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Original scientific paper

Influence of Some Socio-Economic Factors on Growth and Development of the Boys in the Tuzla Region (Bosnia and Herzegovina)

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A B S T R A C T

The impact of certain exogenous factor (socio-economic, ecological) has been investigated with special attention paid to the parents' living standard, and number of family members on some anthropometric parameters like: body height, body mass, chest circumference, upper leg circumference, upper arm circumference, sitting height, arm length, leg length, pelvis width, shoulders width, lenght of head and with of head on the sample of 698 boys aged 11 to 16 (17) years in the Tuzla region (the northeastern Bosnia, Western Balkan peninsula). Anthropometric measurements have been carried out using metodology proposed by the International Biological program (IBP). The results of these investigations have shown that there is a certain impact of the socio-eonomic conditions on the growth and development of boys. Children from families that have better living standard are, as a rule, taller, which is indicated by the statistical significant differences ($P > 0.01$). This trend indicates also value of Body Mass Index (BMI), which is in younger children from the families with lower living standard 16, while in the same category in the children from the families with better living standard it has value 18.5. The real impact of living conditions on the dynamics of development could be the best seen in the period of puberty. The number of children in the family has negative relationship with anthropometric features. Statistically significant differences ($P > 0.001$) have been detected in numerous analysed features in families with one or two children in comparison with families with three, four, or five children. Therefore, BMI has been significantlly lower (16) in children from famiels with several children, while in the families with one child in the same growth class (11 years) it was significanlly higher (17.4). Similar value of BMI (17.9) have children from the families with five children and which are 17 years old. Besides socio-economic conditions, high level of environmental pollution which is typicall for Tuzla region for a long time, has also significant impact on the growth and development of children.

Key words: *anthropometric parameters, living standard, number of children, envronmental conditions, social class, social mobility*

Introduction

In the modern anthropological investigations focused on determination of patterns in the process of growth of human populations, and particularlly in the children, a dominant role play very different approaches[1–7]. Numerous both endogenous and exogenous factors have impact on the process of the growth and development in children. Beside of the environmental conditions, socio-economic factors play an important role in the growth process in children[8–11]. Socio-ecomical factors involve: parents' living standard, diet and nutrition (its quality and quantity), living conditions, working conditions, number of family members, as well as the level of development of health care, physical culture, hygienic and working.

Recent investigations have shown that social factors, in the first place the economic ones, strongly effect psychophysical development and working capability of children.

Family living conditions and atmosphere at home have great significance. A family as a biologic, economic and educational unit of a society is a very important factor for psychic ans psycho-physical development of chil-

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dren, particularly at younger age. Higher living conditions can provide better comfort, less physical efforts, and a chance to have high quality leisure time. All those factors effect the modification of living and developmental trends. It is proved that growth acceleration is more expressed in better diet conditions, and it is followed by higher level of parents' education.

Although various anthropological investigations[12–14] have been carried out in the wider, and even in this area, there are no exact and aimed studies on estimation of intensity and the form of impact of exogenous factors on anthropological picture of the inhabitants. Main investigations have been focused to general anthropometric estimation of various samples, mainly school children, in certain parts of Bosnia and Herzegovina[15–21], or those investigations had anthropogenetical features (investigation of influence of exogenous factors on growth and development researched by using quantitative variation.

The results of various investigations of exogenous factors, and particularlly environmental factors, have shown that ecological conditions have significant impact on the growth and development of children, as well as to the health conditions in youth (persons in age 18) for military service. For these reasons, in the period before the war, the highest percentage of persons with limited ability and unfit persons was from areas with high level of air pollution (Zenica, Kaknj, Tuzla)[21]

Although numerous researchers have estimated that socio-eonomic condition have without any doubt impact on the life quality, precise detemination of the dominant factor is very difficult. Regarding socio-economic conditions, one of the most precise parameters which has the most direct impact on the growth and development is food[22–27]. Therefore, the best indicator of social-economic status in the given conditions is capability of given family to ensure high quality and divers food, which demands certain finnancial funds.

Besides food as a dominant indicator of socio-economic conditions, it is necessary to add in the given circumstances in Tuzla region also environmental factors which without any doubt have impact on the growth, development, and even to the total psychosomatical development of the children. Here is also necessary to add significant impacts of aggression on Bosnia and Herzegovina followed by the cruel war (1992–1996) which led to the numerous stress situations, and to the certain deviations in the growth and development, particularlly in young population. The main reasons are the lack of basic food and its low diversity, as well as the food quality as a serious risk factor (doubtfull hygienic and microbiological quality and value).

The objective of paper

The objective of the paper is to carry out evaluation of the level of impact of certain exogenous factors, socio--economic status of family (living standard of parents on the basis of their occupation and monthly salaries) and number of children in the family considering 12 selected anthropometrical features in 698 boys, age 11–16, in Tuzla region which has deteriorated environmental conditions.

Environmental condition

Tuzla region has been settled ever since Neolitic age. Since here in the Roman period have been discovered significant deposits of salt, coal, mineral waters, and other natural resources, the whole region has been a very attractive for living for ages.

Tuzla region has a moderate continental climate[28] with significant influence of continental climate from the north. Mean annual air temperature is around 11°C; mean monthly temperature for the coldest month (January) is around – 1.5°C, and for the hottest month (July) is around 21°C. The number of days with precipitations is 100, and mean annual number of sunny hours is 1850. There are clearly defined four seasons. Spring is hot, summer is a very hot, while autumn is mild with a lot of precipitations, and winter is cold. Significant impact on climate has pronounced emission of pollutants from various local sources. The imission comming from transboundary sources is in the most cases higher than emission.

In the past, and particullarly after WW II Tuzla region was one of the most developed industrial centers in Bosnia and Herzegovina and ex-Yugoslavia. Here are located two thermal power plants of high power, and basic chemical and electrochemical industry, concrete factory, and factories of building material. This has led to the extremly high emission of various air pollutants (SOx, NOx, COx, and other compounds). Waste waters polluted almost all surface waters. Therefore, this region is even today one of the most polluted regions in Bosnia and Herzegovina[29,30].

War activities

During aggression on Bosnia and Herzegovina in the period 1992–96, in exodus migrations, as the result of ethnical cleansing of non-Serb population, some 300,000 refugees, mainly from the eastern and the notheastern Bosnia have passed through Tuzla (Federal Institute for Statistics, 1998). In 1996, here lived 153,384 stanovnika, while in 1971, in the same region lived 107,293 inhabitants. Out of that number, 25% have been refugees, and 55% out of the total number of inhabitants were woman. The highest number of refugees was rural population with significant social and cultural characteristics in comparison with domicile inhabitants. During the war, there was significant shortage of food, drinking water and medicals.

War activities had differentiated impacts on certain social groups. The refugees and the social groups with low economic status have experienced the most significant effects of the war. This also had a direct impact on nutrition and living conditions. Numerous refugees have lived in very modest conditions, without electricity, regular heating, and warm water. Due to the hard living conditions and general apathy, a very high proportion of induced abortions were recorded in this period[31–32].

Material and Methods

Data collecting

The investigations have been carried out in Tuzla region, during 1996/97 school year. The data have been gathered in two elementary and four secondary schools. Cross sectional method has been used in the research. Anthropometric measurements have been carried out according to IBP regulations, that assures a uniform methodology in measurements and sameness of data obtained using the same standards, anthropological methods[5] and by using standardized instruments constructed according to criteria of Martin's anthropological instruments.

The following twelve anthropological parameters were tested: 1. body height; 2. body weight 3. mean chest circumference 4. upper arm circumference; 5. upper leg circumference; 6. sitting height; 7.arm length; 8. leg length; 9. head length; 10. head width; 11. pelvis width and 12. shoulders width.

The sample was divided into groups according to decimal age calculated from the gathered data on the day, month and year of birth of each tested person as follows: boys 10.6–11.5 years old made the 11 years group; 11.6–12.5 made 12 years group; 12.6–13.5 made 13 years group; 13.6–14.5 made 14 years group; 14.6–15.5 made 15 years group; 15.6–16.5 made 16 years group. The total sample size was N = 698. They were categorized according to the parents' living standard and to number of children in family.

This classification into three categories of living standard is established after the questionnaire carried out with 60 persons (30 professors of Tuzla University and 30 employed citizens of diverse professions, over 30 years old). The questionnaire included a list of 200 diverse professions (enclosed). It is interesting that opinions (about living standard on the base of profession) in both groups were identical. Profession nomenclature is taken from the book »Jedinstvena standardna klasifikacija zanimanja« (Uniform Standard Classification of Professions, ed. by Savezni zavod za statistiku, Beograd)[33].

Evaluation of atitude and public opinion about which professions (in that period) belong to the lower, middle and higher living standard has been made after processing of the data gathered in the questionairre. It is a very interesting that opinions in both groups (about level of living standard on the basis of the profession) have been a very similar.

The second criterion for the estimation of the living standard of parents was total monthly income of the family in comparison to the value of so called consumer basket. After the data XX (Institute for Statistics of the Federation BiH), the value of the consumer basket for July 1996 for four member family in Tuzla region was 355.32 KM (= 177.66 Euro). There was a significant coorelation between profession of parents and total monthly income.

Status of mothers-housewives-made the group of lower living standard. Living standard of both parents was calculated in this way: category 1 was added to the category 2 and the obtained sum was divided by 2. The obtained mean values (1.5) were classified into category 2, values (2.5) into category 3.

TABLE 1
STRUCTURE OF THE SAMPLE ACCORDING TO THE PARENTS' LIVING STANDARD

Age	11	12	13	14	15	16
N – lower living standard	43	50	41	35	33	57
N – average living standard	48	50	63	67	49	34
N – higher living standard	19	25	25	28	23	9
Total: 698	110	125	129	130	105	100

Variable »number of children in family« was classified into 3 categories.
The sample is divided into 3 categories as follows:

1st category (1 child in the family)
2nd category (2 children in the family)
3rd category (3 children in the family)

Mean values of the parameters have been tested (t-test).

Just a few families had 4, 5, 6 or more children, and therefore it was not possible to compare them with categories 1, 2 and 3.

TABLE 2
STRUCTURE OF THE SAMPLE ACCORDING TO THE NUMBER OF CHILDREN IN FAMILY

Age	11	12	13	14	15	16
N – 1 child in the family	20	23	23	29	10	15
N – 2 children in the family	74	82	83	80	74	69
N – 3 children in the family	20	17	24	20	16	19
Total: 698	114	122	130	129	100	103

On the basis of the data obtained from the questionnaire on parents profession, as well as on the basis of the value of the consumer basket, the total sample was divided into 3 categories (Table 1):

1st category – lower living standard
(value of one consumer basket)
2nd category – average living standard
(value of one to 1.5 consumer baskets)
3rd category – higher living standard
(value of more than one consumer basket).

Data processing

Descriptive statistics and »t« test have been carried out using software STATISTICS 4.5 for Windows). »t« test method (for dependant and independent samples) has been used for assessment of statistically significant differences between mean values of anthropometric variables and analyzed exogenous factors in this paper (num-

ber of the children in the family and living standard of parents considering their occupation and monthly income).

Body mass index (BMI) has been calculated using software[35] after formula:

$$BMI = m / h^2$$ (m – mass in kg; h – height in cm)

Results

The anthropometric characteristics of boys and family number

Detailed results of anthropometric measures of boys in relation to the number of family members, that is the number of children is presented in Table 3.

Number of family members has a certain effect on children's growth, as well. Children from larger families are shorter and lighter in all ages than the children from smaller families. Average number of children in the tested sample was 2, except in the age of 16 years; this group had approximately 3 children (Table 3). These families are not large in number, so we can analyze this factor only by the third child, as the sub-samples with 4, 5 and more children are very small.

The anthropometric characteristics of boys and living standard of parents

The results of anthopometric measures of boys in relation to the living standard of parents are given in Table 4. The obtained results have shown that there are significant differences in almost all features of anthropometric parameters between children coming from families with lower and higher living standard.

The boys at age 11 (third category, higher living standard) had significantly higher values for body height, upper leg circumference, head width, sitting height and leg length in comparison with the boys from the other two categories. The other tested parameters had higher mean values in the third category as well, but statistically insignificant (Table 4).

The boys at age 12, category of higher living standard, also have higher mean values, but wihout significance, for all the tested parameters (except for the head width).

The boys at age 13 (3rd category) had significantly higher mean values for almost all tested parameters (except for upper arm circumference and pelvis width) in comparison with the 2nd and first categories.

The age of 14 years had insignificantly higher average values of the tested parameters (except for the body

TABLE 3
NUMBER OF CHILDREN IN FAMILY AND ANTHROPOMETRIC PARAMETERS

Number of children	Age (years)	Anthropometric parameters											
		Body height (cm)	Body mass (kg)	Chest circum-ference (cm)	Upper leg circum-ference (cm)	Upper arm circum-ference (cm)	Sitting height (cm	Arm length (cm)	Leg length (cm)	Pelvis width (cm)	Shoul-ders width (cm)	Length of head (cm)	Width of head (cm)
One child (X_1)	11	144.19*	*36.58*	*70.59	*45.45*	*20.60*	*74.83	*63.28	*84.84	*21.94	*31.98	18.04*	14.97
	12	146.05	36.98	70.92	43.87	19.86	75.32	63.83	86.95	22.60	32.44	18.07	15.39
	13	*156.62	*45.61*	75.21	46.83	*21.89*	79.67	*71.14*	94.61*	*24.33*	34.19	18.31	15.10
	14	*162.10	*53.21	80.43	50.07	22.78	82.10	*72.26	*98.66*	*25.59*	35.83	18.21	15.29
	15	166.21	*57.30	*85.24	50.80	*24.06	85.66	72.76	98.38	26.08	37.00	18.50	15.46
	16	172.00	64.00	87.10	51.00	*26.30	90.00*	*73.00	100.00	27.60	38.00	18.80	15.30
Two children (X_2)	11	–	33.69*	68.51	42.37*	19.20*	74.19*	63.16*	84.25*	21.63*	31.77*	17.86	14.99*
	12	146.95	36.53	69.67	42.56	19.56	74.95	64.39	86.97	22.02	32.36	18.10	15.09
	13	153.53	41.88*	73.77	45.17	20.70*	77.84	68.86*	91.97	23.31*	33.50	18.22	15.16
	14	161.48	50.33*	78.83	49.01	22.43	81.38	70.79	96.60*	24.64*	35.24	18.41	15.20
	15	169.34	57.91*	83.31*	51.24	23.63	85.27	74.80	100.55	25.94	37.88	18.60*	15.28
	16	172.63	59.29	85.27	51.15	24.17	87.43*	75.59	102.52	26.86*	38.60	18.59*	15.63
Three children (X_2)	11	*139.50*	*31.06*	*67.21	*40.83	*18.57*	*72.11*	*61.08*	*81.32*	*20.81*	*30.90*	17.61*	14.67*
	12	144.44	34.93	69.72	42.63	19.67	73.91	62.67	84.64	21.93	31.91	18.00	14.87
	13	*152.01	*42.05	73.59	46.43	*20.58	78.40	*68.46	90.87*	*23.48	34.20	18.28	15.23
	14	*158.66	*50.33	80.17	48.86	22.83	80.84	*69.93	*95.21	*24.63	35.45	18.25	15.32
	15	166.37	*53.23*	*80.35*	48.77	*22.79	84.32	72.95	98.75	26.03	36.97	18.15*	15.22
	16	173.48	59.06	85.66	51.59	*23.85	89.39	*77.03	102.59	28.39*	39.29	18.93*	15.57

* – before numerical value indicates significance ($p>0.001$) between categories: 1 child and 2–4 children

* – after numerical value indicates significance ($p>0.001$) among categories: 1–2; 2–3; 1–3 children

height, head length and leg length, that have statistically significant distinctions among the compared categories)

The age of 15 and 16 years (3rd category), had significantly higher body height, arm length and head length in comparison with the 1st and 2nd categories. The group of higher standard had higher mean values, statistically insignificant, for the rest of parameters than the other two cartegories.

Discussion

The anthropometric characteristics of boys and family number

Number of family members has a certain effect on children's growth, as well. Children from larger families are shorter and lighter in all ages than the children from smaller families. Some authors[36] underlines that children coming from families with 1–2 children are better built than those from 3 children-families. Children coming from 1 child-family are »higher« than those from the several children-families by Prokopec's research[37].

However, there are justified opinions and attitudes about sequence of birth of children and differences among certain anthropometric parameters. Namely, although it could be concluded that firstborns are higher than other children, this does not necessary have any significant relationships with anthropometric characters, and particularly with body mass and height. In Europe, families coming from higher socio-economic class express tendency to have smaller number of children in comparison to the families coming from lower classes. Also, the children from higher classes are taller than children from lower classes. This could create an impression that firstborns are taller than other children, which is not true in any case[38–41]. In fact, groups of children that are born later on, come in the first place from families belonging to the lower classes. Therefore, those children are lower than firstborns, due to their social status and not because of the order of being born. The height of boys decreases with the increase of the number of children. This tendency confirms this trend (Table 3 and Table 5).

On the basis of the results of statistical analysis of relationships betwen nthropometric characteristics and number of family members certain relationships and patterns have been determined. The results of t-test indicate that there are significant differences ($p>0.001$) between children with lower and higher living standard. As

TABLE 4
LIVING STANDARD OF PARENTS AND ANTHROPOMETRIC PARAMETERS

Level of standard	Age (years)	Anthropometric parameters											
		Body height (cm)	Body mass (kg)	Chest circum-ference (cm)	Upper leg circum-ference (cm)	Upper arm circum-ference (cm)	Sitting height (cm	Arm length (cm)	Leg length (cm)	Pelvis width (cm)	Shoul-ders width (cm)	Length of head (cm)	Width of head (cm)
Lower living standard (X_1)	11	*140.52	31.86	67.89	*40.43	18.83	72.90	62.14	*81.92	21.79	31.12	177.24	*147.00
	12	145.43	35.10	69.77	41.76	19.38	74.25	63.74	85.64	21.79	31.90	180.68	*148.12
	13	*148.94	*36.39	*70.13	*42.56	18.97	*76.66	*66.79	*88.57	22.69	*32.71	181.22	*149.85
	14	*158.21	48.18	78.26	48.05	21.59	80.74	69.73	*94.06	24.56	35.77	*180.22	150.02
	15	*166.09	56.32	82.78	*55.27*	23.86	83.54	*72.92	98.01	25.41	36.77*	*182.41	152.73
	16	171.99	59.32	85.62	51.40	24.24	87.87	75.61	101.82	26.93	38.43	186.32	158.43*
Mean living standard (X_2)	11	141.36*	33.32	68.95	42.80	19.23	73.06	62.19	83.06	21.87	31.60	177.25	149.21
	12	146.81	35.73	69.61	42.61	19.57	75.27	64.21	86.57	23.31	32.49	182.16	149.16*
	13	150.70*	39.14*	71.71*	43.95*	20.40	77.35	67.86*	89.68*	23.31	32.99*	179.82*	148.32*
	14	158.69*	48.30	78.18	48.15	22.45	79.65*	70.20	95.27*	24.38	34.63	181.44*	151.69
	15	168.64	58.12	83.83	51.28*	23.77	85.63	73.92	99.02	26.22	38.67*	184.32*	152.44
	16	172.08	59.46	85.14	50.96	24.35	86.55	75.52	102.51	26.98	38.18	184.43*	158.11
High living standard (X_2)	11	*144.20*	34.53	68.83	*43.25	19.53	74.65	64.33	*84.85	22.70	31.87	179.54	*150.42
	12	146.53	37.08	70.05	43.04	19.82	74.98	64.01	87.01	22.19	32.40	180.71	*152.08*
	13	*156.05*	*45.19*	*75.72*	*46.97*	21.50	*78.98	*70.27*	*94.09*	23.80	*34.24*	182.72*	*152.85*
	14	*162.40*	52.02	79.86	49.66	22.69	82.07*	71.39	*97.78*	24.99	35.52	*182.04*	152.80
	15	*169.09*	56.42	83.43	*49.89*	23.22	85.24	*74.84	100.92	25.92	37.46*	*185.37*	153.03
	16	172.79	58.82	83.35	51.09	23.99	87.76	75.79	102.26	27.48	38.90	187.12*	156.24

* – before numerical value indicates significance ($p>0.001$) between categories: the first one (low standard) and the third one (higher standard)

* – after numerical value indicates significance ($p>0.001$) between the first category (lower standard) and the second one (middle standard) as well as between the second one and the third one (higher standard)

a rule, the higher living standard means higher values for larger number of analysed anthropometric parameters. For these reasons, the category that includes children from the famlies with the higher living standard has often significantlly higher mean values for considered parameters. These differences have the highest values in the period of adolescence and after that period they are decreasing.

On the basis of descriptive statistics and t-test it could be concluded that children from smaller families have higher mean values for the analyzed variables in comparison with children coming from larger families. This factor »number of children in family« is in a negative correlation with anthropometric variables, the more number of children – the lower average values for the analyzed characteristics. That difference in the mean values (t-test) is particularly pronounced in the period before puberty, at age 12 (14.5) years, while afterwards, it is a bit smaller. Length parameters (body height, sitting height, arm length, leg length) are the indicators contributing at most to the differences among the compared categories. Smaller differences are in circumferences and width parameters.

More children in a family means lower living standard and worse residence conditions, lower socio- and health-hygienic standards, lower quality diet, and so on. The results are smaller anthropometric measures.

T-test involved families with 1, 2, and 3 children. The results of descriptive statistics and of t-test are shown in the Tables 3.

The anthropometric characteristics of boys and living standard of parents

Significant number of previous results[42–44] stress the importance of living standard on anthropometric measures, and particularlly on the height and body mass in children in an intensive phase of their growth and development[45–49].

It is obvious that living standard has impact on the dynamics of development which could be best seen in the period of puberty. However, besides these differences, it is a very hard to attribute high signifincance of the living standard of parents to the growth and development in children, without taking into acount some other both exogenous nd endognous factors.

Although it was detected presence of certain differences in almost all anthopometric features between children with lower and higher living standard, it is not possible to attribute them only to this parameter in the given conditions. Also, despite the fact that children from higher classes are taller, their body mass was lower in the group of almost grown up boys. This could without any doubt indicate pronounced impact of certain environmental factors, such as permanently high air pollution with NOx, SOx and COx compunds, bad water quality[30], since all children have been almost equally exposed to these impacts during the largest part of the year, regardless living standard. Also, the value of BMI (Table 6) supports this fact.

TABLE 5
BODY INDEX MASS OF BOYS IN RELATION TO THE LIVING STANDARD OF PEARENTS

Age of boys	Low standard	Medium standard	High standard
11	16.1	16.6	16.9
12	16.6	16.7	17.4
13	16.0	17.1	18.5
14	19.2	19.0	19.8
15	20.3	20.3	19.6
16	19.9	19.9	19.7
17	19.3	19.5	19.6

TABLE 6
BODY INDEX MASS (BIM) OF BOYS IN RELATION TO THE NUMBER OF CHILDREN IN FAMILY

Age	One child	Two children	Three children	Four children	Five children
11	17.4	16.6	16	16.7	16.1
12	17.4	17.1	16.9	17.9	14.3
13	18.7	17.9	18.2	16.0	–
14	20.2	19.3	19.8	17.3	21.0
15	20.7	20.3	19.2	18.3	15.0
16	21.6	19.7	19.7	20.3	20.7
17	–	20.5	19.2	–	17.9

Body mass index (BMI)

BMI is one of the simplest indicators of malnutrition and eventual pretility in population. Although it is not the most precise indicator, BMI gives an adequate statistical value for assessment of (mal)nutrition of population – although it is neither the best nor the most precise indicator.

Besides, BMI as a statistical measure enables assessment of changes in the society during certain period and it is easy to calculate this indicator which has been successfully used for evaluation of the impact of socio-economic conditions on nutrition of population in investigated sample.

Determined BMI values indicate real impact of the number of children in the family on nutrition. According to the obtained BMI values it could be concluded that all children at age 11 and 12 are underfed regradless the number of children in the family. However, in families with two or three children malnutrition has been recorded in the age 13 group. The children in the families with four or five members are underfed even after 15 year, that is 17 years (Table 5).

The results of analysis of relationships among certain anthropometric characters in boys and living standard of their parents using BMI index values indicate certain

patterns. The children with high living standard were underfed only in the categories 11 and 12, while the children with low and medium standard, even in age 13 group (Table 6). In older groups (after 14 years) there are no significant differences. However, it is clear that there are differences in the quality of body mass in children from familiess with various welfare.

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UTICAJ NEKIH SOCIJALNO-EKONOMSKIH FAKTORA NA RAST I RAZVOJ DJEČAKA U TUZLANSKOM REGIONU (BOSNA I HERCEGOVINA)

SAŽETAK

Istraživan je uticaj nekih egzogenih faktora (socijalno-ekonomski, ekološki) sa posebnim osvrtom na životni standard roditelja, broj članova obitelji na neke antropometrijske parametre kao što su: tjelesna visina, tjelesna masa, obim grudi, obim natkoljenice, obim nadlaktice, sjedeća visina, dužina ruke, dužina noge, širina karlice, širina ramena, du-

žina i širina glave, u uzorku od 698 dječaka starosti od 11 do 16 (17) godina u Tuzlanskom regionu (sjeveroistočna Bosna, zapadni Balkan). Antropometrijska mjerenja izvršena su prema metodologiji Međunarodnog biološkog programa (IBP). Rezultati ovih istraživanja pokazuju da postoji određeni uticaj socijalno-eknomskih prilika na rast i razvoj dječaka. Djeca iz porodica sa višim standardom su u pravilu viša, na što ukazuju i statistički značjne razike ($p > 0,01$). Ovu pravilnost pokazuje i vrijednost Indeksa tjelesne mase (BMI) koji kod mlađe djece iz niže društvene klase iznosi 16, a u istoj kategoriji kod djece iz više klase 18.5. Stvarni utjecaj životnog standarda na tempo razvoja se najbolje vidi u doba pubertetea. Broj djece u porodici je u negativnom odnosu sa antropometrijskim svojstvima. Utvrđene su statistički značajne razlike ($p > 0,001$) u mnogim analiziranim svojstvima kod djece sa jednim ili dvoje djece u odnosu na porodice sa troje, četvero, ili petoro djece.Tako BMI je stanovito niži (16) kod djece iz višečlanih obitelji dok je u obiteljima sa jednim djetetom u istoj uzrasnoj klasi (11 godina) znatno viši (17,4). Sličnu vrijednost BMI (17.9) imaju djeca u obiteljima sa petoro djece i sa 17 godina starosti. Uz socijalno-ekonomske prilike, na rast i razvoj djece ima i visoko zagađenje okoliša, karakteristično koz duži vremenski period za Tuzlanski region.