# CHANGES IN YOUTH NUTRITION HABITS DURING COVID- 19 PANDEMIC THE REPUBLIC OF SRPSKA

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#### SHORT SCIENTIFIC ARTICLE

**Abstract:** The corona virus pandemic has led to disruptions in various parts of the world and thus caused numerous changes in people's lifestyles, including social interactions, the ability to play sports, and even the diet itself. The aim of the study was to determine the extent to which Covid-19 influenced changes in diet in young people. The research was conducted from January to April 2021, on a total sample of 376 respondents from the category of students, from the area of Republika Srpska. SPSS software, version 23.00, was used to process the obtained data. The results, obtained by ANOVA analysis, showed that most of the respondents did not have a problem with food procurement, but higher food consumption was observed during the pandemic. Also, it was confirmed that there are no statistically observed differences in the change of habits during a pandemic, in relation to the gender structure of the respondents. Research has shown that the crisis situation of the pandemic did not affect the change in the intensity of physical activity. The work has a wider social and scientific significance, because it can help to perceive changes in the behavior and habits of young people during crisis situations, such as a pandemic.

#### Key words: habits, diet, COVID-19, Republika Srpska

### **INTRODUCTION**

On March 11, 2020, the World Health Organization declared the Covid-19 pandemic a virus, which caused numerous changes in people's lifestyles, both around the world and in the Republic of Srpska. According to official data, the new Corona virus (SARS-Cov-2) is transmitted by droplets and directly through sneezing and coughing, as well as touching objects, such as most viruses that infect the respiratory tract (Klissouras, 2012). Anti-epidemic recommendations for reducing the spread of COVID-19 virus infection include, in addition to enhanced personal hygiene measures and disinfection of the area with appropriate disinfectants, staying at home as the main way to limit human exposure to the virus or better and greater physical isolation. The aforementioned has greatly influenced the lives of

individuals, but it also leaves a great impact on the whole society. During quarantine, continuous listening or reading about a pandemic can have effects on various aspects of people's lives. One of these very significant effects is on human nutrition (Smirmual et al., 2020). There is currently no evidence that food or food packaging is a source or route of transmission of the COVID-19 virus (Smirmual et al., 2020). In addition to social and physical activities, the pandemic has greatly affected the diet of many people. Everyday challenges during the pandemic were, among other things, food procurement, meal preparation, and as the introduction of quarantine drastically limited movement, made physical activity outdoors more difficult and completely banned gyms, sports clubs, fitness centers and other facilities where to accommodate a larger number of people. As the way of life changed during the pandemic, most people were forced to adapt their diet to a greater or lesser extent. The way of eating, among other things, can be influenced by the number of family members, the number of children, the number of members with a specific way of eating, but also the reduction or loss of financial income during the pandemic. A moderate, balanced and varied diet is especially important during epidemics, because a proper diet can affect the body's ability to fight and recover from various infections. In this context, maintaining immunity is of great importance for the health of the entire population. WHO (World Health Organization, 2021) recommendations during the pandemic relate to moderate consumption of a variety of foods including fruits and vegetables, whole grains, legumes, moderate intake of meat, fish, eggs and milk: limited intake of salt, oil and fats, as well as sugar and sweetened beverages; then avoiding alcohol and drinking enough fluids, especially water.

Anti-epidemic measures (temporary suspension of educational institutions, limited work of the company and recommendations for work from home, temporary measure of limited leaving the house for people over 65, as well as closing facilities and open spaces for training) are limited and routine outdoor activities, including regular physical activity. Physical activity has a positive effect on more than forty biological markers - from the improvement of cognitive functions, the effect on blood vessels, blood pressure, bone density to the impact on psychiatric diseases such as depression, anxiety and the like (Gajić et al., 2020a). Particularly positive impact of medium-intensity activities is related to reducing the incidence of upper respiratory tract infections (Gajić et al., 2020b). Obese people are more susceptible to more serious clinical forms of the disease and are at higher risk of hospitalization, due to lower-grade chronic inflammation (Garber et al., 2011; Klissouras, 2012; Smirmaul, 2020) altered immune response to infection, and consequent cardiometabolic comorbidity. In some studies, a significant relationship has been found between diet, physical activity and mood (Garber et al., 2011). Numerous psychological problems, such as anxiety in persons deprived of their liberty, have been reported in the literature (Ammar et al., 2019; Arab et al., 2019). Disorder of stress hormone levels, caused by anxiety, economic insecurity, drastic change of life habits and forced stay indoors affects the potential of the immune system and can cause an increase in appetite (Crocq, 2015). A study conducted in China on the impact of isolation after a pandemic on mental health indicates that almost 35% of the population shows symptoms of post-traumatic stress disorder, with a higher proportion found to be women (Venter et al., 2020). At the University of Padua,

Department of Molecular Medicine, it was found that of 2,000 respondents among employees and students, 49.6% did not significantly modify their diet during the pandemic, but 46.1% said they had more meals during the day (Crocq, 2015). Increased consumption of chocolate and ice cream (42.5%) as well as salty snacks (23.5%) was also recorded, and 42.7% of them attributed these increases to increased levels of anxiety. About 21.2% of respondents increased the consumption of fresh fruits and vegetables (O'Neil et al., 2014). In accordance with their obligations at the faculty, students spend most of the day outside the home, which can lead to irregular and improper diet. The student population tends to consume high-energy foods low in nutrients, as well as neglect meals, most often breakfast. Inadequate eating habits result in an increasing number of young people who have weight problems (Cao et al., 2020).

With regard to energy consumption, physically more or less active people also have certain nutritional requirements. Among other important factors for maintaining immunity, which is much needed in a pandemic and fighting the virus, there are also good health and physical predisposition. Adequate nutrition is a fundamental component (Luppino et al., 2010). The diet must be well planned and individually adjusted based on physical characteristics, tendency to gain weight or lose weight, as well as the frequency of physical activities. Studies have shown that a well-balanced macro-micronutrient ratio, supported by supplements and adequate hydration, can make a significant contribution to the fight against the COVID-19 virus as well as play a key role in maintaining and boosting immunity. An optimally designed diet and physical activity program contributes to overall health improvement (Li, 2017). The body needs energy for cellular functions during rest and muscle effort from carbohydrates, fats and proteins. Muscle energy can be generated anaerobically, by the glycolysis process, where glucose or glycogen is exclusively broken down, or aerobically, by the Krebs cycle, where glycolysis metabolic products are used together with fatty acids through the beta oxidation process. When the body is at rest, most of the energy (about 60%) comes from burning fat, while the share of carbohydrates is significantly lower (about 35%). The remaining 5% on average comes from protein.

During muscular effort, the relative share of fuel in energy production depends on the intensity and duration of exercise, as well as on diet (Hord, 2009). The human body has a reserve of about 500g of carbohydrates. Most of the carbohydrates are stored in the form of glycogen in the muscles (about 450 gr) and liver (about 50gr), and only 15 gr in the form of glucose in the blood. A diet rich in carbohydrates can almost double the reserves in the muscles and liver, while a diet with reduced carbohydrate intake will have the opposite effect (Tunick, 2015). The most important sources of carbohydrates are fruits, vegetables and grains. Fruits and vegetables contain glucose and fructose, while cereals are dominated by starch. A negligible amount of carbohydrates occurs in foods of animal origin (Trasande et al., 2018). Proteins or protein-complex organic compounds of high molecular weight consist of amino acids. Proteins that contain all essential amino acids in the appropriate ratio have great biological value, ie they are complete. The best sources of protein are foods of animal origin: milk and dairy products, eggs, meat, fish and mushrooms (Trasande et al., 2018). Fats are an ideal form through which cells can store and expend energy. One gram of fat contains about 9 kcal, twice as much as

one gram of protein or carbohydrates. Fats are stored in the form of triglycerides in muscle cells (about 500 gr) and adipocytes (about 14,000 gr), while a negligible amount (0.4 gr) in plasma is in the form of free fatty acids. Sources of fat are foods of plant and animal origin. Of the meat, pork and beef contain the most fat, and the least fat is veal, chicken and turkey. Of the fish, eels and catfish have the most fat, while pike, trout, hake and other white fish have the least (Trasande et al., 2018). Carbohydrates and fatty acids are the priority fuel that serves as a source of energy during exercise. With prolonged exercise, muscle glycogen reserves are reduced, and proteins begin to be used. Amino acids are converted in the liver through gluconeogenesis and lead to oxidative processes. Vitamins and minerals (micronutrients) are essential nutrients that participate in numerous physiological functions, but also in the synthesis and repair of muscle tissue during recovery from exercise and injuries (Kobayashi, 2018). Prolonged sports activities increase the risk of oxidative stress and increase the production of free radicals. Intense physical activity stimulates antioxidant defenses, but people who exercise regularly should have a sufficient amount of antioxidants that will counteract free radicals. Vitamins and minerals are antioxidants that reduce oxidative stress created during exercise (Guilland, 2013). There is ample evidence that improper intake of various minerals or vitamins can lead to various diseases and therefore special attention should be paid to planning and proper intake of minerals. Also, a favorite spice in the diet - if taken in large quantities can lead to an increase in average blood pressure or hypertension and in severe cases and death (Petraccia et al., 2006). Good hydration enables the maintenance of the balance of intracellular and extracellular fluid in the body and forms the basis for undisturbed physical activity (Hydrocortisone, 2021). An adult needs 1.5 to 2 liters of water during the day because that amount is lost from the body. It is best to consume water of controlled origin (Trasande et al., 2018). Food has become recognized in the market as a part of the culture consumed by the local population, as well as a potential component of local agricultural and economic development and as a regional factor influenced by consumption patterns and observed consumer desires. Therefore, one should think globally and buy locally, because domestic food from the local area has a positive effect on health because it is primarily of controlled origin (Velázquez-Sámano et al., 2019).

The COVID-19 pandemic reached its peak when it disrupted the functioning of the majority of the population of many countries. Local and health authorities have recommended and / or implemented various strategies of epidemiological measures such as social or physical distance, quarantine, extensive locking measures and the like (Albert et al., 2021). Although necessary, such strategies can lead to more interrelated physical, mental, and psychological health problems (Albert et al., 2019). Interruption of the daily routine can cause unwanted consequences for the health of entire families. This means that whole families have the challenge of maintaining a healthy lifestyle, quality of life and well-being itself (Majumder & Minko, 2021). An important challenge during and after a pandemic is managing factors that affect health, such as proper nutrition. Many people who practice diet may have eating disorders caused by COVID-19 infection. Although families have the opportunity to cook more often at home, lack of knowledge about what constitutes a healthy diet and lack of cooking skills can lead to individuals and families increasing the use and consumption of fast food, which can be bad for the human body. Further, such behavior leads to obesity and other eating disorders (Gil, 2014). Authors Smirmaul, Chamoni and collaborators in a study called Lifestyle Medicine (2020) point out the following recommendations for improving nutrition: increase fruit consumption to 200 to 300 gr or two to three servings per day, as well as vegetables 300gr to 400gr prepared in various ways. baked, grilled, steamed, etc.), consume 100 grams to 150gr of cereals (whole grains) to be added to the dish to improve the taste, color and nutrients, beans and legumes to eat in the form of pasta while walnuts, almonds and more similar fruit eats 20gr to 30gr as snacks and all this with mandatory hydration with water. In addition to the above, food hygiene must be observed because the virus can be picked up by touching contaminated objects and surfaces. The work of the author (Gil, 2014) also lists six nutritional recommendations for improving the behavior of people related to nutrition, namely: developing culinary skills; introduce regular meals by avoiding snacks and skipping meals; eat smaller meals slowly (a feeling of satiety will appear only after about 20 minutes from the beginning of the meal; eat carefully - take time and relax, listen to your favorite music, think about what to eat and be focused; eat sitting at the table and be aware How the intensity of hunger gradually decreases during meals. The authors of this paper relied on a similar study, which took a structured questionnaire with modifications and final comparisons of the two questionnaires. 19 points out that pandemics and guarantine can have negative effects on human nutrition. It was found that a significant number of students did have good eating habits while as many as 34.2% of respondents were under stress om because of pandemic-related data. About 114 respondents aged 20 to 23 participated in the research.

### **METHOD**

The research was conducted from January to April 2021, during the coronary virus pandemic. In the research, 400 surveys were forwarded, while 376 of them were returned and analyzed. Students from several cities in Republilic of Srpska participated: Banja Luka, Bijeljina, East Sarajevo, Foča, Doboj and Prijedor. For the purposes of this research, an online structured survey anonymous questionnaire was purposely formulated, which contained questions from two parts. The first part contained questions with a demographic description of the respondents and the second part related to food consumption before and during the pandemic. The reliability of the questionnaire is checked by Cronbach's Alpha, which must be greater than 0.07. ANOVA or analysis of variance was used, which consists of examining the variability of arithmetic means from several randomly selected samples, where the total variability (total variance) is divided into components, ie variability due to the influence of applied treatment and random variability. Categorical variables (features) are shown by relative (%) frequency. The central tendency of numerical features is shown by the arithmetic mean (m) and the scatter by the standard deviation (sd). The frequency distribution of numerical features was examined with indicators of skewness and kurtosis. Since all variables are normally distributed, parametric statistics methods were used. One-way analysis of variance was used to examine the differences in the arithmetic means of several samples, one categorical variable with several modalities and another variable of the interval level. The selected significance level is 0.05. Generally speaking, the instrument shows satisfactory measurement characteristics. Reliability is determined by the Crombach alpha coefficient. The internal reliability of the questionnaire used is 0.80 (Krombach's alpha coefficient  $\alpha = 0.867$ , with standardization  $\alpha = 0.863$ ). The authors set the following hypotheses:

X0: There was a difference in the habits of food consumption before and during the pandemic by the respondents.

H1: There is no statistically significant difference between male and female respondents in food consumption before and during the pandemic.

H1a: There is a statistically significant difference between male and female respondents in food consumption before and during the pandemic.

H2: There is a statistically significant difference in the consumption of certain foods before and during the pandemic.

X3: There is a observed difference in the habits of physical activity during the crown.

#### **RESULTS AND DISCUSSION**

Results show that 376 students participated in the research, 199 (53.9%) male and 177 (47.1%) female students, 312 (83.0%) under the age of 22, 45 (12.0%) they are from 22 to 30 years old and the least are those over 30 years old, 19 of them (5.1%). Students had the opportunity to indicate at what level of study they are currently. Out of 367 students, most of them attend the first year of basic academic studies, 96 students (25.5%), the second year 54 (14.4%), and the third year 90 (23.9%). 72 (19.1%) students who are currently in the fourth year of basic academic studies and 45 (12.0%) in master's academic studies were surveyed. As expected, the fewest students are currently attending doctoral studies, 19 of them (5.1%). Important data for the research is where students currently live, because it is assumed that many lived alone in rented apartments before the pandemic, and the like. It was concluded that the largest number of students currently live with their parents, 205 (54.5), 147 (39.1) live in a rented apartment, while only 16 of them live in their own house or apartment with their family (4.3%) as can be seen in Table 1.

Category	Values and results		
	-	N	%
Gender	Male	199	52,9
	Female	177	47,1
Age	- 22 years	312	83,0
	22-30 years	45	12,0
	+ 30 years	19	5,1
Current level of	And a year of undergraduate	96	25,5
study	studies		
	II year of basic studies	54	14,4
	III year of basic studies	90	23,9
	IV year of basic studies	72	19,1
	Master studies	45	12,0
	PhD studies	19	5,1
During the	with parents	205	54,5
pandemic,	in a rented apartment	147	39,1
students live	with his own family in his house or	16	4,3
	apartment		
	other	8	2,1
	* N = total number		

Source: Author's research.

Reliability statistics are most often used when there are several questions in the survey / questionnaire that are assessed by the Likert scale. This reliability is being investigated by Cronbach's Alpha which must be greater than 0.07. In the case of this research, the value of this test is 0.952, which indicates the high reliability of the questionnaire.

Table 2. Reliability statistics		
Cronbach's Alpha	N of Items	
.952	11	
Source: Author's research.		

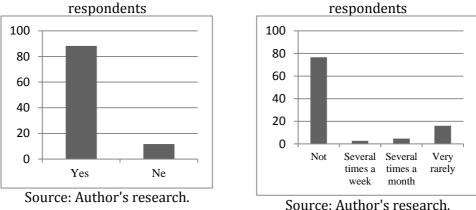
When asked "Do you have dietary restrictions", the following results were obtained: the largest number, 365 (91.1%) students, answered that there are no dietary restrictions. A small number of 4 (1.1%) answered that they have dietary restrictions due to illness, three students (0.8%) have dietary restrictions due to economic reasons, while also four (1.1%) have dietary restrictions reasons. The vast majority of students, 371 (98.7%), said they had no difficulty in procuring food and 5 (1.3%) had some difficulty, as can be seen in Table 3. It is assumed that these are students who currently in families living in rural areas.

Table 3: Restrictions on student nutrition			
	N	%	
	365	97.1	
	4	1.1	
	3	0.8	
	4	1.1	
Yes	5	1,3	
No	371	98,7	
	Yes	N 365 4 3 4 Yes 5	

Source: Author's research.

Of great importance for understanding the diet of students is the data on the consumption of cigarettes and alcohol. According to this research, the vast majority of 332 (88.3) students do not consume cigarettes, while 44 (11.7%) out of 376 consume them. Also as can be seen in Charts 1 and 2, 288 of them do not consume alcohol (76.6%) while the rest do. According to the data, 10 (2.7%) consume alcohol often and several times a week, which can be related to the current situation in society, caused by the pandemic. Of the other students, 18 (4.8%) consume alcohol several times a month, while 60 (16%) consume alcohol very rarely.

**Graph 1**: Cigarette consumption by



Graph 2: Alcohol consumption by

During the pandemic, 5.3% of respondents or 20 of them felt certain mental problems, while 5 and 1.3% of them also felt physical problems. However, most students did not experience any health problems (93.4%) as shown in Table 4.

<i>Table 4:</i> Student health status		
	Ν	%
I did not feel any health problems	351	93,4
I felt fear, panic or uncertainty	15	4,0
I felt other mental problems	5	1,3
I felt physical discomfort	5	1,3

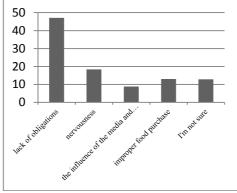
Table 4: Student health statu	lS
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\* N = total number

Source: Author's research.

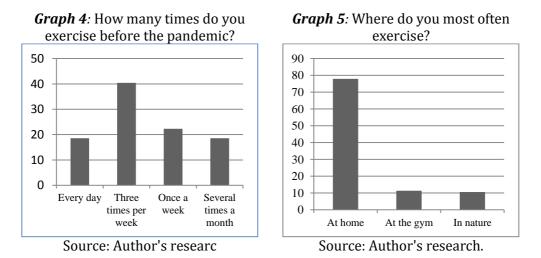
During the pandemic, more than half of the respondents consumed more food than usual, 196 of them (52.1%). The largest number of respondents answered that it was due to reasons such as boredom and lack of obligations (47.1%) and then due to nervousness caused by quarantine (18.4%). A smaller number of students stated that they consumed more food than usual due to the influence of the media and social networks (8.8%) and due to improper purchase of groceries (13.0%) in order not to throw away food.

*Graph 3*: The reason for consuming more food during a pandemic

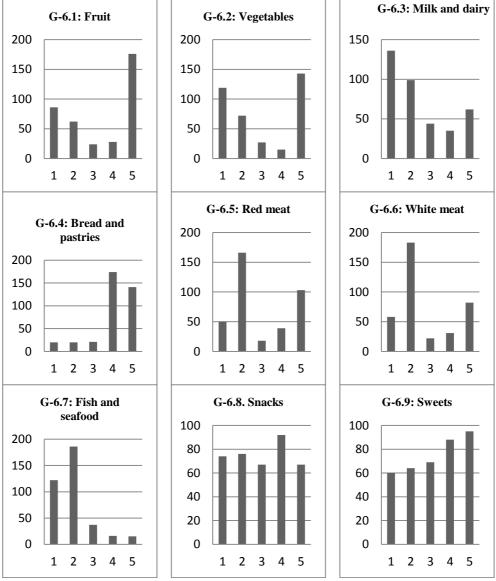


Source: Author's research.

However, most of them practiced physical activity, which is related to the previously researched. The largest number, 152 (40.4%) exercised some type of physical activity (running, jogging, swimming, walking, cycling, exercising) three times a week, followed by the rest, which was relatively evenly distributed as shown in Graph 4. Most practiced physical activity at home, which is associated with existing epidemiological measures and quarantine, while a smaller percentage of students stayed in gyms, fitness centers and in nature. Most respondents expressed a positive attitude about whether they exercise more during the pandemic than before, which leads to the conclusion that Hypothesis 3 has been confirmed - there is a difference in the habits of physical activity during the corona.



The main questions during the survey were related to food consumption during and before the pandemic. On the Likert scale (from 1 to 5, that is, I do not agree to completely agree), the respondents had the opportunity to assess the extent to which they consumed certain foods correctly and according to dietary rules during the pandemic.



*Graph 6 (1-9):* Distribution of respondents' answers to what extent used certain foods properly during a pandemic

Source: Author's research.

Criterion	М	Sd
Fruit	3.39	1.698
Vegetables	2.98	1.740
Milk and dairy products	2.44	1.466
Bread and pastries	4.05	1.059
Red meat	2.94	1.475
White meat	2.72	1.410
Fish and seafood meat	1.98	.977
Salty snacks	3.01	1.397
Sweets	3.25	1.413
Cooked meals	1.57	1.051
Water	1.47	1.177

 Table 5: Consuming food during a pandemic

\* m = arithmetic mean; sd = standard deviation

Source: research author

From the previous table 5 it can be seen that most believe that they consumed sufficient amounts of bread and pastries compared to the time before the pandemic (m = 4.05; sd = 1.05), then fruit (m = 3.39; sd = 1, 69) and vegetables (m = 2.98; sd = 1, 69)1.74). Many respondents felt that they did not consume sufficient amounts of red meat (m = 2.94; sd = 1.47), white meat (m = 2.72; sd = 1.41) and especially fish meat (m = 1.98; sd = 0.97) during a pandemic. It is assumed that the respondents consumed the most fruits and vegetables due to current trends in nutrition and special propaganda on social networks and other media. It is believed that the use of larger quantities of dough and pastries stems from the culture of the people from these areas. Interestingly, many respondents increased the consumption of salty snacks and sweets during the pandemic than usual. According to the research, the main reason is the lack of obligations and the time spent at home. Also, the concern arises because many respondents stated that they do not consume enough water, which is very necessary for maintaining the health and proper functioning of the human body. What stands out is that many respondents consumed more cooked food during the pandemic than usual during their regular duties. It is assumed that this is because many students are often outside their homes in the place of permanent residence. In order to determine whether the physical activity of the respondents has anything to do with proper nutrition, the examination of the homogeneity of variance was first approached. The homogeneity test of variance showed that this precondition was not met because the level of significance of the homogeneity test was higher than sig = 0.005, ie during the test it was sig = 0.009. Due to the above, the Brown-forsythe test was developed. The level of significance of the Brown-forsythe test was sig = 0.000. Analysis of variance showed that the values of F = 87,158, which is greater than 1, and therefore it can be concluded that physical activity affects the proper diet of respondents. Based on the above, it is concluded that Hypothesis 2 was confirmed as follows: there is a statistically significant difference in the consumption of certain foods before and during the pandemic.

Physical activity	N N	Subset for alpha = 0,05	
		1	2
Regular	306	1,01	
Irregular	70		2,14
Sig.		1,000	1,000

*Table 6:* Tukey test - Influence of physical activity on the proper nutrition of the respondents

Source: research author

Table 6 provides an insight into the results of the PostHoc test (TukeyHSD) and shows that respondents who have regular physical activity also practice a more proper diet compared to respondents who do not have regular physical activity.

Although previous studies have confirmed that, compared to men, women take more care of their diet and consume larger amounts of fruits, vegetables, milk and dairy products, it is interesting that this study found that women surveyed reduced their intake of milk and dairy products. products during a pandemic. There is no statistical association between increased intake of fruits, vegetables, fish and cooked meals in women.

### **CONCLUSION**

The current global problem with the COVID-19 pandemic has affected most countries, and thus has a great impact on the population of the Republic of Srpska, which is part of the Republic of Bosnia and Herzegovina. During the pandemic, maintaining health and strengthening immunity is of great importance. Nutrition is one of the key factors in maintaining good health. During the pandemic and all the measures that are being taken (quarantine, imprisonment, etc.), many residents of different countries had problems with groceries and food preparation. Various studies have concluded that a lack of culinary skills is one of the key problems in preparing healthy meals, which has been reflected in maintaining health during a pandemic(Tunick, M. H., & Van Hekken, D. L. 2015). With regard to energy consumption, people also have certain nutritional requirements. Adequate nutrition is a fundamental component(Thar et al., 2020). The diet must be well planned and individually adjusted based on physical characteristics, tendency to gain weight or lose weight, as well as the frequency of physical activities. Republika Srpska has a large number of students who pay attention to their diet. The authors conducted research in Republika Srpska in several cities to determine whether the COVID-19 virus pandemic had an impact on dietary changes in young people or students.

Respondents evaluated the given items, more precisely, they expressed their position on how they ate during the pandemic in relation to the time before it. Relying on similar research and available literature, the authors approached data processing and analysis via SPSS software version 23.00. Descriptive statistical analysis provides average and standard estimates for all factors and their items as well as a description of research participants. The reliability of the questionnaire was checked ( $\alpha = 0.652$ ). Based on the presented research and various statistical analyzes, the authors came to the following conclusions:

- Respondents eat to a certain extent during the pandemic than before (which confirmed the initial hypothesis H0);

- There is no statistically significant difference when it comes to food consumption during the pandemic in relation to the time before the pandemic between male and female respondents (which confirmed hypothesis H1 and refuted the alternative hypothesis H1a);

- There is a statistically significant difference when it comes to the consumption of certain foods during the pandemic in relation to the time before the pandemic (which confirmed hypothesis H2);

- And there is a significant difference in the habits of physical activity during the pandemic in relation to the time before (which confirmed hypothesis H3).

The diet certainly contributes to the improvement and preservation of health, as well as the strengthening of immunity, which is necessary in the fight against the Covid-19 virus.

The results and conclusions of this study may contribute to better management of this or possibly a future pandemic or similar crisis in this area and around the world. It is necessary to pay more attention to the influence of all factors and changes, thus creating an opportunity for the development of future studies, helping to understand whether the findings in our country are coherent and in line with other regions.

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