



Evaluation of dietary habits and diet quality in a group of adolescents by using questionnaire (FFQ) and pro-Healthy Diet Index (pHDI-10)

Ocena zwyczajów żywieniowych i jakości diety w grupie młodzieży za pomocą kwestionariusza (FFQ) i indeksu prozdrowotnej diety (pHDI-10)

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A – Koncepcja i projekt badania, B – Gromadzenie i/lub zestawianie danych, C – Analiza i interpretacja danych, D – Napisanie artykułu, E – Krytyczne zrecenzowanie artykułu, F – Zatwierdzenie ostatecznej wersji artykułu

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Abstract

Introduction and Objective. Mistakes in dietary behaviours are considered a major public health challenge, especially among youth populations that may be affected by long-term health complications in adulthood. The aim of this study was to evaluate some dietary habits and the quality of the diet related to health characteristics among adolescents living in southern Poland.

Materials and method. A total of 381 adolescents aged 10–16 years were surveyed. The nutritional behaviours and diet of the participants were evaluated using questionnaire (FFQ) and the quality of the diet was evaluated from the aspect of intensity of the pro-health characteristics (pro-Healthy Diet Index – pHDI-10).

Results. Half of the respondents consumed 4 meals a day and 26% snack mainly once a week. The structure of consumption of the foods most and least consumed was as follows: fruit (5.0 ± 1.1), white bread (4.9 ± 1.4), and butter (4.9 ± 1.3) vs. legume seeds (2.5 ± 1.2), fast-foods (2.5 ± 1.1), and fish (2.8 ± 1.0), respectively. Mineral water (5.0 ± 1.4), tea (5.0 ± 1.1) and fruit juice (4.4 ± 1.3) were drunk the most frequently in the total group. Boys preferred white bread ($p=0.0037$), deli meat ($p=0.0023$), red meat ($p=0.0039$) and potatoes ($p=0.0434$) more frequently, compared to girls. Also, fizzy and non-fizzy ($p=0.0001$), cola type ($p<0.0001$) and energy drinks ($p=0.0003$) were also more likely to be drunk by boys. The pHDI-10 showed a low intensity of pro-health characteristics (pHDI-10) of the applied diet in nearly 80% of the respondents.

Conclusions. Nutrition professionals should pay attention to the increase in pro-health products in the diet of adolescents. Gender differences in the influence of eating behaviour should also be considered to improve the effectiveness of this objective.

Key words

dietary habits, nutrition, adolescents, frequency of consumption, diet quality

Streszczenie

Wprowadzenie i cel pracy. Nieprawidłowe zachowania żywieniowe stanowią poważne wyzwanie dla zdrowia publicznego, zwłaszcza w populacjach młodzieży, gdyż młodzi ludzie mogą być narażeni na długotrwałe powikłania zdrowotne w wieku dorosłym. Celem pracy była ocena niektórych zwyczajów żywieniowych i jakości diety młodzieży mieszkającej w południowej Polsce pod kątem jej cech prozdrowotnych.

Materiał i metody. Badaniem objęto 381 nastolatków w wieku od 10 do 16 lat. Oceny zachowań żywieniowych i sposobu żywienia uczestników dokonano za pomocą kwestionariusza (FFQ), a jakość diety oceniono w aspekcie nasilenia występowania żywności o potencjalnie korzystnym wpływie na zdrowie (Indeks Prozdrowotnej Diety – pHDI-10).

Wyniki. Połowa badanych spożywała 4 posiłki dziennie, a 26% podjadało głównie raz w tygodniu. Struktura spożycia produktów najczęściej i najrzadziej spożywanych była następująca: owoce ($5,0 \pm 1,1$), białe pieczywo ($4,9 \pm 1,4$) i masło ($4,9 \pm 1,3$) w porównaniu z nasionami roślin strączkowych ($2,5 \pm 1,2$), fast foodami ($2,5 \pm 1,1$) i rybami ($2,8 \pm 1,0$). W badanej grupie najczęściej pito wodę mineralną ($5,0 \pm 1,4$), herbatę ($5,0 \pm 1,1$) i soki owocowe ($4,4 \pm 1,3$). Chłopcy częściej niż dziewczęta preferowali białe pieczywo ($p=0,0037$), wędliny ($p=0,0023$), czerwone mięso ($p=0,0039$) i ziemniaki ($p=0,0434$). Ponadto częściej pili napoje gazowane i niegazowane ($p=0,0001$), typu cola ($p<0,0001$) i napoje energetyzujące ($p=0,0003$). Wskaźnik pHDI-10 wykazał niskie nasilenie cech prozdrowotnych (pHDI-10) stosowanej diety u blisko 80% badanych.

Wnioski. Specjaliści zajmujący się żywieniem sugerują, aby zwrócić uwagę na wzrost udziału produktów prozdrowotnych w diecie nastolatków. Należy przy tym uwzględnić fakt, iż płeć różnicuje zachowania żywieniowe.

Słowa kluczowe

nastolatki, żywienie, zwyczaje żywieniowe, częstość spożycia, jakość diety

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INTRODUCTION

Excess body weight during puberty has become a significant public health concern, voiced by various government and non-governmental organizations within the health care sector [1]. Adequate dietary habits constitute one of the elements of a health lifestyle and play a vital role in overweight and obesity prevention. The topic of selected foods and drinks consumption among children and adolescents has been tackled both in Poland and many European countries. Poland has been realizing numerous programmes aimed at shaping adequate eating habits in younger populations [1,2], and has signed a resolution about requirements for mass catering and foods considered suitable for sale at schools and other units within the educational system [3].

The Institute of Food and Nutrition in Warsaw (since 2020 part of National Institute of Public Health/National Institute of Hygiene – National Research Institute), a leading centre in Poland, has issued dietary guidelines for children and adolescents in the form of a food pyramid, which depicts the recommended consumption frequency of selected foods and drinks [4]. Nevertheless, dietary mistakes are observed in the youth group and predominantly include the structure of the consumed foods and drinks and associated decreased supply of some vitamins and minerals [5]. Long-term international studies (Health Behaviour in School-aged Children – HBSC) have demonstrated mistakes and changes in the structure of the consumption of selected foods among adolescents. Only 38.2% of teenagers consume fruit and 34.2% consume vegetables in the recommended amount. The frequency of daily fruit consumption decreased with age in both genders. At the same time, it was found that almost 70% of the adolescents consumed sweets more than once a week (girls more often than boys), and almost 44.9% drank sweetened drinks with the same frequency (boys more often than girls). In comparison to 2014, an small increase in vegetable and fruit intake and a decrease in sweet fizzy drinks and sweets have been observed among school-aged (11–15 years) children. Also, skipping breakfast has been on the decline among this group [6]. An audit in selected schools in Poland has revealed various inconsistencies and mistakes in the nutrition of children and adolescents, as well as in the implementation of health education programmes [7].

Age, gender, economic status, type (e.g. family home) and place of residence (origin) are listed among the determinants of dietary behaviour among various populations, including children and adolescents [6,8]. Socio-economic factors may affect the nutritional status of the investigated pupils, including overweight and obesity [9]. A study conducted among children from South-Eastern Poland between 1998–2008 detected a declining tendency for obesity among girls (from 10.1% to 7.7%; $p < 0.001$) and boys (from 6.8% to 6.4%; $p > 0.05$), but a growing tendency for overweight in those gender groups (girls: from 12% to 13.3%; $p > 0.05$ and boys: from 10.5% to 14.2%; $p < 0.001$) [10]. A declined tendency for excess weight among adolescents has also been confirmed by multicentre studie [6]. In light of the above mentioned, the positive results of various initiatives to prevent excess weight gain among children and adolescents are an incentive to continue with the efforts.

OBJECTIVE

The aim of the study was to evaluate some dietary habits – consumption frequency of meals and snacks as well as eating habits – consumption frequency of selected foods and drinks. Furthermore assessment was made of diet quality from the aspect of intensity of pro-health features (pro-Healthy Diet Index – pHDI-10) among adolescent inhabitants of the Małopolska (Lesser Poland) Province of southern Poland, mostly from rural areas and stratified by gender.

MATERIALS AND METHOD

A retrospective observational study was conducted between 2015–2017 among school-aged adolescents (aged 10–16 years) from the Małopolska Province (southern microregion of Poland), mostly from rural areas. Before the study began, carers and participants were informed of the aims and conditions of the study. The Local Ethics Committee (Approval No. 122.6120.217.2015), school principals and legal guardians of the adolescents approved the study. The criteria for inclusion in the study, in addition to obtaining the required consents, included the possibility for minors to complete the questionnaire on their own, and to take anthropometric measurements in accordance with the conditions specified in the study. The criteria for exclusion from the study were lack of consent from the legal guardian or the study participant, absence on the day of the study, inability to complete the questionnaire independently, and inability to take anthropometric measurements, according to the conditions of the study. The completion of the questionnaire on the assessment of eating behaviour as well as the anthropometric measurements were performed at school under the supervision of the investigators. A total of 381 pupils (171 boys and 210 girls) were examined. Anthropometric parameters [body weight (kg) and height (cm), waist and hip circumference (cm)] were evaluated in order to assess the nutritional status of participants. The results of that part of the study have been published elsewhere [11].

An anonymous questionnaire designed for the purpose of the study on the basis of the Dietary Habits and Nutrition Beliefs Questionnaire (QEB – Questionnaire of Eating Behaviour) created by Behavioural Nutrition Team Committee of Human Nutrition, Polish Academy of Sciences (PAN) [12], was used. The questionnaire included sections about dietary behaviour, consumption frequency of selected foods and drinks, and personal data. Questions on dietary behaviour in the last year pertained to the number of the meals during the day, regularity of meals, snacking, and most popular snacks. The personal data section included questions about place of residence, school, parents, and the economic status of the family (e.g. ‘are your parents professionally active?’, or ‘do your parents have enough money to buy food?’). Questions about the consumption frequency of meals and snacking over the last year, at home and outside, were also included. A six-point scale (never – 1–3 times a month, once a week, several times a week, every day, several times a day) was used. In total, 29 products, including drinks, were listed in the consumption frequency table.

On the basis of the answers to the questionnaire (QEB) it is possible to assess whether a person’s diet is pro-healthy (pro Healthy Diet Index – pHDI-10). Pro-healthy products (whole meal bread; buckwheat and oatmeal; milk; fermented

milk drinks; cottage cheese; fish; legume-based dishes; fruit; vegetables; white meat-based dishes) consumed several times per day, the maximum value of p HDI-10 of 20 points was achieved. p HDI-10 index was calculated as the sum of frequency of consumption those 10 groups of foods (multiples/day); range 0–20. The quality of pro-healthy diet was evaluated at three intervals: 0–6.66 points – assessed as low, 6.67–13.33 – moderate and 13.34–20.0 – high. The authors of the questionnaire QEB recommended expression of the pHDI-10 index in points, on a scale of 0–100 points, using the following formula: $\text{pHDI-10, in points} = (100/20) \times \text{sum of the frequency of intake of 10 food groups (multiplication/day)}$. Low probability of pro-healthy dietary properties is in the range of 1–33 points, moderate 34–66 points and high in the range of 67–100 points.

STATISTICA PL 12.5 was used for statistical analysis. Non-parametric U Mann-Whitney test and Chi-square test were used to analyze quantitative data, stratified by gender. The p-value of $\alpha=0.05$ was considered as statistically significant.

RESULTS

A total of 381 (55.1% – girls and 44.9% – boys) pupils, aged 13.1 ± 1.8 years, were included in the study. A clear majority of the respondents lived in the rural areas of the Małopolska Province (81.9% vs 18.1% small towns and city of Kraków, $p>0.05$) and had siblings (90.6%). Approximately half of the study population (49.6%) consisted of primary school students (grades 4–6), and the other half (50.4%; $p=0.02134$) of junior high students (freshman and sophomore years). As far as professional activity of the parents was concerned, both parents, or one parent, or neither parent worked in 48.3%, 42%, and 9.7% of the cases, respectively. Reportedly, most parents had sufficient money to buy food (always – 85.6% sometimes – 10.5%), while insufficient money was reported by 4.2% of respondents. Approximately 85% of the pupils declared lack of problems at school (Tab. 1).

No statistically significant differences were found between the number of meals/day and gender [Boys (B): 3.7 ± 0.8 vs. Girls (G): 3.8 ± 0.7 ; $p=0.0566$]. A half of the pupils (50.1%) consumed four meals/day (Fig. 1).

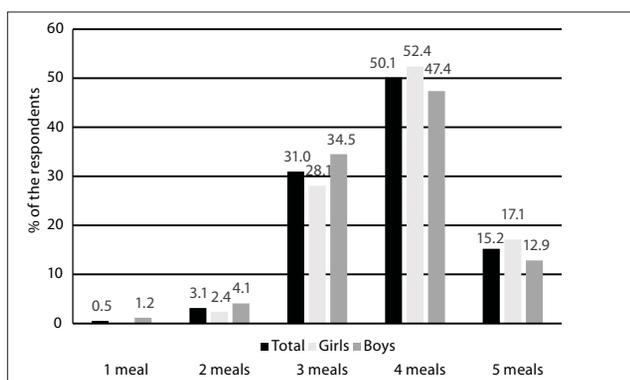


Figure 1. Number of meals/day in total and stratified by gender [%]

Regularity of meals (always and sometimes) was declared by most pupils (68.7%). There were no significant differences in the variables when stratified by gender. Irregular meal times were reported by approximately one-third of the adolescents (B: 26.9% vs. G: 34.3%; $p=0.0557$) (Fig. 2).

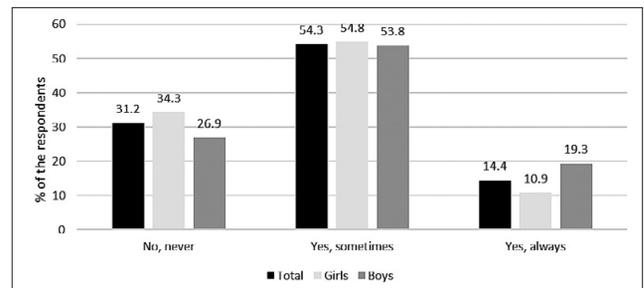


Figure 2. Regularity of meals consumed in total and stratified by gender [%]

Snacking once a week was declared by 26% of respondents (B: 25.7% vs. G: 26.2%; $p=0.3058$), whereas 20% of the boys and 21% of the girls never snacked between meals. One or more snacks per day were reported by 18.7% of the boys and 15.3% of the girls (Fig. 3).

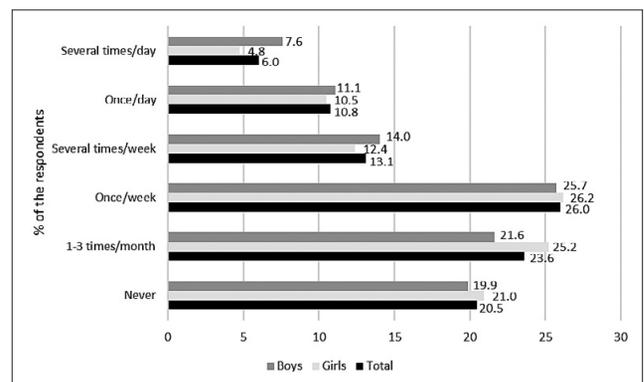


Figure 3. Snacking between meals in total and stratified by gender [%]

Various types of fruit were the most popular snack (76.1%), followed by sweets (candy bars, wafers – 50.1%), and non-sweetened drinks and dairy snacks, e.g. yoghurt (35.2%), whereas nuts, almonds and edible seeds were the least popular snacks (17.3%). Significant differences became visible when the groups were stratified by gender: sweetened dairy drinks and vegetables were more often chosen by boys, compared to girls (B: 30.1% vs. G: 21.9%; $p=0.0442$ and B: 28.1% vs. G: 18.6%; $p=0.0280$ respectively) (Tab. 2).

White bread (46.7%), butter (42%), and fruit (41.5%) were most often consumed several times/day. Legume seeds, curd cheese (including homogenized cheese) and whole-wheat bread were never consumed by 17.8%, 16.3%, and 16% of the respondents, respectively. Statistically significant differences in the frequency of consumption of white bread ($p=0.0037$), deli meats/sausages/wiener sausage ($p=0.0023$), red meat ($p=0.0039$), and potatoes ($p=0.0434$) were observed if the groups were stratified by gender (Tab. 3).

Mineral water (54.3%), tea (44.4%), and fruit juice (24.9%) were the most frequently consumed drinks – several times a day, while energy drinks (0.5%) and coffee (2.4%) were the least often consumed beverages in the total group. Fizzy and non-fizzy ($p=0.0001$), Cola type ($p<0.0001$) and energy drinks ($p=0.0003$) were significantly more often consumed by boys (Tab. 4).

In the range of pHDI10, which proves the low intensity of pro-health features of the applied diet, the highest number of respondents in total occurred (83.2%). There were no significant differences in the assessment of pro-health features of diet in gender groups ($p=0.0654$). In gender groups, a diet

Table 1. Socio-economic characteristics of the study group stratified by gender [%]

Variable	Total	Girls	Boys	P
	X±SD			
Age	13.1±1.8	13.2±1.7	13.0±1.8	0.1841a
Responses [%]				
place of residence				
village	81.9	83.8	79.5	0.2025 ^b
small town	2.6	3.3	1.8	
city of Kraków	15.5	12.9	18.7	
school type				
primary school	49.6	44.3	56.1	0.0213^b
middle school	50.4	55.7	43.9	
siblings				
no	9.4	9.0	9.9	0.7667 ^b
yes	90.6	91.0	90.1	
parental work activity				
no	9.7	9.5	9.9	0.2214 ^b
yes, only mum	10.8	11.9	9.4	
yes, only dad	31.2	34.8	26.9	
yes, both	48.3	43.8	53.8	
having money to buy food that is needed				
no	4.2	4.3	4.1	0.9687 ^b
sometimes no	4.7	4.8	4.7	
sometimes yes	5.8	5.2	6.4	
yes	85.3	85.7	84.8	
school problems				
no	84.8	85.2	84.2	0.7812 ^b
yes	15.2	14.8	15.8	

X – mean; SD – standard deviation; P – level of statistical significance between the groups using U Mann-Whitney test; P^b – level of statistical significance between the groups using Chi-Square test

Table 2. Frequency of food consumption during snacking in total and stratified by gender [%]

Food product	Type of answer	Responses [%]			P
		Total	Girls	Boys	
Fruit	Y	76.1	76.2	76.0	0.9696
	N	23.9	23.8	24.0	
Vegetables	Y	22.8	18.6	28.1	0.0280
	N	77.2	81.4	71.9	
Unsweetened dairy beverages and desserts	Y	35.2	35.2	35.1	0.9756
	N	64.8	64.8	64.9	
Sweetened dairy beverages and desserts	Y	26.0	21.9	31.0	0.0442
	N	74.0	78.1	69.0	
Sweet snacks	Y	50.1	53.8	45.6	0.1115
	N	49.9	46.2	54.4	
Savoury snacks	Y	26.8	25.7	28.1	0.6054
	N	73.2	74.3	71.9	
Nuts, almonds, seeds	Y	17.3	18.6	15.8	0.4754
	N	82.7	81.4	84.2	
Other	Y	95.0	95.7	94.2	0.4859
	N	5.0	4.3	5.8	

Y – yes; N – no; P – level of statistical significance between the groups using Chi-Square test.

with low intensity of pro-health traits characterized 83.8% of girls and 82.5% of boys. A moderate intensity of pro-health traits was found in the diet of 15.7% of respondents (16.2% of girls and 15.2% of boys). Only four respondents followed a diet which showed a high probability of pro-health characteristics – these were boys (2.3%) (Tab. 5).

DISCUSSION

Consumption of an adequate number of meals during the day is one of the key elements of proper nutrition. According to the national recommendations, children and adolescents <18 years of age should consume five meals/day (every 3–4 hours) [4]. A study conducted among adolescents from the rural regions of the Zachodniopomorskie (Western Pomeranian) Province demonstrated that 44.7% of the respondents consumed three or more meals/day, while over half of them (55.3%) consumed three or fewer meals/day [13]. In the current study, the percentage of adolescents who consumed four or five meals/day was higher – 65.3%, with no difference between gender groups. Adolescents who did not consume breakfast were also more likely to be overweight/obese in the study by Mihrshahi et al., in a group of 5 – 16-year-olds [14]. Among adolescents aged 13–17 years in Malaysia, irregular meals as well as gender was associated with BMI-for-age z-score [15]. The results of a systematic review also suggest that skipping breakfast is associated with cardiometabolic risk factors in adolescents aged 10–19 years [16].

According to National Nutrition Surveys (1995, 2007, 2011–2012), snacking in a group of Australian children and adolescents increased in frequency over time, and in the energy contribution in both core and discretionary foods [17]. In other studies, snack frequency was associated with a higher odds of overweight and abdominal obesity in children [18]. In the current study, snacking – most often fruit (76.1%) and sweets (50.1%) – was reported by most respondents. A combination of relatively healthy and unhealthy snacks was also considering adolescents general snack consumption in Cool Snacks project [19]. Galczak-Kondraciuk et al. also found that fruit and vegetables were the most popular snacks among children aged 7–12 years from the northern regions of the Lublin Province in eastern Poland (B: 42.4% and G: 51%; p<0.05) [20]. In the findings of the current study, gender differences were found between boys and girls in snacking sweetened dairy products and vegetables which was chosen more often by examined boys. Own findings can show a new trend in the change of food chosen by gender groups.

The boys in the current study were more likely than girls to consume white bread, deli meats, sausage, red meat and potatoes. Those products (except potato) are components with a potentially negative influence on health, although in accordance with pHDI-10, there were no differences in the pro-healthy diet in the gender group. In the older group of students (456 people, mean age 23 years) there was similar findings to those in the current study in which meat products and potato were statistically significant differences in the gender group [21]. This was in accordance with the study by Cichocka and Krupa in group of adolescent high school students in Nowy Sącz, also in the Malopolska (Lesser Poland) Province [22].

Sygit et al., reported irregularities in the consumption frequency of selected foods among adolescents in rural areas.

Table 3. Frequency of food consumption during last year stratified by gender [%]

Food product	Gender	responses [%]						P
		Several times/day	Once/day	Several times/week	Once/week	1–3 times/month	Never	
white bread	G	39.0	28.6	19.0	2.9	3.8	6.7	0.0037
	B	56.1	22.2	9.9	3.5	2.3	5.8	
whole-wheat bread	G	11.9	13.3	21.4	13.3	21.4	18.6	0.7647
	B	8.8	14.0	24.0	16.4	24.0	12.9	
white rice, regular pasta, fine groats	G	1.4	7.1	34.3	25.2	28.1	3.8	0.0524
	B	7.0	6.4	35.7	29.8	15.8	5.3	
coarse grits, whole-grain pasta	G	2.4	15.7	21.4	23.3	27.1	10	0.4228
	B	6.4	12.9	26.9	17.0	28.1	8.8	
fast foods	G	1.4	3.3	8.1	11.9	64.8	10.5	0.0816
	B	4.7	4.1	13.5	13.5	53.2	11.1	
butter	G	39.0	31.4	18.1	3.8	4.8	2.9	0.2908
	B	45.6	29.2	12.3	4.7	3.5	4.7	
milk, including flavoured milk, cocoa	G	6.2	27.1	27.1	15.2	18.6	5.7	0.0865
	B	12.9	23.4	32.7	14.6	11.1	5.3	
fermented dairy drinks	G	4.3	12.4	34.3	19.5	22.9	6.7	0.3183
	B	9.4	11.7	31.0	21.6	23.4	2.9	
curd cheese (homogenized)	G	2.4	6.2	20.5	20.5	34.8	15.7	0.5223
	B	2.3	5.3	21.6	28.7	25.1	17.0	
cheese, including processed and blue cheeses	G	5.7	11.9	25.7	18.1	23.3	15.2	0.1503
	B	7.0	11.1	33.9	18.7	15.2	14.0	
deli meats, sausages, Wiener sausages	G	7.1	20.5	37.6	16.7	15.2	2.9	0.0023
	B	15.8	21.1	42.1	11.7	7.6	1.8	
red meat	G	1.0	4.8	21.4	26.2	35.7	11.0	0.0039
	B	5.8	7.0	28.1	25.7	22.8	10.5	
white meat	G	1.9	8.6	42.9	27.6	14.3	4.8	0.7572
	B	5.3	8.8	38.6	28.7	14.0	4.7	
fish	G	1.0	1.4	13.3	44.3	29.5	10.5	0.4036
	B	2.9	5.3	17.5	30.4	36.3	7.6	
eggs	G	2.4	6.2	38.1	31.0	18.1	4.3	0.2817
	B	6.4	6.4	35.1	36.3	11.7	4.1	
legume seeds	G	1.4	6.7	10.5	17.6	44.8	19.0	0.5817
	B	2.9	2.3	12.3	22.2	43.9	16.4	
potatoes	G	2.9	27.6	48.1	15.2	2.9	3.3	0.0434
	B	11.1	29.2	41.5	11.1	5.3	1.8	
fruit	G	44.3	23.8	27.1	2.9	0.5	1.4	0.2691
	B	38.0	28.7	23.4	7.0	1.8	1.2	
vegetables	G	26.2	32.9	31.4	6.2	1.9	1.4	0.5099
	B	27.5	28.1	29.2	8.2	5.3	1.8	
sweets	G	16.7	20.0	35.7	17.1	8.1	2.4	0.6927
	B	14.0	25.7	35.1	15.8	7.0	2.3	

G – girls; B – boys; P – level of statistical significance between the groups using U Mann-Whitney test.

Daily fruit and vegetable consumption was reported only by 35.2% of the respondents, while 63.4% declared daily consumption of sweets [13]. Mendyk et al., investigated a young population aged 13–18 years and found that 32.5% of the respondents consumed only one serving of fruit and vegetables [23]. In the current study, no statistically significant differences were found in the frequency of fruit and vegetable consumption when the groups were stratified by gender. It was also notable that fruit intake was significantly higher

than vegetable consumption among both among boys and girls, compared to other authors.

Between 2002 – 2010, Cross-sectional Health Behaviour in School-aged Children Surveys were used to investigate trends in the daily fruit and vegetable consumption, in which a significant decrease in fruit consumption was noted, *inter alia* in Poland, while no significant differences were found in vegetable consumption [24]. In analyses of the 2020 HBSC survey data, the trend was confirmed for a decrease in the

Table 4. Frequency of drinks consumption during the last year, stratified by gender [%]

Product	Gender	Responses [%]						P
		Several times/day	Once/day	Several times/week	Once/week	1–3 times/month	Never	
vegetable or vegetable-fruit juice	G	8.1	12.4	22.4	17.6	21.4	18.1	0.3212
	B	11.1	11.1	25.7	16.4	20.5	15.2	
tea	G	42.9	31.9	14.8	2.9	5.7	1.9	0.4591
	B	46.2	30.4	15.2	6.4	1.8	0.0	
coffee	G	1.9	6.2	5.2	5.7	11.9	69.0	0.0903
	B	2.9	6.4	7.0	8.2	17.0	58.5	
fizzy and non-fizzy drinks	G	4.3	9.5	19.5	19.5	35.7	11.4	0.0001
	B	9.9	11.1	29.8	21.1	22.2	5.8	
Cola type products	G	2.4	5.7	9.0	21.9	41.0	20.0	<0.0001
	B	6.4	9.4	26.3	21.6	26.3	9.9	
energy drinks	G	0.0	1.0	2.4	2.4	19.5	74.8	0.0003
	B	1.2	1.2	5.8	11.7	24.6	55.6	
mineral water	G	54.8	15.7	11.4	4.8	10.5	2.9	0.8227
	B	53.8	17.5	15.8	4.7	6.4	1.8	
alcoholic beverages	G	0.0	0.0	0.0	0.0	0.5	99.5	0.5432
	B	1.2	0.0	0.0	0.0	2.9	95.9	
fruit juice	G	1.4	0.5	2.9	27.1	23.8	44.3	0.8530
	B	1.2	1.8	7.0	23.4	28.7	38.0	

G – girls; B – boys; P – level of statistical significance between the groups using U Mann-Whitney test.

Table 5. Level of intensity of pro-health features in total, stratified by gender [%]

Level of intensity of pro-health features	Total [%]	Girls [%]	Boys [%]	P
low	83.2	83.8	82.5	0.0654
moderate	15.7	16.2	15.2	
high	1.0	0	2.3	

P – level of statistical significance between the groups using U Mann-Whitney test.

intake of health beneficial products (fruit and vegetable) with age, and an increase in the intake of unfavourable products (sweets and drinks with added sugar) [25]. In Australian adolescents, females had significantly greater odds for vegetable intake than males, whereas in fruit consumption no odds were found [26].

Grains, especially whole grains, should be included in the diet of children and adolescents. In the current study, a higher intake (several servings/day) of white bread (46.7%), compared to whole-wheat bread (10.5%), was declared by the respondents. Those data are consistent with the findings among adults and children/adolescents in America [27] and the United Kingdom [28] where similarly low levels of the intake of whole grains products were reported. Kiciak et al., who investigated the dietary behaviour of adolescents in the Silesian Province in south-western Poland, also reported a low intake of grits [29]. In own study, boys (56.1%) significantly often consumed white bread several times per day, compared to girls (39.0%; $p=0.0037$). In a study from Biała Podlaska in eastern Poland (175 adolescents in age 16–19 years), whole-wheat bread was eaten the most frequently by girls once or twice a week (64.6%), and in group of boys, three or four times a week (67.5%). This product was also consumed more often by both gender groups with high levels of physical activity [30].

Sygit et al., demonstrated that 78.3% of obese adolescents from rural areas did not drink milk, and as many as 87% did not eat vegetables. The consumption of sweets was also statistically significantly higher ($p<0.05$) in that group of respondents (91.3%) compared to the overweight group (64.9%) [13]. Likewise, Mendyk et al., found that 47.4% of their study population did not drink milk [23]. In the current study, the percentage of adolescents who drank milk (at least one serving/day) was only 34.7%; 83.6% of boys and 75.7% girls drink milk ($p=0.0865$) at least once a week. Young people (300 adolescents, age 16–18 years) declared a low frequency of milk consumption once a day (21.3%), whereas boys consumed fruit yoghurts ($p=0.0127$) and curd cheese ($p=0.0023$) more frequently than the girls [31]. In a cross-sectional study by Nezami et al., among 536 males and females aged 12–18, boys drank (0.9 ± 1.2) significantly more milk as a serving/day, compared to girls (0.6 ± 0.6 ; $p<0.0001$) [32]. The total dairy intake and cheese intake of the boys was substantially higher than that of girls [32]. These findings are the opposite to result from Iran where boys had a low level of milk and dairy products intake [33]. According to Sawicka et al., insufficient milk and dairy product consumption among children from primary schools increases with age: only 20.9% of junior high students drank one glass of milk/day, i.e. 10% less than primary school students [34]. Better results were reported by Jonczyk et al., who investigated children aged 6–13 years from rural areas, and found that 61.7% consumed milk and dairy products every day [35]. According to the dietary guidelines on nutrition, children and pubescent should consume the equivalent of 3–4 glasses of milk/day, e.g. yogurt or buttermilk [4].

Also, children and adolescents up the age of 18 years should eat fish at least twice a week, especially sea-fish. In the current study, the respondents most often reported fish intake only once a week. In a study from Koszalin in the

Western Pomeranian Province in north-west Poland, 44.5% of primary school children (grades 4–6) consumed fish twice a week [36]. In a study from Łódź in central Poland, from among 622 adolescents aged 12–19 years, as many as 24% declared a complete lack of fish intake in their diet [37]. According to Ambroży et al., 33.8% of city dwellers and 28.6% of the inhabitants of rural areas consumed fish less than once a week [8].

The abovementioned guidelines from the National Institute of Public Health/National Institute of Hygiene – National Research Institute in Warsaw emphasize the need to reduce the intake of sugar and sweets. In the current study, a half of the respondents declared daily, also several times a day, consumption of sweets (49.3%). Głębocka and Kęska reported an even higher percentage. In their study, the inhabitants of Zamość in the Lublin Province of eastern Poland, consumed sweets significantly more often compared to their age peers in Warsaw – 70% vs. 54%, respectively [38].

In the current study, fast foods were consumed several times a month by the respondents (59.6%), which is consistent with the findings of other authors [20, 23]. In a study by Kolmaga et al., over half of the adolescents aged 12–19 years consumed fast foods even more often – up to several times a week [39]. Fast food was often the snack of choice during shopping at the school stores (9.5% of the students), with crisps and sweets among the most popular products – 19.8% and 41.3%, respectively [40]. In the light of these findings, the introduction in 2016 of laws ruling against junk food at schools and the need for healthy food to be available at school stores, seems like a prudent change [41].

The results of the frequency of consumption of selected products were also confirmed by the low percentage of people (1%) whose diet had a potentially beneficial effect on health based on the pro healthy diet index (p HDI-10). Respondents in the study by Mendyk et al., (<18 years old) also displayed a low level of pro-health behaviour with regard to nourishment. An insufficient amount of vegetables and fruit, excessive consumption of junk food, sweets, salty snacks, and substituting milk and water with sugary beverages, was observed [23]. Promoting pro-healthy behaviours, including a proper diet, is one of the elements for the prevention of overweight and obesity among young people [42].

Approximately 71% of the students in the current study reported drinking water at least once a day. The study did not include quantitative analysis of fluid intake, similar to the study by Wojtyła-Buciora, in which 48% of the respondents declared a daily water intake [40]. In a study by Mendyk et al., a clear majority (82.5%) of adolescents under 18 years of age reported drinking water every day, although less than five glasses/day [23]. Sweet fizzy drinks were consumed more than four times a week by 51.3% girls and 50.3% boys in the Lublin Province of eastern Poland [20], and every day by 32% of the adolescents from the Kalisz Province in central Poland [40]. In the current study, sweet fizzy drinks were most often consumed several times/week (24.1%), while Cola type products were consumed less often (1–3 times/week) by 34.4% of the pupils. Most of the respondents did not drink coffee at all (64.3%), but 8.7% consumed coffee every day or several times/day. In a study by Mendyk et al., consumption of at least one cup of coffee/day and energy drinks was declared by 37.7% and 9.6% of respondents, respectively [23]. In a study by Ambroży et al. among adolescents in rural areas, coffee consumption of more than one cup/day was reported by

25.3% of the study population [8]. In the current study, however, the percentage of pupils who did not consume energy drinks was higher (66.1%) compared to other authors. Admittedly, this may have been the result of the young age of the respondents. In a study among adolescents aged 11–13 years in Warsaw, Cola-like drinks were consumed by as many as 89.1% of the respondents, followed by energy drinks – 23.8%. Median daily caffeine intake from these beverages was 5.71 mg [43].

The nutritional mistakes demonstrated the low quality of the diet (83.2%) of most of the adolescents examined, and deviated from a health-promoting diet. Adverse behaviours and lifestyle factors, included *inter alia* poor diet and metabolic syndrome, are key risk factors for the development of non-communicable diseases in adolescence [44]. The results of the updated systematic review of diet quality indices and their associations with health-related outcomes in children and adolescents, indicate the usefulness of this tool in relation to selected non-communicable diseases [45].

CONCLUSIONS

Irregular dietary behaviour was detected in the group of children and adolescents from the Małopolska (Lesser Poland) Province. Most respondents did not follow the guidelines on the recommended number of meals/day and often snacked between the meals. The structure of the consumed foods and drinks also revealed numerous dietary mistakes, notably, an especially high intake of white bread, low intake of milk and dairy products, eggs, legume seeds and fish. Despite the fact that the adolescents declared frequent consumption of fruit and vegetables, the proportions were not compliant with the guidelines (three out of five servings should consist of vegetables). As for fluid intake, the frequent consumption of water was a positive finding, and juice and tea consumption were comparably high. Significant differences were observed in the consumption frequency of selected products when the groups were stratified by gender. Boys significantly more often reported consumption of foods and drinks which should be limited in a healthy diet, i.e. meat, deli meats, and sweet drinks, often caffeinated and fizzy. This translated into an evaluation of the quality of the diet, which in most respondents did not meet the health-promoting criteria included in the Diet Quality Index – pHDI-10.

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