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Dietary Behaviour Patterns in Rural Primary Schools: An Empirical Assessment*

Anna S. KOWALSKA and Klaudia PASKUDZKA

University of Economics and Business, Wroclaw, Poland

Correspondence should be addressed to: Anna S. KOWALSKA, anna.kowalska@ue.wroc.pl

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Abstract

The study investigates the extent to which selected demographic factors- age and sex- shape dietary behaviours among students aged 11– 14. Existing research on nutritional practices in early adolescence highlights the importance of demographic determinants; however, empirical findings remain inconclusive, particularly in the context of Central and Eastern Europe. This gap is relevant given the growing emphasis on the role of school food environments in promoting healthy eating. To address this void, the study employs a quantitative survey conducted among students from primary schools, focusing on behaviours directly linked to everyday nutritional routines. Descriptive statistics and chi-square tests were applied to examine patterns related to the number of meals consumed, the frequency of bringing a second breakfast, participation in school lunches, and the use of school shops. The analysis shows that neither age nor sex significantly differentiates the total number of meals or the number of hot meals consumed. No significant associations were identified for bringing a second breakfast, eating school lunches, or using school shops. The only statistically significant relationship was found between bringing a second breakfast and participation in school lunches, although the effect size was weak. Overall, the findings indicate that dietary behaviours in this age group remain relatively stable across demographic categories, suggesting that effective interventions should target school-level determinants rather than demographic segmentation.

Keywords: dietary behaviours; school nutrition; adolescents; school food environment.

Introduction

Despite numerous recommendations promoting regular meal consumption among school- aged children, there remains insufficient evidence regarding the extent to which key demographic characteristics- namely sex and age- determine both the number of meals consumed (including hot meals) and specific behaviours related to school nutrition. These behaviours include bringing a packed second breakfast, eating lunch in the school canteen, and purchasing food in school shops. The lack of such knowledge hinders the development of targeted educational interventions and school-based environmental policies. Accordingly, the research problem focuses on assessing the extent to which students' sex and age influence the number of meals they consume (both overall and hot meals), as well as their dietary habits related to bringing a second breakfast to school, eating lunch in the school cafeteria, and using school shops.

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The aim of the study was therefore to identify students' dietary habits, with particular emphasis on the total number of meals consumed and the number of hot meals, and to examine the effects of sex and age on these behaviours. The analysis further encompassed habits related to bringing a second breakfast to school, purchasing food in school shops, and having lunch in the school canteen. The study seeks to provide empirical evidence that can support the formulation of recommendations for school policies and educational interventions. To achieve this aim, the following research questions were formulated:

- Do students differ significantly in the number of meals consumed (overall and hot meals) depending on their sex?
- Do students differ significantly in the number of meals consumed (overall and hot meals) depending on their age?
- Does sex influence the frequency of bringing a second breakfast to school, eating lunch in the school canteen, and using school shops?
- Does age influence the frequency of bringing a second breakfast to school, eating lunch in the school canteen, and using school shops?

The following research hypotheses were proposed for empirical verification:

H1: There are significant differences in the total number of meals consumed between students of different age groups.
H2: There are no significant differences in the total number of meals consumed between boys and girls.
H3: The frequency of eating lunch in the school canteen and bringing a second breakfast to school decreases with age.
H4: The use of school shops increases with age and is more frequent among girls than boys.
H5: Students who eat lunch at school are less likely to bring a second breakfast compared to those who do not eat lunch at school.

Literature Review

Research on the dietary behaviours of school- aged children and adolescents consistently highlights that eating patterns during the school years are a critical determinant of physical, cognitive, and psychosocial development (Jarosz, 2020). Numerous studies indicate that meal regularity, the nutritional quality of foods consumed, and the characteristics of the school food environment significantly affect both short- and long- term health outcomes (Stoś et al., 2021). Within this field, particular attention is given to the role of demographic, environmental, and institutional factors in shaping students' dietary habits.

Nutrition guidelines for children and adolescents recommend consuming four to five regular meals per day (Jarosz, 2020). However, population-based studies demonstrate that meal regularity tends to decline with age, which is associated with increasing dietary autonomy, decreasing parental oversight, and stronger peer influence (Neumark-Sztainer et al., 2011). While some authors report a marked decrease in the regularity of meals in older students (Decyk-Chęcel, 2017; Larson et al., 2013), others indicate that this trend is not universal and may depend on contextual factors such as family eating routines, duration of school attendance, availability of school meals, and the broader school food environment (Utter et al., 2018). Differences in the number of meals by sex receive comparatively less scholarly attention, although existing studies suggest that girls and boys differ more in their food preferences than in the frequency of meal consumption (Croll et al., 2001). In younger age groups, family practices and parental modelling appear to be more influential determinants of meal frequency than individual choices.

The mid- morning meal plays an important metabolic and cognitive role, improving concentration, supporting learning capacity, and stabilising glycaemic levels (NFZ, n.d.; PSSE Szczecinek, n.d.). Despite this, skipping the mid-morning meal is widespread in both Poland and other European countries (Brukało et al., 2016). The decline in the habit of bringing a packed mid-morning meal is particularly visible during early adolescence. Older students are less likely to bring food from home (Wolnicka, 2017), a behaviour that may be associated with increased autonomy, the availability of school shops, and greater peer influence. Conversely, Fletcher et al. (2008) argue that school-level environmental conditions- such as break duration, food regulations, and canteen/shop infrastructure- serve as stronger determinants of this behaviour than individual characteristics alone.

School canteens represent a core element of school nutrition policy and provide students with access to a regular, nutritionally optimised hot meal (Jeruszka-Bielak & Górnicka, 2024). International studies demonstrate that students who consume school lunches tend to exhibit better overall dietary quality throughout the day (Neumark-

Sztainer et al., 2005; Tilles-Tirkkonen et al., 2011). The decision to participate in school lunches is influenced by multiple factors, including: taste acceptance and food preferences, time available for eating, meal cost, parental attitudes and routines, social dynamics within the canteen (Stevens et al., 2013). Some researchers observe a decline in participation in school lunches among older students, which may result from greater independence and the increasing likelihood of purchasing external food options.

School shops play a dual role: they may promote healthy eating choices or, in the absence of proper regulation, encourage unhealthy dietary habits (Hamułka et al., 2009). Research provides strong evidence that well-regulated school shops, those offering nutrient-dense foods and restricting highly processed and high-sugar products, can significantly improve the overall dietary quality of students (Bekker et al., 2017). The availability of pocket money and growing dietary autonomy, especially in older adolescents, increases the frequency of school shop use (WHO, 2021). Velazquez et al. (2017) demonstrate that even single items in the shop assortment- such as sugary beverages- can shape daily dietary patterns. In Poland, formal guidelines exist regarding the operation and nutritional standards of school shops (Miasto Stołeczne Warszawy, 2015). However, recent analyses indicate a lack of up- to- date, representative data evaluating actual compliance with these recommendations and their impact on students' dietary behaviour (Romaniuk et al., 2022).

The school environment is recognised as one of the most influential determinants of students' dietary behaviour. Studies have shown that: the availability of healthy food options increases their consumption, restrictive policies limiting low-nutrient foods are effective, consistent implementation and monitoring of food policies are essential for sustained behavioural change (Grigsby-Duffy et al., 2022). Neumark-Sztainer et al. (2005) and Tilles-Tirkkonen et al. (2011) highlight that schools have the potential to mitigate nutritional inequalities arising from household conditions, provided that a coherent and well-monitored school nutrition policy is in place.

The reviewed literature demonstrates that students' dietary behaviours are shaped by a range of interrelated demographic, environmental, familial, and institutional factors. The absence of clear, consistent associations between age, sex, and dietary habits- reported in numerous studies- underscores the need for multifactorial analysis and systemic approaches to school nutrition. School canteens and school shops play particularly important roles, as their organisation and offerings can reinforce or undermine healthy eating patterns among students.

Methods

The study used a survey research design and was conducted among pupils aged 11–14. Data were collected using a questionnaire that included items related to the number of meals consumed, bringing a second breakfast to school, eating lunch in the school canteen, and using school shops. Demographic variables- sex and age- were also recorded.

The sample size of 274 students was determined based on both methodological and substantive considerations. Although the population of pupils aged 11– 14 in rural primary schools is relatively dispersed, the obtained sample ensures sufficient representation across key demographic categories (age and sex), allowing for reliable subgroup comparisons. The final sample meets this criterion and provides acceptable statistical power for identifying potential associations between demographic factors and dietary behaviours. Moreover, the sample reflects the actual distribution of students across grades in the participating schools.

Descriptive statistics were applied in the analysis, including the calculation of means, medians, and standard deviations for variables capturing the number of meals and the number of hot meals. This allowed for the assessment of general tendencies and variability in students' dietary behaviours.

To examine associations between categorical variables (e.g., sex vs. bringing a second breakfast, age vs. eating school lunches), the chi-square test of independence was employed with a significance level of $\alpha = 0.05$. For analyses in which significant relationships were identified, the strength of association was additionally assessed using Cramér's V and Somers' D coefficients.

The results were presented in the form of tables and charts to ensure clear visualisation of response distributions and statistical values.

Results

Figure 1 presents the average number of all meals and the average number of hot meals consumed by the surveyed students, both overall and stratified by sex and age. The mean total number of meals is approximately 4.4, whereas the mean number of hot meals is around 2.0. Thus, students consume on average slightly more than four meals per day, of which roughly half are hot meals.

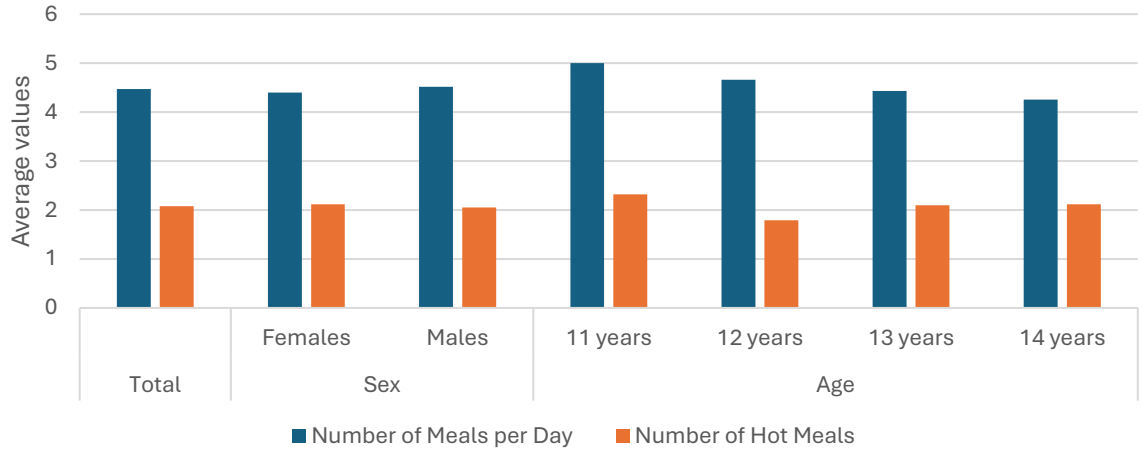

Figure 1. Average number of total and hot meals consumed during the day by respondents in total and by gender and age (average)

Source: own study based on a survey conducted.

The analysis showed that the differences in the number of meals consumed between boys and girls were minimal (Table 1). Boys consumed on average only 0.12 more meals per day than girls, which is consistent with the comparable median values (5 and 4 meals, respectively). A similar level of variability was observed in both groups, as reflected by comparable standard deviation values. With regard to the number of hot meals, no significant differences between sexes were identified. Girls consumed on average 0.07 more hot meals per day than boys; however, the medians and standard deviations indicate a highly similar dietary pattern across both groups.

Table 1. Descriptive Summary of Meal Consumption Variables

Specification			Mean	Median	SD
Number of Meals per Day	Sex	Females	4.40	4.0	1.22
		Males	4.52	5.0	1.28
	Age	11	5.00	5.0	1.44
		12	4.66	5.0	1.43
		13	4.43	4.0	1.29
		14	4.26	4.0	1.02
Number of hot meals	Sex	Females	2.12	2.0	0.85
		Males	2.05	2.0	0.82
	Age	11	2.32	2.0	0.75
		12	1.79	1.0	0.98
		13	2.09	2.0	0.79
		14	2.12	2.0	0.80

Source: own study based on a survey conducted.

In the analysis stratified by age, it was observed that the number of meals consumed per day decreased gradually with age- from an average of 5 meals among 11- year-olds to 4.26 meals in the group of 14- year- old students. At the same time, the standard deviation decreased, suggesting more uniform dietary habits within the older age groups. Regarding the number of hot meals, the highest values were recorded among 11- year-olds, followed by a marked decline at age 12. In the subsequent age groups, this indicator returned to approximately two hot meals per day. The greatest variability occurred in the group of 12- year-olds, which may indicate a less regular eating pattern during this stage.

The chi-square test results (Table 2) confirmed the absence of a relationship between the number of meals consumed and sex ($\chi^2 = 0.117$; $p = 0.732$), as well as between the number of hot meals consumed and sex ($\chi^2 = 1.35$; $p = 0.25$). In both cases, the p-values substantially exceeded the $\alpha = 0.05$ threshold, indicating no basis for rejecting the null hypothesis and confirming that sex is not a determinant of the number of meals consumed.

Table 2. Chi-Square Test Results for Associations Between Eating Habits and Demographic Variables

Test		Statistics χ^2	p-value
Number of Meals per Day vs	Sex	0.117	0.732
	Age	4.470	0.215
Number of Hot Meals vs	Sex	1.35	0.25
	Age	4.29	0.23

Source: own study based on a survey conducted.

The chi-square test did not confirm statistically significant differences for either the number of meals and age ($\chi^2 = 4.470$; $p= 0.215$) or the number of hot meals and age ($\chi^2 = 4.29$; $p = 0.23$). The obtained p-values exceeded the significance threshold of $\alpha= 0.05$, indicating no significant association between the examined variables and age.

In summary, neither sex nor age demonstrated a statistically significant effect on the total number of meals consumed or the number of hot meals consumed. Although certain tendencies can be observed with respect to age (such as a decrease in the number of meals and fluctuations in the number of hot meals), these differences did not reach statistical significance. This indicates that the dietary habits of the examined population remain relatively stable across both sex and age groups.

The analysis also included students' dietary behaviours related to bringing a second breakfast to school, consuming lunch at the educational institution, and using school shops. The results were presented with consideration of respondents' sex and age.

Most students declared that they bring a second breakfast to school (59.1%), while 40.9% reported that they do not (Figure 2). No differences were observed by sex- identical proportions of girls and boys declared bringing or not bringing the meal. In contrast, clear variation was evident across age groups. Younger students were more likely to bring a second breakfast: among 11- year- olds, 35.5% reported not bringing one, and among 12- year-olds- 31.9%. In the older groups, this percentage increased: 41.1% among 13- year- olds and 46.5% among 14-year-olds. Thus, the share of students who forgo bringing a meal increases with age. Despite this, in every age group the proportion of students who bring a second breakfast remains higher than the proportion who do not. For example, 68.1% of 12- year- olds bring a second breakfast, which is 14.6 percentage points more than in the group of 14-year-olds (53.5%).

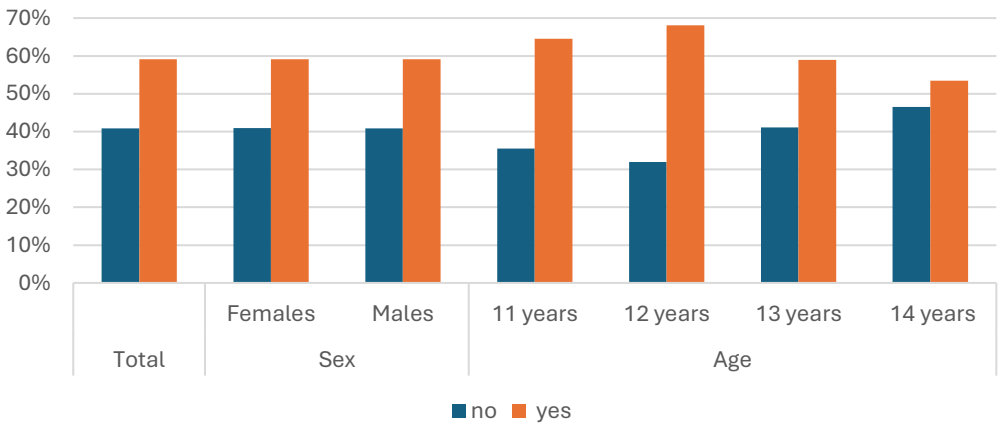

Figure 2. Takes second breakfasts to school according to the respondents in total and by gender and age (%)

Source: own study based on a survey conducted.

The chi-square test results (Table 3) showed no association between sex ($\chi^2 = 0.000$; $p= 0.993$) or age ($\chi^2 = 2.567$; $p= 0.109$) and bringing a second breakfast to school. In both cases, the p- values substantially exceeded the significance threshold of $\alpha= 0.05$, indicating no basis for rejecting the null hypothesis and confirming that neither sex nor age is a determinant of bringing a second breakfast to school.

Table 3. Chi-Square Test results for associations between bringing second breakfasts to school and demographic variables

Test	Statistics χ^2	p-value
Takes second breakfasts to school vs Sex	0.000	0.993
Takes second breakfasts to school vs Age	2.567	0.109

Source: own study based on a survey conducted.

In summary, bringing a second breakfast to school is relatively common; however, approximately 40% of students do not do so. This may lead them to rely more frequently on snacks purchased from the school shop or to eat irregularly. The differences between girls and boys are minimal, indicating that both groups display similar habits in this regard. A noticeable trend emerges with age- particularly around 13 years- when students become less consistent in bringing a second breakfast. This may be associated with increasing autonomy, reduced parental supervision, or a greater tendency to use food options available at school. Nevertheless, the statistical analysis did not confirm these patterns, and thus the observed tendencies were not statistically significant.

More than half of the students consume lunch at school (52.6%), whereas 47.4% do not use this meal option (Figure 3). Girls reported eating school lunch slightly more often than boys (54.5% vs. 51.2%), although the difference is minor. Far greater variation is observed across age groups. The highest proportion of students eating lunch was recorded among 11- year- olds (67.7%). In contrast, a sharp decline is observed among 12-year-olds- only 40.4% reported consuming school lunch, whereas 59.6% refrained from doing so. In the subsequent age groups, that is, among 13- and 14-year-olds, the trend reverses, with an increasing proportion of students eating lunch; however, the values do not return to the level noted among the youngest group. Nearly half of the students still refrain from consuming a hot meal during the school day.

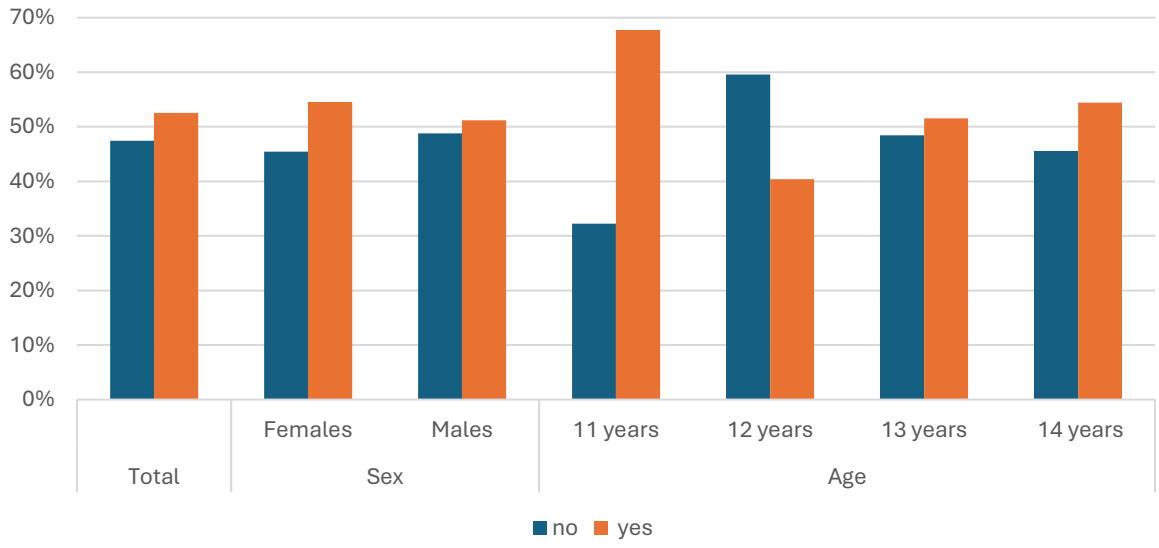

Figure 3. Eating lunch at school according to the respondents in total and by gender and age (%)
Source: own study based on a survey conducted.

The chi-square test results (Table 4) confirmed the absence of a relationship between eating lunch at school and sex ($\chi^2= 0.292$; $p= 0.589$), as well as between eating lunch at school and age ($\chi^2 = 0.071$; $p= 0.790$). In both cases, the p-values exceeded the significance threshold of $\alpha= 0.05$, indicating no basis for rejecting the null hypothesis

and confirming that the analysed demographic variables do not significantly influence the likelihood of consuming lunch in the school canteen.

Table 4. Chi-Square Test results for associations between eating lunch at school and demographic variables

Test	Statistics χ^2	p-value
Eating lunch at school vs Sex	0.292	0.589
Eating lunch at school vs Age	0.071	0.790

Source: own study based on a survey conducted.

The school canteen is the primary place where students consume lunch— most students who eat a hot meal at school do so in this setting. However, it is evident that younger students, particularly 12- year- olds, make use of school lunches least frequently. This may be related to shorter time spent at school or parental preferences for alternative meal arrangements. The influence of sex on whether students eat lunch in the canteen is minimal, although boys appear to do so slightly less often. Nevertheless, the statistical analysis did not confirm these patterns, and the observed differences were not statistically significant.

An additional analysis was conducted to determine whether students who do not consume school lunches are more likely to bring a second breakfast from home (Figure 4). The assessment of the relationship between eating lunch at school and bringing a second breakfast showed that the majority of students bring their own morning meal regardless of whether they participate in school lunches.

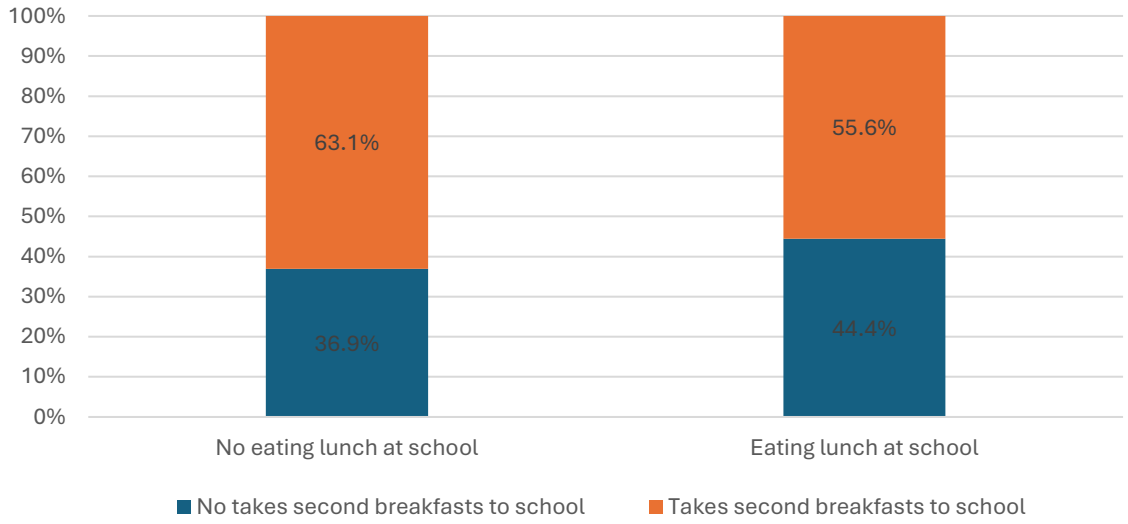

Figure 4. Relationship between eating lunch at school and bringing second breakfasts from home (%)

Source: own study based on a survey conducted.

Among students who ate lunch at school, 55.6% brought a second breakfast, whereas in the group of students who did not eat lunch, this percentage increased to 63.1%. The chi-square test results (Table 5) indicated a statistically significant association between eating lunch and bringing a second breakfast ($\chi^2 = 276.61$, df = 4, $p < 0.001$). This finding confirms the hypothesis that students who do not eat school lunches are more likely to bring a second breakfast from home. However, the value of Somers' D (Y|X = –0.060) suggests that the practical strength of this relationship is very weak. These results indicate that the decision to eat lunch at school does not substantially determine whether a student brings a second breakfast.

Table 5. Chi-Square Test results for associations between eating lunch at school and takes second breakfasts to school

Test	Statistics χ^2	p-value	V_C	$D_{Y\|X}$
Eating lunch at school vs Takes second breakfasts to school	276.605	0.000	0.709	-0.060

Source: own study based on a survey conducted.

More than half of the surveyed students attend a school equipped with a school shop (57.7%) (Figure 5), and its popularity in the schools where it is available is considerable.

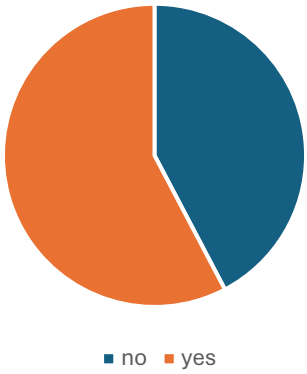

Figure 5. The school has a school shop to the respondents (%)

Source: own study based on a survey conducted.

Among students who had access to a school shop, the vast majority reported using it (72.8%), indicating that this is a widespread behaviour within the studied group (Figure 6). Girls used the shop noticeably more often than boys (80.0% vs. 67.7%). The age-related analysis revealed certain fluctuations in usage levels: the lowest proportion of users was recorded among 12-year-olds (60.0%), whereas the highest was observed among 14- year-olds (79.2%). In the remaining age groups, the values oscillated around the overall average. These results suggest that the tendency to use the school shop increases with age.

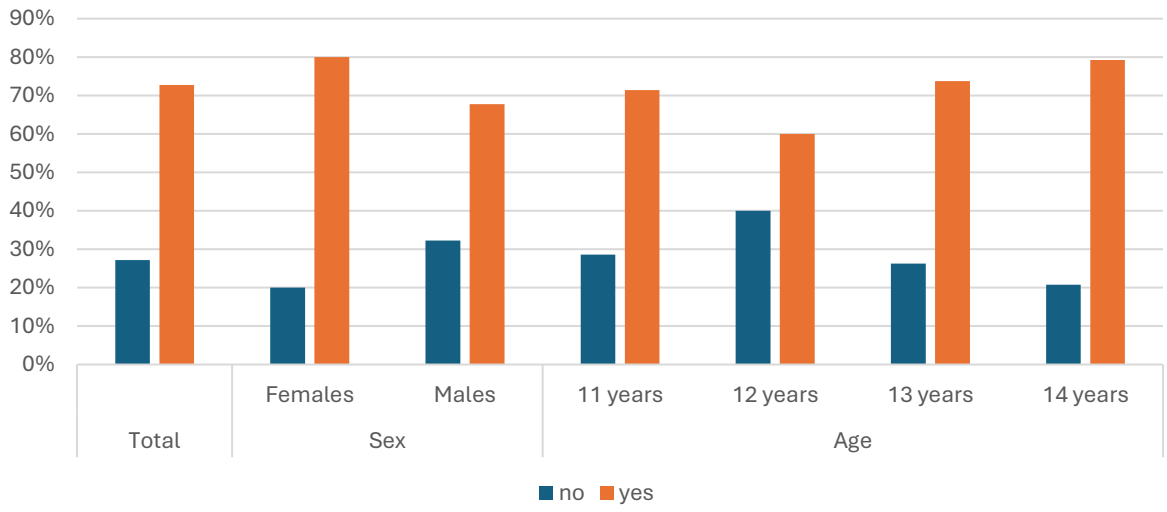

Figure 6. Using the school shop to the respondents in total and by gender and age (N = 158, %)

Source: own study based on a survey conducted.

In both analyses conducted, the chi-square test statistics did not reach the significance threshold of $\alpha = 0.05$ (Table 6). The obtained p-values exceeded the critical level, indicating no basis for rejecting the null hypothesis. Consequently, no statistically significant relationships were identified between the variables under examination.

Table 6. Chi-Square Test results for associations between using the school shop and demographic variables

Test	Statistics χ^2	p-value
Using the school shop vs Sex	2.902224	0.08846
Using the school shop vs Age	3.635130	0.30365

Source: own study based on a survey conducted.

In summary, the school shop plays an important role in students' daily lives by providing easy access to food products and other items, while simultaneously shaping their eating habits and consumer awareness. It also represents a setting capable of supporting healthy dietary choices and nutrition education, which is of considerable importance for the development of young people.

Discussion

The aim of the present study was to determine whether selected demographic factors- specifically age and sex- differentiate students' dietary habits in terms of the number of meals consumed and the use of school meals and school shops. The results indicated that most of the assumed relationships did not reach statistical significance, which allows for several important conclusions concerning adolescents' eating behaviours and their alignment with evidence reported in the literature.

The study confirmed that students consume an average of approximately 4.4 meals per day, a value consistent with nutritional recommendations for children and adolescents, which typically suggest four to five regular meals daily (Jarosz, 2020). Although the descriptive analysis showed a decline in the number of meals with age- from five meals among 11-year-olds to approximately 4.26 among 14- year-olds- this trend did not achieve statistical significance. This pattern corresponds with research demonstrating that increasing age is associated with greater autonomy and reduced parental oversight of dietary behaviour (Neumark-Sztainer et al., 2011). At the same time, other studies emphasise that the decline in meal regularity during adolescence is not always pronounced and may depend heavily on family and school context (Utter et al., 2018), which is reflected in the lack of a clear relationship in the present findings.

With regard to sex, no significant differences were observed in the number of meals or hot meals consumed. This result aligns with a portion of existing studies suggesting that although boys and girls may differ in food preferences, the frequency of meal consumption itself tends to remain similar (Croll et al., 2001). The absence of sex-based differences may also stem from the fact that, in younger age groups, dietary patterns are more strongly shaped by family practices than by individual choices.

The findings related to bringing a second breakfast to school and consuming school lunches likewise did not reveal significant associations with age or sex. Notably, although descriptive analysis suggested a decreasing tendency to bring a second breakfast among older students, this effect was not statistically confirmed. These observations are consistent with national and European reports indicating that skipping the mid-morning meal is common among children and adolescents (Brukało et al., 2016; Stoś et al., 2021). The literature offers mixed findings: some authors report that the regularity of bringing food from home declines in higher grades (Decyk-Chęcel, 2017; Larson et al., 2013; Wolnicka, 2017), whereas others highlight the role of school environmental factors as stronger moderators of this behaviour (Fletcher et al., 2008). Evidence also suggests that increasing age is associated with greater dietary autonomy, peer influence, and a tendency to replace full meals with snacks (Broniecka & Wyka, 2012). Similar observations are presented by Całyniuk et al. (2014), who emphasise the relative stability of general eating habits, accompanied by subtle age- and lifestyle-related changes. According to recommendations issued by the National Health Fund (NFZ) and the State Sanitary Inspection, the mid-morning meal plays an important metabolic and cognitive role, and prolonged gaps between meals may lead to reduced energy levels and concentration, potentially affecting students' academic functioning (Drugie śniadanie – ważny posiłek dla zdrowia…, n.d.; NFZ, n.d.). In this context, the observed decline in meal regularity among older students is a concerning phenomenon.

Within the scope of the present study, however, the differences appear too small to be interpreted as a stable trend.

The only statistically significant result concerned the relationship between eating school lunch and bringing a second breakfast. Students who did not consume lunch in the school canteen were more likely to bring a second breakfast, supporting the hypothesis that one type of meal may substitute for the other. Nevertheless, despite the significance of the chi-square test, the value of Somers' D indicated a very weak association, suggesting that the decision to bring a meal from home is not strongly determined by participation in school lunches. This result aligns with research showing that students' behaviours regarding bringing meals and using the school canteen are multifactorial and depend not only on meal availability but also on taste preferences, costs, and peer influence (Stevens et al., 2013).

The results concerning the use of the school shop, although not statistically significant, proved noteworthy. The findings indicate that school shops constitute an important component of the students' food environment. Girls used the shop more frequently than boys, and the frequency of purchases showed an upward trend with age. These observations are consistent with reports by the WHO (2021), which highlight increasing purchasing autonomy among adolescents and their greater access to pocket money.

Several studies confirm that the availability of school shops and their product offerings may encourage especially older students to buy quick snacks or beverages, particularly when shops sell highly palatable items (Velazquez et al., 2017). The lack of statistical significance in the present study may be attributable to an insufficient sample size or differences in regulations governing shop assortments across the surveyed schools. These results underscore that the school food environment remains a crucial area for targeted interventions.

The literature emphasises that school shops can play either a supportive role in promoting healthy eating or- if inadequately regulated- may contribute to unhealthy dietary choices (Hamułka et al., 2009; WSSE, 2023). Studies by Bekker et al. (2017), Jeruszka-Bielak and Górnicka (2024), and analyses by the WHO (2021) indicate that an appropriately curated product range- rich in nutrient-dense foods and devoid of highly processed items- can effectively improve students' dietary quality.

In Poland, official guidelines exist regarding school nutrition and the operation of school shops (e.g., Miasto Stołeczne Warszawy, 2015), yet there is a lack of up-to-date, representative empirical data evaluating the actual compliance of school shop assortments with these recommendations and their impact on students' purchasing behaviours and health outcomes (Romaniuk et al., 2022; Socha, 2012).

International reviews consistently show that the quality of the school environment—including shop offerings, availability of school lunches, time allocated for eating, and food-sale regulations- has a substantial influence on students' daily dietary choices (Neumark-Sztainer et al., 2005; Tilles-Tirkkonen et al., 2011). Research demonstrates that restrictive policies limiting access to low-nutrient foods and promoting healthier options can influence behavioural change among students, provided they are implemented and monitored consistently (Bekker et al., 2017; Grigsby-Duffy et al., 2022).

The findings of the present study confirm the relevance of such interventions: the high popularity of school shops among students represents both an opportunity and a risk- depending on the nutritional quality of the products available.

In summary, the analyses indicate that many of the observed differences are descriptive in nature and do not reach statistical significance. This suggests that the dietary behaviours of students in the studied population appear relatively stable across age and sex groups, with the exception of the relationship between eating lunch at school and bringing a second breakfast. In light of existing literature, these results may reflect the multifaceted determinants of dietary behaviours and the limited influence of single demographic variables.

An important contribution of this study lies in its focus on students from rural primary schools, a population that remains markedly underrepresented in national and international research on school-related dietary behaviours. Existing studies predominantly examine urban or mixed settings, often overlooking the structural and organisational specificities of rural schools. By analysing a targeted cohort of 274 students, the study offers nuanced insights into dietary practices shaped by a context characterised by limited food outlets, different household routines, and more constrained school food infrastructures.

Moreover, the study provides novel evidence regarding the relative stability of dietary behaviours across demographic groups, despite commonly assumed age- and sex-related differences. The absence of statistically significant associations for most examined behaviours suggests that environmental and institutional conditions- rather than individual demographic characteristics- may be the dominant determinants of students' nutritional

routines. This shifts the analytical focus from individual attributes to systemic and school-level influences, contributing an important perspective to the existing literature.
Implications for practice primarily include the need to enhance the attractiveness of school meals, strengthen nutrition education, and implement measures improving the availability of healthy food options, particularly in school shops. The findings also point to the necessity of further analyses using larger samples and multivariate models, which would allow for a more comprehensive understanding of the determinants of students' dietary behaviours.

Conclusions and Policy Implications

The study yielded several important insights into students' eating patterns and the factors that may shape their dietary behaviours. First, the findings indicate that the number of meals consumed—both overall and hot meals—remains relatively stable and is not significantly influenced by students' age or sex. Similarly, no significant differences were observed in the frequency of bringing a second breakfast to school or eating lunch in the school canteen. This suggests that basic demographic characteristics do not play a decisive role in shaping everyday dietary behaviours in the analysed group.

Second, although the descriptive analysis revealed certain tendencies—such as a lower likelihood of bringing breakfast among older students or greater use of school shops among girls—these differences were not statistically significant. This may indicate the multifactorial nature of dietary decisions, which depend on environmental, familial, economic, and individual preference-related determinants.

Third, the only statistically confirmed relationship concerned the link between bringing a second breakfast and eating lunch at school. Students who did not use school lunches were more likely to bring their own meal, suggesting the presence of a substitution mechanism. At the same time, the strength of this association was modest, limiting its practical relevance.

In sum, the study underscores the role of the school environment as a key setting for shaping dietary habits. Although basic demographic variables do not substantially determine students' behaviours, there remains considerable potential for supporting healthy eating through educational activities, canteen organisation, school shop offerings, and cooperation with parents. The findings also highlight the need to deepen analyses by incorporating additional factors that may explain individual differences in dietary habits, as well as the importance of monitoring the school food environment as a tool for promoting student health.

Based on the conducted analyses and in light of the existing literature, several recommendations can be formulated to support the development of healthy dietary habits among students. The results indicate that demographic characteristics such as age and sex are not the primary determinants of dietary behaviours. This implies that effective interventions should focus primarily on the school and family environment and on systemic actions, such as:

- Strengthening nutrition education in schools. Health education should be systematic, practice-oriented, and engaging. Introducing short, regular sessions on meal planning, reading food labels, composing healthy lunchboxes, or analysing the energy value of food products may enhance students' awareness and support more informed dietary choices.
- Enhancing the attractiveness and availability of school lunches. The study demonstrated a high overall level of canteen use, although the frequency varied across age groups. Therefore, it is advisable to improve the quality and diversity of meals, adjust the menu to students' preferences while maintaining nutritional standards, and enhance the conditions under which meals are consumed (e.g., time allocation, dining environment, seating availability). Evidence suggests that the attractiveness of meal offerings is a key factor encouraging students to use the school canteen.
- Promoting healthy alternatives in school shops. Although the analysis did not reveal statistically significant differences in school shop use, these outlets remain an important source of snacks. Recommended actions include implementing a "healthy assortment" policy (e.g., fruit, nuts and dried fruit, natural yoghurts, whole-grain sandwiches), limiting access to high-sugar or highly processed products, and cooperating with suppliers to reduce the prices of healthy items. Such interventions have proven effective in numerous countries.
- Collaboration with parents and caregivers. Parents exert a substantial influence on children's eating habits, particularly with regard to bringing a second breakfast to school. Schools can support this process by organising workshops and providing educational materials for parents, offering guidance on preparing

balanced breakfasts, and providing tools to facilitate meal planning for children. Continuation of nutritional education at home may reinforce meal regularity and reduce excessive reliance on school shops.

- A systemic approach to healthy eating in schools. It is recommended to develop coherent nutritional policies that encompass rules governing the operation of school canteens and shops, standards for foods available on school premises, and regular monitoring of students' dietary behaviours. Such an integrated approach increases the effectiveness of interventions and reduces inconsistencies in the school food environment.
- Further research and diagnosis of local needs. Regular surveys assessing students' dietary habits and preferences in individual schools are advisable, as they enable the tailoring of interventions to actual needs. It is also important to conduct multifactorial analyses that take into account variables such as family socioeconomic status, levels of physical activity, and school-day organisation.

Limitations

The authors acknowledge several limitations that should be considered when interpreting the findings. First, the study did not examine the actual assortment available in school shops or the specific types of products purchased by students, which constrains the ability to evaluate the influence of the food environment on dietary quality. Moreover, the cross-sectional design does not allow for tracking changes in dietary behaviours over time or establishing causal relationships. The absence of links between the collected data and students' health parameters further limits the assessment of the health implications of the observed behaviours. Finally, due to the characteristics of the sample and potential regional differences, the results cannot be fully generalized to the entire population of school-aged children in Poland.

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