta	-0.04	-0.82	0.412
					Milk and dairy products	-0.03	-0.65	0.514
					Red meat	0.01	0.15	0.882
					Poultry	0.01	0.33	0.742
					Fish	-0.05	-1.09	0.278
					Cold meats	0.04	0.66	0.507
					High quality hams	0.04	0.79	0.428
					Eggs	-0.06	-1.29	0.197
					Butter	-0.04	-0.91	0.361
					Cream	0.03	0.73	0.468
					Fats	0.04	0.78	0.436
					Olive oil, oil	-0.04	-0.79	0.432
					Potatoes	-0.05	-1.15	0.250
					Vegetables	0.09	1.64	0.102
					Fruit	-0.05	-0.95	0.342
					Dry legume seeds	0.01	0.10	0.919
					Sugar	-0.03	-0.42	0.674
					Cakes, biscuits	-0.04	-0.69	0.491
					Chocolate	0.02	0.43	0.666
					Jams	0.01	0.16	0.875
					Dinner dishes (fritters, dumplings, pancakes)	0.06	1.03	0.304
					Ready sauces (ketchup, mayonnaise)	-0.02	-0.48	0.629
					Snacks	-0.12	-2.54	0.011*
					Juices	-0.11	-2.17	0.030*
					Fast-food	0.06	1.21	0.226

	Sweetened drinks (cola, sprite)	0.05	0.97	0.333
	Tea	0.09	1.66	0.097

R^2 – adjusted model fit coefficient; F – test statistic; df – degrees of freedom; β – standardised beta coefficient; t – test statistic; p – statistical significance; * $p < 0.05$

TABLE 5 Detailed analysis of dependencies between variables according to participants' age.

Analysed variable	**Age group**		**p**
Red meat	up to 9 years old	9.1 - 11 years old	0.082
	up to 9 years old	over 11 years old	1.000
	9.1 - 11 years old	over 11 years old	0.012 *
Fish	up to 9 years old	9.1 - 11 years old	1.000
	up to 9 years old	over 11 years old	0.007 **
	9.1 - 11 years old	over 11 years old	0.001 **
Eggs	up to 9 years old	9.1 - 11 years old	0.537
	up to 9 years old	over 11 years old	0.411
	9.1 - 11 years old	over 11 years old	0.009 **
Ready sauces (ketchup, mayonnaise)	up to 9 years old	9.1 - 11 years old	1.000
	up to 9 years old	over 11 years old	0.048 *
	9.1 - 11 years old	over 11 years old	0.261
Chocolate	up to 9 years old	9.1 - 11 years old	1.000
	up to 9 years old	over 11 years old	0.005 **
	9.1 - 11 years old	over 11 years old	< 0.001 ***

* $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$; p – statistical significance

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