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A Brief Review of Environmental Factors Influencing Adult's Eating Behaviors

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Abstract

Eating behaviors in adults are influenced by a complex interplay of environmental factors. This review explores physical, social, economic, and cultural environments that shape dietary choices and habits. Addressing these factors is critical for developing effective public health strategies to promote healthier eating patterns and combat diet-related diseases. To provide an overview of the environmental factors—physical, social, economic, and cultural—that shape eating behaviors in adults, highlighting key studies and interventions that have sought to influence dietary habits through environmental changes. Current study synthesizes findings from human trials and studies that explore the relationship between environmental influences and eating behavior. Access to healthy foods, such as supermarkets and fresh produce outlets, is strongly associated with healthier eating patterns. Interventions such as portion size reduction and menu labeling in cafeterias have led to reduced calorie intake and healthier food choices. Studies have shown that adults are more likely to choose unhealthy foods when dining with friends or in social settings. Additionally, social norms favoring healthy eating can lead to better food choices. Economic factors, including food prices and marketing, significantly affect dietary decisions. Cultural norms and globalization have led to dietary transitions, particularly in developing countries. Traditional diets are often replaced by processed and westernized food patterns, which have been associated with higher rates of obesity and metabolic diseases. Policymakers and public health officials should incorporate environmental considerations into dietary recommendations and health interventions. Further research is needed to evaluate the long-term effectiveness of such environmental interventions across diverse populations.

Keywords: Globalization, Climate Change, Portion size, Eating behaviors, Agriculture

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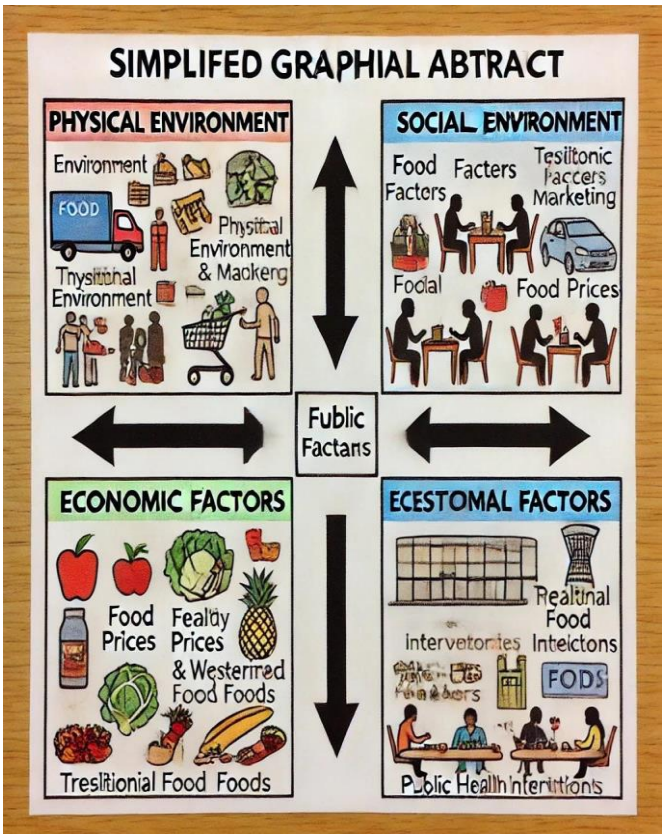
Graphical Abstract



1. Introduction

Eating behavior is a multifaceted process shaped by intrinsic factors such as genetics and psychology and extrinsic environmental factors. This review focuses on environmental influences on adults' eating behaviors, including physical availability, economic accessibility, social interactions, and cultural norms. Understanding these factors is crucial for developing comprehensive interventions to promote healthy eating. Globally, the population is aging rapidly, with the number of individuals aged 60 and older projected to double from 1.4 billion in 2015 to 2.1 billion by 2050 [1]. To address the challenges posed by an aging population, the World Health Organization emphasizes the importance of promoting the health and well-being of older adults [2]. One critical factor in this endeavour is fostering healthy eating habits, which are fundamental to healthy aging [3]. Studies indicate that maintaining nutritious eating behaviors can significantly reduce the prevalence of conditions such as cognitive decline and metabolic disorders, thereby lowering healthcare costs [4,5]. Additionally, healthy dietary practices have been linked to enhanced quality of life and improved overall health in older

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adults [6]. However, physical challenges or reduced appetite often lead to unhealthy eating patterns, increasing the risk of malnutrition in this demographic [7].

The environment plays a pivotal role in shaping sustainable diets by influencing food availability, choices, and behaviors. Ecosystems, which encompass interconnected elements such as plants, animals, microorganisms, water, soil, and humans, create the context for dietary decisions [8]. Any disruption within an ecosystem can affect its balance and sustainability, directly impacting food systems [9]. Urban and rural settings, for instance, differ in terms of access to diverse and nutritious foods due to factors like proximity to markets, local agricultural practices, and income levels. Marketing strategies and packaging also significantly affect consumer choices.

Dietary patterns have broader implications, including their impact on land and water use, biodiversity, and climate change [7,8]. These interconnections highlight the complexity of achieving sustainable diets that are healthy, affordable, accessible, and culturally appropriate. Alterations to one determinant of a sustainable diet can influence other factors, leading to potential unintended consequences [9].

Malnutrition poses severe risks to the health, independence, and quality of life of older adults, making it essential to identify factors that influence their eating behaviors. Immediate environmental elements, such as access to fresh produce, workplace meal options, and social interactions during dining, play a significant role in shaping dietary habits. Addressing these influences requires a multidisciplinary approach that combines urban planning, economic policies, and cultural awareness. By synthesizing findings from human trials and observational studies, it is possible to gain valuable insights into these environmental determinants and develop targeted health promotion strategies tailored to the needs of older adults [10,11].

It is essential to understand the factors influencing the eating habits of older adults to develop targeted health promotion strategies that cater to their specific needs. Studies have demonstrated that eating behaviors are significantly affected by the surrounding environment, including access to fresh produce in local neighbourhoods, the role of workplace dining options, and the impact of social interactions during meals. Addressing these environmental influences demands a comprehensive, multidisciplinary approach that integrates urban planning, economic frameworks, and cultural considerations.

Eating behavior is a multifaceted process shaped by intrinsic factors such as genetics and psychology and extrinsic environmental factors. This review focuses on environmental influences on adults' eating behaviors, including physical availability, economic accessibility, social interactions, and cultural norms. While previous studies have examined these influences individually, there remains a significant gap in synthesizing how these elements interact within diverse populations and settings. This review addresses these gaps by integrating findings on the interplay of physical, social, economic, and cultural factors that collectively shape dietary patterns. By exploring these interrelations, this review aims to provide a comprehensive framework for understanding and addressing dietary behaviors through targeted interventions.

Globally, the aging population poses unique challenges to nutrition and public health. The World Health Organization emphasizes the promotion of healthy eating habits as critical to combating malnutrition and reducing healthcare costs. However, existing literature often lacks a holistic analysis of how immediate environmental factors, such as access to fresh produce or the role of workplace meal options, influence eating behaviors in older adults. This review synthesizes findings from diverse human trials and observational studies to address these gaps and propose multidisciplinary strategies for promoting healthy eating habits.

2. The Role of Food Environments in Influencing Food Choices

In recent years, the concept of "food environments" has gained recognition as a significant factor affecting individuals' food choices. Swinburn et al. define the food environment as the collective physical, economic, policy, and sociocultural conditions that shape people's food selection and nutritional habits [12]. This concept encompasses a variety of elements, including physical,

social, economic, policy, and cultural environments, integrating aspects of the previously identified main categories of influences on food choice as shown in Fig.1. Research has attempted to adopt a more comprehensive perspective on food environments. For instance, one study proposed that food consumption is influenced by food preferences, which are shaped by food characteristics (e.g., taste, texture, and cost), individual traits (e.g., nutritional awareness, health attitudes), and environmental factors (e.g., seasonality, urbanization, and family size) [13]. Similarly, Rozin highlighted the interplay of biological (e.g., physiological and evolutionary), psychological (e.g., preferences and context), social, and cultural factors in shaping food choices [14].

It is widely acknowledged that food choices are impacted by social and environmental factors, such as family eating habits, food labeling, and personal food histories, as well as psychological aspects like perceived control and motivation [15]. Leng et al. explored determinants such as the appeal of certain foods, physiological processes (e.g., hunger and satiety mechanisms), cognitive-affective influences (e.g., stress, health attitudes, anxiety, and depression), genetic and familial traits, and cultural pressures [16].

Fig. 01 The key components, determinants, factors, and processes of a sustainable diet

Castro et al. examined the role of retail environments, identifying factors like shelf displays, branding, nutrition labeling, food sampling, pricing strategies, and customers' beliefs about taste and health. Additionally, they emphasized store environment characteristics, such as aisle size and layout, as important influences [17].

Bauer and Reisch further summarized that food decisions are shaped by an interplay of individual, social, and environmental factors, highlighting the complexity of food choice behavior [18].

2.1 Physical Environment

The physical environment plays a pivotal role in shaping dietary behaviors by influencing the availability, accessibility, and presentation of food options. This review explores how elements of the physical environment, including food deserts, food swamps, and workplace interventions, impact eating patterns and overall nutrition. Food deserts, areas with limited access to fresh produce or supermarkets, pose significant barriers to healthy eating. Research demonstrates that residents in these regions are less likely to consume fruits and vegetables, leading to poor nutritional outcomes [19]. Conversely, food swamps—zones dominated by calorie-dense, nutrient-poor fast food outlets—promote unhealthy eating behaviors [20]. Interventions, such as introducing supermarkets to underserved areas, have shown measurable improvements in access to healthier food options and subsequent dietary habits [21].

Environmental factors in workplaces and institutions also profoundly influence dietary choices. Interventions such as offering smaller portion sizes, nutritional labeling, and strategic meal presentation have been effective in encouraging healthier eating behaviors [22]. For example, reducing plate sizes has been shown to decrease calorie intake unconsciously, while clear labeling increases awareness of nutritional content and prompts healthier choices [23]. These findings underscore the potential for physical environment modifications to nudge individuals toward improved dietary patterns.

Environmental cues, including the arrangement of food items and meal presentation, significantly affect unconscious decision-making [24]. Simple strategies, such as placing healthier options at eye level, have been associated with increased consumption of fruits and vegetables. These insights emphasize the importance of intentional design in food environments to support public health objectives. The physical environment is a critical determinant of dietary behaviors. Addressing the challenges of food deserts and swamps while optimizing workplace and institutional settings can foster healthier eating patterns. Continued research and targeted interventions hold promise for leveraging the physical environment to improve nutrition and reduce diet-related health disparities.

2.2 Social Environment

Social interactions and norms significantly influence eating behaviors. Humans are inherently social beings, and their dietary choices often reflect the dynamics of their social environments. Social norms play a dual role in shaping dietary behaviors, encouraging either healthy or unhealthy eating. Salvy et al. (2007) observed a 48% increase in calorie consumption when participants dined with friends compared to eating alone [25]. Moreover, Higgs and Thomas (2018) found that exposure to normative messages favoring healthy eating boosted healthy snack selection by 40% [26]. Within family units, shared meals, parental modeling, and household food preferences exert a profound impact on dietary choices. Parents' prioritization of convenience over nutrition often leads to increased consumption of processed foods. Studies indicate that adults living in multi-generational households or with young children tend to have more imbalanced diets due to competing priorities [27]. The extensive knowledge about the nutritional and health benefits of food, particularly among smallholder producers and consumers, holds immense value. However, this knowledge is increasingly being lost due to changing con//sumption patterns, globalized marketing, and habitat degradation. These factors not only impact dietary practices but also influence traditional socio-cultural norms, either strengthening or diminishing them. Additionally, modern food production and consumption practices are exerting significant pressure on the natural environment, leading to disruptions in ecosystems and profoundly affecting dietary habits across the globe [30].

2.3 Economic Environment

Agriculture affects economic determinants of sustainable diets, as well. The income amount and the distribution of income of a population or a nation is also a major factor regarding the affordability of a diet [28,47]. Economic factors such as income levels, food prices, and marketing strategies profoundly influence dietary patterns. The high cost of fresh produce relative to processed foods disproportionately affects low-income populations, leading to poorer dietary quality. Pricing interventions, such as subsidies for healthy foods, have shown potential to mitigate this disparity.

Monsivais et al. (2022) found a 35% increase in fruit and vegetable purchases following a 25% price reduction [28]. Aggressive marketing of unhealthy foods, particularly through digital media, plays a significant role in shaping dietary preferences. Conversely, policies taxing sugary beverages, such as Mexico's sugar-sweetened beverage tax, led to an 11.4% reduction in purchases within two years [29].

2.4 Cultural Environment

Cultural norms and globalization also shape dietary habits, with traditional and modern influences often coexisting in tension. Cultural traditions dictate food preferences and meal structures, which can either promote or hinder healthy eating. Popkin et al. (2015) noted that cultural ties to traditional diets, rich in legumes and vegetables, acted as a protective factor against the global nutrition transition [30]. Globalization has facilitated a shift towards Westernized diets, characterized by high intakes of sugar, fat, and processed foods. This transition has been linked to rising obesity and metabolic disorders. In India, Misra et al. (2008) reported a 20% increase in calorie intake from fats over a decade, driven by the proliferation of fast foods [31].

3. Policy and Environmental Interventions

Policy-driven interventions targeting the environmental determinants of eating behavior are crucial for fostering sustainable dietary changes. Regulatory measures, such as mandatory front-of-pack labeling, empower consumers to make healthier choices. For instance, countries implementing these policies have observed significant shifts in consumer behavior towards lower-calorie options [32]. There is a pressing need to devise and implement innovative approaches for understanding, evaluating, and advancing sustainable diets and food systems in relation to human health and nutrition. It is essential to reconsider both the quantitative and qualitative aspects of how food is produced, processed, marketed, and consumed, ensuring that these practices align with the principles of sustainability and public health. [30,46].

Urban design can facilitate healthier eating by ensuring access to fresh produce markets and integrating urban agriculture into cityscapes. Walkable neighborhoods with strategically located food outlets encourage healthier dietary patterns [33].

Environmental factors, encompassing physical, social, economic, and cultural dimensions, profoundly influence eating behaviors in adults. Interventions targeting these factors have demonstrated varying degrees of success in promoting healthier eating. Policymakers must adopt multi-faceted approaches that address these determinants comprehensively. Future research should focus on evaluating the scalability and sustainability of these interventions, particularly in diverse and low-resource settings [44,45].

4. Studies on Environmental Factors and Eating Behaviors: Evidence from Human Trials

Research on environmental factors influencing eating behaviors has increasingly relied on human trials to provide causal evidence. This section highlights key studies investigating the impact of physical, social, economic, and cultural factors on dietary habits in Table 1.

Traditionally, nutrition research has centered on specific nutrients, addressing deficiencies, and examining the health impacts of particular foods or food groups. However, recent efforts and studies have shifted towards examining entire diets and their implications for human health, the environment, and food systems. In 2010, the FAO spearheaded an initiative to establish a consensus definition of “sustainable diets.” According to this definition, sustainable diets are those that have minimal environmental impact while ensuring food and nutrition security and promoting healthy lives for both current and future generations. These diets prioritize biodiversity and ecosystem protection, cultural acceptance, accessibility, economic fairness, affordability, nutritional adequacy, safety, and health, while making optimal use of natural and human resources. [47].

Interventions and Programs

Efforts to improve nutritional health and dietary behaviors require well-designed interventions and programs tailored to various settings and populations. Below are examples of practical interventions that address accessibility, behavior change, and economic incentives, demonstrating measurable success in promoting healthier eating habits [48].

1. Urban Agriculture Programs

Urban agriculture initiatives, such as community gardens and urban farming projects, have been instrumental in addressing food insecurity, particularly in urban areas known as "food deserts," where access to fresh produce is limited [50]. By converting vacant lots

and underutilized spaces into community gardens, these programs enable residents to grow their own fruits and vegetables. Studies show that participants in urban agriculture programs significantly increase their consumption of fresh produce. Beyond the direct health benefits, these programs foster a sense of community, reduce food costs, and promote environmental sustainability. For example, a study on community

Table 1: Summary of Key Findings from Human Trials on Environmental Factors and Eating Behaviors

Factor	Study	Intervention	Results
Physical	Ghosh-Dastidar et al. (2017)	Introduction of supermarkets	+12% fruit intake, +8% vegetable intake [34]
	Mendes et al. (2020)	Portion size reduction	-21% calorie intake per meal [35,41]
Social	Salvy et al. (2007)	Social setting variation	+48% calorie intake with friends [36,42]
	Higgs and Thomas (2018)	Peer norm exposure	+40% healthy snack selection [37,43]
Economic	Colchero et al. (2017)	Sugar-sweetened beverage tax	-11.4% SSB purchases in year two【38】
	Monsivais et al. (2012)	Price discounts on fresh produce	+35% fruit and vegetable purchases【39】
Cultural	Popkin et al. (2015)	Urbanization and cultural shifts	+40% processed food intake, -30% traditional food intake【40】
	Misra et al. (2008)	Globalization's impact on dietary transition	+20% calorie intake from fat【41】

gardens in low-income urban neighborhoods found a 30% increase in participants' daily fruit and vegetable intake [48][49].

2. School-Based Nutritional Policies

Schools are pivotal environments for instilling lifelong healthy eating habits. Nutritional programs in educational settings often involve subsidized meal plans rich in fruits, vegetables, whole grains, and lean proteins. Simultaneously, policies restrict access to unhealthy, processed, and sugar-laden foods, ensuring that students are exposed to better dietary choices. These interventions have demonstrated long-term benefits. For instance, children participating in school meal programs with enhanced nutritional guidelines were found to have improved dietary habits extending into adulthood [51]. In Finland, a school lunch program emphasizing fresh produce and whole foods led to measurable reductions

in childhood obesity rates over a decade. Additionally, students reported improved concentration and academic performance, linking nutrition to cognitive outcomes [52].

3. Workplace Nutritional Interventions

Given that many adults consume a significant portion of their meals at work, workplace-based interventions offer a practical avenue to encourage healthier eating. Common strategies include reducing portion sizes in cafeterias, implementing clear nutritional labeling on food items, and reorganizing food displays to make healthier options more prominent. These measures have been shown to nudge employees toward making better food choices. A case study from a large corporate office revealed a 20% increase in the selection of low-calorie meals when portion sizes were adjusted and calorie information was displayed prominently. Such interventions not only improve employees' health outcomes but also contribute to reduced absenteeism and higher productivity[50,51].

4. Economic Interventions

Economic tools, such as subsidies and taxes, can shift consumer behavior on a broader scale by making healthy options more affordable and unhealthy options less appealing. Examples include subsidies on fresh fruits and vegetables and taxes on sugar-sweetened beverages (SSBs).

Economic incentives have shown remarkable success globally. For example: Mexico's Sugar-Sweetened Beverage Tax: Introduced in 2014, this 10% tax resulted in an 11.4% reduction in purchases of sugary drinks within two years, with a more pronounced decline among lower-income households. Subsidies on Fresh Produce: Studies reveal that reducing the price of fruits and vegetables by 10-30% increases their consumption by 20-35%. Such programs, when implemented alongside educational campaigns, amplify the effect by raising awareness about the benefits of healthy eating [51]. These interventions and programs showcase the potential for strategic action in addressing dietary behaviors across different settings. Whether through urban agriculture, school policies, workplace strategies, or economic incentives, each approach plays a critical role in building healthier communities. Moreover, the integration of these strategies into broader public health frameworks ensures long-lasting and sustainable improvements in nutritional health.

Conclusions

Environmental factors play a significant role in shaping adults' eating behaviors. Interventions that alter the physical, social, economic, and cultural environments can promote healthier eating habits. Policymakers and public health officials should incorporate environmental considerations into dietary recommendations and health interventions. Many studies reviewed were limited by small sample sizes or a lack of representation across socioeconomic and geographic strata. This limitation reduces the generalizability of findings to broader populations. A significant proportion of studies were conducted in high-income countries, which may not accurately reflect the challenges faced in low- and middle-income nations. Short-term studies often fail to capture the long-term sustainability and effectiveness of interventions, underscoring the need for longitudinal research. Cultural norms significantly influence eating behaviors, yet many studies fail to account for regional dietary practices and their implications for intervention success. Further research is needed to evaluate the long-term effectiveness of such environmental interventions across diverse populations. The reviewed research highlights subtle seasonal variations in the suitability of certain foods, along with more noticeable shifts in food aroma and flavor preferences, as well as consumption behaviors, depending on the time of year. These findings underscore the influence of seasonal factors on dietary choices and eating habits. By addressing these challenges, future efforts can enhance the impact of dietary interventions, reduce diet-related health disparities, and contribute to the development of sustainable food systems.

References

1. United Nations: World Population Ageing: 1950–2050. New York: United Nations; 2002.
2. Lloyd-Sherlock P, Kalache A, Kirkwood T, et al. Who's proposal for a decade of healthy ageing. Lancet. 2019;394(10215):2152–3. DOI: 10.1016/s0140-6736(19)32522-x.
3. Sadana R, Blas E, Budhwani S, et al. Healthy ageing: raising awareness of inequalities, determinants, and what could be done to improve health equity. Gerontologist. 2016;56(Suppl 2):178–93. DOI: 10.1093/geront/gnw034.
4. Lesáková D. Health perception and food choice factors in predicting healthy consumption among elderly. Acta Universitatis Agriculturae et Silviculturae Mendelianae Brunensis. 2018;66(6):1527–34.

5. Robinson SM. Improving nutrition to support healthy ageing: what are the opportunities for intervention? Proc Nutr Soc. 2018;77(3):257–64. DOI: 10.1017/s0029665117004037.
6. Govindaraju T, Sahle BW, McCaffrey TA, et al. Dietary patterns and quality of life in older adults: a systematic review. Nutrients. 2018;10(8):971. DOI: 10.3390/nu10080971.
7. Zaragoza-Martí A, Ferrer-Cascales R, Hurtado-Sánchez JA, et al. Relationship between adherence to the mediterranean diet and health-related quality of life and life satisfaction among older adults. J Nutr Health Aging. 2018;22(1):89–96. DOI: 10.1007/s12603-017-0923-2.
8. Drewnowski A, Shultz JM. Impact of aging on eating behaviors, food choices, nutrition, and health status. J Nutr Health Aging. 2001;5(2):75–9. PMID: 11426286
9. Fávaro-Moreira NC, Krausch-Hofmann S, Matthys C, et al. Risk factors for malnutrition in older adults: a systematic review of the literature based on longitudinal data. Adv Nutr. 2016;7(3):507–22. DOI: 10.3945/an.115.011254.
10. Leslie W. Improving the dietary intake of frail older people. Proceedings of the Nutrition Society. 2011;70(2):263–7. DOI: 10.1017/S0029665111000036
11. Di Francesco V, Fantin F, Omizzolo F, et al. The anorexia of aging. Dig Dis. 2007;25(2):129–37. DOI: 10.1159/000099477.
12. Swinburn B, Sacks G, Hall KD, McPherson K, Finegood DT, Moodie ML, et al. The global obesity pandemic: Shaped by global drivers and local environments. Lancet. 2011;378(9793):804–14.
13. Kearney J. Food consumption trends and drivers. Philos Trans R Soc Lond B Biol Sci. 2010;365(1554):2793–807. DOI: 10.1098/rstb.2010.0149.
14. Rozin P. The integration of biological, social, cultural and psychological influences on food choice. In: Shepherd R, Raats M, editors. The Psychology of Food Choice. Wallingford: CABI; 2006. p. 19–39. DOI: 10.1079/9780851990323.0019.
15. Stok FM, De Vet E, de Ridder DTD, De Wit JB. The potential of peer social norms to shape food intake in adolescents and young adults: A systematic review of effects and moderators. Health Psychol Rev. 2017;11(2):146–60. DOI: 10.1080/17437199.2016.1155161.
16. Leng G, Adan RAH, Belot M, Brunstrom JM, De Graaf K, Dickson SL, et al. The determinants of food choice. Proc Nutr Soc. 2017;76(3):316–27. DOI: 10.1017/S002966511600286x.
17. Castro IA, Majmundar A, Williams CB, Baquero B. Customer decision-making at grocery stores: Promoting healthy choices through shelf design, nutrition labels, and price incentives. Curr Obes Rep. 2020;9(4):432–41. DOI: 10.3390/ijerph15112493.
18. Bauer JM, Reisch LA. Behavioural insights and (un)healthy dietary choices: A review of current evidence. J Consum Policy. 2019;42(1):3–45. DOI: 10.1007/s10603-018-9387-y.
19. Ghosh-Dastidar B, Cohen DA, Hunter GP, Zenk SN, Huang C, Beckman R, et al. Distance to store, food prices, and obesity in urban food deserts. Am J Prev Med. 2017;52(1S1):S74–82. DOI: 10.1016/j.amepre.2014.07.005.
20. Mendes A, Cardoso R, Viana J, et al. Portion size reductions in workplace cafeterias: a controlled intervention trial. Public Health Nutr. 2020;23(3):502–10.
21. Wansink B, van Ittersum K. Portion size me: plate-size induced consumption norms and win-win solutions for reducing food intake and waste. J Exp Psychol Appl. 2016;22(1):37–46. DOI: 10.1037/a0035053.
22. Thorndike AN, Sonnenberg L, Riis J, Barraclough SJ, Levy DE. A 2-phase labeling and choice architecture intervention to improve healthy food and beverage choices. Am J Public Health. 2014;104(3):527–33. DOI: 10.2105/AJPH.2011.300391.
23. Salvy SJ, Coelho JS, Kieffer E, Epstein LH. Effects of social contexts on overweight and normal-weight children's food intake. Int J Obes (Lond). 2007;31(6):930–7. DOI: 10.1016/j.physbeh.2007.06.014.
24. Higgs S, Thomas J. Social influences on eating. Curr Opin Behav Sci. 2016;9:1–6. DOI: 10.1007/978-3-030-14504-0_27.
25. Higgs S, Thomas J. Peer and social influence on eating behavior: a systematic review. J Acad Nutr Diet. 2018;118(4):688–704.
26. Monsivais P, Aggarwal A, Drewnowski A. Are socioeconomic disparities in diet quality explained by diet cost? J Epidemiol Community Health. 2012;66(6):530–5. DOI: 10.1136/jech.2010.122333.
27. Colchero MA, Rivera-Dommarco J, Popkin BM, Ng SW. In Mexico, evidence of sustained consumer response two years after implementing a sugar-sweetened beverage tax. Health Aff (Millwood). 2017;36(3):564–71. DOI: 10.1377/hlthaff.2016.1231
28. Popkin BM, Adair LS, Ng SW. Global nutrition transition and the pandemic of obesity in developing countries. Nutr Rev. 2012;70(1):3–21. DOI: 10.1111/j.1753-4887.2011.00456.x
29. Misra A, Singhal N, Khurana L. Obesity, the metabolic syndrome, and type 2 diabetes in developing countries: role of dietary fats and oils. J Am Coll Nutr. 2010;29(3 Suppl):289S–301S. DOI: 10.1080/07315724.2010.10719844
30. Walker RE, Keane CR, Burke JG. Disparities and access to healthy food in the United States: A review of food deserts literature. Health Place. 2010;16(5):876–84. DOI: 10.1016/j.healthplace.2010.04.013
31. Beaulac J, Kristjansson E, Cummins S. A systematic review of food deserts, 1966-2007. Prev Chronic Dis. 2009;6(3):A105.
32. Story M, Kaphingst KM, Robinson-O'Brien R, Glanz K. Creating healthy food and eating environments: policy and environmental approaches. Annu Rev Public Health. 2008;29:253–72. DOI: 10.1146/annurev.publhealth.29.020907.090926
33. Swinburn BA, Caterson I, Seidell JC, James WP. Diet, nutrition and the prevention of excess weight gain and obesity. Public Health Nutr. 2004;7(1A):123–46. DOI: 10.1079/PHN2003585
34. Drewnowski A, Darmon N. The economics of obesity: dietary energy density and energy cost. Am J Clin Nutr. 2005;82(1 Suppl):265S–273S. DOI: 10.1093/ajcn/82.1.265S
35. Monsivais P, McLain J, Drewnowski A. The rising disparity in the price of healthful foods: 2004–2008. Food Policy. 2010;35(6):514–20. DOI: 10.1016/j.foodpol.2010.06.004
36. Harris JL, Pomeranz JL, Lobstein T, Brownell KD. A crisis in the marketplace: how food marketing contributes to childhood obesity and what can be done. Annu Rev Public Health. 2009;30:211–25. DOI: 10.1146/annurev.publhealth.031308.100304
37. Scarborough P, Appleby PN, Mizdrak A, Briggs AD, Travis RC, Bradbury KE, et al. Dietary greenhouse gas emissions of

meat-eaters, fish-eaters, vegetarians, and vegans in the UK. Clim Chang. 2014;125(2):179–92. DOI: 10.1007/s10584-014-1169-1
38. Sallis JF, Floyd MF, Rodríguez DA, Saelens BE. Role of built environments in physical activity, obesity, and cardiovascular disease. Circulation. 2012;125(5):729–37. DOI: 10.1161/CIRCULATIONAHA.110.969022
39. Larson NI, Story MT, Nelson MC. Neighborhood environments: disparities in access to healthy foods in the U.S. Am J Prev Med. 2009;36(1):74–81. DOI: 10.1016/j.amepre.2008.09.025
40. Vermeer WM, Steenhuis IH, Poelman MP. Small portion sizes in worksite cafeterias. Int J Behav Nutr Phys Act. 2010;7:43.
41. Wansink B, van Ittersum K. Reducing portion size reduces intake: A meta-analytic review of portion-size effects. Obes Rev. 2017;18(4):361–71.
42. Zlatevska N, Dubelaar C, Holden SS. Sizing up the effect of portion size on consumption: a meta-analytic review. J Mark. 2014;78(3):140–54. DOI: 10.1509/jm.12.0303
43. Geier AB, Rozin P, Doros G. Unit bias: A new heuristic that helps explain the effect of portion size on food intake. Psychol Sci. 2006;17(6):521–5. DOI: 10.1111/j.14679280.2006.01738.x
44. Altieri MA, Nicholls CI. Agroecology and the design of climate change-resilient farming systems. Agron Sustain Dev. 2015;35(3):869–90. DOI: 10.1007/s13593-015-0285-2
45. Gabriel AS, Ninomiya K, Uneyama H. The role of the Japanese traditional diet in healthy and sustainable dietary patterns around the world. Nutrients. 2018;10(2):173. DOI: 10.3390/nu10020173
46. Hendrie GA, Ridoutt BG, Wiedmann TO, Noakes M. Greenhouse gas emissions and the Australian diet—comparing dietary recommendations with average intakes. Nutrients. 2014;6(1):289–303. DOI: 10.3390/nu6010289
47. Johnston JL, Fanzo JC, Cogill B. Understanding sustainable diets: a descriptive analysis of the determinants and processes that influence diets and their impact on health, food security, and environmental sustainability. Adv Nutr. 2014;5(4):418–29. DOI: 10.3945/an.113.005553
48. Lin BB, Bichier P, Liere H, Egerer M, Philpott SM, Jha S. Community gardens support high levels of food production, but benefit distribution is uneven across the gardener community. Sustainability Science. 2024 Nov;19(6):2013-26. DOI: 10.1007/s11625-024-01558-7
49. Health Begins. Community gardens: Evidence assessment. 2024 Oct [cited 2025 Jan 6]. Available from: https://healthbegins.org/wp-content/uploads/2024/10/Community-Gardens-Evidence-Assessment.
50. Chatterjee P, Nirgude A. A Systematic Review of School-Based Nutrition Interventions for Promoting Healthy Dietary Practices and Lifestyle Among School Children and Adolescents. Cureus. 2024 Jan;16(1). DOI: 10.7759/cureus.53127
51. Billings KC. USDA's Latest Update to Nutrition Standards for School Meals. CRS Report R47522, Version 4. Updated. Congressional Research Service. 2024 May 31.