Overweight and Obesity in Adolescents in Kyrgyzstan: The Impact of Lifestyle, Nutrition, and Physical Activity: A Narrative Review

*Saltanat Abazbekova [1], Tursun Mamyrbaeva [1], Aida Anarbaeva [2], Gulshara Myrzabekova [3], Asylkan Moldobaeva [1]

1. *Department of Public Health, International Higher School of Medicine, Bishkek, Kyrgyzstan*
2. *Department of Pediatric Surgery, Osh State University, Osh, Kyrgyzstan*
3. *Department of Children's Diseases, Asfendiyarov Kazakh National Medical University, Almaty, Kazakhstan*

*Corresponding Author: Email: sabazbekova@gmail.com

Abstract
This review examined the prevalence and possible causes of overweight and obesity among adolescents in Kyrgyzstan. According to a national survey in Kyrgyzstan, the prevalence of overweight among adolescent girls is classified as "high" according to the WHO thresholds (14.5 %). The prevalence of overweight shows a slight upward trend with age and is classified as "very high" among adolescents aged 16-18 years (20.8 %). The review explores dietary habits, physical activity, socioeconomic consequences, and the impact of advertising unhealthy products.

Keywords: Adolescent; Overweight; Obesity; Nutrition

Introduction

The problem of overweight and obesity (OaO) among children and adolescents is becoming a pressing public health issue worldwide (1). This is due to the increasing prevalence of OaO and its severe health consequences. The prevalence of OaO among children and adolescents aged 5-19 years has increased from 8% in 1990 to 20% in 2022 (2). According to the WHO, of the 1.2 billion children and adolescents aged 5-19 years, 390 million were overweight, including 160 million with obesity. Additionally, 37 million children under five years of age were overweight (3).

OaO significantly impacts the economic condition of countries. In 2019, the economic impact of OaO was estimated at 2.19% of global GDP (4). If current trends continue, the economic impact of OaO is projected to grow to 3.29% of global GDP by 2060, with the greatest growth expected in low-resource countries. Growth will be greatest in low-resource countries: between 2019 and 2060, total economic costs in high-income countries will quadruple, while they will increase 12-25 times in low- and middle-income countries. Reducing the projected prevalence of OaO by 5% annually compared to current trends, or maintaining it at 2019 levels, could result in average annual cost reductions of USD 429 billion or USD 2,201 billion, respectively, between 2020 and 2060 globally (4).

In Kyrgyzstan, losses associated with reduced productivity due to OaO amounted to 14.6 billion soms in 2017, nearly four times the amount allocated for measures to prevent and treat nutrition-related noncommunicable diseases (NCDs). The total economic impact of NCDs in Kyrgyzstan was estimated at 17.1 billion soms per year, equivalent to 3.9% of the country's GDP (5).

OaO is a multifactorial disease associated with excessive accumulation of body fat. In adults, BMI (How to Calculate BMI? BMI = W / (H2) where W is the person's weight (in kilograms, not pounds) and H is the person's height (in meters). In other words, BMI is a person's weight (in kilograms) divided by the square of height (in meters) classifications are as follows: "Underweight" (<18.5), "Healthy weight range" (18.5–24.9), "Overweight" (25.0–29.9), and "Obese" (>30) (BMI 30-35: Moderately obese (Obese Class I), BMI 35-40: Severely obese (Obese Class II) BMI > 40: Morbidly obese (Obese Class III). For children aged 5-19 years, overweight is defined as a BMI-for-age more than one standard deviation (SD) above the WHO height median, and obesity as more than two SDs above. In children under 5 years of age, a weight-to-height ratio greater than the WHO median for child height norms by more than 2 SDs is an indicator of overweight and by more than 3 SDs is an indicator of obesity (3).

Moreover, OaO is caused by the interaction of various genetic and non-genetic factors (6). The role of genetic factors is supported by the varying prevalence of OaO among different ethnic groups, the higher likelihood of developing the condition in identical twins (7), the increased likelihood of future obesity in a child if one parent is obese, and the relatively high risk in children if both parents are obese (8).

In rare monogenic disorders, obesity is directly related to gene mutations. Examples of such disorders are Bardet-Biedl syndrome (9) and Prader-Willi syndrome (10).

Such causes of OaO as medications (glucocorticosteroids, antidepressants), hypothalamic and brainstem tumors, brain injury, hypercorticism, hypothyroidism and other neuroendocrine disorders, and chromosomal abnormalities are much less common in children and adolescents (6).

The main risk factors for the development of OaO are considered to be the dietary style with a predominance of highly processed foods containing a large amount of simple carbohydrates and saturated fats, as well as reduced physical activity and sedentary lifestyle (11). The socioeconomic development of a country also significantly impacts the prevalence of OaO (12).

Socio-economic characteristics of Kyrgyzstan and prevalence of OaO.

Kyrgyzstan is a mountainous, landlocked, lower-middle-income country in Central Asia (13). Kyrgyzstan has a gross domestic product per capita of US$1,740.1 in 2022 (14).

The population of Kyrgyzstan (7,037.6 thousand people as of the beginning of 2023) is considered relatively young from a demographic perspective. Children and adolescents aged 0–19 years comprise more than 40% of the population (2,884.2 thousand people), while young people aged 20–29 years account for 15.1% (1,063.6 thousand people). At the beginning of 2023, the average age of the population was 28.3 years: 27.4 years for men and 29.2 years for women (15). More than one-third of the permanent population (34.9%) lives in urban settlements, while nearly two-thirds (65.1%) reside in rural areas (16).

In 2022, the standardized mortality rate (The value to which the crude death rate would correspond if the structure of the population distribution by age were given the composition of the population of Europe, taken as a standard) in Kyrgyzstan was 8.2 deaths per 1,000 population. Characteristic for Kyrgyzstan is that the greatest impact on the change in total mortality is mortality from diseases of the circulatory system, which annually cause more than half of deaths (16,359 deaths, or 52.1 % of the total number of deaths in 2022). The overwhelming number of deaths from this cause of death (12,653 deaths, or 76.8 % of the number of deaths from cardiovascular diseases) are persons over working age. Circulatory system diseases also dominate as a cause of death among the working-age population, accounting for nearly

37% of deaths in this age group in 2022. Cancer ranks as the second leading cause of death, comprising 12.2% of total mortality in 2022, a persistently high proportion over the years (17). These statistics suggest that, in addition to other contributing factors, overweight and obesity (OaO) play a significant role in the morbidity and mortality profile of Kyrgyzstan. Cardiovascular diseases, type 2 diabetes, and at least 13 types of cancer are strongly associated with OaO (18).

The onset of OaO in childhood and adolescence is highly likely to be associated with an increased risk of developing a number of NCDs in adulthood. Data from the Rabin Medical Center in Petah Tikva and colleagues at Tel Aviv University strongly suggest an increased risk of pancreatic cancer in adults who had higher than normal body weight at ages 16-19 years (19).

In the Kyrgyz Republic, 14.5% of adolescent girls are overweight, of whom 4 % are obese and 11% are overweight (20). According to the WHO thresholds (21), the prevalence of OaO in adolescent girls is categorized as "high".

The prevalence of OaO has a slight increasing trend with age (*P*-value 0.072) (Fig. 1), and among adolescents aged 16-18 years is classified as "very high" according to the WHO thresholds (21).
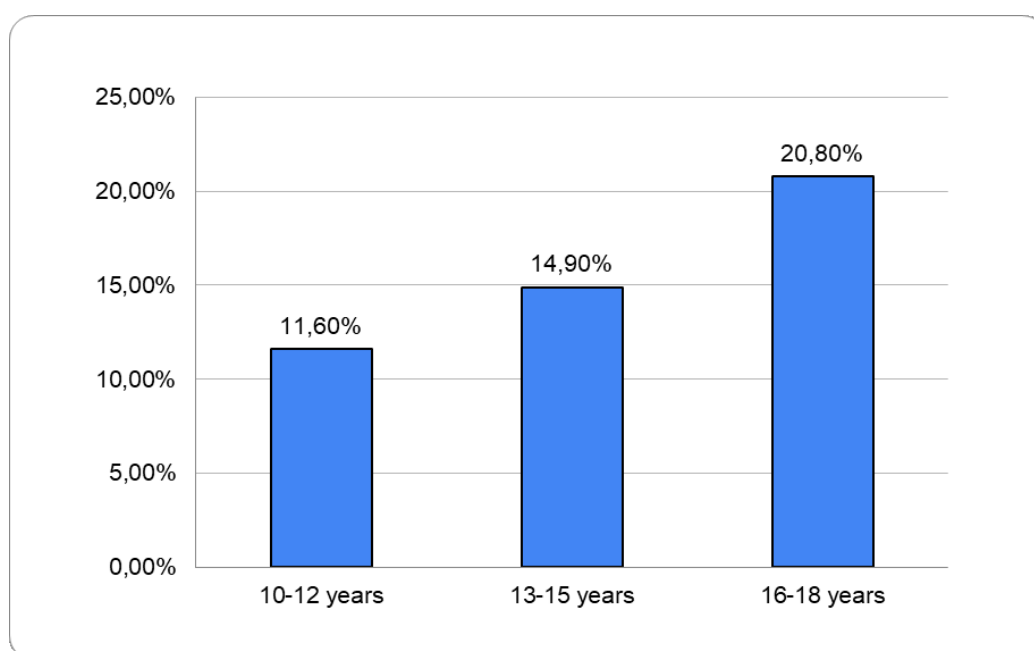
Fig. 1: Prevalence of OaO by age, national study in Kyrgyzstan, 2021 (22).

Factors influencing obesity among adolescents

The prevalence of OaO varies in states with different levels of poverty. In the USA, states with a poverty rate of more than 35% had a 145% higher prevalence of OaO compared with richer states (23).

In Kyrgyzstan, almost 1/3 of the population lives in poverty (Table 1). The extreme poverty rate increased almost 10-fold from 2017 to 2023, with 9.8 percent of the population at risk of poverty in 2023 (15).

Table 1: Poverty rate of the population of Kyrgyzstan (as a percentage of the total population)

Poverty indicators	2017	2018	2019	2020	2021	2022	2023
Overall poverty rate	22.4	20.1	25.3	25.3	33.3	33.2	29.8
Extreme poverty rate	0.6	0.5	0.9	6.0	6.0	6.0	5.0
Depth of poverty	3.7	3.3	4.4	6.6	6.8	6.8	6.3
The severity of poverty	0.9	0.8	1.1	2.0	2.0	1.9	1.8

In a national study in Kyrgyzstan (NIMAS)(22), no direct association was found between the prevalence of OaO among adolescent girls and family wealth quintile (Table 2).

Table 2: Level of overweight and obesity among adolescent girls in Kyrgyzstan depending on the level of well-being (%)

Wealth Quintile	N	%	(95% CI)	P-value
The lowest	263	14.4	(9.9, 20.4)	0.980
Second	202	14.1	(9.7, 20.1)	
Middle	157	13.7	(8.7, 20.9)	
Fourth	145	16.1	(10.6, 23.7)	
The highest	85	15.7	(6.8, 32.3)	

The relationship between family income and the prevalence of OaO among children and adolescents has been reported as ambiguous by other researchers. In sub-Saharan Africa, high family income has been identified as a significant factor associated with obesity, whereas in the United States, obesity has been predominantly linked to low family income (24).

Analysis of longitudinal associations in relative and absolute terms between social status in early childhood and the development of OaO at age 8-11 years using data from seven prospective cohorts of newborns in six high-income countries (United Kingdom, Australia, the Netherlands, USA, Sweden, one national cohort and one from the province of Quebec, Canada) showed social gradients in obesity risk for low maternal education (pooled OR: 2.99, 95% CI: 2.07, 4.31) and low household income (summary OR: 2.69, 95% CI: 1.68, 4.30); inter-cohort heterogeneity ranged from nonsignificantly to moderate (*P*: 0.300 to < 0.001) (24). However, the income-overweight/obesity association was not statistically significant in this study in Sweden, which the authors hypothesized was due to Sweden's social and family policies, including maternity leave for child care, universal preschool enrollment, prohibition of "junk food" advertising to children, and universal provision of free school meals (25).

Thus, at this stage of studying the problems of OaO in Kyrgyzstan, it is somewhat premature to draw conclusions about associative links "income - overweight/obesity". Nutrition, physical activity, social interactions, cultural preferences, behavioral habits, personal values and beliefs are important in the development of OaO (26).

In Kyrgyzstan, 54.9% of adolescents consume fruits and vegetables daily, while 33.7% consume sugar, sweets, and confectionery products. Additionally, 9.5% eat fish and seafood 1-2 times per week, and 33.3% of children and adolescents report including milk and dairy products in their diet daily. Fast food is consumed at least once a week or more by 43.7% of children and adolescents, and 67.6% consume carbonated soft drinks once a day or more. The findings of this study indicate a high prevalence of unhealthy eating habits among children and adolescents (27).

The choice of food products among adolescents in Kyrgyzstan is evidently heavily influenced by advertising. Television channels targeting chil-

dren and adolescent audiences most frequently advertised sugary carbonated drinks (49.7%), juices (18.3%), salty snacks (17.0%), chocolate and confectionery products (7.2%), and dairy drinks (7.2%). Notably, vegetables and fruits were absent from the advertised products (28).

The impact of artificially created environments on physical activity, sleep disturbances caused by the active use of social networks, parents' education levels, as well as developmental and nutritional factors in early childhood in the context of childhood and adolescent obesity in Kyrgyzstan has not yet been studied. However, a comprehensive analysis of predictors of childhood and adolescent obesity is essential. This includes examining public policies aimed at creating safe environments for physical activity, improving nutrition by limiting the availability of unhealthy foods, implementing taxation on "unhealthy" products, introducing clear visual labeling, regulating the marketing and accessibility of sugary drinks, controlling portion sizes, and addressing other relevant factors. Such an analysis could support the development of an effective and culturally appropriate strategy for the prevention of OaO. Preventive interventions during childhood and adolescence are recognized as the most effective approach to mitigating the OaO epidemic (29).

Conclusion

In Kyrgyzstan, the prevalence of OaO among adolescents constitutes a "high" public health burden based on the WHO thresholds. This highlights the urgent need for a state-level program aimed at preventing OaO among adolescents, which would ultimately contribute to reducing the prevalence of nutrition-related NCDs in adulthood.

Effective adolescent OaO prevention programs should consider environmental influences and critical developmental periods when long-term dietary habits and active lifestyles are established. Further research into obesity risk factors, with consideration of the child's age, is essential to

enable timely prevention efforts. Such research would also support educating parents and children about the potential causes and consequences of obesity, fostering a more informed approach to mitigating this growing health issue.

Journalism Ethics considerations

Ethical issues (Including plagiarism, informed consent, misconduct, data fabrication and/or falsification, double publication and/or submission, redundancy, etc.) have been completely observed by the authors.

Conflict of interest

The authors declare that there is no conflict of interests.

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