

## Overweight/ obesity in Balkan region 2013-2015 for Albanian children

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### Abstract

This study research aim to find out the overweight/ obesity prevalence in Albanian children (19,850 children; 9973 boys and 9877 girls) living in the Balkans (Albania, Kosovo, FYR Macedonia, Montenegro) for the period 2013- 2015. This study research is based on the results of the "BASIC" project applied in Sports University of Tirana (SUT). This report is developed for the first time in the Region as well as in Albania, including mapping the spread of obesity and overweight, regarding children in primary and secondary school (6- 15 years old).

It was measure body weight and body height in children and BMI was calculated using this two parameters. The reference curves used for calculated overweight/ obesity (BASIC Albanian reference population for overweight/ obesity) were based on the LMS method (Cole 1990) using the software LMS chart maker (LMS Pro version 1.16, Institute of Child Health, London).

The prevalence of overweight and obesity in Balkan among boys and girls aged 6.5–15.5 years (2013-2015), by countries (estimates based on Albanian reference population) was: Albania- overweight 10.9 % (boys 11.5%, girls 10.2 %); obesity 5.7% (boys 5.8%, girls 5.6%); Kosovo- overweight 6.8 % (boys 7.3%, girls 6.3 %); obesity 3.3% (boys 3.3%, girls 3.3%);

FYR Macedonia- overweight 10.7 % (boys 9.9%, girls 11.6 %); obesity 6.8% (boys 7.1%, girls 6.6%); Montenegro- overweight 14.9 % (boys 16.9%, girls 12.6 %); obesity 10.2% (boys 10.9%, girls 9.5%).

The results of this study show that there is a difference of the prevalence of overweight and obesity among Albanian children living in Balkan (between countries, gender and geographic location)

**Keywords:** overweight, obesity, children, Balkan

### Introduction

Obesity is caused by an imbalance between energy input and energy expenditure. This epidemic is rapidly and constantly growing and affects all socioeconomic levels and ethnicities (Ogden et al., 2006). Recent reports from different studies have highlighted the severity of obesity in children by suggesting: "today's generation of children will be the first for over a century for whom life expectancy falls" (Hills et al., 2007). Data from several sources (Boreham et al., 2004; Venn et al., 2007) have identified overweight and obesity in children as a major contributing factor of low levels of physical activity and as a cause for becoming obese adults as they will grow up compared with those children of normal weight in the future. Venn et al. (2007) identified obesity in childhood as a stronger predictive of obesity in early

adulthood and most of obese young adults were a healthy weight as children. Increase in obesity has been suggested to be the result of reduced physical activity (Kuboonchoo, 2001; Ekelund et al., 2004; Patrick et al., 2004). In children, physical inactivity and lack of fitness are associated with increasing prevalence of cardiovascular risk factors (McKenzie et al., 1997). A recent study by Wang and Lim (2012) show that overweight and obesity prevalence in children has increased dramatically since 1990, in parallel with rapid economic development and rising standards of living around the world (Peters, 2002). The authors conclude that, if this trend will continue the prevalence may reach 9% of the children population in 2020. Recent evidence from Sweden, Denmark and Norway (Pearson et al., 2010; Kollé et al.,

2009) presents encouraged data that childhood obesity has not worsened since the year 2000. The authors highlights the possibility to stop the epidemic of overweight and obesity in children. Data from the past decades compared with the data taken from year 2002-2007, (Pearson et al., 2010) show that there were no significant changes in the prevalence of obesity.

In Albania is difficult to find accurate data and reliable information about the percentage of overweight and obesity in children. There are two main reasons; first, poor methodology followed and the second is the reliability of the data we collect. However, in recent years several studies have been undertaken in this area. The objectives of the study by Jarani and Qeleshi (2013) in Albania children (Tirana, the capital city of Albania), were to investigate the problem of overweight/obesity in children. The results revealed that the prevalence of overweight for the entire participants was 14 % and did change by gender and the prevalence of obesity was 4%.

Although, the results from another investigation study by Jarani et al., (2014a) reveal strong evidence that children in Albania showed lower values in weight compared to Portuguese children and equal weight compared to Belgian children and were shorter than their European younger counterpart. The prevalence of Albanian children for overweight was 10.2% and obesity 3.2%. Significant differences were observed between boys and girls regarding prevalence of obesity (5.7% boys and 2.2% girls, ( $P \leq 0.05$ ).

Since that in Albania there is not a clear picture about the percentage of overweight and obesity in children a study was undertaken in Albanian children ( living in the Balkans ) for two reasons; the first to highlight a clear picture on this phenomenon and the second to draw the normal overweight/ obesity references for Albanian children

## Methods

This study research aim to find out the overweight/obesity prevalence in Albanian children (19,850 children; 9973 boys and 9877 girls) living in the Balkans (Albania, Kosovo, FYR Macedonia, Montenegro) for the period 2013- 2015 and is based on the results of the "BASIC" project applied in Sports University of Tirana (SUT).

This report is developed for the first time in the Region as well as in Albania, including mapping the spread of obesity and overweight, regarding children

in primary and secondary school (6- 15 years old).

It was measure body weight and body height in children and BMI was calculated using this two parameters. In the framework of this project is also established a computer program (web based) where parents, teachers and other individuals can identify the status of their children, only with the information of age of the child and the parameters (weight, height, BMI and waist circumference).

The reference curves were based on the LMS method (Cole 1990) using the software LMS chart maker (LMS Pro version 1.16, Institute of Child Health, London). The LMS method summarizes the distribution of the dependent variable by its median (M) and coefficient of variation (S), plus a measure of skewness based on the Box-Cox power (L) required to transform the data to normality. These three quantities depend on age and sex and are modelled using penalized likelihood as cubic splines by non-linear regression. L values of 1 indicate absence of skewness in the distribution, while 0 is the log transformation and -1 is the invers transformation (more skewed than log-normal). A normal distribution is assumed following LMS transformation. When a variable follows a normal distribution z-scores can be used interchangeably with centiles. Therefore, using L, M and S values, a dependent variable (y) can be converted to Z -scores according to the formulas:

$$z = \frac{\left(\frac{y}{M}\right)^L}{LS}, L \neq 0$$

And to  $z = \frac{\log_e\left(\frac{y}{M}\right)}{S}, L=0$  centiles using the formula:

L, M and S parameters were exported at  $c = M(1 + LSz)^{1/L}$  0.5 year intervals for each sex. Based on these quantities, centiles curves corresponding to the 3<sup>rd</sup>, 10<sup>th</sup>, 25<sup>th</sup>, 50<sup>th</sup> 75<sup>th</sup>90<sup>th</sup> and the 97<sup>th</sup> percentile were calculated for height, weight, body-mass index (BMI) and waist-circumference for each sex. We further calculated the 85<sup>th</sup>and the 95<sup>th</sup> percentiles for BMI and used these to define cut-offs for overweight and obesity, respectively. By this definition, the prevalence of overweight (including obesity) is 15% and the prevalence of obesity is 5%. Goodness of fit was examined using worm-plots (Van Buuren and Fredriks 2001) and by examining empirical vs. observed centiles (i.e. 90<sup>th</sup> centile included 90% of observations). For each dependent variable we identified the num-

ber of smoothing parameters for L, M and S which gave the best possible fit (lowest deviance) based on the generalized Akaike's information criteria (GAIC (3)) and still created smooth centile curves (i.e. did not over-fit the curves).

Information on anthropometric data was available in 18448 (waist-circumference) to 18512 (weight) individuals. Of the 19850 invited, 297 had declined participation, 419 were not included as their sex-age group was too small (covering 6 cells) and 534 had no information on either age, gender or any anthropometric variable. At least 200 observations in a 0.5 year sex-age group were required to include the cell (Wang, Moreno et al. 2006). Data was manually screened which lead to exclusion of 23 observations on weight, 34 on waist-circumference and 54 for height. After calculation of BMI, further 34 observations were dropped as the BMI was below 12 kg/m<sup>2</sup>. This is considered unlikely (i.e. error in one or more measurements) or indicating extreme malnutrition. Dropped observations amounted to <0.5% of the included data. The included sample was between 6.3 and 15.7 years old.

**Results**

The prevalence of overweight and obesity in Balkan (Table 1) among Albanian children aged 6.5–15.5 years (2013-2015) was for overweight 10.2%, (boys 10.9% and girls 9.7%) and obesity 5.7%, (boys 5.9% and girls 5.5%), while by geographic location (estimates based on Albanian reference population) was: urban- overweight 11. % (boys 11.5%, girls 10.4 %); obesity 5.7% (boys 5.9%, girls 5.5%); rural- overweight 6.8 % (boys 7.3%, girls 6.2 %); obesity 4.3% (boys 4.7%, girls 3.8%): The prevalence of overweight and obesity in Balkan (Table 2) among boys and girls aged 6.5–15.5 years (2013-2015), by countries (estimates based on Albanian reference population) was: Albania- overweight 10.9 % (boys 11.5%, girls 10.2 %); obesity 5.7% (boys 5.8%, girls 5.6%): Kosovo- overweight 6.8 % (boys 7.3%, girls 6.3 %); obesity 3.3% (boys 3.3%, girls 3.3%): FYR Macedonia- overweight 10.7 % (boys 9.9%, girls 11.6 %); obesity 6.8% (boys 7.1%, girls 6.6%): Montenegro- overweight 14.9 % (boys 16.9%, girls 12.6 %); obesity 10.2% (boys 10.9%, girls 9.5%).

The prevalence of overweight and obesity in Balkan (Table 3) among boys and girls aged 6.5–15.5 years

**Table 1** Prevalence of overweight and obesity in Balkan among boys and girls aged 6.5–15.5 years (2013-2015), by location (estimates based on Albanian reference population)

	Overweight (%)			Obese (%)		
	Total	Boys	Girls	Total	Boys	Girls
<b>Balkan</b>	<b>10.30</b>	<b>10.86</b>	<b>9.73</b>	<b>5.73</b>	<b>5.92</b>	<b>5.54</b>
<b>Urban</b>	<b>10.97</b>	<b>11.54</b>	<b>10.40</b>	<b>6.01</b>	<b>6.17</b>	<b>5.85</b>
<b>Rural</b>	<b>6.76</b>	<b>7.34</b>	<b>6.15</b>	<b>4.28</b>	<b>4.69</b>	<b>3.84</b>

**Table 2** Prevalence of overweight and obesity in Balkan among boys and girls aged 6.5–15.5 years (2013-2015), by countries (estimates based on Albanian reference population)

Individual countries	Overweight (%)			Obese (%)		
	Total	Boys	Girls	Total	Boys	Girls
<b>Albania</b>	<b>10.87</b>	<b>11.53</b>	<b>10.21</b>	<b>5.66</b>	<b>5.77</b>	<b>5.55</b>
<b>Kosovo</b>	<b>6.80</b>	<b>7.32</b>	<b>6.29</b>	<b>3.34</b>	<b>3.34</b>	<b>3.33</b>
<b>FYR Macedonia</b>	<b>10.74</b>	<b>9.92</b>	<b>11.57</b>	<b>6.83</b>	<b>7.07</b>	<b>6.58</b>
<b>Montenegro</b>	<b>14.92</b>	<b>16.91</b>	<b>12.64</b>	<b>10.20</b>	<b>10.86</b>	<b>9.45</b>

(2013-2015), by countries and location (estimates based on Albanian reference population) was: Albania- overweight urban 11.8 % (boys 12.6%, girls 11 %) and rural 5.7 % (boys 5.8%, girls 5.6 %); obesity urban 6.3% (boys 6.4%, girls 6.2%) and rural 2.3 % (boys 2.7%, girls 1.8 %):

Kosovo- overweight urban 7.5 % (boys 8.3%, girls 6.8 %) and rural 3.4 % (boys 3%, girls 3.9 %); obesity urban 3.8% (boys 3.9%, girls 3.8%) and rural 1 % (boys 0.8%, girls 1.1 %):

FYR Macedonia- overweight urban 11 % (boys 9.8%, girls 12.1 %) and rural 8.1 % (boys 10.8%, girls 4.9 %); obesity urban 6.7% (boys 7%, girls 6.5%) and rural 8 % (boys 8.3%, girls 7.8 %):

Montenegro- overweight urban 15.2 % (boys 16.9%, girls 13.1 %) and rural 14.3 % (boys 16.9%, girls 11.7 %); obesity urban 8.8% (boys 9.3%, girls 8.1%) and rural 13.7 % (boys 14.9%, girls 12.6 %):

dence from a study of Kipping et al. (2008) have reported that the rate for overweight or obese in Western world is one in three to five children. The main cause of this increase over past decades may be attributable to the increase of physical inactivity among children (Must and Tybor, 2005).

Kelishadi (2007) investigated the prevalence of overweight and obesity in children in their review. They found that Eastern Europe and Middle east region had the highest prevalence of overweight children. They suggested that time trends in childhood obesity, should be monitored in developing countries in order to obtain useful insights for primordial and primary prevention of the upcoming chronic disease epidemic in such communities. Environmental, policy, and societal changes are important contributors to the rapid rise in obesity over the past few decades (Sallis and Glanz, 2009).

**Table 3** Prevalence of overweight and obesity in Balkan among boys and girls aged 6.5–15.5 years (2013-2015), by countries and location (estimates based on Albanian reference population)

Individual countries (Urban/Rural)		Overweight (%)			Obese (%)		
		Total	Boys	Girls	Total	Boys	Girls
Albania	Urban	11.81	12.60	11.03	6.28	6.35	6.22
	Rural	5.71	5.82	5.59	2.26	2.72	1.77
Kosovo	Urban	7.51	8.27	6.77	3.84	3.90	3.78
	Rural	3.44	2.96	3.94	0.96	0.81	1.13
FYR Macedonia	Urban	10.97	9.83	12.08	6.72	6.96	6.49
	Rural	8.07	10.83	4.85	8.07	8.33	7.77
Montene- gro	Urban	15.15	16.93	13.05	8.75	9.32	8.09
	Rural	14.34	16.87	11.72	13.73	14.86	12.55

## Discussion

Results from the study show that the level of overweight was 10.3 % and that of obesity 5.7 % of Albanian children living in Balkans. Boys have a higher percentage of girls in terms of level of overweight and obesity (overweight- boys 10.9 % vs 9.7 % girls; obesity- boys 5.9 % vs girls 5.5 %). Studies have reported the increased prevalence of overweight and obesity in children, more noticeably in industrialized western countries (Wang and Lobstein, 2006; Wang and Lim, 2012; Lobstein et al., 2004) than in some developing countries (Wang and Lim, 2012). Evi-

The objectives of the study by Jarani and Qeleshi (2013) in Albania children (Tirana, the capital city of Albania), were to investigate the problem of overweight/obesity in children. The results revealed that the prevalence of overweight for the entire participants was 14 % and did change by gender and the prevalence of obesity was 4%. In another study conducted in Albania (Tirana), by Jarani et al., 2014a was estimated the prevalence of overweight and obesity in Albanian children where prevalence of overweight was 10.2% and obesity 3.2%. Significant differences were observed between boys and girls regarding prevalence of obesity (5.7% boys and 2.2%

girls, ( $P \leq 0.05$ ). The results of this study are in line with two studies mentioned above conducted in Albania. Although the two studies are focused in the area of the capital city of Albania.

This studies show that there is a difference comparing the prevalence of overweight and obesity regarding geographic position where children in urban areas have higher percentage of values compared to those living in rural area. Albanian children living in Albania and FYR Macedonia have the same percentage of overweight while the data for obesity are different (Albania 5.7% and FYR Macedonia 6.8%). Albanian children living in Kosovo have lowest percentage of overweight and obesity (6.8% and 3.3%). Comparing by gender boys have higher percentage compared to girls with regard to overweight and obesity.

The article by Jarani et al, (2014b) provides an overview of the physical inactivity rates of Albanian children aged 6 to 15 years, based on the first objectively measured physical activity data collected for a representative sample. This study illustrates that 42.7% of children fell below the normal level of PA (inactivity). The most important finding is that inactivity percentage among children ages ten to 12 yrs fell slightly from 39 percent to 33 percent.

The percentage of children in elementary school (50%) aged 6.6-11 years old failed below the normal level of physical activity levels compare to fewer rates that were for secondary school children (42%). Results from this study show that in every age group the percentage of inactive boys is lower compared to percentage of inactive girls. The high percentage of inactive children poses a threat for increased obesity in Albanian children. The findings of the current study are consistent with those of Lasheras et al., 2001 and Sallis et al 2000 who found that physical activity declines with age particular with girls at all ages substantially less active than boys.

In conclusion we must say that these are the first data to Albanian children about the problem of overweight and obesity. These data compared with data of the above studies show a link with the higher rate of inactivity of Albanian children and constitute a major problem in the health of these children at a near future. Policies should be designed for continuous monitoring in order to have a clear picture of the problem in the years of overweight and obesity.

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