

Associations of Childhood Overweight and Obesity with Sociodemographic Characteristics and Parental Chronic Health Conditions in Albania

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Abstract

Background: Childhood overweight and obesity are major public health concerns, yet evidence on key sociodemographic and familial risk factors in Albania is limited. This study examined associations between overweight (including obesity) and sex, residence, parental education, and parental chronic health conditions among children aged 8–9 years.

Methods: Data were drawn from the nationally representative Assessment of Childhood Obesity and Impact of the COVID-19 Pandemic on the Daily Routine and Behaviors of School-Aged Children in Albania, conducted within WHO COSI Round 6. A one-stage stratified cluster sampling of primary schools was applied. Anthropometric measurements were collected, and parents reported chronic health conditions. Logistic regression analyses assessed associations between overweight/obesity and sociodemographic and parental health factors, adjusting for confounders.

Results: Among 3,058 children (50.3% boys; 62.6% urban), overweight prevalence was higher in boys, urban residents, and children of parents with medium or higher education. Parental chronic conditions, including hypertension, diabetes, and high cholesterol, were associated with increased odds of child overweight. Adjusted analyses confirmed male sex (OR=1.40), urban residence (OR=1.34), and parental multimorbidity (OR up to 1.47) as significant predictors.

Conclusion: Childhood overweight in Albania is shaped by sex, urbanization, parental education, and parental chronic health conditions, reflecting combined lifestyle, environmental, and intergenerational influences. (*International Journal of Biomedicine*. 2026;16(1):83-89.)

Keywords: cross-sectional study • parental multimorbidity • childhood overweight • urbanization

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Introduction

Childhood overweight and obesity represent one of the most serious and persistent public health challenges of the 21st century. Globally, the prevalence of excess body weight among children and adolescents has increased markedly over recent decades, reaching levels that justify its classification as a public health pandemic.¹⁻³

In Europe, surveillance data consistently demonstrate high prevalence rates of childhood overweight and obesity, with only limited evidence of stabilization in some countries.^{4,5} Data from the WHO European Childhood Obesity Surveillance Initiative (COSI) provide robust and comparable evidence on the magnitude and distribution of childhood overweight and obesity across the WHO European Region.⁴ Findings from the sixth round of data collection (2022–2024) confirm that childhood overweight and obesity remain widespread, with substantial variation across countries and population subgroups, underscoring the need for sustained surveillance and targeted prevention strategies.⁶ Importantly, COSI data

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indicate that obesity-related inequalities emerge early in life and tend to persist over time, contributing to long-term health and socioeconomic burdens.

Sex differences constitute a well-established dimension of childhood obesity epidemiology. Across many European countries, boys exhibit higher prevalence rates of overweight and obesity compared with girls, although the magnitude and direction of these differences vary by context and age group.^{4,5} Emerging evidence further suggests that gender-specific differences in dietary behaviors, physical activity, and sedentary lifestyles may contribute to these disparities.^{7,8}

Place of residence represents another key determinant of childhood overweight and obesity. Numerous studies have documented significant rural–urban differences in obesity prevalence, physical activity, dietary patterns, and food security among children and adolescents.⁹⁻¹² In many settings, children residing in rural areas face a higher risk of overweight and obesity than their urban counterparts, potentially reflecting structural disadvantages related to access to healthy foods, opportunities for physical activity, and health-promoting environments.¹³

Socioeconomic position, particularly parental education, is among the most consistent predictors of childhood overweight and obesity. Lower parental educational attainment has been repeatedly associated with higher obesity prevalence among children across Europe and globally, reflecting inequalities in health literacy, dietary quality, and capacity to support healthy behaviors within the household.^{2,4,14}

Beyond sociodemographic factors, increasing attention has been directed to the role of parental health status in shaping the risk of childhood obesity. Evidence suggests that parental chronic health conditions, including hypertension, diabetes, hypercholesterolemia, and metabolic syndrome, are associated with a higher likelihood of overweight and obesity in offspring, likely due to a combination of genetic susceptibility and shared environmental and behavioral factors.¹⁵⁻¹⁹ Despite the growing international evidence base, comprehensive analyses examining the combined influence of sex, rural–urban residence, parental education, and parental chronic health conditions on childhood overweight and obesity remain limited in several countries, including Albania. Addressing this gap is essential to informing equitable, context-specific public health interventions.

The aim of the present study was therefore to examine the association between childhood overweight (including obesity) and key sociodemographic factors (sex, place of residence, and parental education level), as well as parental chronic health conditions (high blood pressure, diabetes, and high cholesterol), among Albanian children aged 8–9 years, using nationally representative data from the Assessment of Childhood Obesity and Impact of the COVID-19 Pandemic on the Daily Routine and Behaviors of School-Aged Children in Albania, conducted within the framework of the WHO European Childhood Obesity Surveillance Initiative (COSI).^{6,20}

Methods

Participants

This study is a secondary, in-depth analysis of data derived from the Assessment of Childhood Obesity and the

Impact of the COVID-19 Pandemic on the Daily Routine and Behaviors of School-Aged Children in Albania,¹⁹ conducted within the framework of the WHO European Childhood Obesity Surveillance Initiative (COSI), Round 6, and implemented in accordance with a standardized protocol developed by the WHO Regional Office for Europe.²¹

The study population consisted of children attending the second and third grades of the nine-year compulsory education system in Albania. For the purposes of this analysis, only children aged 8.00–8.99 years were included, in line with the COSI protocol and to ensure comparability with previous survey rounds.²¹ A one-stage stratified cluster sampling design was applied, with primary schools serving as the primary sampling units. Schools were stratified by region and selected with probability proportional to size. Within each participating school, one second-grade and one third-grade class were randomly selected.

Although anthropometric measurements were collected from a larger cohort during fieldwork, the final analytical sample included only children aged 8.00–8.99 years who were present on the day of measurement, whose parents or guardians provided informed consent, who had valid anthropometric measurements, and whose parents completed the questionnaire on chronic health conditions.

A detailed description of the COSI survey methodology as implemented in Albania is available elsewhere.²⁰

Instruments

Data were collected using standardized instruments developed by the World Health Organization for the COSI study.²¹ These instruments included a child record form, completed by trained examiners to collect anthropometric measurements, and a voluntary family questionnaire completed by parents or caregivers.

The family questionnaire collected information on child behavioral characteristics, as well as household sociodemographic and health characteristics, including parental education level and parental chronic health conditions (elevated blood pressure, diabetes, and high cholesterol). These variables constitute the primary exposures examined in the present analysis.

Procedure and study variables

Outcome variables: The primary outcome was child overweight, including obesity, defined using WHO body mass index (BMI)-for-age z-scores for children aged over 5 years. Overweight was defined as a BMI-for-age $> +1$ standard deviation (SD), and obesity as a BMI-for-age $> +2$ SD, in accordance with WHO growth references.^{22,23} For analysis, overweight and obesity were combined into a single category.

Exposure variables: Sociodemographic characteristics of the children included sex, place of residence (urban/rural), and parental education level. Parental education was categorized as low (both parents with lower education), medium (one parent with lower education and one with higher education), or high (both parents with higher education). Lower education was defined as completion of primary education, lower secondary education, or upper secondary/post-secondary non-tertiary education, while higher education included short-

cycle tertiary, bachelor's, master's, or doctoral degrees. In single-parent households, parental education classification was based on the education level of the responding parent, in line with the COSI analytical framework.²⁴

Statistical Analysis

Data were analyzed using SPSS software, version 21. Descriptive statistics were used to summarize the characteristics of participating children and their parents. Associations between child overweight (including obesity) and sociodemographic characteristics, as well as parental chronic health conditions, were examined using logistic regression analyses. Both crude (unadjusted) and multivariable-adjusted odds ratios (ORs) with 95% confidence intervals (CIs) were estimated. Statistical significance was defined as $P \leq 0.05$. A separate logistic regression analysis was conducted to identify predictors of overweight (including obesity) after excluding underweight children ($n = 100$; 3.2% of the total sample). In this restricted sample, both crude and multivariable-adjusted binary logistic regression models were applied to assess associations with (a) demographic and socioeconomic factors and (b) parental chronic health conditions.

Results

General Characteristics of Participants

Among the participating children, 50.3% were boys, and 62.6% had urban residence. More than two-thirds of parents (67.8%) had a high level of education, about 14% had a medium level of education, and 18.3% had a low level of education. The Prevalence of overweight (including obesity) was significantly higher among boys than girls (55.2% vs. 44.8%, respectively), among urban than rural residents (67.9% vs. 32.1%), and among children of low education parents (63%) compared to medium (16.4%) and high education level parents (20.6%) (Table 1).

The prevalence of parental high blood pressure, high cholesterol, and diabetes was 21%, 19.7% and 23.1%, respectively, with about 19% of parents having 1 chronic condition and 2-3 chronic conditions each. The prevalence of overweight was significantly higher among children of parents with high blood pressure, high cholesterol, diabetes, and 1 or more chronic conditions (Table 1).

Association of Overweight with Demographic and Socioeconomic Factors

In unadjusted logistic regression analyses (Table 2, upper panel), several demographic and socioeconomic characteristics were significantly associated with overweight (including obesity). Boys were 1.33 times more likely to be overweight compared with girls (OR=1.33, 95% CI: 1.14–1.55, $P < 0.001$). Likewise, urban residence was associated with a 1.4-fold higher likelihood of being overweight compared with rural residence (OR=1.40, 95% CI: 1.19–1.64, $P < 0.001$).

Medium and high parental education level was associated with a statistically significant increase in the likelihood of obesity by 1.42 and 1.33 times, respectively, compared to parents with a low level of education (OR=1.42, 95% CI: 1.12-1.79, $P = 0.003$ and OR=1.33, 95% CI: 1.08-1.65, $P = 0.008$, respectively).

Table 1.

Characteristics of participating children and their parents.

Variable	Total	Normal (N=2103)	Overweight (N=955)	P-value
Gender				
Boy	1537 (50.3)	1010 (65.7)*	527 (34.3)	<0.001
Girl	1521 (49.7)	1093 (71.9)	428 (28.1)	
Residence				
Urban	1913 (62.56)	1265 (66.1)	648 (33.9)	<0.001
Rural	1145 (37.44)	838 (73.2)	307 (26.8)	
Parental education				
Low	1817 (18.2)	1295 (71.3)	522 (28.7)	0.001
Medium	374 (14.0)	238 (63.6)	136 (36.4)	
High	489 (67.8)	318 (65.0)	171 (35.0)	
Parental high blood pressure				
No	2037 (79.0)	1434 (70.4)	603 (29.6)	0.007
Yes	542 (21.0)	348 (64.2)	194 (35.8)	
Parental high cholesterol				
No	2136 (80.3)	1513 (70.8)	623 (29.2)	<0.001
Yes	525 (19.7)	322 (61.3)	203 (38.7)	
Parental diabetes				
No	1983 (76.9)	1394 (70.3)	589 (29.7)	0.010
Yes	597 (23.1)	386 (64.7)	211 (35.3)	
Parental number of chronic conditions				
None	1528 (62.5)	1096 (71.7)	432 (28.3)	<0.001
1 condition	461 (18.9)	302 (65.5)	159 (34.5)	
2-3 conditions	455 (18.6)	284 (62.4)	171 (37.6)	

*Overweight (including obesity); *Numbers and row percentages (in parentheses). For the total, column percentages. Any discrepancy with the total number is due to missing data; P-value according to chi-square test. For a 2x2 table, the P-value according to Fisher's Exact Test.*

Table 2.

Association of overweight (including obesity) with demographic and socioeconomic characteristics of the children; crude (unadjusted) odds ratios (OR) from binary logistic regression models.

Upper panel: Crude (unadjusted) ORs			
Variable	OR*	95%CI*	P*
Gender			
Boy	1.33	1.14-1.55	<0.001
Girl	1.00	reference	
Residence			
Urban	1.40	1.19-1.64	<0.001
Rural	1.00	reference	
Parental education			0.002 (2)†
Low	1.00	reference	-
Medium	1.42	1.12-1.79	0.003
High	1.33	1.08-1.65	0.008
Lower panel: Multivariable adjusted ORs			
Variable	OR*	95%CI*	P*
Gender			
Boy	1.40	1.19-1.65	<0.001
Girl	1.00	reference	
Residence			
Urban	1.34	1.12-1.60	0.002
Rural	1.00	reference	
Parental education			0.002 (2)†
Low	1.00	reference	-
Medium	1.32	1.04-1.68	0.021
High	1.22	1.098-1.53	0.074

**Odds ratios (OR: overweight including obesity vs. normal weight), 95% confidence intervals (95%CIs) and P-values from binary logistic regression† Overall P-value and degrees of freedom (in parenthesis).*

After simultaneous adjustment for all demographic variables (gender, place of residence, and parental education), the associations remained largely consistent (Table 2, lower panel). Male gender remained a strong predictor (OR=1.40, 95% CI: 1.19–1.65, $P<0.001$), indicating a 40% increased likelihood of overweight/obesity among boys compared to girls. Urban residence continued to be significantly associated with overweight/obesity (OR=1.34, 95% CI: 1.12–1.60, $P=0.002$).

Regarding parental education, after adjusting for gender and place of residence, the association with obesity weakened slightly but remained statistically significant overall and for the medium education level, whereas it was only borderline significant for the high education level.

Association of Overweight with Parental Chronic Health Conditions

In the unadjusted models, overweight/obesity in children was significantly associated with several parental chronic health conditions (Table 3, upper panel). Children of parents with high blood pressure (OR=1.33, 95% CI: 1.09–1.62, $P=0.006$), high cholesterol (OR=1.30, 95% CI: 1.07–1.57, $P=0.009$), and diabetes (OR=1.53, 95% CI: 1.26–1.87, $P<0.001$) had significantly higher odds of being overweight.

Table 3.

Association of overweight (including obesity) with parental chronic health conditions of the children; crude (unadjusted) odds ratios (OR) from binary logistic regression models.

Upper panel: Crude (unadjusted) ORs			
Variable	OR*	95%CI*	P*
Parental high blood pressure			
No	1.00	reference	
Yes	1.33	1.09-1.62	0.006
Parental high cholesterol			
No	1.00	reference	
Yes	1.29	1.07-1.57	0.009
Parental diabetes			
No	1.00	reference	
Yes	1.53	1.26-1.87	<0.001
Parental number of chronic conditions			<0.001 (2) [†]
None	1.00	reference	-
1 condition	1.34	1.07-1.67	0.011
2-3 conditions	1.53	1.23-1.90	<0.001
Lower panel: Multivariable adjusted ORs			
Variable	OR*	95%CI*	P*
Parental high blood pressure			
No	1.00	reference	
Yes	1.25	1.02-1.54	0.032
Parental high cholesterol			
No	1.00	reference	
Yes	1.27	1.04-1.55	0.018
Parental diabetes			
No	1.00	reference	
Yes	1.51	1.24-1.86	<0.001
Parental number of chronic conditions			0.001 (2) [†]
None	1.00	reference	-
1 condition	1.29	1.03-1.61	0.029
2-3 conditions	1.47	1.18-1.85	0.001

*Odds ratios (OR: overweight including obesity vs. normal weight), 95% confidence intervals (95% CIs), and P-values from binary logistic regression. [†] Overall p-value and degrees of freedom (in parentheses).

Moreover, a dose–response pattern was evident for the number of parental chronic health conditions: with increasing parental health conditions, the likelihood of being overweight increased significantly. Children whose parents had two or three chronic health conditions had 53% higher odds of overweight/obesity (OR=1.53, 95% CI: 1.23–1.90), while those with one condition had 34% higher odds (OR=1.34, 95% CI: 1.07–1.67), compared with children whose parents had no chronic health conditions (overall $P<0.001$).

After adjusting for the child's gender, residence, and parental education, all associations retained statistical significance but weakened slightly across all variables (Table 3, lower panel).

Discussion

This national cross-sectional study, conducted among a large sample of school-aged children in Albania, identified several key sociodemographic and parental health factors associated with childhood overweight and obesity. The results indicate that male sex and urban residence were associated with a significantly higher likelihood of being overweight compared with female sex and residence in rural areas. Furthermore, children whose parents had medium or high educational attainment showed a significantly increased likelihood of being overweight. Notably, parental chronic health conditions, including hypertension, hypercholesterolemia, diabetes, and multimorbidity, were each significantly associated with a higher likelihood of childhood overweight, and these associations remained robust after adjustment for sociodemographic confounders. Moreover, the association between childhood overweight and parental multimorbidity followed a graded pattern, with the likelihood of childhood overweight increasing significantly as the number of parental morbidities increased.

Our findings are consistent with a substantial body of international evidence. In particular, the higher risk of overweight observed among boys in our study aligns with well-documented global and European patterns. The WHO European Childhood Obesity Surveillance Initiative (COSI) has consistently reported a higher prevalence of overweight among boys compared with girls in 31 out of 37 participating countries, including Albania and several neighboring countries, such as Italy, Greece, Croatia, Montenegro, and North Macedonia, as well as other former communist countries like Poland and Romania.⁶

Earlier pooled analyses based on three rounds of COSI data collected between 2007 and 2013, covering more than 630,000 children aged 6–9 years across 21 European countries, also demonstrated that the prevalence of severe obesity was generally higher among boys than girls.³ Similar sex-specific patterns have been confirmed in later analyses examining trends in childhood overweight and obesity across Europe between 2007 and 2017.⁴

At the global level, a recent systematic review and meta-analysis including data from 154 countries and over 45 million children and adolescents reported a significantly higher prevalence of obesity among boys than girls,¹ reinforcing

the robustness and consistency of this sex differential across regions and income levels.

The higher prevalence of overweight among boys observed in Albania and its concordance with international findings may reflect gendered patterns in lifestyle behaviors that are relatively consistent across countries. These include differences in physical activity, sedentary behaviors (e.g., screen time), dietary habits, and broader family lifestyle influences. For example, the global meta-analysis by Zhang et al.¹ reported higher levels of screen time and sedentary behavior among boys across several settings. Empirical evidence from Italy showed that boys are significantly more likely than girls to consume energy-dense foods such as commercial cookies.² Similarly, data from Germany indicated that although boys tend to be more physically active, girls score higher on multiple indicators of diet quality and nutrition habits.⁸ Differences in dietary patterns persist into young adulthood, with a recent study among university students reporting significantly higher consumption of butter, red meat, sweetened beverages, and alcoholic beverages among men than among women.²⁵ Consistently, the COSI Round 6 report showed that, in most participating countries, boys consumed sugar-sweetened beverages more frequently than girls (more than three days per week).⁶

In addition to sex differences, we found that urban residence was significantly associated with childhood overweight, in line with evidence from several middle-income countries undergoing rapid nutritional and lifestyle transitions. Studies from Turkey, Serbia, and Romania have reported higher prevalences of childhood overweight and obesity in urban settings, coinciding with increased fast-food consumption and shifts away from traditional dietary patterns.¹⁰⁻¹² Urban environments are typically characterized by greater availability of calorie-dense foods, reduced opportunities for spontaneous physical activity, higher traffic density, and increased sedentary behavior.

Quantitative evidence supports these mechanisms: children spending two or more hours per day on computers had more than twofold the prevalence of obesity compared with those spending less than two hours per day (11.9% vs. 5.5%, respectively).¹ A cross-sectional study in India, including children aged 5–12 years, similarly reported higher obesity prevalence among boys and urban children, alongside higher consumption of sugary beverages and lower physical activity levels in urban areas.² Long-term global analyses have shown that overweight and obesity increase more rapidly in urbanized populations, largely due to the higher likelihood of exposure to obesogenic environments.²⁶⁻²⁸

While some studies from high-income countries such as the United States and Sweden report higher obesity prevalence in rural areas, these patterns are often explained by context-specific factors, including rural poverty and food insecurity.^{13,29,30} In Albania, however, our findings suggest that the effects of urbanization currently outweigh the protective influence of traditional rural dietary patterns, which remain closer to home-prepared meals and Mediterranean-type diets.

Regarding parental education, our results indicate that higher parental education is associated with a higher

likelihood of childhood overweight. This finding contrasts with evidence from most high-income countries, where lower parental education and socioeconomic status are well-established risk factors for childhood obesity.^{13,29} However, our findings are consistent with reports from middle-income and transitioning countries, in which higher socioeconomic status, including education, is often associated with greater access to energy-dense diets and more sedentary lifestyles.¹⁴ In such contexts, higher socioeconomic groups are typically the first to be exposed to obesogenic environments, before the burden gradually shifts toward lower socioeconomic groups as the obesity epidemic matures.^{2,3}

The simultaneous association of male sex, urban residence, and higher parental education with childhood overweight in our study suggests a clustering of risk factors within more affluent households. This pattern is consistent with theoretical and empirical models of obesity transitions in developing and middle-income countries, in which high-SES groups are initially most affected by lifestyle and dietary changes associated with modernization and urbanization.^{27,2} Finally, we observed significant associations between parental chronic conditions (diabetes, hypertension, and hypercholesterolemia) and childhood overweight. Moreover, the likelihood of childhood overweight increased with the number of parental comorbidities. These findings are consistent with previous studies demonstrating intergenerational clustering of cardiometabolic risk, mediated through shared genetic predisposition, common dietary patterns, physical inactivity, and broader household environments.¹⁵⁻¹⁷ The coexistence of parental multimorbidity and childhood overweight may also reflect cumulative household-level stressors and lifestyle constraints, particularly in urban settings undergoing rapid socioeconomic change.^{18,19}

Conclusions

Childhood overweight and obesity in Albania appear to be strongly influenced by multiple elements of the family environment. Specifically, male sex, urban residence, and higher parental education were associated with an increased likelihood of overweight among children. These findings suggest that lifestyle modernization, urbanization, and higher socioeconomic status are contributing significantly to the emerging obesity epidemic in this post-communist context. Furthermore, parental chronic health conditions were also associated with elevated risk of childhood overweight, indicating the complex interplay of genetic predisposition, shared lifestyle and behavioral patterns, and household environment.

Future research should prioritize longitudinal studies to elucidate causal pathways underlying these associations, with cohort designs being particularly appropriate. Complementary qualitative investigations are warranted to explore cultural perceptions and practices regarding diet, physical activity, and other lifestyle factors across diverse socioeconomic groups. Additionally, intervention studies, particularly those targeting families or high-risk geographic areas such as urban centers, are needed to evaluate the effectiveness of preventive strategies and mitigate the ongoing obesity epidemic in Albania.

Limitations of the Study

This study has several limitations. First, its cross-sectional design precludes establishing causal relationships. Second, parental chronic health conditions were self-reported, which may introduce information bias (e.g., recall bias or under-reporting); however, there is no evidence suggesting systematic misreporting. Third, important confounders beyond parental education were not adjusted for, suggesting that residual confounding may have influenced the observed associations.

Despite these limitations, this study also has notable strengths. It included a large sample size, thereby enhancing statistical power to detect true associations. Underweight children were excluded to enable a more focused analysis on overweight and obesity. Finally, adjustment for multiple confounding factors strengthened the validity of the identified predictors of childhood overweight.

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Ethical Statement

The Assessment of Childhood Obesity and Impact of the COVID-19 Pandemic on the Daily Routine and Behaviors of School-Aged Children in Albania study was conducted in accordance with the International Ethical Guidelines for Biomedical Research Involving Human Subjects. Ethical approval for this national survey was granted by the Ethics Committee at the Ministry of Health and Social Protection (Decision No. 131/39, July 26, 2022).

Competing Interests

The authors declare that they have no competing interests.

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