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The Role of Food Systems in the Obesity-Diabetes Epidemic: Policy Innovations for a Healthier Nation

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Abstract

The obesity and diabetes epidemic represents one of the most significant public health challenges of the 21st century, with food systems playing a central role in both driving and potentially mitigating this crisis. This perspective examines how modern food environments contribute to unhealthy dietary patterns and explores innovative policy approaches that offer promising solutions. The article highlights how agricultural policies, food processing practices, and marketing strategies have collectively created an obesogenic environment that disproportionately impacts vulnerable populations. Despite numerous individual-level interventions, systemic changes to food production, distribution, and accessibility remain essential for meaningful progress. The socio-ecological framework presented offers a multi-level approach to policy intervention, emphasizing the need for coordinated action across individual, community, organizational, and governmental domains. While acknowledging the economic and political barriers to reform, this perspective advocates for transformative food system policies that prioritize health equity, sustainability, and nutritional security as pathways toward reversing current trends in diet-related chronic disease.

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Introduction

The global rise in obesity and type 2 diabetes (T2D) represents a significant public health crisis, with multifaceted causes and consequences. This interconnected epidemic is driven by factors such as urbanization, sedentary lifestyles, and the increased consumption of high-calorie processed foods. The prevalence of obesity has escalated from 29% to 37% between 1980 and 2013 globally, affecting both adults and children (Ng *et al.*, 2014). Obesity rates in the U.S. have surged, with approximately 40% of young adults, 45% of middle-aged adults, and 43% of older adults classified as obese (Rao, 2020). Diabetes prevalence has also increased from 8.8% to 11.7% between 1999 and 2014, particularly among those with abdominal obesity (Caspard *et al.*, 2018). Both obesity and T2D contribute to chronic inflammation, leading to immune dysfunction and increased susceptibility to infections (Frydrych *et al.*, 2018).

The interplay between food systems and health outcomes, particularly obesity and diabetes, is increasingly recognized as a critical area of study. Food systems encompass the entire journey of food from production to disposal, influencing dietary patterns and health risks. Unhealthy diets, driven by food systems, significantly contribute to obesity and diabetes (Yambi *et al.*, 2020). Studies show that access to grocery stores and healthy food options correlates with better dietary choices and lower obesity rates (Althoff *et al.*, 2020). Transforming food systems is essential for improving dietary quality and reducing disease burden.

This perspective examines the dynamics of modern food systems as drivers of the obesity-diabetes epidemic, explores the multi-dimensional barriers to healthier eating patterns, and presents a framework for policy innovations that could transform these systems to better support population health. The interconnections between agricultural policy, food manufacturing practices, retail environments, and consumer behavior represent both the challenge and the opportunity in addressing this public health crisis through systemic rather than purely individual approaches.

Epidemiological Profile

The prevalence of obesity and type 2 diabetes has escalated over recent decades, posing significant public health challenges. According to data from the Centers for Disease Control and Prevention (CDC), the prevalence of obesity among U.S. adults increased from 30.5% in 1999–2000 to 42.4% in 2017–2018 (Ricci *et al.*, 2018; Hales *et al.*, 2020; Stierman *et al.*, 2021). The rising rates of obesity and type 2 diabetes in the United States present a significant public health challenge, with data indicating that severe obesity prevalence reached 9.2% from 4.7% during the same period (Ricci *et al.*, 2018; Hales *et al.*, 2020; Stierman *et al.*, 2021). Concurrently, the incidence of diagnosed diabetes mellitus among U.S. adults increased from 4.4% in 2000 to 8.2% in 2018, with type 2 diabetes accounting for over 90% of all diabetes cases (Bullard *et al.*, 2018). These trends correlates with an increase in type 2 diabetes, projected to affect 33% of the population by 2050 (Boyle *et al.*, 2010) and underscore the urgency of addressing the intertwined epidemics of obesity and type 2 diabetes through comprehensive public health strategies.

Drivers of the Epidemic

Impact of food environments on obesity and diabetes

The widespread availability of ultra-processed foods contributes to increased caloric intake and poor nutritional quality. These foods, often high in added sugars, unhealthy fats, and sodium, are heavily marketed and easily accessible, leading to overconsumption and poor dietary habit (Monteiro *et al.*, 2018, 2019; Steiner, Geissler and Schernhammer, 2019; Martini *et al.*, 2021). The convenience and affordability of these products make them a staple in many households, particularly in urban areas where fast food outlets and convenience stores are more prevalent than supermarkets offering fresh produce (Gupta *et al.*, 2021). Limited access to fresh, affordable produce in low-income areas exacerbates health disparities. Food deserts, characterized by a lack of supermarkets and an abundance of fast food and convenience stores, are common in economically disadvantaged neighborhoods (Kotval-K, Khandelwal and Wills, 2021). Studies show that residents in these areas experience higher rates of obesity and related health conditions due to limited access to fresh produce (Corona *et al.*, 2021). For instance, low perceived accessibility to fruits and vegetables correlates with increased odds of high blood pressure and cholesterol levels (Corona *et al.*, 2021). This limited access to nutritious food options forces residents to rely on unhealthy, processed foods, contributing to higher rates of obesity and diabetes in these communities.

Agricultural subsidies and food pricing

The complexity of the food system, which prioritizes profit

over nutrition, contributes to the prevalence of unhealthy foods (Pretorius *et al.*, 2021). Current subsidy structures favor commodity crops (e.g., corn, wheat, soy) used in processed foods rather than fresh fruits and vegetables (Hayes and Kerska, 2021). These subsidies make ingredients for unhealthy foods cheaper and more abundant, while healthier options remain relatively expensive (Siegel *et al.*, 2016). This economic imbalance discourages the production and consumption of nutritious foods, perpetuating poor dietary habits (Headey and Alderman, 2019). Policy shifts toward incentivizing sustainable and health-conscious agriculture could promote better nutrition. By redirecting subsidies to support the cultivation of fruits, vegetables, and other nutrient-dense crops, governments can make healthier foods more affordable and accessible. Additionally, promoting sustainable farming practices can enhance food security and environmental health, creating a more resilient food system.

Regulation of food marketing and labeling

Aggressive marketing of unhealthy foods, particularly to children, influences dietary choices (Cruz, Sousa and Skrivan, 2021). Children are especially vulnerable to marketing tactics that promote sugary cereals, snacks, and beverages. These advertisements often feature appealing characters and themes, making unhealthy foods more attractive to young audiences. This early exposure to unhealthy eating habits can lead to lifelong preferences for poor-quality diets. Strengthened food labeling laws, including clear nutritional information and front-of-package warnings, improve consumer awareness. Effective labeling can help consumers make informed choices by highlighting the nutritional content of foods. Front-of-package labels that clearly indicate high levels of sugar, fat, and sodium can deter consumers from purchasing unhealthy products and encourage healthier eating habits.

Policy innovations for a healthier nation

Taxation of Sugar-Sweetened Beverages (SSBs):

Countries implementing SSB taxes have seen reductions in consumption and improvements in public health outcomes. These taxes discourage the purchase of sugary drinks, which are a major contributor to obesity and diabetes. Mexico's 10% SSB tax reduced purchases by 12% in two years, with revenue funding health programs (Colchero *et al.*, 2016). Modeling suggests a U.S. national tax could prevent 2.4 million diabetes cases over a decade (Long *et al.*, 2015). Revenue generated from SSB taxes can be reinvested in public health initiatives, further supporting efforts to combat diet-related diseases.

Subsidy reform for nutrient-dense crops: Reforming agricultural subsidies to favor nutrient-dense crops like fruits and vegetables is a pivotal policy innovation in combating the obesity-diabetes epidemic. Shifting 10% of U.S. crop subsidies to fruits/vegetables could lower prices by 7%, increase their availability and consumption hence encouraging healthier dietary choices among consumers (Bittman, 2011). The 2018 Farm Bill marked a progressive step in this direction by increasing mandatory funding for programs supporting local and regional food systems (Spangler, Burchfield and Schumacher, 2020). Notably, it established the Local Agriculture Market Program (LAMP), which consolidates initiatives aimed at enhancing the

production and distribution of local produce (Carlisle *et al.*, 2019; Fischer and Willis, 2020). By incentivizing the cultivation of fruits and vegetables, these programs aim to improve public health outcomes and stimulate local economies

Marketing regulations and labeling: Implementing marketing regulations and enhancing food labeling are pivotal policy innovations in addressing the obesity-diabetes epidemic. Chile's 2016 Law of Food Labeling and Advertising mandated front-of-package warning labels on foods high in sugars, sodium, or saturated fats, leading to a 24% decrease in the purchase of such products (Corvalán *et al.*, 2013). This comprehensive approach also restricted child-directed marketing and banned the sale of unhealthy foods in schools, serving as a model for other nations. Similarly, Quebec's ban on advertising targeting children under 13 resulted in reduced fast-food consumption and lower obesity rates among children, highlighting the effectiveness of stringent marketing regulations (Dhar and Baylis, 2011). These initiatives underscore the potential of policy interventions in reshaping consumer behavior and promoting healthier dietary choices.

Incentivizing healthy food retail: Incentivizing healthy food retail is a pivotal policy innovation for enhancing access to nutritious foods in underserved communities. Philadelphia's Healthy Corner Store Initiative exemplifies this approach by collaborating with over 600 corner stores to increase the availability of fresh produce and healthy snacks, thereby improving dietary diversity in areas known as food deserts (Albert *et al.*, 2017). To scale such models nationally, federal initiatives like the Healthy Food Financing Initiative (HFFI) have been instrumental forming partnership among the Departments of Health and Human Services, Treasury, and Agriculture, in providing financing to develop grocery stores and farmers' markets in communities lacking adequate access to healthy food options (Cantor *et al.*, 2020). As of 2018, the HFFI has awarded \$220 million in grants and assistance, leveraging approximately \$1 billion through private investment and other sources, supporting around 1,000 businesses in 35 states (Gross, Edmunds and Schwartz, 2021; Jutte, Badruzzaman and Thomas-Squance, 2021). Additionally, local policies, such as zoning laws that encourage the establishment of supermarkets in underserved areas, can further promote healthy food retail expansion (Moran *et al.*, 2020). Collectively, these efforts address disparities in food access and contribute to the prevention of diet-related diseases.

Conclusion and Prospects

The obesity-diabetes epidemic represents a complex public health challenge deeply intertwined with the structure and function of modern food systems. While individual-level interventions will remain important components of comprehensive prevention and management strategies, meaningful progress in reversing current trends will require systemic policy innovations that transform the environments in which people make food choices. The socio-ecological framework presented here provides a blueprint for multi-level policy development that acknowledges the interconnected influences on dietary patterns and nutritional outcomes across individual, community, organizational, and governmental domains.

Implementation of these policy innovations faces significant challenges, including industry resistance, jurisdictional complexities, resource constraints, and ideological tensions around the appropriate role of government in shaping food environments. However, the substantial human and economic costs of inaction create a compelling case for bold reform efforts that prioritize population health over short-term commercial interests. Successful models from jurisdictions that have implemented components of comprehensive food system reform demonstrate the feasibility of these approaches when supported by effective coalition-building, strategic communication, and political leadership.

Future progress will require continued research to refine understanding of how specific food system characteristics influence obesity and diabetes risk, evaluation of policy innovations to identify the most effective intervention approaches, and translation of evidence into actionable policy frameworks adaptable to diverse contexts. Importantly, these efforts must center principles of equity and sustainability, recognizing that truly effective solutions will simultaneously address health disparities, environmental impacts, and economic viability within food systems. By confronting the structural drivers of the obesity-diabetes epidemic through comprehensive food system reform, policymakers have an opportunity to create conditions that better support metabolic health while advancing broader goals of social justice and environmental sustainability.

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