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NUTRITIONAL STATUS OF YOUNG SCHOOL-AGED CHILDREN IN PODGORICA, MONTENEGRO

SUMMARY

Excess body weight and obesity, alongside undernutrition, are increasingly prevalent in school populations. Monitoring these disorders is crucial for understanding the societal situation and for timely interventions to prevent their occurrence. The aim of this research was to determine the morphological characteristics and body composition of children in elementary school and to highlight the importance of addressing the causes of any deviations from physiological limits since the nutritional status of children at an early school age is the best indicator of their proper growth and development. Through this objective, the importance of implementing strategies and plans for proper nutrition of children at all ages was also emphasized. The study was conducted at the Elementary School in Podgorica and included 823 students aged 6 to 15 years, 375 girls and 448 boys. During the study, the following parameters were measured: height, weight, upper arm circumference, and skinfold thickness at the triceps. Based on the measured parameters, body mass index (BMI), muscle mass, and fat mass were determined. All collected data were exported to the SPSS program. Boys grew by 55.82 cm and girls by 43.18 cm from ages 6 to 15. There was no significant height advantage until age 13, when boys significantly surpassed girls. At ages 13, 14, and 15, boys averaged 5 to 9 kg more than girls. Obesity among girls was present across all age groups, with the lowest prevalence at age 7 and the highest at age 9, at 25.49%. The highest percentage of obesity in boys was recorded at age 10, at 34.88%. A negative correlation was found between BMI and muscle mass (-0.197), as well as between BMI and fat mass (-0.524). Although the majority of children have a normal nutritional status, it is concerning that the highest number of obese children is among those aged 9 and 10. According to WHO program recommendations, measures and strategies should be implemented to support healthy nutrition and promote health.

Keywords: nutritional status, school population, growth and development, obesity

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INTRODUCTION

The modern lifestyle, along with technological development, has influenced all areas of society. This impact has also reached younger age groups, who adapt easily to innovations, particularly noticeable in urban environments (Scepanovic *et al.,* 2019). Numerous studies have established that this has led to an increase in eating disorders among children. Overweight, obesity, and body fat are prevalent, while undernutrition also exists. The location of fat tissue in the human body determines its metabolic profile. 50-70% of the total body fat mass is stored in subcutaneous fat, while the remainder is the so-called visceral fat, which is located beneath the abdominal wall. Increased energy intake and reduced energy expenditure lead to greater fat deposition and an increase in fat tissue (obesity) (Pavlica, Rakic, 2019). Monitoring these disorders is crucial for understanding the societal situation and for timely interventions to prevent their occurrence, through campaigns promoting healthy lifestyles and proper nutrition, with reduced participation of industrial products rich in trans fats, sugars, and additives (WHO, 2005). In this regard, the European WHO initiative for monitoring childhood obesity (COSI) was established in response to the need for standardized data on the prevalence of overweight and obesity among school-aged children (WHO, 2022). Access to such information is key for developing effective policies and strategies to combat childhood obesity. Meeting nutritional needs and ensuring food safety are important factors in preventing a range of diseases and disorders. In light of this, the Ministry of Health of Montenegro developed the Action Plan for Nutrition and Food Safety in Montenegro (2010-2014) to improve public health protection. The Action Plan for Nutrition and Food Safety in Montenegro serves as a framework document that provides basic guidelines and a coordinated response to the increasing public health challenges related to food and nutrition (Action Plan for Nutrition and Food Safety in Montenegro, 2011). In recent decades, the childhood obesity epidemic has been on the rise (Kimm and Obarzanek, 2002; Ogden *et al*., 2002, 2014). Its prevalence has reached epidemic levels (Branca *et al.,* 2007; Swinburn *et al*., 2011). Based on previous research, the global prevalence of obese children has doubled, while the number of obese adolescents has quadrupled (Ogden *et al.,* 2014; Health, United States, 2011). Numerous data indicate the negative impact of obesity on the proper growth and development of children. It has also been found that these negative impacts are more pronounced in girls than in boys (Drid *et al.,* 2013; Kostic *et al.,* 2009). Additionally, obese children and adolescents are more likely to be obese in adulthood. This is supported by a study conducted by Wang and Lobstein (2006), which demonstrated that children with excess body weight by the age of eight are at greater risk of obesity in adulthood. Data on the health and nutrition of the population in Montenegro are quite limited.

The Multiple Indicator Cluster Survey in Montenegro from 2018 (MICS, 2019) provided representative data related to nutrition; however, only anthropometric markers for preschool-aged children were analyzed, while

assessments for other population groups regarding nutrition were not conducted. The aim of this study was to determine the morphological characteristics and body composition of young school-aged children in the urban center of Podgorica and to highlight the importance of investigating the causes of any deviations from physiological standards for that age group. This is crucial because the nutritional status of children in early school age is the best indicator of their proper growth and development. Through this goal, the research also highlighted the importance of implementing strategies and plans for proper nutrition for children at all ages.

MATERIAL AND METHODS

The study was conducted during the year 2022. at the "21.maj" Elementary School in the urban center of Podgorica and included 823 students aged 6 to 15 years. There were 375 girls (45.56%) and 448 boys (54.43%). During the study, the following parameters were measured and analyzed: height, weight, upper arm circumference, and skinfold thickness at the triceps. Body Mass Index (BMI) was obtained as the ratio of body mass to the square of body height, using the formula (kg) / (m²). Nutritional status was then determined using percentile values. Additionally, muscle and fat mass were calculated from the measured values of upper arm circumference and skinfold thickness at the triceps (Frisancho, 1990). Standardized anthropological instruments were used for anthropometric assessment: anthropometer, scale, and caliper. Statistical analysis of the measured values was performed using standard statistical methods in the SPSS program, including descriptive statistics, correlation analysis, and hypothesis testing using ANOVA. This research was conducted in accordance with the Declaration of Helsinki, with the consent of all parents and school principals. Each parent-participant voluntarily provided written information and consent prior to participating in this study.

RESULTS AND DISCUSSION

Table 1 presents the descriptive statistics for the parameters of height and weight in the overall sample according to gender and age from 6 to 15 years.

Based on the data, the average height increase observed shows that boys grow by 55.82 cm from ages 6 to 15, while girls grow by 43.18 cm. Between the ages of 7 and 13, both girls and boys have approximately the same average weight. However, at ages 13, 14, and 15, boys weigh on average 5 to 9 kg more than girls.

Table 2 presents the analysis of the statistical significance of height values among students of both genders in relation to age. Variance analysis revealed a statistically significant difference in height between boys and girls at ages 8, 14, and 15, which is expected given the known growth rate during this developmental period.

Table 1. Height and weight of students by gender and age

age	gender	N	Mean height	Std. deviation	Min	Max	Mean weight	Std. deviation	Min	Max
6	boys	10	121.0600	5.56581	111.00	130.10	26.5286	6.50172	18.10	37.60
	girls	7	122.7286	5.57576	114.60	128.90	26.0500	6.45002	16.80	38.40
7	boys	56	127.7982	6.2848	115.50	143.30	20.0911	7.10140	18.60	56.40
	girls	45	126.5644	6.3529	116.30	142.60	26.1178	4.23654	19.30	37.40
8	boys	38	136.2947	7.1379	123.70	150.10	33.3921	7.77290	16.30	53.00
	girls	34	131.7941	7.6330	118.40	155.80	29.8471	5.60672	17.90	46.60
9	boys	56	139.6482	6.17744	124.00	153.60	35.7054	7.33288	23.20	53.20
	girls	59	139.5549	5.57707	125.80	152.20	35.6471	7.07178	23.50	49.60
10	boys	43	144.9256	7.72621	128.70	161.30	40.5837	9.08083	25.70	65.60
	girls	32	144.0875	6.31689	133.50	159.00	39.4563	7.56426	27.10	57.60
11	boys	59	151.0627	7.37979	131.50	168.30	45.2593	10.52668	28.00	79.00
	girls	46	150.3457	9.07903	129.40	167.00	42.1022	8.98791	26.80	60.90
12	boys	47	156.9340	8.74129	140.50	193.70	49.3106	10.16238	29.40	79.10
	girls	49	159.1224	7.12210	143.00	174.40	52.2143	12.21550	31.30	90.40
13	boys	48	164.1333	11.7395	140.50	191.40	59.6292	15.12099	32.40	100.80
	girls	44	161.1592	6.52103	146.60	174.50	54.4386	9.95600	32.70	80.00
14	boys	61	172.2262	8.99866	157.50	191.50	65.9967	14.57817	39.00	98.20
	girls	38	163.4921	7.06340	152.00	182.70	56.0816	8.65169	38.00	74.60
15	boys	33	176.8818	8.22255	162.10	198.00	68.1818	12.39633	46.40	94.00
	girls	26	165.9000	5.33547	156.00	173.90	59.9885	10.36947	40.30	80.40

Table 2. Analysis of variance – body height among students of both genders in relation to age.

age	height	Sum of Squares	df	Mean Square	F	Sig.
6	Between Groups	11.464	1	11.464	.370	.552
	Within Groups	465.338	15	31.023		
	Total	476.802	16			
7	Between Groups	37.979	1	37.979	.952	.332
	Within Groups	3948.353	99	39.882		
	Total	3986.332	100			
8	Between Groups	363.475	1	363.475	6.682	.012*
	Within Groups	3807.858	70	54.398		
	Total	4171.333	71			
9	Between Groups	.232	1	.232	.007	.935
	Within Groups	3654.026	105	34.800		
	Total	3654.259	106			
10	Between Groups	12.886	1	12.886	.251	.618
	Within Groups	3744.157	73	51.290		
	Total	3757.043	74			
11	Between Groups	13.290	1	13.290	.199	.656
	Within Groups	6868.052	103	66.680		
	Total	6881.342	104			
12	Between Groups	114.889	1	114.889	1.815	.181
	Within Groups	5949.631	94	63.294		
	Total	6064.520	95			
13	Between Groups	203.076	1	203.076	2.200	.141
	Within Groups	8305.973	90	92.289		
	Total	8509.049	91			
14	Between Groups	1786.146	1	1786.146	36.209	.000*
	Within Groups	4784.866	97	49.329		
	Total	6571.012	98			
15	Between Groups	1753.815	1	1753.815	34.769	.000*
	Within Groups	2875.209	57	50.442		
	Total	4629.024	58			

In Table 3, the analysis of the statistical significance of body weight values among students of both genders in relation to age is presented. The results show that there is a statistically significant difference in body weight values at ages 7, 8, 13, 14, and 15.

Table 3. Analysis of variance – body weight among students of both genders in relation to age.

age	weight	Sum of Squares	df	Mean Square	F	Sig.
	Between Groups	.943	1	.943	.023	.883
6	Within Groups	628.059	15	41.871		
	Total	629.002	16			
	Between Groups	220.574	1	220.574	6.128	.015*
7	Within Groups	3563.371	99	35.994		
	Total	3783.946	100			
	Between Groups	225.514	1	225.514	4.823	.031*
8	Within Groups	3272.832	70	46.755		
	Total	3498.347	71			
	Between Groups	.091	1	.091	.002	.967
9	Within Groups	5457.915	105	51.980		
	Total	5458.006	106			
	Between Groups	23.322	1	23.322	.325	.570
10	Within Groups	5237.137	73	71.742		
	Total	5260.459	74			
	Between Groups	257.638	1	257.638	2.637	.107
11	Within Groups	10062.252	103	97.692		
	Total	10319.890	104			
	Between Groups	202.260	1	202.260	1.596	.210
12	Within Groups	11913.085	94	126.735		
	Total	12115.345	95			
	Between Groups	618.486	1	618.486	3.709	.037*
13	Within Groups	15008.523	90	166.761		
	Total	15627.009	91			
	Between Groups	2301.845	1	2301.845	14.386	.000*
14	Within Groups	15520.896	97	160.009		
	Total	17822.742	98			
	Between Groups	976.245	1	976.245	7.316	.009*
15	Within Groups	7605.556	57	133.431		
	Total	8581.801	58			

*$p < 0,05$

Table 4. Nutritional status of girls aged 6 to 15 years

age	N Girls	malnutrition N (%)	normal BMI N (%)	preobesity N (%)	obesity N (%)
6	10	0 (0%)	7 (70%)	2 (20%)	1 (10%)
7	45	1 (2,22%)	34 (75,55%)	8 (17,77%)	2 (4,44%)
8	34	1 (2,94%)	21 (61,76%)	10 (29,41%)	2 (5,88%)
9	51	2 (3,92%)	29 (56,86%)	7 (13,72%)	13 (25,49%)
10	32	1 (3,12%)	17 (53,12%)	10 (31,25%)	4 (12,5%)
11	46	2 (4,34%)	31 (67,39%)	9 (19,56%)	4 (8,69%)
12	49	2 (4,08%)	32 (65,30%)	6 (12,24%)	9 (18,36%)
13	44	1 (2,27%)	31 (70,45%)	6 (13,63%)	9 (20,45%)
14	38	2 (5,26%)	29 (76,31%)	5 (13,15%)	2 (5,26%)
15	26	1 (3,84%)	20 (76,92%)	3 (11,53%)	2 (7,69%)
Ukupno	375	13 (3,46%)	248 (66,13%)	66 (17,60%)	48 (12,80%)

BMI, calculated as the ratio of body weight to height, for the examined age group is expressed in percentile values, based on which the classification of this index was made in relation to gender and age. The results are presented in the tables below.

For all age groups, the percentage of underweight girls is low, with only 5.26% of underweight girls at age 14. Regarding normal body weight, the lowest representation was at ages 8 and 9, with 53%, while in other age groups it ranged from 60% to 77%. The highest prevalence of excess body weight was observed in the ages of 8 and 10. Obesity was present in all age groups, with the lowest prevalence at age 7 and the highest at age 9, at 25.49%.

In the same way, Table 5 presents the results of the nutritional status for boys by age groups.

Table 5. Nutritional status of boys aged 6 to 15 years

age	N boys	malnutrition N (%)	normal BMI N (%)	preobesity N (%)	obesity N (%)
6	7	0 (0%)	5 (71,41%)	2 (28,57%)	0 (0%)
7	56	0 (0%)	31 (55,35%)	9 (16,07%)	16 (28,57%)
8	38	1 (2,63%)	22 (57,89%)	10 (26,31%)	5 (13,15%)
9	56	0 (0%)	31 (55,35%)	11 (19,64%)	14 (24,99%)
10	43	0 (0%)	21 (48,83%)	7 (16,27%)	15 (34,88%)
11	59	1 (1,69%)	18 (30,50%)	26 (44,06%)	14 (23,72%)
12	47	3 (6,38%)	23 (48,93%)	12 (25,53%)	9 (19,14%)
13	48	2 (4,16%)	23 (47,91%)	9 (18,74%)	14 (29,16%)
14	61	2 (3,27%)	32 (52,45%)	12 (19,63%)	15 (24,59%)
15	33	4 (12,12%)	19 (57,57%)	7 (21,21%)	3 (9,09%)
Ukupno	448	13 (2,90%)	225 (50,22%)	105 (23,43%)	105 (23,43)

At ages 6, 7, 9, and 10, undernutrition was not observed, while the highest percentage of underweight individuals was noted at age 15, with over 12%. Also, in all age groups, the largest number of boys had normal body weight, with the lowest values recorded at age 11, at 30.50%. The prevalence of excess weight was lowest at ages 7 and 10, at 16%, and highest at age 11, at 44.06%. Regarding obesity, it was not observed at age 6, while the highest percentage of obesity among boys was recorded at age 10, at 34.88%.

Based on the measured values of upper arm circumference and skinfold thickness at the triceps, the values for muscle and fat components were calculated, which are presented in Table 6.

It is observed that from ages six to eight, there is a trend of increasing muscle mass in both genders. From age eight onward, the values of muscle mass begin to decline. Additionally, up to age ten, girls, on average, have higher values than boys. Based on the data in the table, it is clear that the lowest value of fat mass is for the age of 14, while the highest is for the age of 6. From these values, we can conclude that fat mass decreases with age.

Analyzing the correlations between the variables BMI, muscle mass, and fat mass, the results showed a negative correlation between BMI and muscle mass (-0.197), as well as between BMI and fat mass (-0.524). The relationship between

BMI and fat mass is stronger, but negative; with a 1 percentage point increase in BMI, there is a decrease in fat mass of 0.524 percentage points. On the other hand, as expected, there is a negative correlation between muscle mass and fat mass; with a 1 percentage point increase in muscle mass, there is a decrease in fat mass of 0.195 percentage points. Detailed data is provided in Table 7 below.

Table 6. Muscle and fat component

age	gender	N	Mean muscle mass	Std. deviation	Min	Max	Mean fatty mass	Std. deviation	Min	Max
6	boys	7	13.4371	4.12136	9.42	21.23	29.4286	8.62104	11.00	35.60
	girls	10	17.8810	6.87043	6.43	28.62	27.0500	13.35367	11.40	47.80
7	boys	56	23.5916	11.60807	5.97	47.22	25.3536	10.19920	5.40	57.60
	girls	45	25.1344	12.37251	9.49	52.25	25.8400	11.27111	1.40	51.70
8	boys	38	26.4150	13.05942	8.32	59.24	22.4342	8.31564	8.80	43.80
	girls	34	27.7456	15.50776	7.91	71.80	22.8618	7.88278	5.40	39.50
9	boys	56	22.2654	10.61007	8.35	50.90	22.1839	7.46338	8.00	41.40
	girls	51	21.1449	9.93186	9.46	50.24	23.6784	8.77540	8.60	47.20
10	boys	43	23.1870	10.92435	8.11	61.16	19.2419	5.98089	5.80	30.90
	girls	32	24.4219	11.21975	8.05	52.30	17.8938	5.80089	7.00	32.80
11	boys	59	26.3100	12.91470	7.95	59.91	16.3763	5.03393	2.80	27.00
	girls	46	24.7157	10.38250	8.83	51.46	17.6261	6.65006	3.70	37.90
12	boys	47	23.1749	11.55709	7.58	63.00	17.2660	7.15913	5.80	37.10
	girls	49	21.6792	9.72877	8.05	45.16	16.500	5.27964	2.00	28.00
13	boys	48	20.5523	10.12719	8.28	61.77	14.4583	5.66564	7.80	32.70
	girls	44	20.3843	9.80145	6.96	45.14	16.8045	6.94878	3.30	39.10
14	boys	61	23.7392	12.24567	8.83	58.56	13.5262	5.17001	2.00	25.20
	girls	38	20.5579	9.76805	7.10	43.68	12.9658	4.90726	4.10	27.60
15	boys	33	17.4933	7.33636	7.78	36.54	14.8667	3.69803	9.30	23.00
	girls	26	20.5554	8.13552	9.23	39.31	13.6000	3.80421	4.80	21.90

Table 7. The degree of correlation between BMI, muscle mass, and fat mass

Correlations		BMI	muscle mass	fatty mass
BMI	Pearson Correlation	1	-.197**	-.524**
	Sig. (2-tailed)		.000	.000
	N	823	823	823
muscle mass	Pearson Correlation	-.197**	1	-.195**
	Sig. (2-tailed)	.000		.000
	N	823	823	823
fatty mass	Pearson Correlation	-.524**	-.195**	1
	Sig. (2-tailed)	.000	.000	
	N	823	823	823

**. Correlation is significant at the 0.01 level (2-tailed).

DISCUSSION

In childhood, disorders related to body weight often arise from inadequate nutrition. Food that is low in nutrients but high in energy value is readily available to the population. The consumption of such foods by children, combined with decreased physical activity, increases the risk of overweight and obesity (Medanic, Pucarin-Cvetkovic, 2012). Overweight or obesity are becoming so prevalent that they are approaching epidemic levels, as evidenced by the health statistics of children worldwide. This issue is becoming increasingly pronounced in developed countries, and research conducted so far indicates a growing trend of children with excess body weight and obesity, corroborated by data from the World Health Organization (WHO, 2022). According to the findings of the MICS in 2018, 7.3% of children under five years old were overweight. In the following year, 2019, the Institute for Public Health of Montenegro conducted a survey that included seven-year-olds, which revealed that 18.1% of boys and girls were overweight, while 16.1% of boys and 10.5% of girls were obese (Institute of Public Health of Montenegro, UNICEF, and GroundWork (2022). The program of measures for improving nutritional status in Montenegro, along with the Action Plan for the period 2021-2022, emerged from the need to continue aligning national activities in this area with regional recommendations from the World Health Organization related to the European region (European Action Plan on Food and Nutrition for the period 2015-2020). It also aims to adopt recommendations highlighted in the Final Report on the implementation of the Action Plan (Program of Measures for Improving Nutritional Status in Montenegro for 2020). During the three-year period between two rounds of the COSI study (2016 and 2019), the Institute for Public Health of Montenegro, with support from UNICEF, developed and published Guidelines for the Nutrition of Preschool-Aged Children and Recommendations for Reducing the Intake of Foods High in Saturated Fats, Trans Fats, Sugar, and Salt, with the aim of improving children's nutrition and creating an environment that promotes and supports proper nutrition (WHO, COSI, 2022).

Montenegro joined this research during the fourth round of investigations in 2016. The target group comprised seven-year-olds. Their anthropometric characteristics were measured, and parents provided data on dietary habits, physical activity, and the socio-economic characteristics of the family. In 2019, data revealed that nearly one-fifth of girls and boys had excess body weight (18.1%), while just under one-fifth were obese (16.1%). Girls had nearly the same percentage of excess weight as boys, while almost one in five boys (16.1%) and one in ten girls (10.5%) were obese. According to this research, the average body weight for seven-year-olds was 29.0 kg, the average height was 129.3 cm, and the average body mass index was approximately 16.7 kg/m². Comparing these results with those of our research, smaller deviations are observed in terms of height, weight, and body mass index. (For the same age group, these results are on average: body weight 27.76 kg, body height 127.24 cm, and the average BMI value 16.9 kg/m²). When discussing the daily consumption of fresh fruit among children aged 6-9 years in Montenegro, it is noticeable that girls consume fruit

more frequently than boys, with a difference of 6%, while boys more often consume sugary soft drinks compared to girls (28% versus 24%) (WHO, COSI, 2022). Numerous studies have been conducted in neighboring countries concerning body weight and nutrition among children. For example, the Croatian Institute of Public Health, in collaboration with UNICEF (2024), provided a series of recommendations for the prevention of overweight and obesity in children through a review of research, practices, and documents, after finding that Croatia ranks fifth in Europe in relation to these health issues. For the same reasons, the Public Health Institute of the Federation of Bosnia and Herzegovina (2012) published guidelines for healthy nutrition of preschool and school-age children. Many authors have also addressed this issue using slightly smaller samples than those mentioned. Djukic and Medjedovic (2013), in their work on the nutrition of children aged 9 to 12 years in Serbia, indicated that of a sample of 757 students, 66.3% had a normal body weight, 18.4% were overweight, and 15.3% were obese. They also found that obesity was more common in younger age groups.

Our research showed a lower percentage of children with normal body weight (50.22%) and a higher percentage of children with overweight (23.43%) and obesity (23.43%) compared to the aforementioned study, with obesity also being more pronounced in younger age groups, specifically 24.99% in 9-year-olds and as high as 34.88% in 10-year-olds. To determine the impact of a modern lifestyle on children, particularly nutrition, other anthropometric measures were also examined, as well as their correlation with excess body weight. Many works have investigated the relationship between anthropometric parameters and body mass index to identify groups at risk for overweight and obesity. Tomkinson *et al.* (2018) established that differences between genders in terms of adipose tissue become apparent after the age of twelve, while deviations in our study appeared at ages 6, 10, and 13. At ages 6 and 10, boys had higher fat mass values, while at age 13, girls surpassed boys in this parameter. In all age groups, this difference is around 2%. Herda *et al.* (2016) determined that children with a higher percentage of subcutaneous fat have less muscle mass. Our research also examined the degree of correlation between BMI, muscle mass, and fat mass, and it was found that there is a negative correlation between BMI and muscle mass (-0.197), as well as between BMI and fat mass (-0.524). On the other hand, as expected, there is a negative correlation between muscle mass and fat mass, meaning that for every 1 percentage point increase in muscle mass, fat mass decreases by 0.195 percentage points. In the aforementioned study conducted in 2019, which also included demographic parameters, it was established that in the central part of Montenegro, there was a higher percentage of boys with excess body weight and obesity, which also aligns with the results of our research, indicating an even greater percentage of obesity among boys. Regarding the distribution of children with obesity in relation to the degree of urbanization, it is noticeable that the highest percentage (15%) lives in urban areas compared to suburban (12.3%) and rural areas (9.6%). Unfortunately, numerous studies indicate a significant percentage decrease in the rural population in our country and negative

demographic trends that result in a shift towards urban areas. This not only affects the socioeconomic situation but can also negatively impact the overall health of the population. Primarily, this refers to the negative effects of the fast-paced urban lifestyle, the detachment from traditional foods, reduced physical activity, and an increasingly sedentary lifestyle in indoor environments.

The results of obesity studies, particularly among children (Scepanović *et al.,* 2019), as well as the previously mentioned projects carried out in Montenegro across all three regions, also address this issue, including population nutrition. Confirmation of the demographic trends from the north has been provided by research showing the impact of economic and ecological events on migration patterns from Pljevlja and other northern municipalities since the beginning of the 21st century. Emigration of the young and middle-aged population led to the transformation of the agricultural population into a non-agricultural one, which initially had positive effects. However, today, due to the spontaneity of this process, the agricultural population is largely made up of older households, which brings negative consequences in all spheres of life, including those related to food strategies and care (Mijanović *et al.,* 2023).

CONCLUSIONS

Based on this research and with the help of the criteria and recommendations from the WHO, it is concluded that each new study related to excess body weight and obesity in children yields increasingly poor and concerning results. When it comes to parameters such as height, the typical so-called first crossover of growth curves, where girls surpass boys in height at age 9, is absent; instead, there is a uniformity in height that persists until age 13. Unfortunately, an increased percentage of obese children is already evident at ages 9 and 10. It is essential to undertake urgent measures and strategies for proper nutrition in children within the framework of multidisciplinary activities to avoid more severe health consequences. By focusing on these aspects, we can better understand how children's nutritional status directly influences their overall well-being. It emphasizes the need for targeted interventions, early identification of potential nutritional issues, and the promotion of healthy eating habits to support their growth. Additionally, it points to the role of schools, families, and communities in ensuring that children receive adequate nutrition, which is essential for their physical and cognitive development.

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