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Body weight patterns in a country in transition: a population-based survey in Tirana City, Albania

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Abstract

Objective: This paper reports the distribution and determinants of body mass index (BMI) and obesity in Tirana City (Albania).
Design: Cross-sectional survey conducted in mid-2001.
Setting: Tirana City.
Subjects: One thousand one hundred and twenty adults aged 25 years and over (response rate 72.7%), selected using multi-stage cluster sampling.
Results: Over three-quarters of male and female respondents had an excess body weight. The overall population prevalence of obesity in Tirana was estimated to be 22.0% in men and 30.9% in women. Obesity affected both genders (age-standardised prevalence in males 22.0%, females 30.9%; age-adjusted odds ratio (OR) 1.89; 99% confidence interval (CI) 1.33–2.67) and all age groups, but most particularly middle-aged women. The age-standardised overall prevalence of central obesity was 21.6% in men and 29.4% in women (age-adjusted OR 1.58; 99% CI 1.11–2.25), increasing with age ($P < 0.01$). In women, the likelihood of being obese was inversely related to educational achievement (trend $P = 0.001$) and alcohol consumption (trend $P = 0.009$). Income, smoking and leisure-time physical activity were not associated with obesity.
Conclusions: Excess weight and obesity are major public health problems in the adult population of Tirana, but most particularly in middle-aged women. The high obesity prevalence observed along with the recent decrease in physical activity, dietary changes and increase in smoking prevalence make it probable that there will be substantial increases in many non-communicable diseases in Albania in the coming decades. Health promotion strategies are needed that prevent excess weight gain in the Albanian population.

Keywords
Tirana City
Body mass index
Overweight
Central obesity
Diet

Overweight and obesity have become so common throughout the world that they are slowly replacing the more traditional health problems of malnutrition and infectious diseases as significant causes of poor health[1]. The World Health Organization (WHO) has predicted that, by the year 2025, about 300 million people in the world are likely to be obese[2].

It is now generally accepted that obesity is an important risk factor for many chronic diseases and that it is strongly associated with total mortality rates. Individuals whose body mass index (BMI) is greater than $30\,kg\,m^{-2}$ (the standard definition of obesity[3]) would typically experience more than twice the risk of death compared with people of average weight[4–6]. More specifically, obesity has been shown to increase the risk of hypertension[7], cardiovascular disease[8,9], stroke[10], certain cancers[11,12] and diabetes mellitus[13,14].

In Albania, a country that is experiencing a major transition process, little information is available on the prevalence and determinants of obesity. Albania was isolated from developments elsewhere in Europe for most of the twentieth century. Before 1990, the levels of physical activity were high, agriculture was unmechanised and highly labour-intensive, the few cars in the country were reserved for senior officials, and diet was based on what could be produced locally. Albania's isolation changed dramatically in 1991 with the first democratic elections. In the following decade the country opened up rapidly to Western influences. Car ownership increased and Western foods became widely available, especially in cities. Consequently, dietary patterns have changed and, for many, physical activity has decreased. These recent increases in urbanisation and socio-economic status, reduced physical activity level and dietary changes are

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likely to have impacted on the prevalence of obesity[15]. Knowledge of the current prevalence of obesity in Albania is thus important, particularly as the prevalence of non-communicable diseases such as type 2 diabetes seems to have increased sharply in recent years[16]. This paper reports the distribution of body weight and obesity in the adult population of the capital of Albania, Tirana, in 2001.

Methods

A population-based survey was undertaken in 2001 to investigate health behaviours, patterns of body weight and health status in Tirana, Albania, among individuals aged 25 years and over. The Albanian Ministry of Health and the London School of Hygiene and Tropical Medicine granted ethical approval for the study.

The primary aim of the study was to determine the prevalence of type 2 diabetes in the Tirana population. This determined the required sample size for the study, which was estimated to be 1188 people to be able to detect a prevalence of 2.9%, taking 3.7% as the worst value. To allow for non-response, over-sampling of approximately 25% was undertaken. Given the uncertainties about the precise resident population in Albania at the study time, a two-stage cluster sampling technique[17] was used based on a published list of households compiled for the 1997 general elections. Tirana City is divided into 256 zones (map divisions) and, based on this division, 58 zones were randomly selected with probability proportional to size. From each of these 58 zones, we randomly selected 12 households (families with an average of two adults of age 25 and older). This yielded 696 households, which, based on available Instituti i Statistikes (INSTAT) data, was expected to yield at least 1392 adults.

All study respondents were invited to attend a health centre in Tirana where they were interviewed. Interviews were in three parts: (1) a standard questionnaire covering demographic and socio-economic information (sex, age, family status, education level, income) and health behaviours (cigarette smoking, alcohol intake, physical activity at work and during leisure time, and dietary habits such as food preferences, vegetable intake, type of fat consumed and other dietary habits); (2) anthropometric measurements including height, weight, waist and hip circumferences; and (3) blood samples and a glucose tolerance test.

Anthropometric measurements were performed using standardised procedures[18]. Height was measured without shoes with the subjects standing fully erect on a flat surface, with heels, buttocks and shoulders flat to the wall, and the subject looking straight ahead. Measurement was made to the nearest cm. Weight was measured to the nearest 0.1 kg using digital scales, placed on a flat surface. Subjects wore light clothing with no shoes. Waist circumference was measured to the nearest cm, halfway between the lower border of the ribs and the iliac crest, with the tape horizontal. Hip circumference was measured to the nearest cm at the maximum circumference, at the level of the greater trochanter.

BMI was calculated as the weight (in kg) divided by the square of height (in metres). Participants were categorised according to relative body weight status using WHO criteria[19] (underweight: BMI $< 18.5\,\mathrm{kg\,m^{-2}}$; normal: BMI $= 18.5-24.9\,\mathrm{kg\,m^{-2}}$; overweight: BMI $= 25.0-29.9\,\mathrm{kg\,m^{-2}}$; obese: BMI $\geq 30.0\,\mathrm{kg\,m^{-2}}$). Participants were considered as centrally obese[20] if waist-to-hip ratio (WHR) was 0.95 or over for men and 0.85 or over for women. Routine data on body weight distribution from a Western European country, England, were chosen for comparison[21].

Questionnaire design drew extensively on earlier surveys conducted in the Baltic Republics[22–24]. The questionnaire was translated from English into Albanian by the principal investigator and was back-translated by another Albanian physician and compared before being distributed.

Most of the socio-economic factors considered in this paper (gender, sex, income, education) are self-explanatory. The income variable was based on the average family income in Albania in the year 2000[25]. Respondents were asked about their educational achievement and were divided into three groups: those who attended only primary school, those who attended primary and secondary schools and those who attended university.

Physical activity during leisure time was categorised as *low* (reading, watching television or sedentary activities), *moderate* (walking, bicycling or other light activities (at least $4\,\mathrm{h\,week^{-1}}$)) or *high* (jogging and other recreational sports or heavy gardening (at least $4\,\mathrm{h\,week^{-1}}$)). Being sedentary during leisure time was defined as participating only in sedentary activities such as reading or watching television during leisure time.

Current smokers were defined as those reporting smoking at least one cigarette each day. Alcohol consumption was categorised as follows: *never*, *occasionally* (individuals who drink alcohol once a week or less frequently) and *frequently* (individuals who drink alcohol at least two to three times a week).

Statistical analyses were undertaken using SPSS (version 10.0 for Windows). As gender and age are strong determinants of BMI, the results were stratified by gender and age. Age-adjusted gender differences in BMI, WHR and prevalences of obesity and central obesity were estimated using multiple linear and logistic regression analyses. The association of age with BMI and WHR was assessed using analyses of variance and linear regression. For the categorical outcomes (relative body weight categories, prevalences of obesity and central obesity), variations by age group were tested using chi-squared tests. In order to estimate the overall mean BMI and prevalences of obesity and central obesity representative of the adult population of Tirana, age–sex specific means and proportions from

the study group were applied to the standard population of Tirana City (as it was in 1998), for males and females separately. The likelihood of being obese according to a range of sociodemographic and behavioural variables (gender, age, education, income, smoking, physical activity during leisure time, alcohol consumption) was estimated using multiple logistic regression analysis with adjustment for all of the other variables. Tests for trends were conducted for ordinal variables (age, education, income, leisure-time physical activity level, alcohol consumption); significant results for these tests are reported in the text. Because it was not possible to estimate the variance inflation due to clustering[26], it was decided to use a conservative statistical significance level of $P = 0.01$ to reduce the risk of Type I error.

Results

Of the 1540 individuals contacted, 1120 (535 men and 585 women) accepted to participate in the study (response rate 72.7%). The final sample tended to be slightly older than the reference population (data available upon request). For this reason, the results are stratified by age group and overall mean BMI and prevalence rates are age-standardised. There were no women known to be pregnant in the study. The unadjusted mean BMI and WHR by sex and age group are given in Table 1. Overall, female participants had a higher mean BMI than males (age-adjusted difference $0.9\,kg\,m^{-2}$; 99% confidence interval (CI) 0.2–1.5; $P < 0.001$). Gender differences tended to be larger in older age groups. In both males and females, mean BMI varied significantly with age ($P < 0.0001$). It tended to increase with age until 45–54 years. After that it decreased slightly in males but it remained stable in females. The age-standardised overall mean BMI was $27.6\,kg\,m^{-2}$ in men and $27.8\,kg\,m^{-2}$ in women. In both sexes, WHR increased with age, particularly in women (in both genders $P < 0.001$). After adjusting for age, females had a statistically significant lower overall mean WHR (age-adjusted difference −0.08; 99% CI −0.10 to −0.07; $P < 0.001$). Table 2 shows the distribution of the study group according to relative body weight categories and the prevalence of central obesity, by sex and age group. The distribution by body weight categories varied with age in both genders ($P < 0.001$). Overall, over three-quarters of the respondents had an excess weight (BMI $\geq 25\,kg\,m^{-2}$). Of men, 56.4% and of women, 42.2% were overweight while the corresponding figures for obesity were 22.8% and 35.6%. After adjusting for age, women were significantly more likely to be obese than males (odds ratio (OR) 1.89; 99% CI 1.33–2.67; $P < 0.001$). Age-standardised estimates of the prevalence of obesity in adults living in Tirana were 22.0% in men and 30.9% in women.

Females were significantly more likely to be centrally obese than males (age-adjusted OR 1.58; 99% CI 1.11–2.25; $P < 0.001$). The age-standardised prevalence of central obesity in Tirana was estimated to be 21.6% in men and 29.4% in women.

Table 3 shows the age-adjusted prevalence of obesity and the odds ratios for the likelihood of being obese in relation to different covariates. Even after adjusting for all variables, the probability of being obese remained particularly high in middle-aged women compared with women aged 25–34 years (45–54 years: OR 4.87; 99% CI 1.43–16.55). In women, the likelihood of being obese was inversely related to education levels (P-value for trend = 0.001) and alcohol consumption (trend $P = 0.008$). Income, physical activity during leisure time and smoking status were not associated with obesity after

Table 1 Unadjusted mean body mass index (BMI) and waist-to-hip ratio (WHR), by sex and age group

Gender and age group (years)	*n*	BMI ($kg\,m^{-2}$) Mean	BMI ($kg\,m^{-2}$) 99% CI	WHR Mean	WHR 99% CI
Men					
All ages	535	27.7	27.3–28.1	0.90	0.89–0.91
25–34	46	26.1	24.5–27.7	0.86	0.82–0.90
35–44	90	28.3	27.4–29.3	0.89	0.87–0.91
45–54	132	28.6	27.8–29.7	0.91	0.90–0.93
55–64	132	27.9	27.1–28.7	0.91	0.89–0.93
65+	135	26.9	26.2–27.6	0.91	0.90–0.93
Overall *P*-value*		<0.001		<0.001	
Women					
All ages	585	28.6	28.1–29.0	0.82	0.81–0.83
25–34	50	24.8	23.1–26.5	0.77	0.74–0.80
35–44	115	28.4	27.3–29.4	0.80	0.78–0.83
45–54	157	29.0	28.1–29.9	0.81	0.79–0.82
55–64	169	29.2	28.2–30.1	0.83	0.81–0.84
65+	94	29.0	28.0–30.0	0.86	0.84–0.88
Overall *P*-value*		<0.001		<0.001	

CI – confidence interval.
*Significant variation by age for both BMI and WHR, using analyses of variance.

Table 2 Distribution of the respondents according to relative body weight category and prevalence of central obesity, by gender and age group

Gender and age group (years)	*n*	Relative body weight category: Underweight (%)	Normal (%)	Overweight (%)	Obese (%)	Central obesity (%)
Men						
All ages	535	0.4	20.4	56.5	22.8	24.7
24–34	46	2.2	47.8	41.3	8.7	13
35–44	90	0	15.6	53.3	31.1	18.9
45–54	132	0	12.1	59.1	28.8	26.5
55–64	132	0	20.5	53.8	25.8	24.2
65+	135	0.7	22.2	63.7	13.3	31.1
Women						
All ages	585	0.5	21.7	42.2	35.6	32.5
24–34	50	4.0	58.0	26.0	12.0	14.0
35–44	115	0	23.5	40.9	35.7	29.6
45–54	157	0	16.6	44.6	38.9	22.9
55–64	169	0.6	19.5	40.2	39.6	37.3
65+	94	0	12.7	52.1	35.1	53.2

Table 3 Age-adjusted prevalence of obesity and adjusted* odds ratio (OR) for the likelihood of being obese, by sex and other related variables

	Men				Women			
	Obesity		Adjusted* OR for being obese		Obesity		Adjusted* OR for being obese	
	n	%	OR	99% CI	*n*	%	OR	99% CI
Age group (years)								
25–34	46	8.7	1.00		50	12.0	1.00	
35–44	90	31.1	4.49	1.01–20.04	115	35.7	4.06	1.17–14.15
45–54	132	28.8	4.02	0.93–17.34	157	38.9	4.87	1.43–16.55
55–64	132	25.8	3.80	0.84–17.16	169	39.6	3.52	1.01–12.31
65+	135	13.3	1.81	0.37–8.91	94	35.1	2.35	0.63–8.83
Overall *P*-value			0.075				0.009	
Education								
Primary	36	25.0	1.00		55	58.2	1.00	
Secondary	194	23.7	0.70	0.22–2.23	274	38.0	0.47	0.21–1.06
University	305	22.0	0.57	0.18–1.80	256	28.1	0.32	0.13–0.76
Overall *P*-value			0.40				0.003	
Income†								
Level 1 (low)	319	20.4	1.00		461	38.0	1.00	
Level 2 (average)	132	20.5	0.81	0.37–1.75	87	26.4	0.86	0.39–1.86
Level 3 (high)	84	35.7	1.82	0.80–4.19	37	27.0	0.91	0.30–2.76
Overall *P*-value			0.042				0.87	
Drinking								
Never	55	25.5	1.00		170	44.1	1.00	
Occasionally	170	17.6	0.58	0.21–1.58	259	34.4	0.67	0.39–1.17
Frequently	310	25.2	0.81	0.32–2.04	156	28.2	0.52	0.27–0.99
Overall *P*-value			0.29				0.027	
Smoking								
Never smoker	211	19.0	1.00		446	35.2	1.00	
Ex-smoker	123	26.8	1.41	0.68–2.92	26	42.3	1.87	0.61–5.77
Current smoker	201	24.4	1.25	0.64–2.42	113	35.4	1.14	0.62–2.09
Overall *P*-value			0.45				0.33	
Leisure activity								
Low	265	20.8	1.00		337	39.8	1.00	
Moderate	253	26.1	1.21	0.67–2.19	229	29.3	0.67	0.40–1.14
High	17	5.9	0.23	0.01–3.55	19	36.8	1.28	0.34–4.85
Overall *P*-value			0.23				0.11	

CI – confidence interval.
* Odds ratios are adjusted for all other variables in the multivariate logistic regression analysis.
† Income levels: low – US$50–100; average – US$100–200; high – US$200+.

adjusting for other variables. Even after adjusting for all covariates, the gender difference in obesity remained highly significant (OR 1.78; 99% CI 1.29–2.45; $P < 0.001$).

Discussion

This study provides important new evidence on the prevalences of overweight and obesity in Albania. However, some methodological issues must be considered before discussing the findings in detail. One strength of the study is its relatively high response rate (72.7%) even if we had anticipated some recruitment difficulties as the survey involved respondents coming to a central location. The response rate is similar to the rates achieved in recent surveys conducted in other countries in transition[22–24]. In spite of this, the final sample was not entirely representative of the general population in terms of age as it included a lower than expected proportion of younger people. As this might have led to an overestimation of the true prevalence of obesity, overall prevalence rates were age-standardised to the Tirana City population (1998 INSTAT data). Although this study provides the only recent data on body weight distribution in the largest urbanised part of Albania (including nearly 20% of the Albanian population), they cannot be generalised to the whole country as it is likely that both diet and physical activity levels would differ in rural areas. Thus, our estimates may be higher than what would be found in a nationally representative survey. A better understanding of the impact of changing lifestyles in both urban and rural areas is thus urgently needed in this society in transition. Another limitation of the study is the fact that while some respondents were from the same households, information on variance inflation due to clustering was not available for the statistical analysis. As a result, it is possible that the true standard errors of the

estimates were underestimated and that the risk of Type I error was increased. In an attempt to counterbalance these effects, we have increased the significance level to $P = 0.01$ and calculated 99% confidence intervals. However, it is important to note that most significant findings in this study were significant at the even smaller significance level of 0.001.

This study found that overweight and obesity are highly prevalent in Tirana City. Over three-quarters of the participants in the study had an excess body weight and we estimated that 22% of men and about 31% of women aged over 25 in Tirana are obese. The fact that the prevalence of obesity is considerably higher in this region of Albania than in Mediterranean countries such as Spain and Italy is a cause for great concern. Indeed, only 7% of Italian males and 6% of Italian females aged 15 years and over were reported to be obese in 1990[27]. This was the case in 12% of Spanish males and females aged 16 years in 1997[28]. Looking more specifically at middle-aged individuals (35–65 years), results of the MONICA (Monitoring Trends and Determinants in Cardiovascular Disease) project also suggest dramatically higher obesity rates in Albania in this age group than in Italy (14–17% of males, 18–19% of females in 1993/94) and Spain (16% of males and 25% of females)[29]. MONICA results for Yugoslavia (Novi Sad) suggest a higher prevalence of obesity in middle-aged individuals than in Italy or Spain (20% of males, 32% of females in 1994/95), but still lower than what we observed[29].

The lack of previous data on body weight patterns in Albania precludes the identification of time trends in obesity prevalence, but there are reasons to believe that there has been a substantial increase in BMI in both sexes during the past decade. Based on data from other countries in transition[30–32], it is possible that the increased urbanisation[33] and the modernisation of lifestyle (e.g. dietary changes, increased inactivity, smoking) have played a key role in this change.

Few data are available to assess the impact of the transition process on health patterns in Albania, mainly due to the lack of information on the situation prevailing before or early in the transition period. However, mortality statistics, which are believed to be reliable prior to 1990, suggest that deaths from cardiovascular diseases in Albania before the transition period were similar to those observed in other Mediterranean countries[34]. An analysis of the geographical distribution of mortality within Albania showed that mortality rates were lowest in the south-west, where most of the olive oil, fruits and vegetables are produced and consumed[35]. It is not clear how these patterns changed during the transition period as epidemiological data on prevalences of morbidity and mortality from cardiovascular diseases during this period are extremely scarce. However, the high prevalence of overweight among middle-aged males and the strong association between obesity and central obesity observed in this study suggest that the country could face major increases in morbidity and mortality from cardiovascular as well as other chronic diseases, in the future[36,37]. This could have significant implications for healthcare delivery as the fragile economy of this country still undergoing the process of transition.

This study showed clear gender differences in the prevalences of overweight and obesity, with women of all age groups being more likely to be more obese than men. This could not be entirely explained by the sociodemographic and lifestyle factors investigated in this study, even by differences in physical activity during leisure time. Women were also significantly more likely to be centrally obese than males, a finding that parallels the obesity trends. Similar gender differences have been reported in other populations[38,39]. A possible explanation could be the increased central obesity among women aged 55 years and over. This can be attributed to oestrogen and the reduction in physical activity that accompanies ageing and menopause[40]. However, there are other studies reporting an inverse gender relation with central obesity[41,42].

Among the socio-economic and lifestyle factors examined in this study, only educational achievement and alcohol intake were significantly associated with the likelihood of being obese, and this only in women. In accordance with findings from other investigators[36,43], there was a tendency for women with a lower education level to be more likely to be obese compared with those with a higher level of education. The lack of consistent relationship with standard socio-economic factors in this study (including with income – an observation also reported from surveys conducted in the Baltic countries[35]) could be due to the dislocation of income and other measures of social status in a society such as Albania that has undergone a massive transformation in a very short time, making these constructs less relevant as determinants of behaviour[44].

In accordance with other investigators[45–47], this study has shown an association between smoking and a lower prevalence of obesity but one that is not statistically significant. We did not observe any association with physical activity level during leisure time. This could be due to the fact that the questionnaire included only general questions on physical activity or that routine daily physical activity levels (e.g. manual work, walking, cycling) may be more important determinants of overall physical activity level than leisure-time physical activity[48]. More detailed assessment of physical activity, as well as dietary intake, will be necessary for the development of effective strategies for the prevention of obesity in Albania.

In conclusion, this study suggests that excess weight and obesity are major public health problems in Tirana City, an urbanised part of Albania, and that they may lead to dramatic increases in morbidity and mortality from non-communicable diseases in the future if nothing is done to reduce the current prevalence rates. The problem is more

generalised than expected, suggesting that health promotion strategies aiming at preventing and controlling excess weight gain in Tirana City will need to target the population as a whole. A more complete exploration of the correlates of obesity in Albania, including more precise assessments of modifiable lifestyle behaviours such as physical activity and dietary intake, would contribute not only to understanding the determinants of obesity but also to defining the strategies that are most likely to be effective in reducing obesity and thus helping prevent major non-communicable diseases in Albania.

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