INTERNATIONAL MULTI DISCIPLINARY JOURNAL FOR RESEARCH & DEVELOPMENT
eISSN 2394-6334 Impact factor: 8.854 Volume 13, issue 04 (2026)

CHILDHOOD OBESITY: A GROWING PUBLIC HEALTH CRISIS — EPIDEMIOLOGY, RISK FACTORS, AND PREVENTION STRATEGIES

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ABSTRACT: Background: Childhood obesity has emerged as one of the most urgent public health challenges of the twenty-first century, affecting children across all socioeconomic strata worldwide. The condition is associated with a cascade of comorbidities, including type 2 diabetes mellitus, cardiovascular disease, musculoskeletal disorders, and psychosocial impairment. Objective: This article reviews the epidemiology, pathophysiology, and determinants of childhood obesity, and evaluates evidence-based preventive and therapeutic interventions. Methods: A comprehensive narrative review was conducted using peer-reviewed literature from PubMed, Scopus, and WHO databases published between 2010 and 2024. Results: Global prevalence of childhood overweight and obesity has risen dramatically, with over 390 million children aged 5–19 years classified as overweight or obese in 2022. Central contributors include dietary transitions toward energy-dense foods, decreased physical activity, prolonged screen exposure, genetic predisposition, and socioeconomic inequality. Conclusion: Multisectoral, evidence-based strategies combining dietary education, physical activity promotion, and policy-level interventions are essential for reversing this epidemic.

1. INTRODUCTION

Childhood obesity represents a complex, multifactorial condition defined by an excessive accumulation of body fat that poses significant risks to health and wellbeing. The World Health Organization (WHO) defines overweight and obesity in children aged 5–19 years using body mass index (BMI) for age and sex z-scores, with overweight defined as +1 SD and obesity as +2 SD above the median. Over the past four decades, the global prevalence of childhood and adolescent obesity has risen more than fourfold, from 4% in 1975 to over 18% in 2016, and projections indicate continued escalation absent effective intervention.

The public health implications of childhood obesity are profound. Beyond its immediate physiological consequences, obesity in childhood frequently persists into adulthood, predisposing individuals to chronic diseases such as type 2 diabetes, hypertension, dyslipidemia, non-alcoholic fatty liver disease (NAFLD), and obstructive sleep apnea. Furthermore, the psychosocial burden — including bullying, low self-esteem, depression, and impaired academic performance — is well documented in clinical and epidemiological literature.

Low- and middle-income countries (LMICs), historically burdened by undernutrition, are now experiencing a double burden of malnutrition, wherein childhood obesity and stunting coexist within the same communities and sometimes the same households. This epidemiological transition reflects rapid urbanization, changing dietary patterns, and sedentary lifestyles enabled by technological advancement.

Understanding the determinants of childhood obesity requires a systems-thinking approach that integrates biological, behavioral, environmental, and socioeconomic dimensions. This article

synthesizes current evidence on the epidemiology and etiology of childhood obesity and presents a framework for comprehensive prevention and management strategies applicable across diverse healthcare and educational settings.

2. METHODS

This review was conducted following established narrative review methodology. Electronic databases including PubMed, Scopus, Web of Science, and the WHO Global Health Observatory were searched systematically using the following MeSH and free-text terms: 'childhood obesity,' 'pediatric overweight,' 'BMI children,' 'adolescent obesity prevalence,' 'dietary patterns children,' 'physical inactivity children,' and 'obesity prevention interventions.' Articles published between January 2010 and December 2024 in English were included. Gray literature, including WHO technical reports, UNICEF data, and national nutritional surveys from Uzbekistan, Central Asia, and globally representative regions, was also reviewed.

Inclusion criteria required: (1) peer-reviewed publication; (2) child or adolescent population aged 0–19 years; (3) quantitative or mixed-methods design; and (4) reporting of obesity prevalence, risk factors, or intervention outcomes. Studies focusing exclusively on adult populations, case reports with fewer than 10 subjects, and non-English language articles without available abstracts were excluded. Data on prevalence, risk factors, and intervention effectiveness were extracted and synthesized thematically.

3. RESULTS

3.1 Global Epidemiology

The WHO 2022 Global Nutrition Report estimated that 390 million children and adolescents aged 5–19 years were overweight or obese globally. Regionally, the highest prevalence rates are observed in the Pacific Islands, North Africa, the Middle East, and parts of the Americas. In Europe, approximately 29% of boys and 27% of girls aged 7–9 years are classified as overweight or obese according to the WHO European Childhood Obesity Surveillance Initiative (COSI). In Central Asia, including Uzbekistan, data from national health surveys indicate a rising trend of childhood overweight, particularly in urban centers such as Tashkent, where dietary westernization is accelerating.

Age-specific trends demonstrate that obesity risk increases with advancing childhood age. The prevalence among preschool children (2–4 years) is lower but increasing, while the steepest rise occurs during middle childhood (6–11 years) and adolescence (12–17 years). Gender differences are evident in some regions, with boys showing higher rates of overweight in high-income countries, while girls are disproportionately affected in parts of the Middle East and South Asia.

3.2 Risk Factors

Dietary factors: The shift from traditional dietary patterns toward high-calorie, nutrient-poor foods — including ultra-processed foods, sugar-sweetened beverages (SSBs), and fast food — is a primary driver of childhood obesity. A landmark prospective cohort study of over 17,000 children found that daily SSB consumption was associated with a 60% increased risk of obesity onset within three years. Breakfast skipping, low fruit and vegetable intake, and frequent consumption of snack foods have similarly been identified as independent risk factors.

Physical inactivity: WHO guidelines recommend at least 60 minutes of moderate-to-vigorous physical activity daily for children aged 5–17 years. However, global surveillance data

indicate that fewer than 20% of adolescents meet this threshold. Reduced physical education programming in schools, urban environments lacking safe recreational spaces, and cultural norms discouraging outdoor play — particularly for girls — contribute to pervasive physical inactivity.

Screen time and sedentary behavior: Prolonged screen time, including television viewing, gaming, and smartphone use, contributes to obesity through multiple mechanisms: displacement of physical activity, disruption of sleep architecture, and exposure to food marketing. Each additional hour of daily screen time has been associated with a 13% increase in overweight risk in children.

Genetic and epigenetic factors: Hereditary influences account for an estimated 40–70% of BMI variance. Polygenic risk scores incorporating variants in the FTO, MC4R, and TMEM18 genes predict obesity susceptibility. Epigenetic mechanisms, including intrauterine programming and early-life nutritional exposures, also modulate long-term adiposity risk.

Socioeconomic determinants: Poverty, low parental education, food insecurity, and residence in food deserts are strongly associated with higher childhood obesity prevalence. Paradoxically, rapid economic development in LMICs can accelerate obesity through increased purchasing power for energy-dense foods and adoption of sedentary occupations and leisure behaviors.

3.3 Health Consequences

Metabolic consequences of childhood obesity include insulin resistance, dyslipidemia (elevated triglycerides and LDL-cholesterol, reduced HDL-cholesterol), hypertension, and non-alcoholic steatohepatitis. Type 2 diabetes mellitus, once considered a disease of adulthood, now accounts for a rising proportion of pediatric diabetes diagnoses globally. Musculoskeletal complications include tibial torsion, Blount's disease, slipped capital femoral epiphysis, and flat feet, each of which can limit physical function and further perpetuate sedentary behavior.

Psychosocial consequences include stigmatization, peer rejection, clinical depression, anxiety disorders, and diminished academic achievement. A longitudinal study of 3,500 primary school children demonstrated that obese children scored significantly lower on standardized academic assessments and reported higher rates of social isolation compared to healthy-weight peers. These psychosocial sequelae often precede and independently predict cardiometabolic morbidity in adulthood.

4. DISCUSSION

The evidence reviewed underscores that childhood obesity is not a simple consequence of individual behavioral choices, but a product of complex interactions among biological predispositions, family environments, community structures, and macro-level policy environments. The Foresight Report's systems map of obesity causation identified over 100 variables and their interactions, illustrating the inadequacy of single-factor explanations.

Effective interventions must operate at multiple levels simultaneously. School-based programs that integrate nutrition education, daily physical activity, and supportive food environments have demonstrated consistent effectiveness in high-quality randomized controlled trials. A Cochrane meta-analysis of 55 school-based obesity prevention trials found significant reductions in BMI z-score among intervention participants compared to controls.

Policy-level interventions, including taxation of SSBs, front-of-pack nutritional labeling, restrictions on food marketing to children, and urban planning regulations promoting active

transport, represent high-leverage strategies with potential for population-wide impact. Chile's comprehensive food labeling and advertising restriction policy, implemented in 2016, demonstrated measurable reductions in purchases of high-sugar, high-fat products within two years, illustrating the feasibility of structural interventions.

In the Central Asian context, culturally adapted dietary guidance that respects traditional foodways while promoting moderation and physical activity is essential. Plov, lepyoshka, and other traditional foods can be part of a healthful diet when prepared with appropriate portion sizes and balanced with vegetables and physical movement. Community-level champions — including local physicians, school teachers, and religious leaders — can serve as effective conduits for health messaging in Uzbek and other regional languages.

5. CONCLUSION

Childhood obesity is a pandemic of the modern era, driven by the intersection of biological vulnerability, obesogenic food environments, declining physical activity, and socioeconomic inequality. Its consequences extend beyond physical health to encompass cognitive development, mental wellbeing, academic achievement, and long-term economic productivity. Reversing current trends requires coordinated action across health, education, urban planning, and economic sectors, grounded in robust evidence and tailored to local cultural and social contexts.

Future research should prioritize longitudinal studies in underrepresented populations, including Central Asian children, to generate regionally specific prevalence data and to evaluate the effectiveness of culturally adapted interventions. Investment in early-life nutrition, from preconception through the first 1,000 days, offers the greatest potential for altering long-term obesity trajectories.

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