

EATING BEHAVIOURS OF PRIMARY SCHOOL PUPILS FROM ŚLĄSKIE, MAŁOPOLSKIE AND OPOLSKIE VOIVODESHIPS IN POLAND

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ABSTRACT

Background. Nutrition is one of the major environmental factors affecting children's physical development and health, with nutrition mistakes made in early years of life having short- and long-term health consequences.

Objective. This study has been aimed at evaluating eating behaviours of primary school pupils and determining whether there are relationships between pupils' eating habits and their area of residence.

Material and methods. The study was conducted in primary schools located in the following voivodeships (administrative units) in Poland: Śląskie, Opolskie and Małopolskie, on a total sample of 1138 pupils. A survey specially designed for the purpose of this study was used to investigate the pupils' eating behaviours. The findings were then analysed with the use of MS Excel 2010 and Statistica 12.0 software.

Results. According to the survey, 61.42% of pupils in our study ate the recommended number of meals daily. 72.74% reported eating breakfast daily, 66.17% stated they ate packed lunch/midmorning snack daily, 17.49% reported eating wholemeal bread more than once daily, whilst milk and natural yoghurt were consumed daily by 20.04% and 10.81% of pupils, respectively. Sweets and salty snacks were excluded from the diet of 2.2% and 3.08% of pupils respectively. 6.59% of pupils reported not eating fast food at all.

Conclusions. The eating behaviours of primary school pupils differ. Regional variations in eating behaviours have been found to exist, revealing a correlation between the pupils' area of residence (voivodeship) and some eating behaviours. The largest number of healthy eating behaviours were reported by pupils from Małopolskie Voivodeship.

Key words: children eating behaviours, pupils, primary school children

STRESZCZENIE

Wprowadzenie. Odżywianie jest jednym z najważniejszych czynników środowiskowych wpływających na rozwój fizyczny i stan zdrowia dziecka. Błędy żywieniowe popełniane we wczesnych latach życia dziecka mają zarówno krótko- jak i długoterminowe konsekwencje zdrowotne.

Cel. Ocena zachowań żywieniowych uczniów szkół podstawowych oraz stwierdzenie czy istnieją zależności pomiędzy zachowaniami żywieniowymi uczniów i ich miejscem zamieszkania.

Material i metodyka. Badanie zostało przeprowadzone w szkołach podstawowych na terenie województwa śląskiego, opolskiego i małopolskiego wśród 1138 uczniów. Do oceny zachowań żywieniowych posłużył autorski kwestionariusz ankiety. Uzyskane wyniki analizowano przy pomocy programów MS Excel 2010 i Statistica 12.0.

Wyniki. Spożywanie zalecanej liczby posiłków deklarowało 61,42% uczniów. Na codzienne spożywanie I śniadania wskazało 72,74% uczniów, II śniadanie codziennie spożywało 66,17% uczniów. 17,49% uczniów zadeklarowało kilkukrotne spożycie ciemnego pieczywa w ciągu dnia, mleko i jogurty naturalne z tą częstością spożywało odpowiednio 20.04% i 10.81% uczniów. Wykluczenie z diety słodczy oraz słonych przekąsek zadeklarowało odpowiednio 2.2% i 3.08% uczniów. 6.59% uczniów nie spożywa produktów typu fast-food.

Wnioski. Zachowania żywieniowe uczniów szkół podstawowych są różnicowane. Stwierdzono występowanie zależności pomiędzy niektórymi zachowaniami żywieniowymi uczniów i ich miejscem zamieszkania. Najwięcej korzystnych zachowań żywieniowych zaobserwowano u uczniów zamieszkujących województwo małopolskie.

Słowa kluczowe: dzieci, zachowania żywieniowe, uczniowie, dzieci szkół podstawowych

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INTRODUCTION

Nutrition is one of the major factors affecting human health and lifespan. Requirements for energy and nutrients supplied with food vary with age. In children, energy and nutrient intake must cover the needs of the growing and developing body. An adequate amount of energy must also be supplied to facilitate proper mental and physical activity [6, 12].

Eating behaviours are in other word dietary choices, including i.a. the selection of eaten foods, as well as the number and timing of meals eaten every day. These are all components that make up nutrition models which, along with the level of physical activity, affect an individual's health and optimum physical, psychological and social growth [4].

Eating behaviours shaped in childhood are frequently maintained in adulthood. While making dietary choices, children are not driven by the nutritional value of foods they eat, primarily paying attention to food's appearance, taste and smell. They are also susceptible to dietary trends and fads, and are always keen to copy their peers. School-age children tend to have a low level of nutritional awareness, hence the significant role of parents and school in proper education as regards nutrition [3, 25].

Imitating parents' unhealthy eating habits, a low level of nutrition education/awareness, dietary trends, the ubiquitous promotion of high-calorie snacks in media and their wide availability may all result with unhealthy eating behaviours with grave consequences for children's future [18]. Inadequate nutrition at this stage of life has both short- and long-term health consequences. The prevalence of child obesity has been observed to soar recently in many countries, including Poland. The results of multiple studies point to a relationship between unhealthy eating behaviours in children and the incidence of diabetes, osteoporosis or cardiovascular diseases in adults [13, 15].

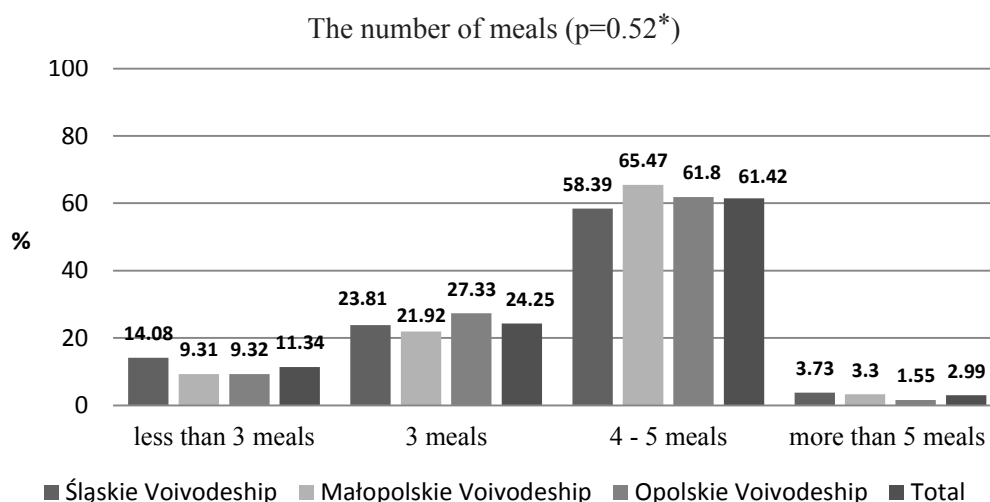
This study has been aimed at evaluating eating behaviours of primary school pupils and determining whether there are relationships between pupils' eating habits and their area of residence.

MATERIAL AND METHODS

The study was carried out personally in spring 2017, and covered a total of 1138 pupils attending primary schools in Śląskie Voivodeship (n=483, 42.4%), Małopolskie Voivodeship (n=333; 29.3%) and Opolskie Voivodeship (n=322; 28.3%), including 573 (50.4%) girls and 565 (48.6%) boys. Among the participants, 339 (29.8%) were Year 4 pupils, 420 (36.9%) Year 5, and 379 (33.3) Year 6 pupils. A dedicated survey was specially developed for the purpose of the study to be used as the research tool, which consisted of a demographic section and a section containing questions facilitating the evaluation of eating behaviours, including the frequency of consumption of given foods within the last 30 days preceding the study. The obtained results were then processed with Microsoft Excel 2010 software, and statistical analysis was performed with Statistica 12.0 (StatSoft. Inc) software. For the purpose of the statistical analysis, various response options in the questions concerning the frequency of food product consumption were pooled together, with the following options distinguished: every day, several times a week, several times a month, occasionally and/or never. Chi square test was utilized to examine the relationship between pupils' eating behaviours and frequency of the consumption of given foods and the voivodeship where students live. For all analyses, $p < 0.05$ was assumed as statistically significant.

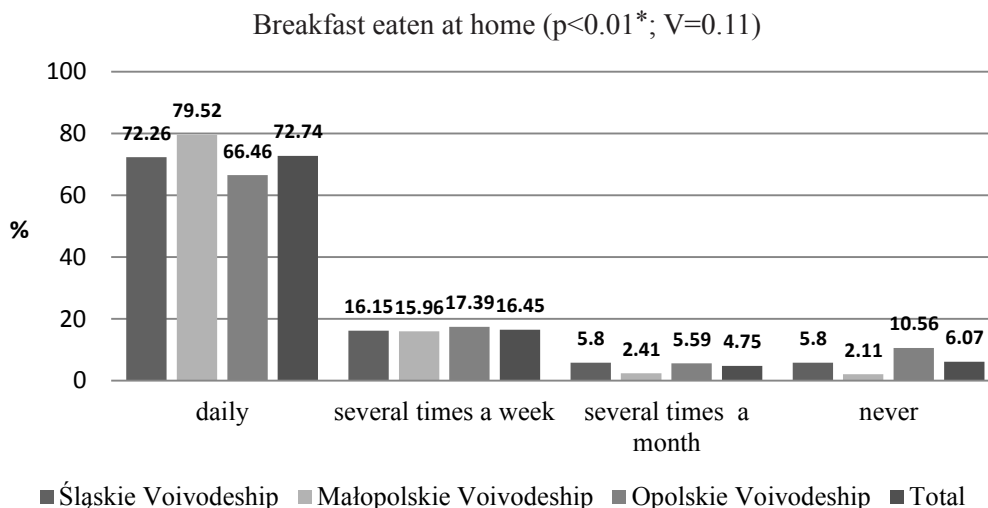
RESULTS

Selected eating behaviours of the studied primary school pupils have been shown in Figures 1-3.



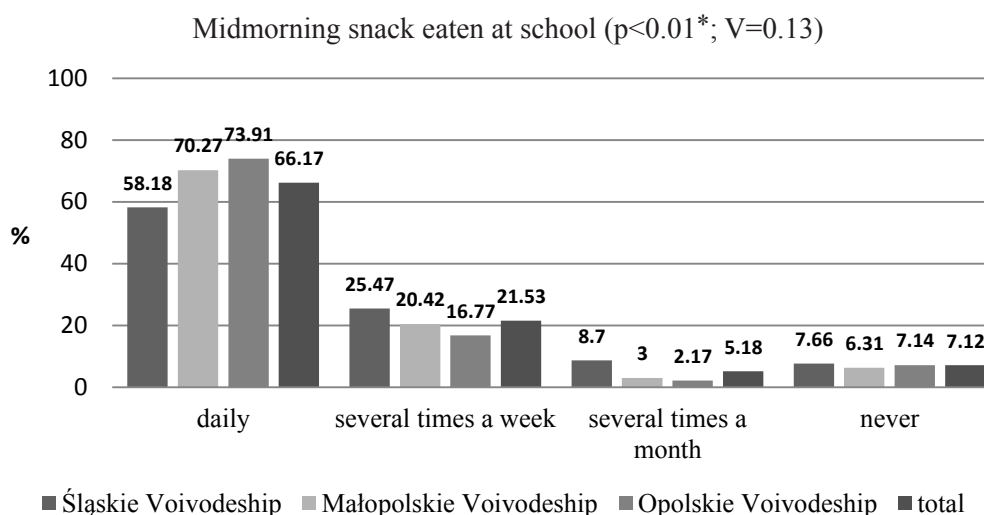
*significance level for Chi square test

Figure 1. The number of meals eaten daily by pupils



*significance level for Chi square test

Figure 2. Breakfast eaten at home by pupils



*significance level for Chi square test

Figure 3. Midmorning snack eaten at school by pupils

61.42% of pupils reported eating the recommended number of 4-5 meals every day, including 58.3% of pupils from Śląskie Voivodeship vs 65.47% of pupils from Małopolskie Voivodeship vs 61.8% of pupils from Opolskie Voivodeship. Breakfast was eaten daily by 72.26%, 79.52 and 66.46% of pupils from respective voivodeships, 72.74% in total. Midmorning snack was eaten daily by 66.17% of pupils, including 58.18% from Śląskie vs 70.27% from Małopolskie vs 73.91% from Opolskie Voivodeship (Figures 1-3).

A correlation between the children's area of residence and their frequency of breakfast intake ($p < 0.01$; $V = 0.11$) and midmorning snack intake ($p < 0.01$; $V = 0.13$) was identified (Figures 1-3).

The frequency of intake of selected foods has been shown in Tables 1-3.

The analysis of intake food products of plant origin showed that 17.49% of pupils ate wholemeal bread, including 21.02% of pupils from Małopolskie Voivodeship, with this answer less frequently selected by pupils from Śląskie and Opolskie voivodeships, 17.6% and 13.66% respectively. Vegetables and fruits are eaten several times a day by 37.79% and 55.45% of participants respectively, including 41.41% and 55.28% from Śląskie vs 40.24% vs 60.60% from Małopolskie, and 29.81% and 50.93% of pupils from Opolskie Voivodeship (Table 1).

Correlation between the studied pupils' area of residence and the frequency of their intake of wholemeal bread was statistically significant. The obtained results suggest that children from Małopolskie Voivodeship eat wholemeal bread significantly more frequently than those living in Śląskie or Opolskie Voivodeship ($p = 0.03$; $V = 0.08$) (Table 1).

Table 1. Intake of food products of plant origin

Group of food products	Frequency of intake of selected foods	Voivodeship						Total		Result of the test*
		śląskie		małopolskie		opolskie		n	%	
		n	%	n	%	n	%			
Wholemeal bread	Several times a day	85	17.60	70	21.02	44	13.66	199	17.49	p=0.03 V=0.08
	Once-a-day	67	13.87	65	19.52	48	14.91	180	15.82	
	Several times a week	104	21.53	70	21.02	77	23.91	251	22.06	
	Several times a month	65	13.46	39	11.71	53	16.46	157	13.80	
	Occasionally	69	14.29	39	11.71	46	14.29	154	13.53	
	Never	93	19.25	50	15.02	54	16.77	197	17.31	
Vegetables	Several times a day	200	41.41	134	40.24	96	29.81	430	37.79	p=0.43
	Once-a-day	139	28.78	102	30.63	110	34.16	351	30.84	
	Several times a week	94	19.46	66	19.82	80	24.84	240	21.09	
	Several times a month	20	4.14	15	4.50	18	5.59	53	4.66	
	Occasionally	14	2.90	10	3.00	11	3.42	35	3.08	
	Never	16	3.31	6	1.80	7	2.17	29	2.55	
Fruits	Several times a day	267	55.28	200	60.60	164	50.93	631	55.45	p=0.22
	Once-a-day	117	24.22	80	24.02	84	26.09	281	24.69	
	Several times a week	73	15.11	43	12.91	54	16.77	170	14.94	
	Several times a month	12	2.48	7	2.10	12	3.73	31	2.72	
	Occasionally	5	1.04	1	0.30	6	1.86	12	1.05	
	Never	9	1.86	2	0.6	2	0.62	13	1.14	

*significance level for *Chi*-square test

Table 2. Intake of animal origin food products

Group of food products	Frequency of intake of selected foods	Voivodeship						Total		Result of the test*
		śląskie		małopolskie		opolskie		n	%	
		n	%	n	%	n	%			
Milk	Several times a day	89	18.43	75	22.52	64	19.88	228	20.04	p<0.01 V=0.11
	Once-a-day	136	28.16	119	35.74	84	26.09	339	29.79	
	Several times a week	126	26.09	94	28.23	87	27.02	307	26.98	
	Several times a month	51	10.56	19	5.71	22	6.83	92	8.08	
	Occasionally	33	6.83	8	2.40	26	8.07	67	5.89	
	Never	48	9.94	18	5.41	39	12.11	105	9.23	
Natural yoghurt	Several times a day	52	10.77	45	13.51	26	8.07	123	10.81	p=0.13
	Once-a-day	74	15.32	58	17.42	54	16.77	186	16.34	
	Several times a week	122	25.26	99	29.73	93	28.88	314	27.59	
	Several times a month	96	19.88	51	15.32	69	21.43	216	19.98	
	Occasionally	66	13.66	34	10.21	41	12.73	141	12.39	
	Never	73	15.11	46	13.81	39	12.11	158	13.88	
Cottage cheese	Several times a day	34	7.04	20	6.01	22	6.85	76	6.68	p<0.01 V=0.11
	Once-a-day	50	10.35	76	22.82	48	14.95	174	15.29	
	Several times a week	105	21.74	91	27.33	89	27.64	285	25.04	
	Several times a month	117	24.22	55	16.52	56	17.45	228	20.04	
	Occasionally	77	15.94	31	9.31	46	14.33	154	13.53	
	Never	100	20.70	60	18.02	61	19.00	221	19.42	
Cheese (hard or processed cheese)	Several times a day	87	18.01	56	16.82	42	13.04	185	16.26	p=0.92
	Once-a-day	123	25.47	101	30.33	76	23.60	300	26.36	
	Several times a week	156	32.30	108	32.43	130	40.37	394	34.62	
	Several times a month	44	9.11	30	9.01	32	9.94	106	9.31	
	Occasionally	27	5.29	13	3.90	18	5.59	58	5.10	
	Never	46	9.52	25	7.51	24	7.45	95	8.35	
Meat	Several times a day	130	26.92	62	18.62	60	18.63	252	22.14	p=0.26
	Once-a-day	162	33.54	146	43.84	122	37.89	430	37.79	
	Several times a week	145	30.20	108	32.43	109	33.85	362	31.81	
	Several times a month	25	5.18	9	2.70	16	4.97	50	4.39	
	Occasionally	8	1.66	7	2.10	12	3.73	27	2.37	
	Never	13	2.69	1	0.30	3	0.93	17	1.49	
Fish	Several times a day	21	4.35	13	3.90	6	1.86	40	3.51	p<0.01 V=0.12
	Once-a-day	22	4.55	31	9.31	22	6.83	75	6.59	
	Several times a week	122	25.26	123	36.94	92	28.57	337	29.61	
	Several times a month	156	32.30	109	32.73	119	36.96	384	33.74	
	Occasionally	100	20.7	42	12.61	46	14.29	188	16.52	
	Never	62	12.94	15	4.50	37	11.49	114	10.02	

*significance level for *Chi* square test

The analysis of intake of food products of animal origin showed that milk and natural yoghurt were consumed several times a day by 20.04% and 10.81% of pupils respectively, including 18.43% and 10.77% of pupils from Śląskie Voivodeship vs 22.52% and 13.51% of pupils from Małopolskie Voivodeship vs 19.88% and 8.07% of pupils from Opolskie Voivodeship. A total of 34.62% of pupils reported eating cheese (hard or processed cheese), including 32.30% of pupils from Śląskie Voivodeship vs 32.43% pupils from Małopolskie Voivodeship vs 40.37% of pupils from Opolskie Voivodeship. Once-a-day intake of meat was reported by 37.79% of pupils, including 33.54% of pupils from Śląskie Voivodeship vs 43.84% from

Małopolskie Voivodeship vs 37.89% from Opolskie Voivodeship. The recommended frequency of fish intake (several times a week) was noted among 29.61% of pupils, including 25.26% of pupils from Śląskie vs 36.94% of pupils from Małopolskie vs 28.57% of pupils from Opolskie Voivodeship (Table 2).

Correlation between the children's area of residence and the frequency of milk, cottage cheese and fish intake was statistically significant. The results suggest that children from Małopolskie Voivodeship drink milk ($p<0.01$; $V=0.11$), eat cottage cheese ($p<0.01$; $V=0.11$) and eat fish ($p<0.01$; $V=0.12$) significantly more frequently than those from Śląskie and Opolskie Voivodeship (Table 2).

Table 3. Intake of foods not recommended for school-age children

Group of food products	Frequency of intake of selected foods	Voivodeship						Total		Result of the test*
		śląskie		małopolskie		opolskie		n	%	
		n	%	n	%	n	%			
Sweets	Several times a day	79	16.36	39	11.71	48	14.91	166	14.59	p=0.07
	Once-a-day	118	24.40	75	22.52	63	19.57	256	22.50	
	Several times a week	134	27.74	101	30.33	125	38.82	360	31.63	
	Several times a month	75	15.53	70	21.02	45	13.98	190	16.70	
	Occasionally	65	13.46	42	12.61	34	10.56	141	12.39	
	Never	12	2.48	6	1.80	7	2.17	25	2.20	
Salty snacks	Several times a day	43	8.90	23	6.91	20	6.21	86	7.56	p=0.25
	Once-a-day	69	14.29	45	13.51	35	10.87	149	13.09	
	Several times a week	134	27.74	94	28.23	105	32.61	333	29.26	
	Several times a month	124	25.67	100	30.03	96	29.81	320	28.12	
	Occasionally	97	20.08	61	18.32	57	17.70	215	18.89	
	Never	16	3.31	10	3.00	9	2.80	35	3.08	
Fast food products	Once-a-day	26	5.38	17	5.11	10	3.11	53	4.66	p=0.69
	Several times a week	66	13.66	43	12.91	38	11.80	147	12.92	
	Several times a month	164	33.95	112	33.63	121	37.58	397	34.89	
	Occasionally	195	40.47	135	40.54	126	42.24	466	40.95	
	Never	32	6.63	26	7.81	17	5.28	75	6.59	
"Instant" food products	Several times a day	14	2.90	3	0.90	8	2.48	25	2.20	p<0.01 V=0.13
	Once-a-day	23	4.76	14	4.20	4	1.24	41	3.60	
	Several times a week	49	10.14	17	5.11	43	13.35	109	9.58	
	Several times a month	69	14.29	41	12.31	75	23.29	185	16.26	
	Occasionally	113	23.40	60	18.02	103	31.99	276	24.25	
	Never	215	44.51	198	59.46	89	27.64	502	44.11	
Sweetened carbonated Drinks	Several times a day	48	9.94	19	5.71	27	8.39	94	8.26	p=0.04 V=0.08
	Once-a-day	50	10.35	21	6.31	22	6.83	93	8.17	
	Several times a week	109	22.57	67	20.12	72	22.26	248	21.79	
	Several times a month	129	26.71	100	30.03	89	27.64	318	27.94	
	Occasionally	107	22.15	98	29.43	79	24.53	284	24.96	
	Never	40	8.28	28	8.41	33	10.25	101	8.88	

*significance level for *Chi* square test

The analysis of intake of foods not recommended in the diet of school-age children showed 2.2% and 3.08% of pupils in our study to report not eating sweets and salty snacks (respectively), including 2.48% and 3.31% from Śląskie Voivodeship vs 1.8% and 3% from Małopolskie Voivodeship vs 2.17% and 2.8% from Opolskie Voivodeship. A total of 6.9% of

pupils reported never eating fast food products, including 6.63% from Śląskie Voivodeship vs 7.81% from Małopolskie Voivodeship vs 5.25% from Opolskie Voivodeship. As far as "instant" food products are concerned, 44.51% of pupils reported exclusion of this group of foods from their diet, including 44.51% of pupils from Śląskie Voivodeship vs 59.46% from

Małopolskie Voivodeship. Pupils from Opolskie Voivodeship made up a much lower percentage of those never eating “instant” food products, at 27.64%. A total of 8.88% of respondents reported not drinking sweetened carbonated drinks, including 8.28% from Śląskie Voivodeship vs 8.41% from Małopolskie Voivodeship vs 10.25% from Opolskie Voivodeship (Table 3).

Relationships between the pupils’ area of residence and intake of “instant” food products and sweetened carbonated drinks were found to be statistically significant ($p < 0.01$; $V = 0.13$ and $p = 0.04$; $V = 0.08$, respectively) (Table 3).

DISCUSSION

Nutrition is one of the major environmental factors affecting children’s physical development and health. In recent years, an increase in the numbers of obese and overweight children has been seen, with the problem affecting developed and developing countries alike [12,22]. According to the estimates by the International Obesity Task Force for the World Health Organization 1 in 5 European children is overweight. The phenomenon is on the rise, with the group of overweight individuals under 18 years old expanding by 4000 000 yearly [8,12]. The results of an audit conducted in Poland by the Supreme Audit Office (*Najwyższa Izba Kontroli, NIK*) in the period from 19th of September 2016 to 3rd of January 2017, which covered 20 state-run schools and 10 Municipality Offices from Lubelskie, Małopolskie, Mazowieckie, Podlaskie and Kujawsko-Pomorskie voivodeships raise major concerns. According to the audit report, the rate of obese and overweight pupils is increasing, and the programmes aimed at promoting healthy nutrition/lifestyle and education aimed at shaping healthy eating behaviours have failed to put a stop to this trend. In 19 out of 20 audited schools, the percentage of pupils with weight disorders increased from 16.8% in the school year of 2012/2013 to 22% in the school year of 2015/2016, with the percentage of overweight and obese children having increased most rapidly [7].

Meal frequency affects the processes of weight control. According to the available reports, individuals who eat more frequent meals tend to eat smaller portions in any given meal, accounting for a smaller total energy intake. The amount of energy supplied every day must account for a person’s age, sex and level of physical activity [23]. School-age children and adolescents are recommended to eat 5 meals at regular times of the day, with intervals between the meals not exceeding 3-4 hours [6]. In our study, we found that only 58.39% of pupils from Śląskie Voivodeship, 61.8% of pupils from Opolskie Voivodeship and 65.47% of children from Małopolskie Voivodeship ate 4-5 meals

a day. Similar results were obtained in a study investigating the eating behaviours of primary school pupils from Kaliski Powiat which found that only 53% of respondents ate 4-5 meals a day [23], and in a study investigating the eating behaviours of children aged 6-13 years old attending selected primary schools in rural areas of Śląskie and Opolskie voivodeships, carried out by *Jonczyk et al.* The authors of the latter study found as little as 46.11% of girls and 50.69% of boys to eat 4-5 meals a day [9].

Nutrition specialists stress the role of breakfast as the most important meal of day. In our study, breakfast was eaten by 72.6%, 79.53% and 66.46% of pupils from respective voivodeships. Similar results were acquired in a study conducted in 2015 in Piekary Śląskie, in which approximately 67.32% of respondents (64.45% of girls and 70.24% of boys) had breakfast daily before school [10]. Pupils who spend more than 6 hours at school should receive one nutritious meal (midmorning snack or cooked lunch) during that time [23]. In our study, only 58.18% of children from Śląskie Voivodeship reported eating daily a midmorning snack at school. Małopolskie and Opolskie Voivodeship had better results in this respect, with 70.27% vs 73.91% of children reporting eating a midmorning snack at school on a daily basis. Similarly, in the study by *Jonczyk et al.*, midmorning snack was consumed daily by 69.76% of pupils (68.91% of girls vs 70.51% of boys) [9].

Daily energy requirements should be met by well-balanced meals providing all the necessary nutrients. With this goal in mind, daily nutrition must include various food groups. Wholemeal food products, including wholemeal bread, are a good source of complex carbohydrates. Pupils in our study, however, rarely ate wholemeal bread, with as few as 33.31% of participants eating this group of foods on a daily basis (including 17.49% eating wholemeal bread several times a day and 15.82% - once a day). This result is similar to the results obtained by *Wojtyła-Bucior et al.* in the study examining eating behaviours of primary school pupils in Kaliski Powiat [23]. The study showed that pupils were typically very reluctant to eat wholemeal bread, with as much as 31% of respondents reporting intake of wholemeal bread less frequent than once a week. Only 11% of pupils in that study stated that they ate wholemeal bread on a daily basis [23].

Fruits and vegetables should be a daily component of children’s diet due to their health benefits. Fruits and vegetables intake reduces the risk for many diseases, such as obesity and diabetes [24]. In our study, 41.41% children from Śląskie Voivodeship vs 40.42% of children from Małopolskie Voivodeship vs 29.81% of children from Opolskie Voivodeship reported daily vegetable intake. Alarmingly, 1 in every 20 participants of our study (5.36%) did not eat vegetables at

all or only occasionally. Fruits, in turn, were found to be eaten several times a day by 60.6% of pupils from Małopolskie Voivodeship vs 55.28% of respondents from Śląskie Voivodeship vs 50.93% of respondents from Opolskie Voivodeship, which is consistent with the results of the study by *Jonczyk et al.*, which demonstrated that few pupils ate adequate amounts of fruits and vegetables daily. According to their study, 69.83% of girls and 57.43% of boys ate fruits and vegetables several times a day, whilst 29% of girls and 39% of boys ate fruits and vegetables once daily. Alarming, 1.17% of girls and 3.57% of boys stated they had no access to fresh fruit and vegetables at all [9,10].

According to the principles of healthy nutrition of children and adolescents, milk or dairy products should be consumed 3-4 times a day, as they are rich in calcium. Intake of dairy products has also been found to counteract hypertension [14]. In our study, 58.26% of pupils from Małopolskie Voivodeship vs 46.5% from Śląskie Voivodeship vs 45.97% of pupils from Opolskie Voivodeship reported milk intake at least once a day. Similar results were obtained by *Ambroży et al.*, who investigated eating behaviours and intake of selected foods by children aged 10-13 years old living in urban and rural areas. In their study, they found milk to be consumed on a daily basis by 48.6% of respondents from urban areas vs 48.3% of respondents from rural areas [2]. In the group of school-age children 6-13 years old living in Piekary Śląskie, studied by *Jonczyk et al.*, milk was consumed daily by 53.1% of respondents, including 49.61% of girls and 56.75% of boys [10].

In children's diet, meat is a valuable source of numerous nutrients, and is especially difficult to replace by other products. In our study, 62.46% of pupils from Małopolskie, vs 60.46% of pupils from Śląskie vs as little as 56.52% of pupils from Opolskie Voivodeship reported eating meat at least once daily. The overall percentage of respondents in our study who stated that they did not eat meat at all amounted to 3.86%. *Szczepańska et al.*, who analysed eating behaviours of pupils from Upper Silesia (a geographical region in Poland) had similar findings. In their study, 61.3% of pupils ate meat and/or meat-based products (such as ham, sausage and other types of charcuterie) at least once daily [21]. *Jonczyk et al.*, however, who investigated eating behaviours of children aged 6-13 years old from rural areas of Śląskie and Opolskie voivodeships obtained different results. In their study, only 12.86% of respondents reported daily meat intake, including 11.92% of girls and 13.36% of boys, with as little as 0.73% of their respondents reporting not eating meat at all [9].

In our study, also fish intake was demonstrated to be far from sufficient. According to WHO recommendations, the minimum fish intake for optimum health

is considered 1-2 times every week [5]. These recommendations are met by as few as 25.26% of pupils from Śląskie Voivodeship vs 28.57% of pupils from Opolskie Voivodeship vs 36.94% of pupils from Małopolskie Voivodeship. The significance of fish intake is unique in children's diet, as apart from high-quality protein necessary for muscle growth and minerals, fish also contain an abundance of omega-3 fatty acids that play a significant role in early and adolescent development. They contribute to normal brain function and good sight, as well as decrease the risk for atopic diseases, allergies, and protect from cardiovascular diseases [5]. Insufficient intake of fish and fish-based products was also identified by *Jonczyk et al.* in their study, which demonstrated the dietary recommendations in this respect to be met by only 11.22% of respondents [9]. The findings of a study by *Szczepańska et al.*, were more favourable, with regular fish intake at the level of 1-2 times a week reported by 44.9% of respondents [21].

Children who eat high-calorie snacks typically find them very satisfying, and as result tend to skip nutritious meals. In long term, this leads to body weight disorders, overweight and obesity [23]. This group of foods comprises sweets, which in our study were eaten several times daily by 14.59% of pupils and once daily by 22.5% of pupils, and salty snacks, which were not eaten at all by as few as 3.08% of respondents. These results are very alarming, as excessive amounts of sweets not only lead to nutrient deficiencies in children's diets, but also contribute to caries [17]. In the studied group, only 2.20% of the participants stated they never ate any sweets. Even less favourable results were obtained in a study carried out in a group of children aged 10-12 years old from Upper Silesia, aimed at evaluating i.a. sweets intake. The authors demonstrated that sweets were eaten by 32.7% of children from urban and 46.6% from rural areas, with only 1.3% of respondents in each of the groups reporting that they did not eat sweets at all [19].

The analysis of fast food intake in our study showed that 12.92% of respondents ate fast food products several times a week, whilst 34.89% ate fast food several times a month. The least favourable data regards pupils from Śląskie Voivodeship, as 13.66% of children from that group reported eating fast food products several times a week. Similar results were obtained by *Kotyrbka et al.* [11], who conducted a study aimed at identifying eating behaviours of children from year 3-5 of elementary school (9-11 year-olds). According to that study, 48% of their respondents used fast food restaurants once a month, 16% several times a week, and only 17% did not use fast food restaurants at all. *Jonczyk et al.* [9] had more optimistic findings, with 83% of their respondents reporting using fast food restaurants less frequently than once a month.

Drinking carbonated beverages high in sugar instead of water results with intake of large amounts of simple sugars [23]. In our study, intake of this type of beverages several times a day was reported by 8.26% of respondents, whilst 8.17% reported once-daily soft drink intake. *Szczepańska et al.* [20] evaluated eating behaviours of a sample of 884 pupils of lower secondary and higher secondary schools, demonstrating 26% of underweight pupils, 21.4% of pupils with normal body weight and 22.4% of overweight pupils to drink sweetened beverages at least once a day. A study conducted in 2009-2011 in the city Thessaloniki (Greece) on a group of 607 pupils aged 7-15 years old, showed daily intake of carbonated beverages to be prevalent, at 79.4% [16]. Excessive intake of soft drinks has also been pointed out by numerous other authors [12, 23].

The results of our conducted analysis, concerning the eating behaviours are consistent with data obtained earlier in other research projects conducted among primary school students in Poland. Based on earlier examples, it can be concluded that there are no marked differences between eating behaviours and dietary habits in results obtained in earlier periods of time and in other voivodeships.

CONCLUSIONS

1. The eating behaviours of primary school pupils differ. Regional variations in eating behaviours have been found to exist, revealing a correlation between the pupils' area of residence (voivodeship) and some eating behaviours.
2. Increasingly among children incorrect eating behaviours and low physical activity indicate the need for implementation multidirectional educational and health activities.

Conflict of interest

The authors declare no conflict of interest.

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Received: 21.11.2017

Accepted: 23.01.2018