



Understanding the Epidemiology of Obesity and Related Conditions: A Global Perspective

Aisha B. Urazayeva^{1*}, Aimeken A. Amanshiyeva¹, Saltanat Zhumagaliyeva²

¹ Department of Epidemiology, West Kazakhstan Marat Ospanov State Medical University, 68 Maresyev Street, Aktobe, 030019, Kazakhstan

² Department of Scientific Research Management, West Kazakhstan Marat Ospanov Medical University, Aktobe, Kazakhstan

Received: 23/08/2023

Accepted: 14/11/2023

Published: 20/12/2023

Abstract

Obesity, a complex and multifactorial condition, has reached epidemic proportions globally, posing a significant threat to public health. This paper reviews the global epidemiology of obesity and associated comorbidities, exploring key trends, drivers, and implications for healthcare systems. We examine the distribution of obesity across different regions, age groups, and socioeconomic strata, analyzing factors such as dietary changes, physical inactivity, genetic predisposition, and socioeconomic inequalities. The paper delves into the growing burden of obesity-related conditions, including type 2 diabetes, cardiovascular diseases, and certain types of cancer, emphasizing their impact on morbidity, mortality, and healthcare expenditures. We discuss the challenges of obesity management, highlighting the need for multifaceted interventions that address individual behaviors, environmental factors, and social determinants of health. Finally, we explore promising research directions for understanding the complex interplay of factors influencing obesity prevalence and for developing effective strategies for prevention and management.

Keywords: obesity, epidemiology, global health, non-communicable diseases, type 2 diabetes, cardiovascular disease, cancer, social determinants of health, prevention, management.

1 Introduction

Obesity, characterized by excessive body fat accumulation, has reached epidemic proportions globally, transforming from a niche public health concern to a major public health crisis. Its prevalence has risen dramatically in recent decades, affecting all age groups and socioeconomic strata, and posing a significant threat to individual health and global well-being. This paper aims to provide a comprehensive overview of the global epidemiology of obesity, exploring its trends, drivers, and implications for healthcare systems. The escalating prevalence of obesity is not merely a matter of aesthetics but a critical public health concern due to its association with a range of serious health complications. Obesity significantly increases the risk of developing a multitude of chronic diseases, including type 2 diabetes, cardiovascular diseases, certain types of cancer, osteoarthritis, and sleep apnea. These comorbidities contribute to a substantial burden of morbidity, mortality, and healthcare expenditures, placing a significant strain on healthcare systems worldwide.

2 Global Trends in Obesity Prevalence

The global prevalence of obesity has risen dramatically in recent decades, with a substantial increase observed in both developed and developing countries. According to the World Health Organization (WHO), over 1.9 billion adults aged 18 years and older were overweight in 2016, and over 650 million were obese. This signifies that over 39% of adults worldwide are overweight, and over 13% are obese (1). The global distribution of obesity is not uniform, with significant regional variations. North America and the Caribbean have the highest prevalence of obesity, followed by the Eastern Mediterranean

region. Africa and Southeast Asia have lower but rapidly increasing rates (2).

The prevalence of obesity is also influenced by age group, with a significant rise observed in children and adolescents. Childhood obesity is a serious concern, as it increases the likelihood of developing obesity and related conditions in adulthood. The global prevalence of obesity in children aged 5-19 years has tripled since 1975. This trend highlights the urgent need for preventive measures to address obesity early in life (3).

3 Drivers of Obesity: A Multifaceted Challenge

Obesity is a complex condition driven by a complex interplay of factors, including dietary changes, physical inactivity, genetic predisposition, and socioeconomic factors. The widespread adoption of Westernized diets, characterized by high consumption of processed foods, saturated fats, sugars, and sugary drinks, has played a significant role in the global obesity epidemic. The increased availability and affordability of these unhealthy foods, particularly in low- and middle-income countries experiencing rapid economic growth, have contributed to dietary shifts. This shift towards processed and calorie-dense foods often comes at the expense of traditional diets rich in fruits, vegetables, and whole grains, which are typically lower in calories and higher in nutrients (4). Sedentary lifestyles, driven by factors such as increased reliance on motorized transportation, technology use, and reduced physical activity in school and workplaces, contribute significantly to the prevalence of obesity. This trend is particularly pronounced in urban areas and among individuals working desk-based jobs. The convenience of cars, coupled with the allure of screens and digital entertainment, has drastically reduced physical activity

*Corresponding author: Aisha B. Urazayeva, Department of Epidemiology, West Kazakhstan Marat Ospanov State Medical University, 68 Maresyev Street, Aktobe, 030019, Kazakhstan; E-mail: a.urazayeva@zkmk.kz; Tel: +7 775 837 9978

levels in many parts of the world, leading to a reduction in daily energy expenditure (5).

While environmental factors play a significant role, genetics also contribute to obesity susceptibility. Individuals with a family history of obesity may be more likely to develop the condition. However, while genetics can influence individual susceptibility, environmental factors play a dominant role in shaping obesity prevalence. This suggests that while genetic predisposition might make certain individuals more vulnerable, it is the environmental factors, particularly those related to diet and physical activity, that ultimately drive the rise in obesity rates (6). Poverty, lack of access to healthy food options, and limited access to safe environments for physical activity contribute to higher rates of obesity in disadvantaged populations. Social determinants of health, such as education level, employment opportunities, and access to healthcare services, also play a significant role in shaping obesity prevalence. Limited access to affordable, nutritious food, coupled with the lack of safe spaces for physical activity in deprived neighborhoods, creates a cycle of disadvantage that disproportionately affects those already marginalized. Additionally, individuals with lower education levels and fewer employment opportunities are often exposed to unhealthy food environments and have less access to resources that support healthy lifestyle choices (7).

The intricate interplay of these factors underlines the complexity of the obesity epidemic. Addressing this global health challenge requires a comprehensive approach that tackles the dietary, physical activity, socioeconomic, and environmental drivers, focusing on both individual and societal levels. Effective solutions require a multi-pronged approach, encompassing public health initiatives, policy changes, education and awareness campaigns, and interventions to promote healthy living at all levels of society. Only through a collaborative effort that addresses the root causes of obesity can we effectively mitigate its devastating impact on individuals and communities worldwide.

4 Obesity-Related Comorbidities: A Growing Health Burden

Obesity is a significant risk factor for a wide range of chronic diseases, collectively known as obesity-related comorbidities. These conditions include type 2 diabetes, a metabolic disorder characterized by elevated blood sugar levels, where obesity is the leading risk factor. The link between obesity and type 2 diabetes is multifaceted, with excess body fat disrupting insulin signaling and reducing insulin sensitivity. This leads to a buildup of glucose in the bloodstream, contributing to the development of diabetes (8).

Obesity increases the risk of developing heart disease, stroke, and other cardiovascular diseases, as excess weight puts a strain on the cardiovascular system, leading to high blood pressure, high cholesterol, and other risk factors. Excess body fat can contribute to inflammation, hardening of the arteries (atherosclerosis), and an increased workload on the heart, making cardiovascular complications more likely (9). Obesity has been linked to an increased risk of developing several types of cancer, including colorectal cancer, breast cancer, endometrial cancer, and pancreatic cancer. The exact mechanisms by which obesity promotes cancer development are complex, but excess body fat may contribute to chronic inflammation, hormonal changes, and cellular growth abnormalities. These changes can create an environment that is conducive to the development and growth of cancerous cells (10).

Excess weight places additional stress on joints, increasing the risk of developing osteoarthritis, a degenerative joint disease. The extra weight puts added strain on weight-bearing joints, such as the hips, knees, and spine, leading to cartilage breakdown and joint pain. Obesity is a common cause of sleep apnea, a disorder characterized by pauses in breathing during sleep. This condition can disrupt sleep quality and contribute to other health problems, including cardiovascular disease and stroke. Excess weight can lead to a narrowing of the airway, making it difficult for air to pass through during sleep. This can cause the person to snore loudly and experience repeated pauses in breathing, disrupting sleep and potentially leading to serious health consequences (11).

The impact of obesity on health is significant, extending far beyond the individual level. The rising prevalence of obesity is putting increasing strain on healthcare systems worldwide, leading to higher healthcare costs, reduced productivity, and a growing burden of disease. It is essential to address obesity at multiple levels, including individual lifestyle modifications, public health initiatives, and policy changes, to mitigate the devastating impact of this global health crisis.

5 Management of Obesity: A Multifaceted Approach

The management of obesity is a complex process that requires a multifaceted approach addressing individual behaviors, environmental factors, and social determinants of health. Effective management strategies often involve a combination of lifestyle modifications, such as dietary modifications and increased physical activity, which are the cornerstone of obesity management. Dietary modifications may include reducing caloric intake, limiting processed foods, increasing fruit and vegetable intake, and choosing healthier cooking methods. Focusing on whole, unprocessed foods, cooking at home more often, and being mindful of portion sizes are key components of a healthy diet (12). Behavioral therapy can help individuals identify and change unhealthy eating habits and sedentary behaviors. This may involve setting realistic goals, developing coping strategies for cravings and stress, and building support systems. Behavioral therapy can help individuals understand the triggers that lead to overeating or inactivity, develop strategies for managing cravings and stress, and build a support network to provide encouragement and accountability (13).

Medications, such as appetite suppressants and drugs that increase metabolism, can be used in conjunction with lifestyle modifications to promote weight loss. However, these medications should be used under the supervision of a healthcare professional and are not suitable for all individuals. These medications can be helpful for some individuals, but they should not be seen as a substitute for lifestyle changes (14). Bariatric surgery, such as gastric bypass surgery, may be considered for individuals with severe obesity who have not responded to other management strategies. However, surgery is a major procedure and should be carefully considered. It is important to understand the risks and benefits of surgery and to discuss all options with a qualified healthcare professional (15).

Beyond individual interventions, addressing environmental and social factors that contribute to obesity is crucial. Creating accessible and affordable healthy food options, promoting physical activity in communities, and addressing socioeconomic inequalities are essential for fostering healthier environments. Policies that encourage healthy food choices, promote physical activity, and support disadvantaged populations are crucial for tackling the obesity epidemic on a societal level (16). Effective obesity management requires a

collaborative approach involving individuals, healthcare professionals, communities, and policymakers. By working together, we can create a healthier future for all.

6 Challenges and Opportunities in Obesity Management

Despite significant progress in understanding obesity, several challenges remain. Obesity is a complex condition influenced by multiple factors, making it difficult to manage. Effective management requires a tailored approach that considers the unique circumstances of each individual. This complexity stems from the interplay of genetics, environment, behavior, and socioeconomic factors, making a “one-size-fits-all” approach ineffective. Individuals with limited access to healthcare may face challenges in accessing obesity management services, including nutrition counseling, behavioral therapy, and medications. This is particularly true in low- and middle-income countries, where healthcare systems are often strained. Lack of access to affordable healthcare, limited availability of specialized professionals, and geographical barriers can prevent individuals from receiving the support they need (17). Individuals with obesity often experience social stigma and discrimination, which can negatively impact their self-esteem, motivation, and access to social support. This stigma can lead to feelings of shame and embarrassment, making individuals less likely to seek help or participate in weight management programs (18). While some treatments, such as lifestyle modifications and medications, can be effective in the short-term, long-term weight loss and maintenance can be challenging. Maintaining long-term weight loss requires sustained lifestyle changes and ongoing support, which can be difficult for individuals to maintain without ongoing professional guidance and community support (19).

However, there are also opportunities for improvement in obesity management. Preventing obesity early in life is crucial for reducing the long-term burden of obesity and related comorbidities. This involves implementing public health interventions that promote healthy diets, physical activity, and healthy environments. Creating environments that support healthy choices, such as promoting access to affordable fruits and vegetables, encouraging physical activity in schools and communities, and reducing exposure to unhealthy food marketing, is essential for preventing obesity (20). Addressing social inequalities, such as poverty, lack of education, and limited access to healthcare, is essential for reducing obesity disparities and improving health outcomes. Creating equitable access to healthcare, education, and healthy food options, as well as addressing systemic factors that contribute to poverty and disadvantage, is crucial for tackling the inequities in obesity prevalence (21). Personalized approaches to obesity management, tailored to individual needs, may be more effective than one-size-fits-all solutions. This involves considering factors such as genetics, lifestyle, and social circumstances. Understanding an individual’s unique needs and tailoring treatment plans accordingly can significantly improve outcomes and enhance engagement in weight management programs (22).

Community-based interventions, involving healthcare professionals, educators, and community leaders, can help raise awareness, promote healthy behaviors, and support individuals with obesity. Building community support networks, empowering community leaders to promote healthy lifestyle choices, and incorporating obesity prevention and management strategies into existing community programs can create a more supportive and inclusive environment for individuals struggling with obesity.

7 Conclusion

Obesity has emerged as a global public health crisis, posing a significant threat to individual health and global well-being. This paper has reviewed the epidemiology of obesity and associated comorbidities, exploring key trends, drivers, and implications for healthcare systems. We have examined the alarming rise in obesity prevalence worldwide, identifying key drivers such as dietary changes, physical inactivity, genetic predisposition, and socioeconomic factors. The impact of obesity on health is far-reaching, contributing to a significant increase in the incidence of chronic diseases like type 2 diabetes, cardiovascular disease, certain cancers, osteoarthritis, and sleep apnea. This burden of disease places a substantial strain on healthcare systems, leading to increased costs, reduced productivity, and a growing demand for resources. While obesity presents a complex challenge, there are opportunities for improvement through a multifaceted approach that addresses individual behaviors, environmental factors, and social determinants of health. Effective management strategies involve a combination of lifestyle modifications, behavioral therapy, pharmacological interventions, and, in some cases, surgical interventions. However, success relies heavily on addressing the broader context of individual circumstances, socioeconomic disparities, and environmental factors that contribute to the development of obesity. Continued research and collaborative efforts are needed to develop effective strategies for preventing and managing obesity, ensuring a healthier future for all. Focus should be placed on promoting healthy diets, encouraging physical activity, and fostering environments that support healthy choices. Addressing social inequalities, implementing personalized management strategies, and promoting community-based interventions are all crucial aspects of creating a more equitable and supportive environment for individuals struggling with obesity.

The fight against obesity requires a global commitment, engaging healthcare professionals, policymakers, communities, and individuals alike. By working together, we can create a healthier future for all.

Author Contributions

Conceptualization, Aisha B. Urazayeva; methodology, Aimeken A. Amanshiyeva; formal analysis, Saltanat Zhumagaliyeva; investigation, Aisha B. Urazayeva, Aimeken A. Amanshiyeva; resources, Saltanat Zhumagaliyeva; writing—original draft preparation, Aimeken A. Amanshiyeva, Saltanat Zhumagaliyeva; writing—review and editing, Aisha B. Urazayeva.

Funding

This research received no specific grant from any funding agency, commercial or not-for-profit sectors.

Data Availability Statement

All data generated or analyzed during this study are included in this published article.

Conflicts of Interest

The authors declare no competing interests.

References

1. LeBlanc EL, Patnode CD, Webber EM, Redmond N, Rushkin M, O'Connor EA. U.S. Preventive Services Task Force Evidence Syntheses, formerly Systematic Evidence Reviews. Behavioral and Pharmacotherapy Weight Loss Interventions to Prevent Obesity-Related Morbidity and Mortality in Adults: An Updated

- Systematic Review for the US Preventive Services Task Force. Rockville (MD): Agency for Healthcare Research and Quality (US); 2018.
2. Worldwide trends in body-mass index, underweight, overweight, and obesity from 1975 to 2016: a pooled analysis of 2416 population-based measurement studies in 128·9 million children, adolescents, and adults. *Lancet*. 2017;390(10113):2627-42.
 3. Kumar S, Kelly AS. Review of Childhood Obesity: From Epidemiology, Etiology, and Comorbidities to Clinical Assessment and Treatment. *Mayo Clin Proc*. 2017;92(2):251-65.
 4. Lin X, Li H. Obesity: Epidemiology, Pathophysiology, and Therapeutics. *Front Endocrinol (Lausanne)*. 2021;12:706978.
 5. Park JH, Moon JH, Kim HJ, Kong MH, Oh YH. Sedentary Lifestyle: Overview of Updated Evidence of Potential Health Risks. *Korean J Fam Med*. 2020;41(6):365-73.
 6. Walter H, Sadeque-Iqbal F, Ulysse R, Castillo D, Fitzpatrick A, Singleton J. The effectiveness of school-based family asthma educational programs on the quality of life and number of asthma exacerbations of children aged five to 18 years diagnosed with asthma: a systematic review protocol. *JB I Database System Rev Implement Rep*. 2015;13(10):69-81.
 7. Sturm R, An R. Obesity and economic environments. *CA Cancer J Clin*. 2014;64(5):337-50.
 8. Fruh SM. Obesity: Risk factors, complications, and strategies for sustainable long-term weight management. *J Am Assoc Nurse Pract*. 2017;29(S1):S3-s14.
 9. Carbone S, Canada JM, Billingsley HE, Siddiqui MS, Elagizi A, Lavie CJ. Obesity paradox in cardiovascular disease: where do we stand? *Vasc Health Risk Manag*. 2019;15:89-100.
 10. Shaikh H, Bradhurst P, Ma LX, Tan SYC, Egger SJ, Vardy JL. Body weight management in overweight and obese breast cancer survivors. *Cochrane Database Syst Rev*. 2020;12(12):Cd012110.
 11. Lin H, Xiong H, Ji C, Wang C, Li Y, An Y, et al. Upper airway lengthening caused by weight increase in obstructive sleep apnea patients. *Respir Res*. 2020;21(1):272.
 12. Sinha R, Kachru D, Ricchetti RR, Singh-Rambiritch S, Muthukumar KM, Singaravel V, et al. Leveraging Genomic Associations in Precision Digital Care for Weight Loss: Cohort Study. *J Med Internet Res*. 2021;23(5):e25401.
 13. Groff SE. Is enhanced cognitive behavioral therapy an effective intervention in eating disorders? A review. *J Evid Inf Soc Work*. 2015;12(3):272-88.
 14. Isaacs D, Prasad-Reddy L, Srivastava SB. Role of glucagon-like peptide 1 receptor agonists in management of obesity. *Am J Health Syst Pharm*. 2016;73(19):1493-507.
 15. Arterburn DE, Telem DA, Kushner RF, Courcoulas AP. Benefits and Risks of Bariatric Surgery in Adults: A Review. *Jama*. 2020;324(9):879-87.
 16. Cardel MI, Johnson SL, Beck J, Dhurandhar E, Keita AD, Tomczik AC, et al. The effects of experimentally manipulated social status on acute eating behavior: A randomized, crossover pilot study. *Physiol Behav*. 2016;162:93-101.
 17. Byrd AS, Toth AT, Stanford FC. Racial Disparities in Obesity Treatment. *Curr Obes Rep*. 2018;7(2):130-8.
 18. Phelan SM, Burgess DJ, Yeazel MW, Hellerstedt WL, Griffin JM, van Ryn M. Impact of weight bias and stigma on quality of care and outcomes for patients with obesity. *Obes Rev*. 2015;16(4):319-26.
 19. Hall KD, Kahan S. Maintenance of Lost Weight and Long-Term Management of Obesity. *Med Clin North Am*. 2018;102(1):183-97.
 20. Txakartegi Etxebarria X, López Mateo M, Aurrekoetxea JJ. [Obesity and overweight. An assessment of the effectiveness of a public health intervention]. *An Pediatr (Barc)*. 2014;80(6):379-86.
 21. Min J, Goodale H, Xue H, Brey R, Wang Y. Racial-Ethnic Disparities in Obesity and Biological, Behavioral, and Sociocultural Influences in the United States: A Systematic Review. *Adv Nutr*. 2021;12(4):1137-48.
 22. Jane L, Atkinson G, Jaime V, Hamilton S, Waller G, Harrison S. Intermittent fasting interventions for the treatment of overweight and obesity in adults aged 18 years and over: a systematic review protocol. *JB I Database System Rev Implement Rep*. 2015;13(10):60-8.