

Patterns of adolescent eating behavior during the COVID-19 pandemic

Ludmila Zhuravleva*, Elena Zarubina, Aleksey Ruchkin, Natalya Simachkova, and Irina Chupina

Ural State Agrarian University, 620075 str. Karl Liebknecht, 42, Yekaterinburg, Russia

Abstract. The ongoing COVID-19 pandemic has exacerbated problems of ensuring food security for all strata of the population of many countries of the world, including Russia. For scientific research of these problems, development and implementation of effective practical recommendations in the international scientific community has developed an interdisciplinary the concept of "food security". Food security is a stable condition processes, mechanisms, infrastructures, relationships and influences related to food production, storage, transportation, supply, consumption and disposal food waste. The concept of food security it is the key to studying the problems of providing for the population food economists, lawyers, specialists management and logistics, marketers, social psychologists, nutritionists, as well as specialists in the field of other sciences. Its place in comprehensive security research food security is also found by the sociology of nutrition, which studies food systems, first of all, in its links such as the consumption of food by various social groups and food waste management. During the third stage of the sociological research, the topic which was the change in the eating behavior of various socio-demographic groups of Russian society in the conditions of ongoing pandemics, the author's team conducted an analysis of food practices children and adolescents in the conditions of the COVID-19 pandemic. Methods of conducting smart survey and in-depth interviews were selected for the research. Analysis the results of the study allowed us to formulate recommendations, which can be used in educational and educational institutions, as well as in families for the formation of a food culture children and adolescents, improving food security of the specified socio-demographic group.

1 Introduction

One of the urgent modern problems during the COVID-19 pandemic was the problem of ensuring food security of socio-demographic groups of all countries of the world, including in Russia. The COVID-19 pandemic has had a negative impact on food security, triggering problems with the supply of food, their production, storage and transportation, which directly affects the potential of human health [1]. Fear, panic moods, loss or threat of job

* Corresponding author: zhuravleva08@gmail.com

loss, salary reduction due to lockdowns, forced self-isolation, living in conditions of socio-economic uncertainty have changed the usual way of life, reduced food security and general well-being of the population. The study of food security as a stable, stable state of processes, mechanisms, infrastructures, relations and influences related to the production of food, their storage, transportation, supply, consumption and disposal of food waste has today become a trend direction of medical and social sciences and the subject of scientific and practical conferences [2].

Of particular relevance is the study of food security and eating behavior of representatives of various social groups and, first of all, marginal (borderline) and risk groups [3, p. 78]. Adolescence is the most important stage of personality development, which determines the interest of scientists in its study. The essence of the puberty period is the transition from childhood to adolescence, culminating in biological maturation, when a person looks like an adult, but is not yet one. The leading dominant of adolescence can be considered the process of emancipation from adults against the background of the formation of a new identity, under the influence of the changed basic needs of representatives of this age cohort, which increases its conflict and deviance [1, p. 111].

The peculiarities of the puberty period affect the values, preferences and behavioral patterns of representatives of this marginal (transitional, borderline) group, creating prerequisites for experimentation and the search for new experiences.

These circumstances aroused interest in the study of adolescents' opinions about the nature of nutrition as a health factor during the pandemic. For schoolchildren and college students, the spread of coronavirus infection coincided with the transition to distance learning, the restriction of movement around the city, walking, the cancellation of classes in sections and institutions of additional education. Children and teenagers began to stay mostly at home in the mode of "temporal autonomy", often in the absence of their parents. This situation could not but affect the eating behavior of adolescents.

A review of the literature showed that foreign researchers began to actively study the nutritional practices of adolescents in new conditions [4]. Italian researchers Roberta Pujia, Yvelise Ferro, Samantha Maurotti, Janin Khoory, Carmine Gazzaruso, Arturo Pujia, Tiziana Montalcini and Elisa Mazzata described the growth of eating disorders in adolescents caused by a change in the habitual employment of adolescents when switching to online education and the increased transition to eating fast food, pizza, sweets, which led to a set of 67% of teenagers participating in the survey are overweight [5]. Another group of Italian scientists, Zae D., Di Pietro M.L., Reali L., investigated food insecurity in Italian children during the COVID-19 pandemic and its correlation with health [6].

Eustachio Colombo P., Elinder L.S., Patterson E. investigated the problems associated with the introduction of environmentally friendly nutrition in schools in Sweden. The authors note: "The successful implementation of environmentally friendly school meals will require a lot of knowledge among students and kitchen staff. The staff also needs to be trained in the preparation of environmentally friendly dishes" [7, p. 89].

Canadian researchers Tugo-Lafleur C.N., Gonzalez O.D., O'Connor T.M. and others studied the influence of parental food education models on children's eating behavior. Scientists came to the conclusion that there are six main models of food education that affect children's eating behavior, their diet and weight [8]. A group of Taiwanese scientists investigated the relationship of dietary literacy of college students with their healthy eating behavior. The authors prove that nutrition literacy mediates the influence of all other positive and negative factors on the healthy eating behavior of college students [9].

In Russian sociology of nutrition, the nutrition culture of children and adolescents during the pandemic is little studied. The risks of disorderly consumption of food "garbage" and stress in all population groups, including children, which is associated with lifestyle changes, as well as fear of a new viral disease are evidenced by the work of domestic

scientists [10]. A.V. Torkunov, S.V. Ryazantsev and V.K. Levashov emphasizes that in the nutrition of all socio-demographic groups of Russian society in the conditions of the COVID-19 pandemic, such problems as overeating, eating disorders, excessive consumption of sweet and flour dishes have arisen [11, p.153]. Specialists of the Russian National Medical Research Center for Children's Health in 2020 issued methodological recommendations "Organization of children's nutrition in quarantine and not only". The authors emphasize that the time of quarantine and lockdown is favorable for improving children's nutrition, since parents spend more time at home and can devote more time to feeding their children. It is the family that turns out to be a decisive factor in the formation of healthy eating behavior of a child from early childhood. The authors give recommendations on healthy nutrition of young children in families and emphasize that the following have a positive impact on the formation of a culture of nutrition and healthy eating behavior of a child from an early age: "a joint meal at the dining table with the whole family; observance of family traditions and rituals of joint table setting; the use of bright children's dishes, originally decorated dishes" [12, p. 23].

2 Method

The purpose of the article is to analyze the daily eating practices of adolescents during the COVID-19 coronavirus pandemic. The empirical base was the data obtained during the smart survey (N=166) conducted in January-February 2022 and the materials of an in-depth interview within the framework of the full-scale project "Nutrition Culture of the population".

Of course, for teenagers who are the object of our intelligence sociological research, the best method of studying dominant patterns of behavior is, in our opinion, a handout questionnaire in a situation of face-to-face communication between a sociologist and respondents. However, the coronavirus pandemic (COVID-19) and the distance learning regime left us with no other choice.

It should be noted that smart queries are becoming the leading method of collecting sociological information in modern society, but they have limitations that should be taken into account. Like all correspondence types of surveys, smart surveys are sensitive to the respondent's motivation, require certain intellectual and time costs, interest in the research topic, and without the support of a sociologist give the effect of a low return of questionnaires in case of misunderstanding on the part of the respondent, which can lead to a distortion of the sample.

In addition, they require smartphones, digital user competencies and high-speed Internet. Therefore, the main recommendations when designing this type of toolkit are mainly related to the fact that it is necessary to take into account the characteristics of the audience, the questions should be understandable and speak the respondent's language. Nevertheless, in the conditions of a pandemic, it is smart queries that provide the opportunity to obtain operational information of an objective and subjective nature (about the motives, opinions, judgments and assessments of respondents).

The survey was attended by schoolchildren and college students in the age range from 12 to 17 years (see Figure 1).

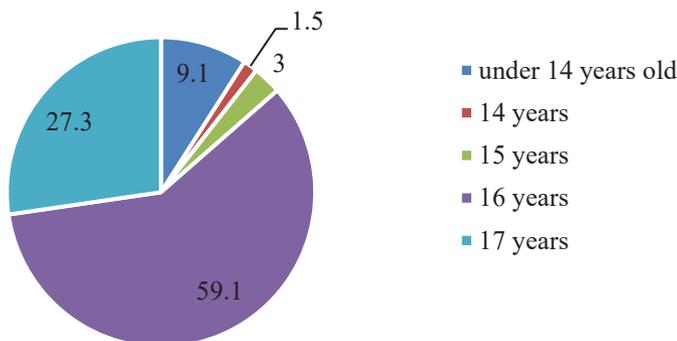


Fig. 1. Age of respondents.

As for gender characteristics, 78.8% of the respondents were female representatives, as more advanced in the research topic and better motivated. Thus, 16-year-old girls dominate in the portrait of the respondents.

3 Study detail and result

We have already written earlier that the shocks caused by the coronavirus pandemic (COVID-19) affected the inner world of people, increasing the tilt towards vital and cultural values [2, p. 108]. The attitude towards one's own health and the health of loved ones has changed, which has become seen as family capital and the result of an established lifestyle, which can be both self-destructive and healing, and can directly affect food patterns [3].

One of the objectives of our study was to study the respondents' opinions about the factors that most affect health. The data obtained are presented in Table 1.

Table 1. Opinions of adolescents about factors affecting health*(percentage of the number of respondents)

Factors affecting human health	Rank	%
Full sleep	1	74,2
Food culture	2	66,7
Physical activity	3	57,6
Mode of the day	4	56,1
Environmental situation	5	51,5
Human heredity	6-7	31,8
Sports activities	6-7	31,8
Quality of medicine	8	27,3
Way of thinking	9	19,7

* means that the sum of percentages exceeds 100, since respondents could choose several items

Analyzing the data obtained, you can see five dominant factors that teenagers consider important.

The first place is occupied by a full-fledged sleep, which, in our opinion, is associated with the physiological restructuring of the growing organism, emotional stress and energy-consuming activities of this group, which require the opportunity to get enough sleep for good health.

The second factor influencing the state of health, the surveyed adolescents consider the culture of nutrition (the ability to choose healthy foods and cook delicious dishes), which correlates with the results of our previous studies [4, p. 16].

In third place is physical activity, which is associated by teenagers not only with health promotion, but also affecting appearance and posture, which is very important for the emerging self-esteem and "I-concept". The fourth and fifth places are occupied by the mode of the day and the environmental situation.

Summing up, we summarize that health is becoming the most important value of modern adolescents, influencing the behavior of this group, including daily routine practices.

Since the organization of high-quality, balanced and varied meals at catering establishments in educational institutions is a factor affecting the health of students, our next research task was to identify the degree of satisfaction with nutrition within the educational institution.

The majority of respondents 83.6% eat or have eaten in school canteens regularly. We asked respondents to evaluate the quality of food in the school cafeteria (buffet) according to a 5-point system, where 1 is the lowest and 5 is the highest score (see Figure 2).

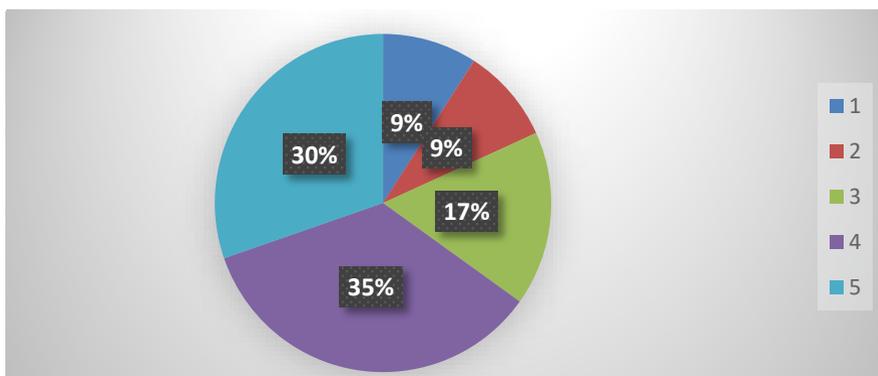


Fig. 2. Assessment of nutrition in school canteens.

The data presented in Figure 2 allow us to conclude that 65% of respondents are satisfied with the meals in school canteens.

The opinions of teenagers about the nutritional deficiencies in the school canteen (buffet) are given in Table 2.

Table 2. Opinions of teenagers about nutritional deficiencies in the school cafeteria (buffet)* (percentage of the number of respondents)

Respondents' responses	%
There are no disadvantages	44.4
Warm or cold first and second courses for lunch	38.1
Monotonous menu	25.4
Tasteless dishes	20.6
Not always fresh food	17.5

* means that the sum of percentages exceeds 100, since respondents could choose several answers

The analysis of the data obtained above allows us to conclude that there is a sufficient resource of public catering enterprises for the formation of a nutrition culture of adolescents.

We use the term "food culture" as the most relevant, from our point of view, when analyzing the cultural context and displaying the lifestyle of a person as a representative of

a particular social group. This definition, with all its breadth, allows us to distinguish cognitive, axiological and activity aspects of the analysis of established food practices, including knowledge of the properties of products and their possible effects on the body, the ability to make value choices in favor of quality food and health, to possess culinary skills and reflexive analysis of food practices [3, p. 96].

We were interested in the question of whether respondents adhere to certain repetitive cultural principles in their daily diet. The majority of respondents (64%) answered this question in the affirmative, and 15% found it difficult to answer this question, which we regarded as a lack of skill in reflexive analysis of routine food practices (see Figure 3). At the same time, an interview with those participating in the survey confirmed that the answers to the questionnaire questions made many people think for the first time and analyze the diet and the current model of eating behavior.

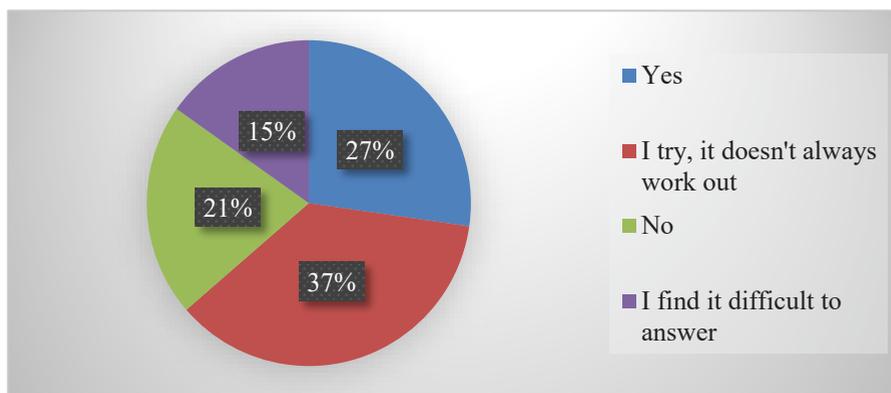


Fig. 3. Respondents' opinions on the implementation of the principles of nutrition culture

Data on the principles of nutrition culture applied by respondents are given in Table 3.

Table 3. Opinions of teenagers about the principles of nutrition culture observed* (percentage of the number of respondents)

Principles observed	Rank	%
Drink enough water	1	67.3
Eating while sitting	2	60.0
Take food in a calm state, do not rush anywhere	3	58.2
Eat a variety of food	4	52.7
Don't overeat	5	50.9
Eat freshly prepared food	6	47.3
Do not consume (or minimize the use of) harmful products (mayonnaise, ketchup, "fast food", alcohol, etc.)	7	41.8
Chew each piece well	8	32.7
Eat fish at least 2 times a week	9	20.0
Eat mostly natural organic food	10	18.2

* means that the sum of percentages exceeds 100, since respondents could choose several answers

The analysis of the data given in Table 3 allows us to see the observance by adolescents of the principles of nutrition culture, indicating the formation of behavioral patterns that positively affect the health and appearance of adolescents. The five most common principles among teenagers included: drinking enough water, eating while sitting, eating in a calm state, eating a variety of food, not overeating, which is associated with the realization of the basic needs of adolescents who want to fit into a group, build successful communication with peers. Overweight, which is present in some adolescents, often forms

complexes of young people and makes it difficult to communicate with representatives of the opposite sex. This explains the choice of priority principles of nutrition culture.

At the same time, the assessment of their own eating behavior according to the five-point system familiar to schoolchildren and college students turned out to be low - 3.7 points (see Fig. 4).

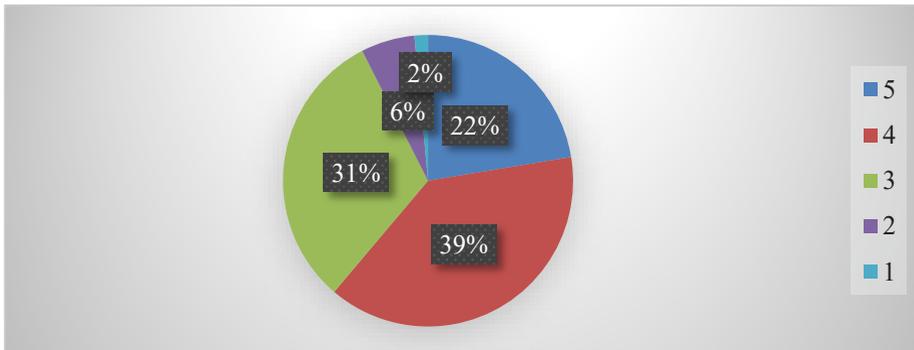


Fig. 4. Self-assessment of food practices

Summing up, I would like to note that there are several patterns of eating behavior among adolescents, with different levels of implementation of the principles of nutrition culture from good to satisfactory. These groups were divided approximately equally.

The key objective of the study was to study possible changes in the structure of nutrition during the pandemic of coronavirus infection.

To the direct question "Has your diet changed during the pandemic?" only one in four respondents answered positively. However, the data obtained during the survey made it possible to assume that many of the respondents simply did not have the habit of analyzing their daily eating practices. During the answers to the questionnaire questions, some of the respondents for the first time for themselves carried out a reflection of their attitudes and eating habits. When answering control indirect questions, the surveyed adolescents noted that during the pandemic, both positive (70%) and negative changes occurred in their diet (30%).

Selective interviews with individual survey participants confirmed that before filling out the questionnaire, such a routine process as eating was performed automatically and was not analyzed. As one of the respondents put it: "After the survey, I became more attentive to the choice of products and eating, although I hadn't thought about it before," that is, it can be assumed that the respondents' daily eating practices became more conscious after participating in the survey. Here are the opinions on the positive aspects of nutrition during the pandemic in Table 4.

Table 4. Adolescent opinions on the positive aspects of nutrition during the pandemic * (percentage of respondents)

Positive changes in nutrition during the pandemic	Rank	%
I began to eat more regularly	1	50,0
I began to eat less outside the house (cafes, restaurants)	2-4	45,8
I began to cook my favorite dishes at home more often	2-4	45,8
I began to eat more varied	2-4	45,8
I began to pay more attention to the calorie content of dishes	5-6	25
I began to pay more attention to food culture	5-6	25

* means that the sum of percentages exceeds 100, since respondents could choose several answers

Among the negative changes that occurred in nutrition during the COVID-19 pandemic, the teenagers who answered this question noted:

- there was an uneven diet (frequent snacks: chips, sweets) – 35.7 %;
- more money is spent on the purchase of food – 35.7 %;
- nutrition led to weight gain – 28.6%;
- forced to learn to cook their own food – 28.6%;
- I began to eat less outside the house – 28.6%;
- began to eat more monotonously – 25%;
- began to buy semi-finished products more often, order fast food – 17.9%;
- I began to pay less attention to food culture – 14.3%.

4 Discussion

The analysis of the above data allows us to identify two dominant patterns of eating behavior of the surveyed adolescents.

The first model can be conditionally called a group with a "growing culture of nutrition and conscious consumption". We attributed about 70% of the teenagers participating in the survey to it. This category of respondents with one or another degree of regularity follows the principles of nutrition culture, which indicates the formation of ecological consciousness and behavioral patterns that positively affect the health of adolescents. Representatives of this group rated their daily food practices excellent and good, expressed the opinion that during the pandemic there were mainly positive changes in the structure of their daily diet. Such teenagers have the skills to choose high-quality products in stores, know how and love to cook, prefer home-cooked meals to catering (canteens, cafes, restaurants), monitor the calorie content, energy value, variety and balance of food consumed.

We defined the second model as "unbalanced", we attributed to it 30% of respondents who rated their nutrition by 3, 2 and 1 points. This group experienced mainly negative changes in food practices during the pandemic, an uneven diet with frequent snacks and eating food that they consider harmful to health. Every third person in this group noted that eating during the coronavirus infection led to weight gain, and every fourth respondent indicated that he began to buy semi-finished products more often, order fast food and eat more monotonously.

Based on the results of our research, we formulated the following recommendations to managers and teachers of educational organizations:

- systematically stimulate the development of the nutrition culture of adolescents through the formation of responsibility for their own behavior;
- promote the values of health and the fashion for a safe lifestyle in the context of educational and extracurricular activities, the process of environmental education and enlightenment;
- to introduce into the practice of the educational process the organization of culinary master classes, harvest festivals and competitions aimed at the formation of knowledge about the culture and traditions of cooking, table etiquette;
- improve the work of school canteens and improve the quality of the dishes offered in them.

The data of our study correlate with the results obtained in the course of a sociological study conducted by the independent holding Romir, which may indicate the reliability of the results obtained [4].

Thus, ensuring the food security of the population of our country in the difficult conditions of the COVID-19 pandemic requires further comprehensive study of the eating

behavior and nutrition culture of various socio-demographic groups, including children and adolescents.

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References

1. L. Zhuravleva, E. Zarubina, A. Ruchkin, N. Simachkova and I. Chupina, Sociology of nutrition: theory and practice. International Scientific and Practical Conference "Fundamental and Applied Research in Biology and Agriculture: Current Issues, Achievements and Innovations" (FARBA), 254 (2021) DOI: 10.1051/e3sconf/202125410027 (2021)
2. Modern society in conditions of socio-economic uncertainty, XV International Scientific Conference "Sorokin readings": Collection of materials. Moscow: MAKS Press, 1241 p. (2021) (In Russ.) (Electronic edition of complex distribution) DOI: 10.29003/m2013.978-5-317-06609-3
3. L.A. Zhuravleva, N.V. Zavyalova, Education and science, **4**, 77-90 (2013) (In Russ.)
4. A.G. Rundle, Y. Park, J.B. Herbstman, E.W. Kinsey, Y.C. Wang, COVID-19–Related School Closings and Risk of Weight Gain Among Children. *Obesity*, **28**, 1008–1009, (2020)
5. R. Pujia, Y. Ferro, S. Maurotti, J. Khoory, C. Gazzaruso, A. Pujia, T. Montalcini, E. Mazza, *Nutrients*, **13**(8), 2641 (2021) DOI: 10.3390/nu13082641
6. D. Zae, M.L. Di Pietro, L. Reali et al. Food security, **13**, 13–24 (2021) DOI: 10.1007/s12571-020-01111-1
7. P. Eustachio Columbo, L.S. Elinder, E. Patterson et al. *Law Int J Behav Nutr Phys*, **18**, 89 (2021) DOI: 10.1186/s12966-021-01158-z
8. C.N. Tight-Lafleur, O.D. Gonzalez, T.M. O'Connor et al. *Law Int J Behav Nutr Phys*, **18**, 59 (2021) DOI: 10.1186/s12966-021-01119-6
9. I.-J. Lai, L.-K. Chang, K.-K. Li, L.-L. Liao, *Nutrients*, **13**, 3451 (2021) DOI: 10.3390/nu13103451
10. *Society and the pandemic: experience and lessons of fighting COVID-19 in Russia*, 744 (Moscow, 2020) (In Russ.)
11. A.V. Torkunov, S.V. Ryazantsev, V.K. Levashov, etc. The COVID-19 pandemic: *Challenges, consequences, counteraction*: monograph, 248 (Moscow, Aspect Press Publishing House, 2021) (In Russ.)
12. A. P. Fisenko, T. E. Borovik, V. A. Skvortsova, T. V. Bushueva, etc. Organization of children's nutrition in quarantine conditions and not only URL: <https://nczd.ru/wp-content/uploads/2020/04/2020-04-16-book.pdf> (2020) (In Russ.)