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The Magnitude of Obesity, Strategies, and Interventions

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ABSTRACT

This article addresses the critical public health issue of obesity, a condition defined by a Body Mass Index (BMI) of 30 or higher, which affects millions of Americans. The introduction highlights the profound impact of obesity on health, the economy, and society, underscoring the urgency of addressing this epidemic. The prevalence of obesity in the U.S. has steadily increased over the past few decades, with recent data showing that 42.4% of adults are classified as obese. The manuscript explores the various factors contributing to this rise, including genetics, environmental influences, behavioral factors, the food industry, government policies, and socio-economic conditions.

The consequences of obesity are far-reaching, impacting individual health, the economy, and societal well-being. Health risks associated with obesity include cardiovascular diseases, type 2 diabetes, and certain cancers, while the economic burden is reflected in substantial healthcare costs and lost productivity. Social and psychological impacts, including discrimination and reduced quality of life, further exacerbate the challenges faced by individuals with obesity.

In response to this complex issue, the manuscript discusses a multi-faceted approach to combating obesity, emphasizing the importance of public health campaigns, community programs, school-based interventions, and policy measures. Public health campaigns aim to raise awareness and promote healthier lifestyles, while community programs focus on creating supportive environments for behavior change. School-based interventions are critical in preventing childhood obesity, and policy measures, such as food labeling, taxation of unhealthy foods, and regulation of food advertising, are essential for creating systemic changes. Overall, the manuscript provides a comprehensive overview of the magnitude of obesity, its causes and consequences, and the strategies and interventions necessary to address this significant public health challenge.

Key Words: Obesity, Public Health, Interventions, Socioeconomic Factors

INTRODUCTION

Obesity is a chronic, but treatable, disease associated with excess weight. People with a Body Mass Index (BMI) greater than or equal to 30 are usually considered to have obesity. Obesity is a critical public health issue in the United States, affecting millions of Americans and contributing to a range of health complications, economic burdens, and social stigmas. Millions of adults have health challenges. Obesity is one of the most prevalent. People with obesity in the US have higher health care costs than those of normal weight: 27 percent increased costs on physician visits and outpatient costs, 46 percent inpatients costs and 80 percent spending on prescription drugs (Finkelstein et al., 2009). With increased medical spending, obesity can become an economic burden on both public and private payers. This paper explores the extent of obesity in the U.S., examining its prevalence, causes, consequences, strategies and interventions to address this epidemic.

PREVALENCE OF OBESITY

Obesity rates in the United States have been on a steady rise over the past few decades.

According to the National Health and Nutrition Examination Survey (NHANES), obesity prevalence in 2007-2008 was 32.2 percent and 35.5 percent among adult males and females, representing a more than 100 percent increase from 1976-1980 and a 50 percent increase from 1988-1994 (Flegal et al., 2010). More recent data according to the Centers for Disease Control and Prevention (CDC), as of 2020, indicating an approximately 42.4 percent of U.S. adults were classified as obese, defined by having a Body Mass Index (BMI) of 30 or higher. This statistic represents a significant increase from 30.5 percent in 2000 and indicates that nearly half of the adult population is grappling with obesity. The prevalence of severe obesity, defined as a BMI of 40 or higher, has also increased, affecting about 9.2 percent of adults. In addition to physical ailments, obesity has been found to be related to lower satisfaction with work, family relations, partner relationships, social activities, and depression (Stutzer, 2007). Hammond and Levine (2010) measured direct medical costs associated with obesity. They argue that relative medical spending for the obese may be as much as much as 100 percent higher than for healthy-weight adults, and nationwide "excess" medical spending may amount to as much as $147.0 billion annually for adults and $14.3 billion annually for children. Obesity is not only a serious health concern for adult but also for children; obese children and adolescents are more likely to become obese as adults.

Obesity rates are particularly high among certain demographic groups, with non-Hispanic Black adults (49.6%), Hispanic adults (44.8%), and non-Hispanic White adults (42.2%) showing significant prevalence. These disparities highlight the intersection of obesity with socio-economic and cultural factors. In his research, Tomer (2011) indicates that socioeconomic groups with low personal capital, low health capital, and low social capital have higher obesity rates than socioeconomic groups with higher endowments of intangible capital. This has been supported by other studies that indicate that higher diet quality, as measured by the Healthy Eating Index (HEI), is associated with higher incomes, more education, and thus with lower rates of obesity and overweight (Henderson, 2007). These are will be discussed in further detail in the following sections.

CAUSES OF OBESITY

The rise in obesity rates in the U.S. can be attributed to a complex interplay of factors, including genetics, environment, behavior, food industry and government policy and socio-economic status. Each factor will be discussed in more details.

Genetic Factors

Genetics play a crucial role in determining body weight, with studies suggesting that genetic factors can influence the likelihood of developing obesity. Studies have shown that 40 percent to 70 percent of interindividual differences in BMI are explained by genetic factors (Hebebrand, et al., 2013). Most cases of obesity are polygenic, involving multiple genes. Genome-wide association studies (GWAS) have identified numerous genetic variants associated with obesity. A recent meta-analysis of genome-wide association studies (GWAS) for BMI identified over 700 independent variants in European descent populations (Yengo et al., 2018), implicating a large number of genes and pathways regulating satiety, energy balance and metabolism in adipose tissue. Another study (Haung et al., 2022) report that thousands of genome-wide single nucleotide polymorphism (SNP) associations with BMI in both European (EA) and African (AA) descent populations in the Million Veteran Program (MVP) mega-biobank, including meta-analysis with other large-scale multi-ancestry consortia and UK Biobank.

The understanding of genetic factors in obesity has advanced significantly, with new findings from GWAS, microbiome studies, and epigenetics research providing a more

comprehensive picture of the genetic underpinnings of obesity. This work shows that the complex genetic architecture of BMI associates with a broad range of major health conditions, supporting the need for comprehensive approaches to prevent and treat obesity. Recent studies highlight how genetic predisposition interacts with environmental factors like diet and physical activity. A 2021 study in *The American Journal of Clinical Nutrition* demonstrated that individuals with a high genetic risk for obesity could mitigate this risk through a healthy lifestyle. More recent study (Yanbo et al., 2024) supporting the lifestyle risk scores (LRSs) and genetic risk scores (GRSs) were independently positively associated with BMI. However, genetics alone cannot explain the rapid increase in obesity rates over the past few decades.

Environmental Factors

Environmental factors significantly impact obesity rates through dietary habits, physical activity levels and access to recreational spaces, socioeconomic status, urbanization, and media influence. Addressing these factors requires comprehensive public health strategies that promote healthy eating, active living, and equitable access to resources.

Behaviors conducive to developing obesity can be influenced by societal and environmental factors beyond an individual's control. For example, availability of healthful food at reasonable prices may influence food purchasing behaviors. Additionally, availability of recreational spaces may influence a person's ability or choice to engage in physical activity. Pleasure derived from food palatability can be a powerful driver of overconsumption behavior that can result in an energy imbalance favoring weight gain. In addition, the modern environment is often characterized by sedentary lifestyles and easy access to high-calorie, low-nutrient foods. Urbanization and technological advancements have reduced the need for physical activity, while the proliferation of fast food and processed foods has increased calorie consumption.

Aggressive marketing of unhealthy foods, especially to children, influences dietary choices and contributes to obesity (Harris et al., 2009). Addressing these factors requires comprehensive public health strategies that promote healthy eating, active living, and equitable access to resources.

Food Industries and Government Policy

Government policies on food regulation play a critical role in addressing obesity by influencing the availability, affordability, and marketing of foods. These policies aim to create an environment that supports healthy dietary choices and reduces the prevalence of obesity.

Food prices have declined with innovation in food industries and government subsidies of corn. Lower price increase consumption of these products among low-income families. Moreover, as a consequence of this food policy and other innovation, and changes in the working environment, most work now requires much less strenuous exercise than it once did.

Developments in agriculture and food technology have made added sugars and vegetable oils accessible globally at remarkably low costs. As a result of added fats, the cost of the daily diet has been maintained at a lower level. Americans have the lowest-cost food supply in the world. The typical American diet derives almost 40 percent of daily energy from added sugars and added fats which are relatively inexpensive (Frazoa & Allshouse, 2003). Given low price and tasty low-quality food, the marginal utility per dollar of low-quality food can be high, and that can lead to higher consumption. Implementing taxes on sugar-sweetened beverages can reduce consumption and generate revenue for public health initiatives (Colchero et al., 2016). Also providing subsidies for fruits, vegetables, and other healthy foods can make them more affordable and increase their consumption (Thow et al., 2010).

Several rigorous clinical research clearly showing that ultra-processed foods (UPFs) lead to higher calorie intake and weight gain. Ultra-processed foods are industrial formulations typically made with five or more ingredients. These ingredients often include substances not commonly used in culinary preparations, such as: Preservatives, Sweeteners, Colorings,

Flavorings, Emulsifiers and other additives. Several studies have found a correlation between UPF consumption and obesity. A study in the United States found that higher consumption of UPFs was associated with a higher body mass index (BMI) and greater waist circumference (Hall, 2019). The NutriNet-Santé cohort study in France linked UPF consumption to an increased risk of overweight and obesity (Srour, 2019). Understanding the impact of ultra-processed foods on health is crucial for developing dietary guidelines and public health policies aimed at reducing the prevalence of obesity and related diseases. Michael Moss in his book on *Salt, Sugar, Fat: How the food giants hooked us* (2013) details how food scientists use extensive research to find the "bliss point" of sugar, the ideal amount of salt, and the perfect combination of fats to make foods irresistible. These engineered foods stimulate the brain's reward system, encouraging overconsumption. Moss links the consumption of processed foods high in salt, sugar, and fat to the rising rates of obesity, diabetes, hypertension, and other health issues. He discusses how companies create brand loyalty from a young age through advertising and product placement. He argues that the food industry's practices have significantly contributed to the public health crisis.

Government policies on food regulation are essential tools in the fight against obesity. By implementing measures such as nutritional labeling, taxes, and subsidies, advertising regulations, school food policies, and urban planning, governments can create environments that promote healthier lifestyles and reduce the prevalence of obesity. These policies require continuous evaluation and adjustment to ensure their effectiveness in addressing the complex and multifaceted nature of obesity.

Socio-Economic Factors: Poverty and Income Inequality

The relationship between socioeconomic factors and obesity is complex and influenced by a variety of elements including income, education, occupation, and access to resources.

Diet quality is also influenced by one’s socioeconomic position and may well be limited by financial access to nutrient-dense foods. Lower socio-economic status is often associated with higher obesity rates. This link is due to several factors, including low income, limited access to healthy foods, lack of safe environments for physical activity, lack of education, and reduced health literacy. Additionally, stress and mental health issues, more prevalent in lower socio-economic groups, can contribute to unhealthy eating behaviors. Education increases awareness about the importance of nutrition and physical activity. Educated individuals may also have better access to resources and healthcare, facilitating healthier lifestyle choices. Jobs with irregular hours can disrupt normal eating patterns and sleep, both of which are linked to obesity (Drewnowski & Specter, 2004).

Comparing changes in price of healthy food like fresh fruits and vegetable versus unhealthy food like cupcakes allowing us to figure out the reason for lower purchasing power of low-income families on affordability of healthy food. Over the course of twenty-seven years, the fresh fruits and vegetables index rose 49 percent. By contrast, the price index for cakes, cupcakes, and cookies increased until the early 1990s, and then decreased, leaving it 6 percent higher in 2006 than in 1980. In 2006, the fresh fruits and vegetables index stood 40 percent higher than the index for cakes, cupcakes, and cookies.

Poverty can affect social life and sociability as well. Friendship and involvement in social life are highly protective of good health, while low social status or bigger status differences and more inequality are harmful (Wilkinson & Pickett, 2009). Sociability is measured by the strength of community life and how much people trust each other. Larger differences in income and wealth create a social gulf between people. Social status stratification, like ranking systems or pecking orders among animals, is fundamental, with orderings based on power and coercion, and on privileged access to resources, regardless of others’ needs. In its most naked, animal form, the situation becomes “might is right and the weakest eat last” in a Darwinian-type of life.

Kawachi et al. (1996-2000) arguing "The health of a population depends not just on the size of the economic pie, but how the pie is shared." The authors speculate on how social inequality produces differences in health at each step on the socioeconomic ladder. "Income inequality," they observe, "appears to affect health by undermining civil society. Lack of social cohesion leads to lower participation in political activity (such as voting, serving in local government, volunteering for political campaigns)." Lower participation, in turn, reduces public demands for increased government spending on public goods, such as education, and social safety nets. Then "social capital" takes its place alongside "economic capital" and "human capital" as something fundamental to the smooth functioning of society and economic growth.

CONSEQUENCES OF OBESITY

Obesity has far-reaching consequences that extend beyond individual health, affecting the economy, healthcare system, and society as a whole. Obesity causes a variety of other adverse effects on the body that will be discussed in the following section. Indeed, the more excess weights an individual carries, the more difficulties he or she may experience in getting the obesity under control with exercise (Hojjat, 2021).

1. Health Consequences: Obesity is associated with numerous health problems, including cardiovascular diseases, type 2 diabetes, certain cancers, and respiratory issues. It also contributes to musculoskeletal disorders, such as osteoarthritis, and increases the risk of mental health conditions, including depression and anxiety.

Each year approximately 300,000 lives are lost due to the direct or indirect consequences of obesity. The rising trend of obesity is worrisome because it has significant consequences for individuals, business, and society. Obesity is associated with multiple chronic conditions, such as high blood pressure, high cholesterol, heart disease and stroke, type 2 diabetes, uterine, breast, colon and gall bladder cancers. Sleep apnea, arthritis, and depression can also be linked to obesity. There is 50 to 100 percent increased risk of all-cause mortality amongst obese individuals. Around 80 percent of obese individuals have diabetes, high cholesterol, high blood pressure, or heart disease. Direct medical costs related to obesity are secondary to preventive, diagnostic and treatment services.

2. Economic Burden: The economic impact of obesity is substantial, with estimated annual medical costs in the U.S. exceeding $147 billion. These costs include direct medical expenses for treating obesity-related conditions and indirect costs such as lost productivity and absenteeism.

Indirect costs focus on premature mortality, higher disability insurance premiums, and labor market productivity (morbidity). Mortality costs include future income lost as a result of premature death. Morbidity costs also factor income lost from decreased productivity, restricted activity, and absence from work. As per the indirect costs related to obesity, obese people tend to be less productive than the average healthy person and they are more subject to the phenomenon of presentism; that is, the tendency to go to work even if you are not in optimal physical condition (Finkelstein et al., 2010).

3. Social and Psychological Impact: Obesity often carries a social stigma that can lead to discrimination and psychological distress. Individuals with obesity may experience bias in various settings, including the workplace, education, and healthcare, which can negatively impact their quality of life and mental health.

Puhl and Heuer (2009) described the high degree of prejudice and discrimination that obese individuals suffer in employment, education, and health care. Another study supporting the point of view that individuals with obesity may face discrimination in hiring, promotions, and wages (Baum and Ford, 2004). The studies they reviewed showed that obese patients were less likely to get screenings for breast, cervical, and colorectal cancer, among other examples.

Furthermore, many people in the United States have not secured employment because they experience discrimination for being obese. The outcome is that this impacts negatively on the country's economy because of reduction in national output and tax revenue. There is also an increase in the national government expenditure on both incapacity and unemployment benefits.

The social and psychological impacts of obesity are profound and multifaceted, affecting mental health, social interactions, relationships, and economic status. Addressing these impacts requires comprehensive strategies that include psychological support, anti-stigma campaigns, and policies that promote social inclusion and equity.

ADDRESSING OBESITY: STRATEGIES AND INTERVENTIONS

Efforts to combat obesity in the United States involve a multi-faceted approach, targeting individual behavior, community environments, and policy initiatives.

1. Public Health Campaigns: Government and non-profit organizations run public health campaigns to raise awareness about the importance of healthy eating and physical activity. These campaigns aim to educate the public about the risks associated with obesity and promote lifestyle changes that can lead to healthier weight management. Tailor campaigns to specific populations, considering age, gender, cultural background, and socioeconomic status. Focus on high-risk groups, such as children, adolescents, and low-income communities. There could be challenges in this campaign including sustainability and ensuring long-term funding and support for campaigns to maintain momentum and effectiveness. Another challenge could be regular evaluation of the impact of campaigns and adapting strategies based on feedback and changing needs. However, a well-designed public health campaigns can effectively contribute to reducing obesity rates and promoting healthier lifestyles.

2. Community Programs: Community programs are vital in addressing obesity as they create supportive environments that promote healthy behaviors, increase access to resources, and foster social support. Initiatives such as building parks, promoting active transportation, and ensuring access to fresh, affordable foods are crucial in supporting healthier communities. The key components of the community programs are: Accessibility, Comprehensive approach, Cultural relevance, and Sustainability. Accessibility includes all community members must have access to the programs free or at low costs. Comprehensive approach addressing multiple aspects of health, including nutrition, physical activity, mental well-being, education, skill-building, and social support. Cultural relevance; tailor programs to the cultural norms and preferences of the community and involve community leaders and members in the planning and implementation process (Story et al., 2008). Finally, sustainability; by securing ongoing funding and resources to maintain program activities.

3. School-Based Interventions: School-based interventions are crucial in the fight against childhood obesity because they reach children during their formative years and can influence lifelong habits. Schools play a critical role in preventing childhood obesity by providing nutritious meals, integrating physical education into the curriculum, and fostering a culture of health and wellness among students. Up to 65 percent of parents feel schools should play a major role in efforts to curb obesity (Lake Snell Perry & Associates, 2003). The vast majority of US children are schooled outside the home; thus, the education system provides an established infrastructure for targeted implementation of childhood public health interventions. Schools offer children the facilities requisite for classroom or physical education interventions, and the personnel capable of being involved in such efforts (Story, 1999).

According to Kropski et al. (2008), there are key components and strategies for effective school-based interventions: Nutrition education, healthy school meals, physical activity, behavioral interventions, and parental and community involvement. School-based intervention include integrating comprehensive nutrition education into the curriculum to teach students

about healthy eating habits. Ensure school cafeterias offer nutritious, balanced meals that adhere to dietary guidelines along with limit on the availability of sugary drinks and junk food in vending machines and school stores. Incorporate regular physical activity into the school day through physical education classes, recess, and extracurricular sports and promote active transportation to and from school, such as walking or biking if possible. Behavioral intervention can be implemented through programs that encourage behavior change through goal-setting, self-monitoring, and positive reinforcement. At the same time provide counseling and support for students struggling with weight management. Engage parents and the community in promoting healthy behaviors through workshops, newsletters, and events. Collaborating with local health organizations to provide resources and support can be helpful to sustain the intervention. There are several examples on successful initiatives in the United States and in other countries to implement this school-based interventions reducing obesity. An example of such successful program in the United States is the School Nutrition Policy Initiative (SNPI) with a significant reduction in the incidence of overweight and obesity among participating students. Also, Planet Health Program (PHP) in the United States utilized strategies to integrates health education into existing subjects, promotes physical activity, and reduces screen time. The impact was positive by changing students' dietary and physical activity behaviors, and reductions in obesity rates (Kropski et al., 2008)**.**

4. Policy Measures: Policy interventions are essential for creating systemic changes that support obesity prevention and management. Policies that regulate food advertising, improve food labeling, tax sugary drinks, and provide incentives for healthy food production and consumption are some examples of legislative actions taken to address obesity.

Regulating food advertising, especially targeting children, is considered a crucial policy measure to combat obesity. This approach includes restrictions on marketing unhealthy foods and beverages through various media channels. For instance, U.K has implemented strict regulations on advertising foods high in fat, sugar, and salt (HFSS) during children's television programming. Studies have shown a significant reduction in children's exposure to unhealthy food advertisements (Adams et al., 2022). South Korea restricts TV advertisements for fast food and sugary snacks during times when children are likely to be watching. Studies have shown a decrease in children's consumption of these products (Kim et al., 2023).

Tax policies, particularly those targeting sugary beverages and high-calorie, low-nutrient foods, have shown significant promise in reducing obesity rates and improving public health outcomes. By imposing taxes on unhealthy food and beverage options, these policies aim to discourage consumption through higher prices, thereby incentivizing healthier dietary choices among consumers. Studies consistently demonstrate that taxes on sugary drinks lead to a substantial decrease in their consumption. For instance, Mexico's implementation of a sugar tax in 2014 resulted in a 7.6 percent reduction in the purchase of sugary beverages within the first two years (Martinez et al., 2023). The economic impact of these taxes extends beyond health improvements. The revenue generated from these taxes can be reinvested in public health initiatives, education programs, and community projects aimed at further reducing obesity rates and improving quality of life.

Food labeling has emerged as a crucial strategy in the battle against obesity, providing consumers with essential information to make healthier dietary choices. By clearly displaying nutritional information, food labels empower individuals to understand the content of the food they consume, which can lead to better eating habits and, consequently, reduced obesity rates. Studies have shown that clear and transparent food labeling significantly improves consumer knowledge regarding nutritional content. According to Johnson et al. (2023), mandatory calorie labeling on menus in the United States has been associated with a modest reduction in calorie intake among consumers who use the information to make healthier choices. Another research indicates that food labeling can lead to behavioral changes, such as reduced portion sizes and

increased selection of lower-calorie options. A review published in *The Cochrane Database of Systematic Reviews* found that food labeling, particularly when combined with educational campaigns, effectively reduces calorie intake and promotes healthier eating habits.

5. Healthcare Interventions: Healthcare providers are essential in identifying, treating, and managing obesity. Strategies include routine screening for obesity, counseling on diet and physical activity, and, in some cases, medical treatments such as pharmacotherapy or bariatric surgery. Integrating obesity management into primary care settings ensures that patients receive comprehensive support for weight management.

These strategies and interventions highlight the importance of a collaborative and comprehensive approach to effectively address obesity.

CONCLUSION

The magnitude of obesity in the United States is a pressing public health issue that requires urgent and sustained action. With nearly half of the adult population and a significant portion of children and adolescents affected, the health and economic implications are profound. Addressing obesity demands a multi-dimensional approach that includes public health initiatives, community and school-based programs, policy interventions, and healthcare strategies. By tackling the root causes and supporting healthy behaviors, it is possible to mitigate the impact of obesity and improve the overall health and well-being of the population.

REFERENCES

Adams, J., Tyrrell, R., & White, M. (2022). Impact of UK Advertising Restrictions on HFSS Foods: A Follow-Up Study. *Public Health Nutrition*.

Baum, C. L., & Ford, W. F. (2004). The wage effects of obesity: a longitudinal study. *Health Economics*, *13*(9), 885-899.

Centers for Disease Control and Prevention. (2020). Adult Obesity Facts. Retrieved from CDC Website

Centers for Disease Control and Prevention. (2020). Childhood Obesity Facts. Retrieved from CDC Website

Colchero, M. A., et al. (2016). Beverage purchases from stores in Mexico under the excise tax on sugar sweetened beverages: observational study. *BMJ*, *352*, h6704.

Crockett, R.A., King, S.E., Marteau, T.M., et al. (2022). Food Labeling to Promote Healthier Eating: An Updated Systematic Review. *The Cochrane Database of Systematic Reviews.*

Drewnowski, A., & Specter, S. E. (2004). Poverty and obesity: the role of energy density and energy costs. *The American Journal of Clinical Nutrition, 79*(1), 6-16.

Finkelstein, E. A., et al. (2009). Annual Medical Spending Attributable to Obesity: Payer-And Service-Specific Estimates. *Health Affairs, 28*(5), w822-w831.

Flegal, K. M., et al. (2010). Prevalence and trends in obesity among US adults, 1999-2008. *Journal of the American Medical Association*, *303*(3), 235-241.

Frazao, E., & Allshouse, J. (2003). Strategies for intervention: Commentary and debate. *Journal of Nutrition*, *133*(3). Retrieved January 1, 2011, from http://jn.nutrition.org/content/133/3/844S.short

Hales, C. M., et al. (2020). *Prevalence of Obesity Among Adults and Youth: United States, 2017-2018*. NCHS Data Brief, No. 360. Retrieved from CDC Website

Hall, K.D., et al. (2019). Ultra-Processed Diets Cause Excess Calorie Intake and Weight Gain: An Inpatient Randomized Controlled Trial of Ad Libitum Food Intake. *Cell Metabolism*, *30*(1), 67-77.

Hammond, R., & Levine, R. (2010). The economic impact of obesity in the United States. *Diabetes, Metabolic Syndrome, and Obesity: Targets and Therapy*, *3*, 285-295,

Retrieved January 2, 2011, from http://www.ncbi.nlm.nih.gov/pmc/articles/PMC3047996

Harris, J. L., et al. (2009). Priming effects of television food advertising on eating behavior. *Health Psychology*, *28*(4), 404-413.

Haung, J., et al. (2022). Genomics and phenomics of body mass index reveals a complex disease network. *Nature, 13*, 7973. https://www.nature.com/articles/s41467-022-35553-2

Hebebrand, J., et al. (2013). Genetic aspects of weight regulation. *Dtsch Arztebl Int*., *110*(19), 338-344.

Henderson, L. J. (2007). Obesity, Poverty and Diversity: Theoretical and Strategic Challenges. In J. Zoltan, Z. Acs, & A. Lyles (Eds.), *Obesity, business, and public policy* (pp. 57-75). Cheltenham, UK: Edward Elgar.

Hojjat, T. A. (2021). *The Economics of Obesity: Poverty, Income Inequality, and Health*. Springer.

Johnson, K., Lee, A., & Martin, S. (2023). The Effect of Menu Labeling on Calories Purchased: A Randomized Controlled Trial. *Journal of the Academy of Nutrition and Dietetics*.

Kawachi I, B., Kennedy B., & Wilkinson, R. (1999-2000). *The society and population health reader: Income Inequality and Health.* New York, NY: New Press.

Kawachi, I. (2000). *Is inequality bad for our health.* Boston: MA: Beacon Press.

Kim, S., Lee, Y., & Park, J. (2023). Evaluating the Impact of South Korea's Food Advertising Restrictions. *International Journal of Behavioral Nutrition and Physical Activity*.

Kropski, J. A., Keckley, P. H., & Jensen, G. L. (2008). School-based obesity prevention programs: an evidence-based review. *Obesity*, *16*(5), 1009-1018. https://onlinelibrary.wiley.com/doi/full/10.1038/oby.2008.29

Lake Snell Perry & Associates (2003). Obesity as a public health issue: a look at solutions. Retrieved July 8, 2024, from www.phsi.harvard.eduhealth_reformpoll_results.pdf.

Martinez, A., Rivera, J., & Gonzalez, T. (2023). Sugar-Sweetened Beverage Taxes and Health Outcomes: A Review. *The BMJ*.

Moss, M. (2013). *Salt, Sugar, Fat: How the Food Industry Hooked Us*. Random House.

Puhl, R.M., & Heuer, C.A. (2009). The stigma of obesity: A review and update. *Obesity*, *17*(5), 941–964.

Srour, B., et al. **(**2019). Ultra-processed food intake and risk of cardiovascular disease: prospective cohort study (NutriNet-Santé). *BMJ*, *365*, l1451.

Story, M. (1999). School-based approaches for preventing and treating obesity. *Int J Obes Relat Metab Disord*, *23*(Suppl 2), S43–S51.

Story, M., et al. (2008). Creating healthy food and eating environments: Policy and environmental approaches. *Annual Review of Public Health*, *29*, 253-272.

Stutzer, A. (2007). Limited self-control, obesity, and the loss of happiness. *Social Science Research Network*, Discussion Paper, No. 2925, 10. Retrieved January 1, 2011, from http://papers.ssrn.com/sol3/papers.cfm?abstract_id=1001413

Thow, A. M., et al. (2010). The effect of fiscal policy on diet, obesity and chronic disease: a systematic review. *Bulletin of the World Health Organization*, *88*(8), 609-614.

Tomer, J.F. (2011). What causes obesity? And why has it grown so much? *Challenge*, *54*(4), 22.

Wilkinson, R & Pickett, K. (2009). *Why greater equality makes societies stronger: The spirit level*. New York, NY: Bloomsbury Press.

Yanbo, Z., et al. (2024). Associations of Lifestyle and Genetic Risks with Obesity and Related Chronic Diseases in the UK Biobank: A Prospective Cohort Study, *The American Journal of Clinical Nutrition, 119*(6), 1514-1522. https://doi.org/10.1016/j.ajcnut.2024.04.025.

Yengo, L. et al. (2018). Meta-analysis of genome-wide association studies for height and body mass index in approximately 700000 individuals of European ancestry. *Hum. Mol. Genet., 27*, 3641–3649.