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## FEATURES OF EATING BEHAVIOR OF EARLY SCHOOL-AGE CHILDREN IN THE CONTEXT OF THE IMPLEMENTATION OF THE SCHOOL MEALS REFORM

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*The aim of this study is to study the peculiarities of the eating behaviour of children of primary school age, their food preferences, choice of products and attitudes towards school meals, food habits in the choice of products and attitudes towards the school canteen in the context of the implementation of the school meal reform.*

**Materials and methods.** A large-scale medical and sociological study was conducted, which included children (5,401) of primary school age (from 6 to 10 years old) and their parents (4,347 people) from various schools in Kyiv, Vinnytsia, and Donetsk regions. The questionnaires included questions about food preferences, frequency of consumption of different foods, attitudes towards school meals and factors that influence food choices. The collected data were processed and analyzed using descriptive statistics methods in Excel.

**Research results** indicate a significant level of awareness of the importance of a healthy diet by most children, but an insufficient level of water consumption, an insufficient understanding of the importance of nutrition for maintaining health by children, high popularity of high-carbohydrate products and a low level of satisfaction of some parents with school meals.

**Conclusions.** The conducted analytical research revealed several educational and organizational problems related to the introduction of healthy food in schools, especially within the framework of reforming school food programs. According to the Strategy for reforming the school nutrition system, compliance with the principles of healthy nutrition, ensuring high-quality, safe and healthy nutrition, and improving the taste properties of school nutrition compliance with the principles of healthy nutrition, is extremely important for the preservation of children's health and the prevention of chronic non-infectious diseases. The results of our research indicate the need for additional educational programs for children and parents, the gradual introduction of new food standards, as well as ensuring the availability of healthy food in school canteens, and the implementation of social projects that will contribute to the formation of healthy eating habits

**Keywords:** eating behaviour, children, school meals, eating habits, school meal reform, health, disease prevention, ration, diet, drinking regimen

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### 1. Introduction

Junior school is a period of intensive physical and mental development for a child. Inadequate nutrition in childhood, particularly in the primary school period, including both undernutrition and the presence of signs of overnutrition in children, including overweight and obesity, directly affects child health and development [1].

Evidence from various studies shows that the implementation of school food programs is associated with an improvement in the diversity of the diet, an increase in the consumption of the main macronutrients and trace elements, an improvement in the physical development of the child, as well as an increase in school performance and an improvement in cognitive performance.

In addition, at this age, the foundations of a lifestyle are laid and formed, including proper eating behaviour. The mentioned period of formation of eating habits

is critical because the active development of the organism and formation of life habits take place. Considering the growing problem of obesity among children and adolescents, significant rejuvenation and the spread of chronic non-communicable diseases, as well as the threat to health associated with untimely or improper nutrition, the study of eating behaviour becomes a relevant and important topic for research [2–4].

In our country, attention has always been paid to the quality of children's diets, but studies of children's eating behaviour and preferences, as well as factors affecting the choice of products, have practically not been conducted. This problem has become particularly acute, as WHO experts emphasize that the formation of healthy eating habits and behaviour in childhood and youth is a key factor in maintaining health and combating chronic non-communicable

diseases, which today have become a serious challenge for global public health [5].

The essence of the work consists of the analysis of children's and parents' answers regarding the peculiarities of nutrition, preferences for certain dishes and products, and attitudes towards the school canteen. The obtained data allow a deeper understanding of the factors that influence the eating behaviour of children of primary school age, which can be used in the development of measures aimed at improving the quality of nutrition in educational institutions and supporting a healthy lifestyle among children.

**The aim of the work** is to study the peculiarities of eating behaviour of children of primary school age, their food preferences, eating habits in choosing products and attitude to the school canteen in the context of the implementation of the school nutrition reform.

## 2. Materials and methods

The research was conducted on the basis of the State University "Marzиеv Institute for Public Health of the National Academy of Sciences of Ukraine" from 11.2021 to 02.2022.

Questionnaires were developed for children and their parents to study the nutritional characteristics of school-aged children. The questionnaires included questions about food preferences, frequency of consumption of different foods, attitudes towards school meals and factors that influence food choices. The collected data were processed and analyzed using descriptive statistics methods in Excel. The survey was conducted on the eve of the war.

**Questionnaire for children:** It contained questions about food preferences, frequency of consumption of various products, attitude to the school canteen, etc. For children, the questionnaire was adapted to their age and level of development using graphic materials.

**Questionnaire for parents:** It included questions about the child's eating habits, typical foods and meals for snacks, the frequency of receptions in the school buffet/canteen, as well as their views on children's nutrition at school.

5,401 children of primary school age (6–10 years old) and their parents (4,347 people) from various schools of Kyiv, Vinnytsia, and Donetsk regions took part in the study. The average age of the children was  $8.3 \pm 1.2$  years. The research was conducted in 195 schools.

All participants of the study were informed about its purpose and methods. Parental consent was obtained for their children's participation in the study. The study was conducted in compliance with the principles of bioethics, confidentiality and anonymity.

All respondents who took part in the survey were given questionnaires, which were accompanied by detailed instructions with an emphasis on the need to fill them in as accurately as possible.

The Committee on Medical Ethics at the State Institution "Marzиеv Institute for Public Health of the National Academy of Sciences of Ukraine" (protocol No. 3 dated November 30, 2021) concluded that during the conduct of scientific research, measures were taken to ensure safety of people's health, respect for their rights,

human dignity and moral and ethical norms in accordance with the principles of the Helsinki Convention declaration of human rights, the Convention of the Council of Europe on human rights and biomedicine and relevant laws of Ukraine".

During the research, relative percentages were calculated to describe the distribution of answers to questionnaire questions among children of primary school age. Reliability was assessed by calculating a 95 % confidence interval. The z-test was used to determine the reliability of the differences in the obtained values.

## 3. Research results

To the questionnaire question "Do you think that if you eat the wrong food, you can get sick?" analysis of the responses of children of primary school age revealed the following:

Most children (90.8 %, 95 % CI [90.0 %–91.6 %]) noted during the survey that poor nutrition can lead to diseases. However, a small proportion of children (4.1 %, 95 % CI [3.6 %–4.6 %]) answered that there is no harm from improper nutrition, which indicates insufficient understanding of the importance of healthy nutrition and insufficient awareness of the relationship between nutrition and health. A statistically significant difference between these groups was found ( $p < 0.005$ ). About (5.1 %, 95 % CI [4.6 %–5.6 %]) children have doubts and are not sure about the relationship between nutrition and health.

The next block of questions was those that highlighted the child's relationship to the school canteen. When asked whether they like eating in the school canteen, most of the interviewed children of primary school age answered that they have a positive attitude to eating in the canteen (53.0 %, 95 % CI [51.6 %–54.4 %]), (18.2 %, 95 % CI [17.1 %–19.3 %]) of children said that they like school meals very much, and (28.6 % 95 % CI [27.3 %–29.9 %]) of the children surveyed did not like eating in the school cafeteria at all. The difference between the groups of children who like to eat in the school canteen and those who do not like it is statistically significant ( $p < 0.005$ ). At the same time, (31.7 %, 95 % CI [30.4 %–33.0 %]) of the surveyed elementary school children use the buffet or additionally buy something in the cafeteria (15.8 %, 95 % CI [14.8 %–16.8 %]) of the children noted that additional orders are made extremely rarely. The difference between the groups of children who use the buffet and those who do not is statistically significant ( $p < 0.005$ ).

Given the fact that more than a third of respondents still buy additional food, we determined the predominant range of products and dishes that children buy in the school canteen. So, buns, pies, sweets, and juice have become the most popular products. Thus, (73.0 %, 95 % CI [71.7 %–74.3 %]) of children who buy something extra in the school cafeteria or canteen prefer buns, (36.0 %, 95 % CI [34.7 %–37.3 %]) buy juice, (27.0 %, 95 % CI [25.8 %–28.2 %])–pies and every fourth child (25.1 %, 95 % CI [23.9 %–26.3 %]) – sweets (waffles, candies, cookies, bars, etc.).

The surveyed children of primary school age take snacks to school (78.2 %, 95 % CI [77.0 %–79.4 %]), while (61.4 %, 95 % CI [60.1 %–62.7 %]) take snacks

with them to school regularly, and (16.8 %, 95 % CI [15.8 %–17.8 %]) – rarely. The difference between the groups of children who take food with them for a snack and those who do not is statistically significant ( $p < 0.005$ ). Given the fact that the vast majority of children of primary school age bring and consume home food at school, it is important to determine the range of such products and dishes, as this significantly affects the structure of the diet. Thus, (33.7 %, 95 % CI [32.4 %–35.0 %]) of children take sandwiches, (28.0 %, 95 % CI [26.7 %–29.3 %]) – buns, (8.0 %, 95 % CI [7.3 %–8.7 %]) – sweets, fruits – (59.7 %, 95 % CI [58.3 %–61.1 %]), vegetables – (4.6 %, 95 % CI [4.0 %–5.2 %]).

It should be noted that all products and dishes that children bring from home for a snack or additionally buy in the school cafeteria or canteen are sources of a significant amount of simple carbohydrates (except for vegetables, which less than 5 % of children take with them from home) and can significantly influence the child's diet and the formation of his eating habits in the future.

Considering the significant number of studies conducted recently in different countries regarding the necessity and importance of breakfast at home for a school-aged child, during our study, children were asked questions about breakfast-at-home references [6–9]. According to our data, the vast majority of children of primary school age – (55.0 %, 95 % CI: 53.67 %–56.33 %) of the respondents regularly receive breakfast at home. They rarely eat breakfast at home (21.2 %, 95 % CI: 20.11 %–22.29 %) and do not eat breakfast at all – (23.5 %, 95 % CI: 22.37 %–24.63 %). Thus, it can be stated that almost half of the children of primary school age (44.7 %, 95 % CI: 43.37 %–46.03 %) who participated in the study do not receive breakfast before school every day, which negatively affects their physical and mental condition and impairs academic performance.

An important problem that has been studied recently is the violation of the diet of modern people, in particular, school-age children. A significant number of snacks, according to research, contributes to impaired functioning and the occurrence of diseases of the gastro-

intestinal tract. One of the significant problems is the formation of a habit of unsystematic food consumption while working with electronic devices or watching TV. According to our research, even at the age of 6–11, most children have already formed the habit of consuming food in this format. It is very pleasant to consume food while working with gadgets or watching TV stated (27.3 %, 95 % CI [26.0 %–28.6 %]) of the surveyed children, like it – (48.1 %, 95 % CI [46.8 %–49.4 %]) of interviewed, do not like – (24.3 %, 95 % CI [23.1 %–25.5 %]) of the interviewed children.

Thus, it can be assumed that the reliable vast majority of children (75.4 %, 95 % CI [74.1 %–76.7 %]), ( $p < 0.005$ ) have formed a negative eating habit of unsystematic food consumption while working with gadgets or watching television, which may negatively affect their health in the future.

In order to determine the food preferences of younger schoolchildren, the respondents were asked a number of questions about their attitude to dishes from different food groups, as well as food that has a pronounced salty or sweet taste.

According to the results of our study, younger schoolchildren are significantly like more (the difference between positive and negative attitude groups is statistically significant ( $p < 0.005$ )) that has a sweet and salty taste, as well as meat products, and fresh vegetables and fruits. Attention is drawn to the negative attitude of a significant share of respondents to fish dishes (do not like – (45.5 %, 95 % CI [44.2 %–46.8 %])) (Table 1).

Consuming a sufficient amount of liquid in childhood is an extremely important factor in maintaining health.

The results of our research prove that a significant number of schoolchildren do not consume enough water per day. Thus, according to the recommendation of the Ministry of Health of Ukraine [9], there are no uniform norms for liquid consumption, but you should be guided by general recommendations regarding the drinking regime for children: children 4–8 years old: 5 glasses; children 9–13 years old: 7–8 glasses; 14 and over: 8 to 11 glasses.

Table 1  
Food preferences of children of primary school age regarding dishes from different food groups, as well as salty and sweet food, %

Question	Negative attitude		Positive attitude			
	Do not like	95 % CI	Like	95 % CI	Like very much	95 % CI
Do you like sweets?	1.4	[1.1–1.7]	33.5	[32.2–34.8]	65.1	[63.8–66.4]
Do you like main dishes?	25.5	[24.3–26.7]	60.2	[58.9–61.5]	14.3	[13.4–15.2]
Do you like food with meat?	9.8	[9.0–10.6]	46.7	[45.4–48.0]	43.5	[42.2–44.8]
Do you like fish dishes?	45.5	[44.2–46.8]	38.3	[37.0–39.6]	16.2	[15.2–17.2]
Do you like fresh vegetables and salads made from them?	18.2	[17.2–19.2]	43.0	[41.7–44.3]	38.8	[37.5–40.1]
Do you like fresh fruits?	1.1	[0.8–1.4]	19.8	[18.7–20.9]	79.1	[78.0–80.2]

There are also EFSA recommendations for daily water intake (1,700 ml/day for boys aged 9 to 13 and 1,520 ml/day for girls aged 9 to 13) [10, 11].

According to our data, almost a third of the surveyed children (31.6 %, 95 % CI: [30.36 %–32.84 %]) consume only 3 glasses (600 ml) of water per day,

(41.2 %, 95 % SI: [39.89 %–42.51 %]) consume no more than 5 glasses of water per day (1 L). The given data indicate an existing problem with insufficient fluid intake in a significant part of the interviewed children of primary school age, which is a significant problem and requires further study.

A parallel survey of parents concerned their impressions and attitudes towards children's nutrition at school. In general, after the implementation of changes in school meals, parents were asked the following question: "Recently, changes in school meals have been implemented at school. Do you like the new school meals?". The results were distributed as follows: (34.0 %, 95 % CI: [32.6 %–35.4 %]) answered that they did not like it, (39.0 %, 95 % CI: [37.6 %–40.4 %]) expressed satisfaction, (21.8 %, 95 % CI: [20.6 % to 23.0 %]) remained undecided and (5.2 %, 95 % CI: [4.5 % to 5.9 %]) chose other answer options.

Most parents noted that their children have school meals once during the school day (61.0 %, 95 % CI [59.55 %, 62.45 %]) and visit the school canteen or cafeteria twice (25.2 %, 95 % CI [23.93 %, 26.47 %]) of children.

We also asked parents what they liked about the new school meals. The answers were distributed as follows: nothing at all is liked – (24.2 %, 95 % CI: [22.9 %–25.5 %]), the child generally likes school meals – (14.4 %, 95 % CI: [13.4 %–15.4 %]), they like that the new menu follows the rules of healthy eating – (23.2 %, 95 % CI: [21.9 %–24.5 %]), the presence of new dishes to their liking (8.6 %, 95 % CI: [7.8 %–9.4 %]) of parents, a wider assortment of menus – (20.0 %, 95 % CI: [18.8 %–21.2 %]).

Regarding the cost of food (19.7 %, 95 % CI: [18.5 %–20.9 %]), parents noted that it was too high. However, (14.5 %, 95 % CI: [13.5 %–15.5 %]) indicated that their child did not like eating at school at all, (24.4 %, 95 % CI: [23.1 %–25.7 %]) answered that everything suits them, (17.9 %, 95 % CI: [16.8 %–19.0 %]) consider the dishes tasteless, and (15.6 %, 95 % CI: [14.5 %–16.7 %]) – unusual.

In the opinion of (16.5 %, 95 % CI: [15.4 %–17.6 %]) parents, school nutrition reform should not have been carried out, (50.3 %, 95 % CI: [48.8 %–51.8 %]) believe that the changes should have been introduced more gradually, while (29.6 %, 95 % CI: [28.2 %–31.0 %]), on the contrary, note the timeliness of the reform.

#### 4. Discussion of research results

Nowadays, the problem of providing children with healthy and appropriate school meals to preserve their health is important all over the world. However, even the best initiatives in this direction may prove ineffective if children and their parents do not show sufficient interest and support in these changes, or even have a negative attitude towards them.

The results indicated that children's eating behaviour and their attitude to school meals differ in certain aspects from the results of studies conducted in other countries. At the same time, general trends observed in different countries and revealed in other similar works were revealed.

**Children's knowledge about the impact of improper nutrition on health.** The results of the survey indicate that most primary school children (90.8 %, 95 % CI [90.0 %–91.6 %]) are aware that poor nutrition can lead to diseases. Research in other countries shows that from the age of 5–7, children begin to understand the impact of food on the body, but this process depends on

several factors, in particular, self-esteem, education, advertising, etc. [12, 13]. According to our results, almost 10 % of children do not have such information or are not even sure that there is any connection between nutrition and health. These results may indicate the need for additional educational measures to improve understanding of the importance of healthy eating.

**Attitude towards school meals.** The conducted study showed that the majority of children of primary school age (53.0 %, 95 % CI [51.6 %–54.4 %]) have a positive attitude to food in the school canteen, however (28.6 %, 95 % CI [27.3 %–29.9 %]) children generally do not like the food at school, in particular, because of the taste or unusualness of the dishes. The obtained data indicate that some children do not consume / limitedly consume school canteen meals due to their own preferences. This is also evidenced by research conducted in Italy [14], the Netherlands [15], and Korea [16]. In addition, (31.7 %, 95 % CI [30.4 %–33.0 %]) of children use the buffet to buy additional products, like buns, cakes, sweets and juices being popular, indicating a high level of simple carbohydrate intake, which may be a factor the risk of developing chronic non-infectious diseases, in particular, obesity, metabolic syndrome, etc. The obtained results are confirmed by the data of another study, in which it is determined that children who choose high-carbohydrate products in school meals have home eating habits with a high sugar content [17].

**Snacks from home.** More than three-quarters of all surveyed (78.2 %, 95 % CI [77.0 %–79.4 %]) children take snacks from home, in particular, bring sandwiches to school (33.7 %, 95 % CI [32.4 %–35.0 %]), buns (28.0 %, 95 % CI [26.7 %–29.3 %]) and sweets (8.0 %, 95 % CI [7.3 %–8.7 %]), fruits – (59.7 %, 95 % CI [58.3 %–61.1 %]). Considering that the range and quality of these snacks are formed by parents, the results indicate the need for educational programs for parents regarding the healthy nutrition of children. The obtained data are confirmed by the results of other studies, in particular [18], where it is indicated that children also bring to school fruits (50 %), snacks (50 %), sweets (48 %) and sweetened drinks (31 %).

**Diet and breakfast at home.** Almost half of children (44.7 %, 95 % CI: [43.37 %–46.03 %]) do not receive breakfast at home every day, which can have negative consequences for health and physical and mental development. A study conducted in the countries of the European region shows that the frequency of skipping breakfast on working days ranges from 44 % (Slovenia) to 8 % (Spain), which is mediated, among other things, by the nationality of the parents [19]. Lack of breakfast under conditions of a significant workload at school can lead to a decrease in concentration, rapid fatigue and other cognitive disorders.

**Eating while using gadgets.** More than three-quarters of children (75.4 %, 95 % CI [74.1 %–76.7 %]) have a habit of consuming food while working with gadgets or watching TV. Several researchers indicate numerous negative effects, such as a decrease in cognitive control over food consumption, distraction, and disruption of the connection between the feeling of hunger, the food consumed, and the feeling of satiety [20]. All of the above leads to an increase in the number of



calories and the total volume of food consumed. Undoubtedly, the use of gadgets and the simultaneous consumption of food are negative eating habits that can lead to unsystematic food consumption, overeating, and the development of diseases.

**Food preferences.** The results of the survey showed that children prefer sweet (65.1 % 95 % CI: [63.8 %–66.4 %] very like) and meat dishes (43.5 %, 95 % CI: [42.2 %–44.8 %] like it very much), while children do not like fish dishes (45.5 %, 95 % CI: [44.2 %–46.8 %]). As for fish dishes, a negative attitude towards them was determined in a study conducted in Serbia; with age, the preference for fish dishes increased [21]. A study on determining the perception of different tastes shows that the sweet taste is perceived most positively by children of primary school age [22], which can provoke the formation of a food habit of consuming excessive amounts of sugar. The obtained data indicate the need to diversify the school menu, in particular, to reduce the number of sweet dishes and popularize fish dishes.

**Liquid consumption.** Insufficient water intake is a significant problem, as almost a third of children consume only 3 glasses of water per day, and (41.2 %, 95 % CI: [39.89 %–42.51 %]) - no more than 1 L per day, which is significantly less than the recommended norm. Results of cross-sectional surveys in 13 countries also show that 61 % of children and 75 % of adolescents do not consume enough water [11, 23], according to EFSA's daily water intake guidelines [10]. The obtained data indicate the need to implement measures and programs that contribute to the regular consumption of sufficient water by children.

**Parents' approach.** The change in nutrition in schools is aimed at improving the quality of food and forming healthy eating habits in children, but a significant part of parents (24.2 %, 95 % CI: [22.9 %–25.5 %]) report that they do not like the innovations at all. Tasteless and unusual foods (respectively (17.9 %, 95 % CI: [16.8 % - 19.0 %]) and (15.6 %, 95 % CI: [14.5 %–16.7 %])) can lead to children will choose less healthy foods and products, which will negatively affect their nutrition and health. A positive aspect is that (23.2 %, 95 % CI: [21.9 %–24.5 %]) parents noted the observance of healthy eating rules in the new menu.

The issue of cost is also important for (19.7 %, 95 % CI: [18.5 %–20.9 %]) parents, which can limit access to school meals and require the development and implementation of social programs to provide free school meals to vulnerable categories of children. The majority of parents (50.3 %, 95 % CI: [48.8 %–51.8 %]) believe that the changes envisaged by the school meal reform should be introduced gradually. The problem of parents' perception of changes in nutrition in schools has also been noted in other studies, which emphasize the importance of considering their position, conducting educational work and implementing a comprehensive approach to improving school nutrition and forming healthy eating habits among children [24, 25]. This indicates the need for a more gradual approach to the implementation of reforms so that children and parents can adapt to new conditions.

**Practical meaning.** The presented materials can be the basis for the development of measures aimed at improving children's nutrition and health.

**Study limitations.** It is important to note that the study has a certain limitation, since the obtained results are based solely on the indicated assessments, statements and preferences of elementary school students and their parents regarding the characteristics of nutrition, attitude to the school canteen, etc. The study does not consider other possible influencing factors, such as families' socio-economic status, food availability, or dietary traditions, which may also determine schoolchildren's eating habits and food choices.

**The influence of martial law conditions.** The survey was conducted in the settlements of Kyiv, Vinnytsia and Donetsk regions, including the city of Mariupol, before the introduction of martial law (November 2021 – February 2022), so the results of the study were not affected by it. However, the nutrition of children of primary school age changed significantly during the military operations, which requires additional research and comparisons with the results obtained in this paper to determine the extent and direction of these changes.

**Prospects for further research.** The obtained results can serve as a basis for further research on the nutrition of children of primary school age.

## 5. Conclusions

The results of the study indicate a high level of children's awareness of the importance of healthy nutrition, but also indicate insufficient water consumption, insufficient understanding by some children of the importance of nutrition for maintaining health, the high popularity of high-carbohydrate products, and a low level of satisfaction of some parents with school meals.

Improving the taste properties of school food and observing the principles of healthy eating are extremely important for preserving the health of children and preventing chronic non-infectious diseases. The results of the study also indicate the need for additional educational programs for children and parents, the gradual introduction of new food standards, as well as ensuring the availability of healthy food in school canteens, the implementation of social projects that will contribute to the formation of healthy eating habits and reducing the consumption of harmful foods and products.

## Conflict of interest

The authors declare that they have no conflict of interest in relation to this study, including financial, personal, authorship, or any other, that could affect the study and its results presented in this article.

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## Data availability

The data obtained during the research are stored in the database of the State University "Marzиеv Insti-

tute for Public Health of the National Academy of Sciences of Ukraine".

### Use of artificial intelligence

The authors confirm that they did not use artificial intelligence technologies when creating the presented work.

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