

## RETROSPECTION UPON ANTHROPOLOGICAL RESEARCH OF OBESITY IN ROMANIA

ELENA RADU, OANA LUMINIȚA CIOTARU and ALEXANDRA MACOVEI

Institute of Anthropology "Francisc I. Rainer", Romanian Academy, Bd. Eroii Sanitari nr. 8, C. P. 35-13, 050474, Bucharest, Romania, Tel./Fax: (004)-021-317.50.72, E-mail: FRANCISCRAINER@YAHOO.COM

*Received Mays 8, 2007*

The increasing prevalence of obesity in Romania requires its prevention to become a top priority of the strategies towards national biological security.

The epidemic of obesity leads us to creation of an anthropological database that constitute, according to WHO recommendations, a "national population of anthropological reference", a control point for establishing the prevalence of overweight and obesity by age, sex, ecological environment etcetera.

The present study represents the scientific basis of biological security politics in Romania, and a contribution to the assessment of overweight among the populations in the European Region and worldwide, in the context of global strategies of obesity counteracting.

We found that prevalence of overweight and obesity reaches 15% in the 11–18 year old age group; in adult population, the prevalence is 59.42% in the male series, and 42.00% in the female series.

*Key words:* Prevalence; Overweight; Obesity; Secular Trend; Romania.

### INTRODUCTION

The epidemic characteristic of obesity represents one of the most serious challenges regarding public health in the European Region of WHO. Considering the increasing prevalence of obesity in children, adolescents, and adult population as well, the Ministers and delegates attending the WHO European Ministerial Conference on Counteracting Obesity (Istanbul, Turkey, 15–17 November 2006) have adopted the European Charter on Counteracting Obesity.

In the context of epidemic obesity, we also expect also an increase of morbidity and mortality due to the cardiovascular and metabolic diseases, for which obesity constitutes a major risk factor.

According to the European Charter on Counteracting Obesity, the study of obesity should become a priority on the political agenda of the European governments. Romania was scarcely

represented in the international studies upon obesity prevalence in children, teenagers, and adult population as well, a reason for which we undertook many anthropological researches in the last few years.

Our work aims to analyze:

1. The Prevalence of overweight and obesity risks among children and adolescents aged 11–18 years (year of research: 2004) (Figs. 1, 2);

2. The Prevalence of overweight and obesity among adult population (period of research: 2001–2004);

3. The microevolution (secular trend) aspects regarding prevalence of overweight and obesity among adult population between 1980 and 2004 (Fig. 3);

National statistics are needed to constitute the scientific basis of the strategies towards obesity in populations and to assure reliable information on the prevalence of overweight and obesity in Romanian population.

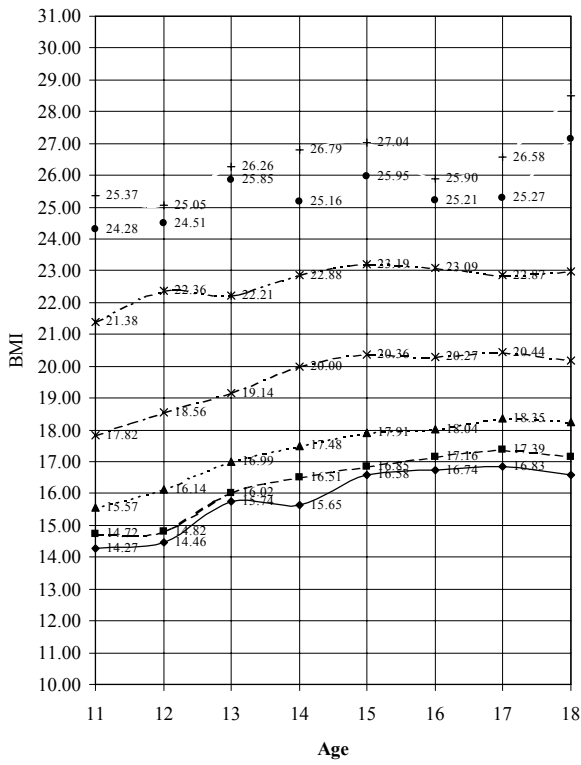


Fig. 1. Body mass index-for-age percentiles in boys, year 2004.

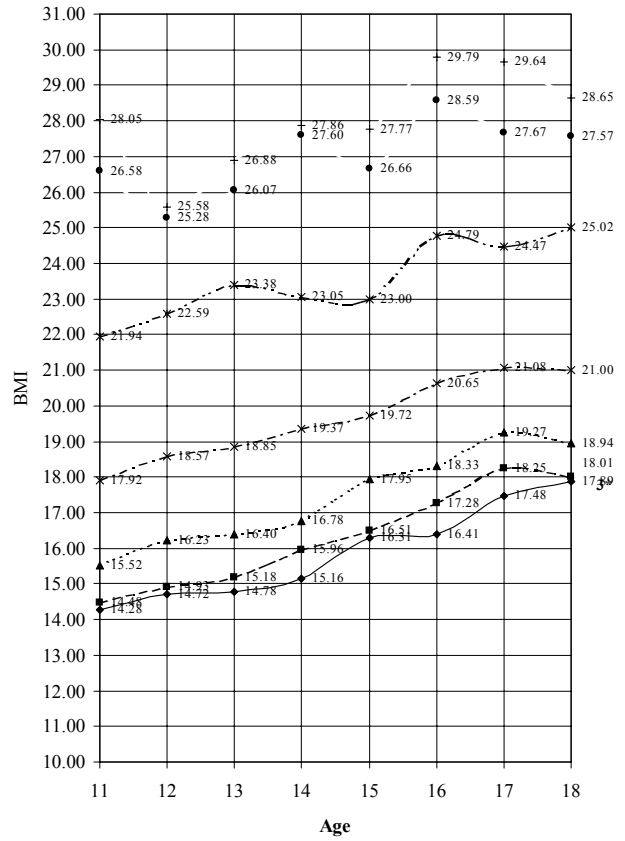


Fig. 2. Body mass index-for-age percentiles in girls, year 2004.

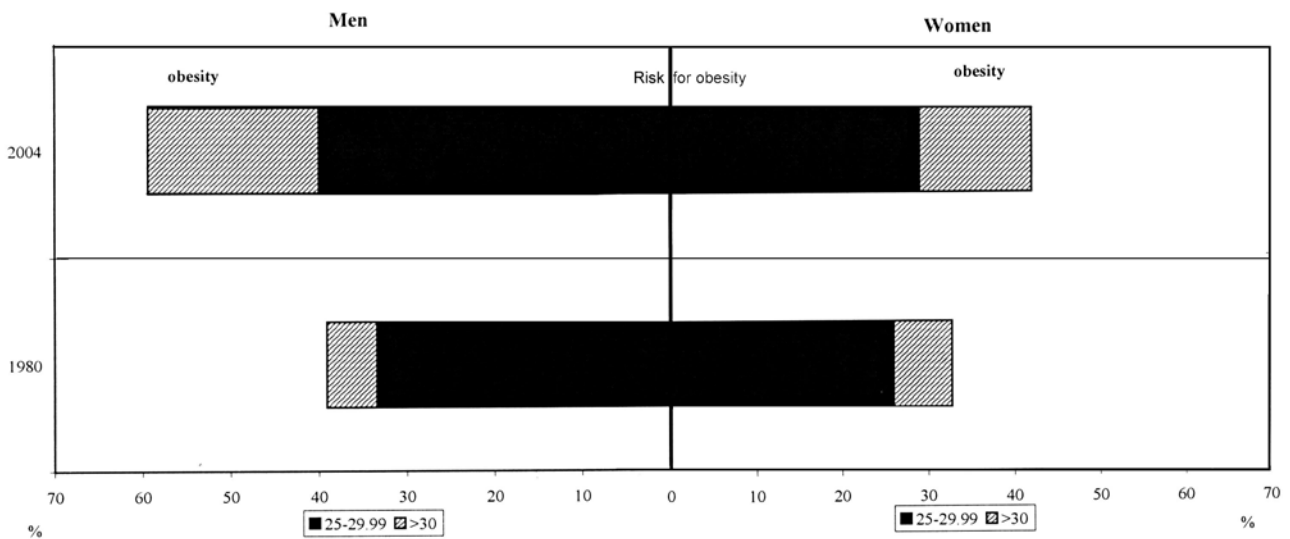


Fig. 3. Prevalence of obesity and risk for obesity in an adult population (men and women), the years of 1980 and 2004.

## METHODOLOGY

In order to evaluate, from the anthropological viewpoint, the populations at risk of being overweight and obese, we examined the variability of body mass index, recommended by WHO since 1995, for defining nutritional health status of a population.

For the population of children and adolescents, we utilized a percentile scale of classification of the BMI values, according to which underweight is to be found under the 5<sup>th</sup> percentile; a normal weight between 15<sup>th</sup> and 85<sup>th</sup> percentile; the risk for being overweight between the 85<sup>th</sup> & 95<sup>th</sup> percentiles; obesity at or over the 95<sup>th</sup> percentile.

For the adult population, we utilized the Quetelet scale of classification, according to which underweight corresponds to BMI values below 18,49 (with 3 categories of underweight, differentiated by the severity of malnutrition); normal weight corresponds to BMI values ranging between 25.00 and 29.99 (some researchers label this category as pre-obesity); and finally, obesity

(including different grades of severity) is placed at BMI values above 30.

## RESULTS ANALYSIS

In 2004 we undertook a study upon BMI variability on a sample of 1378 boys and 1860 girls from different Bucharest school units.

Within the 11–18 year old age group, in the female series, we recorded the following prevalence percentages: 5.32% – underweight, 79.67% – normal weight, 9.84% – risk for overweight, and 5.16% – obesity. The cumulated prevalence of overweight and obesity in girls aged 11–18 years reaches 15%.

In the boys' series, the underweight prevalence is 5.44%, normal weight prevalence is 79.53%, overweight prevalence is 9.94%, and obesity prevalence is 5.07%. The cumulated prevalence of overweight and obesity in boys aged 11–18 years reaches 15.01%.

Therefore, there are no differentiations between female and male series as regards overweight and obesity prevalence (Tables 1, 2).

Table 1

Variability of BMI percentiles among male children and adolescents, in the year 2004

PERCENTILES		11 years		12 years		13 years		14 years		15 years		16 years		17 years		18 years		Total	
		N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%
<5*	Underweight	8	5.07	9	5.47	12	5.55	13	5.39	7	5.22	8	5.47	8	5.68	10	5.96	75	5.44
5* – 85*	Normal weight	126	79.75	139	79.88	171	79.16	192	79.67	107	79.85	116	79.45	112	79.43	133	79.16	1096	79.54
85* – 95*	Risk for obesity	16	10.13	17	9.77	23	10.65	24	9.96	13	9.70	14	9.59	14	9.93	16	9.52	137	9.94
>95*	Obesity	8	5.06	9	5.17	10	4.63	12	4.98	7	5.23	8	5.47	7	4.97	9	5.36	70	5.08
<b>TOTAL</b>		<b>158</b>	<b>100</b>	<b>174</b>	<b>100</b>	<b>216</b>	<b>100</b>	<b>241</b>	<b>100</b>	<b>134</b>	<b>100</b>	<b>146</b>	<b>100</b>	<b>141</b>	<b>100</b>	<b>168</b>	<b>100</b>	<b>1378</b>	<b>100</b>

Table 2

Variability of BMI percentiles among female children and adolescents, in the year 2004

PERCENTILES		11 years		12 years		13 years		14 years		15 years		16 years		17 years		18 years		Total	
		N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%
<5*	Underweight	8	5.47	10	5.18	12	5.34	15	5.52	12	5.26	14	5.10	15	5.07	13	5.75	99	5.32
5* – 85*	Normal weight	116	79.45	154	79.79	179	79.56	216	79.52	182	79.83	219	79.93	237	80.08	179	79.20	1482	79.68
85* – 95*	Risk for obesity	14	9.59	19	9.84	22	9.78	27	9.93	22	9.65	28	10.22	29	9.80	22	9.73	183	9.84
>95*	Obesity	8	5.47	10	5.18	12	5.33	14	5.15	12	5.96	13	4.74	15	5.07	12	5.31	96	5.16
<b>TOTAL</b>		<b>146</b>	<b>100</b>	<b>193</b>	<b>100</b>	<b>225</b>	<b>100</b>	<b>272</b>	<b>100</b>	<b>228</b>	<b>100</b>	<b>274</b>	<b>100</b>	<b>296</b>	<b>100</b>	<b>226</b>	<b>100</b>	<b>1860</b>	<b>100</b>

Graphically depicted (Figures 1, 2), these BMI values mark differentiated curves for female and male series: while in boys aged 11, 14, 16, 17 years, the average values of BMI are placed above the 85<sup>th</sup> percentile, in girls aged 13 and 15 years, the corresponding BMI values are placed somewhere in a lower register. As for the girls aged 18 years, their average BMI value (28.65) is very much alike as boys' (28.51), being placed above the 95<sup>th</sup> percentile.

In conclusion, we found differentiated average values of BMI according to sex and age.

It seems that the risk of obesity is higher in the male series (children and adults).

2. Between 2001–2004, we conducted a research on BMI variability among urban population, represented by a sample of 1050 subjects – men and women – aged 20–55 years, classified by age group.

In the male series (Tables 4, 5), the prevalence of overweight (including obesity) begins to increase

for the 30–34 year old age group, where overweight reaches 34.15% and obesity reaches 24.39%; within the 50–54 year old age group we recorded an overweight prevalence of 50% and an obesity prevalence of 22.88%. For the entire male series, the prevalence of overweight risk is 40.04% and obesity prevalence is 19.38, hence 59.42% of population is exposed to obesity risk.

In the female series (Tables 6, 7), prevalence of overweight starts to increase in the 30–34 year old age group, where overweight reaches 35.71% and obesity reaches 3.57%; within the 50–54 year old age group, the prevalence of risk for overweight is 53.85% and obesity prevalence reaches 15.38%. For the entire female series, the prevalence of overweight is 29.00% and obesity prevalence reaches 13.00%. This means that the female population at risk of being overweight represents 42.00%, a significantly lower value in comparison with that recorded in men (59.42%).

Table 3

Variability of BMI among male adult population, in the year 2004

Weigh classes		20-24 years		25-29 years		30-34 years		35-39 years		40-44 years		45-49 years		50-54 years		>55 years	
		N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%
Underweight	≤ 18.49	4	8.16	0	0.00	2	4.88	0	0.00	0	0.00	2	1.64	0	0.00	0	0.00
Normal weight	18.50–24.99	35	71.43	31	77.50	15	36.59	29	46.77	19	36.54	32	26.23	32	27.12	15	26.79
Overweight	25–29.99	7	14.29	9	22.50	14	34.15	29	46.77	20	38.46	54	44.26	59	50.00	27	48.21
Obesity	>30	3	6.12	0	0.00	10	24.39	4	6.45	13	25.00	34	27.87	27	22.88	14	25.00
<b>Total</b>		<b>49</b>	<b>100</b>	<b>40</b>	<b>100</b>	<b>41</b>	<b>100</b>	<b>62</b>	<b>100</b>	<b>52</b>	<b>100</b>	<b>122</b>	<b>100</b>	<b>118</b>	<b>100</b>	<b>56</b>	<b>100</b>

Table 4

Variability of BMI among male adult population, in the year 1980

Weigh classes		20-24 years		25-29 years		30-34 years		35-39 years		40-44 years		45-49 years		50-54 years		>55 years	
		N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%
Underweight	≤ 18.49	6	1.17	15	1.89	8	1.11	3	0.59	4	0.905	7	1.56	4	1.27	3	1.14
Normal weight	18.50–24.99	430	83.98	562	70.78	450	62.67	282	55.29	234	52.94	215	47.78	122	38.73	93	35.23
Overweight	25–29.99	72	14.06	199	25.06	227	31.62	189	37.06	172	38.91	195	43.33	154	48.89	132	50.00
Obesity	>30	4	0.78	18	2.27	33	4.60	36	7.06	32	7.24	33	7.33	35	11.11	36	13.64
<b>Total</b>		<b>512</b>	<b>100</b>	<b>794</b>	<b>100</b>	<b>718</b>	<b>100</b>	<b>510</b>	<b>100</b>	<b>442</b>	<b>100</b>	<b>450</b>	<b>100</b>	<b>315</b>	<b>100</b>	<b>264</b>	<b>100</b>

Table 5

Variability of BMI among female adult population, in the year 2004

Weigh classes		20-24 years		25-29 years		30-34 years		35-39 years		40-44 years		45-49 years		50-54 years		>55 years	
		N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%
Underweight	≤ 18.49	16	15.53	5	9.80	2	7.14	2	2.82	0	0.00	0	0.00	0	0.00	0	0.00
Normal weight	18.50–24.99	75	72.82	33	64.71	15	53.57	32	45.07	26	37.68	36	37.11	12	30.77	7	58.33
Overweight	25–29.99	10	9.71	7	13.73	10	35.71	28	39.44	25	36.23	40	41.24	21	53.85	3	25.00
Obesity	>30	2	1.94	6	11.76	1	3.57	9	12.68	18	26.09	21	21.65	6	15.38	2	16.67
<b>Total</b>		<b>103</b>	<b>100</b>	<b>51</b>	<b>100</b>	<b>28</b>	<b>100</b>	<b>71</b>	<b>100</b>	<b>69</b>	<b>100</b>	<b>97</b>	<b>100</b>	<b>39</b>	<b>100</b>	<b>12</b>	<b>100</b>

Table 6

Variability of BMI among female adult population, in the year 1980

Weigh classes		20-24 years		25-29 years		30-34 years		35-39 years		40-44 years		45-49 years		50-54 years		>55 years	
		N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%
Underweight	≤ 18.49	48	5.67	55	4.82	24	1.95	9	1.11	8	1.12	2	0.36	2	0.65	1	1.89
Normal weight	18.50–24.99	687	81.11	865	75.88	866	70.29	491	60.62	368	51.69	252	45.08	107	34.85	22	41.51
overweight	25–29.99	103	12.16	199	17.46	284	23.05	250	30.86	255	35.81	227	40.61	130	42.35	20	37.74
Obesity	>30	9	1.06	21	1.84	58	4.71	60	7.40	81	11.38	78	13.91	68	22.15	10	18.87
<b>Total</b>		<b>847</b>	<b>100</b>	<b>1140</b>	<b>100</b>	<b>1232</b>	<b>100</b>	<b>810</b>	<b>100</b>	<b>712</b>	<b>100</b>	<b>559</b>	<b>100</b>	<b>307</b>	<b>100</b>	<b>53</b>	<b>100</b>

If we analyze the data on adult population collected in 2004 in comparison with those recorded in children and adolescents in the same year, we notice that the boys' series displays an accentuated tendency towards overweight, which is also evidenced in the male adult population, by contrast with the girls' series and female adult population.

As a result of our researches, we found that the age of 40 years is a critical one for the nutritional health of a population. Irrespective of sex (men or women), irrespective of milieu (rural or rural) the age of 40 years is marked by the anthropological signs (involutional changes in body measures and conformation) of population's nutritional health failure that put subjects at risk of overweight and obesity, through the average values of BMI that excel the normal weigh range and by the increasing prevalence of these nutritional disorders.

3. We considered useful to analyze the microevolution (secular trend) of the body mass index over a period of 24 years, in the adult

populations, as they were investigated in 1980 and 1994, in order to highlight the sense and variation of the obesity risk (Tables 4, 5, 6, and 7) (Figure 3).

In the male population, overweight prevalence (including obesity) increased from 39.12% in 1980 to 59.42% in 2004, while in the female series, overweight prevalence (including obesity) increased from 32.74% in 1980 to 42.00% in 2004.

In this context, the analysis of BMI variability leads to the anthropological conclusion that the obesity risk is higher in the male Romanian population than in the female one.

## REFERENCES

1. Cameron N., *Assessment of growth and maturation during adolescence, Hormone research*, **1993**, 39 (Suppl. 3), pp 9–17.
2. Cole T.J., Freeman J.V., Preece M.A., *Body mass index reference curves for the UK, 1990, Arch Dis Child*, **1995**, 73, pp 25–9.

3. Cole T.J., "Weight-stature indices to measure underweight, overweight, and obesity", Himes JH (ed.) *Anthropometric assessment of nutritional status*, New York, Wiley, **1991**, pp 83–112.
4. De Onis M., Habicht J.P., *Anthropometric reference data for international use: recommendations from a WHO Expert Committee*, *Food Nutr Bull*, **1997**, 18, pp 179–89.
5. Dibley M.J. et al., *Interpretation of Z-score anthropometric indicators derived from the international growth reference*, *American journal of clinical nutrition*, **1987**, 46, pp 365–372.
6. Dietz W.H., *Critical periods in childhood for the development of obesity*, *Am J Clin Nutr*, **1994**, 59, pp 955–59.
7. Gorstein J., *Assessment of nutritional status: effects of different methods to determine age on the classification of undernutrition*, *Bulletin de l'Organisation mondiale de la Santé*, **1989**, 67, pp 143–150.
8. Himes J.H., Bouchard C., *Validity of anthropometry in classifying youths as obese*, *International journal of obesity*, **1989**, 13, pp 183–193.
9. Must A., Dallal G.E., Dietz W.H., *Reference data for obesity: 85th and 95th percentiles of body mass index (wt/ht<sup>2</sup>) and triceps skinfold thickness*, *American journal of clinical nutrition*, **1991**, 53, pp 839–846.
10. Pietrobelli A., Faith M.S., Allison D.B. et al., *Body mass index as a measure of adiposity among children and adolescents: A validation study*, *J Pediatr*, **1998**, 132, pp 204–10.
11. Rolland-Cachera M.F., *Body composition during adolescence: methods, limitations and determinants*, *Hormone research*, **1993**, 39 (Suppl. 3), pp 25–40.
12. *Update: Prevalence of overweight among children, adolescents, and adults – United States, 1988–1994*, *Morb Mort Wkly Rep*, **1997**, 46, pp 198–202.
13. WHO, *Obesity – Preventing and managing the global epidemic, Report of a WHO consultation on obesity*, Geneva: WHO, **1998a**.
14. WHO, *Physical status: The use and interpretation of anthropometry, Raport of a WHO Expert Committee. Technical Report*, Geneva, **1995a**.
15. WHO, *Programming for adolescent health and development. Report of a WHO/UNFPA/UNICEF Study Group on programming for adolescent health*. Geneva, WHO Tech Rep Ser No. 886, **1999a**.
16. WHO, *The second decade. Improving adolescent health and development*, Geneva, **1998e**.