# How does the food environment shape our food choices?

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## *« What you see is what you get! »*

A simple one-liner that perfectly reflects reality when it comes to accessibility of (un)healthy food products in relation to health behaviors. The home environment, schools, neighborhoods and broader communities all provide access to food choices, while the 'media environment' guides us towards these choices. Looking at the food environment as a whole rather than 'isolated' settings is crucial and crossing borders is key to create food environments that enable people to increase their fruit and vegetable intake and reduce their intake of unhealthy food products.

In this issue of The Global Fruit & Veg Newsletter three very relevant articles are highlighted.

- In his review, Folkvord aimed to reinforce the message of how children and adolescents react to food promotions and how food promotional efforts might be a useful tool to increase the attractiveness of fruit and vegetables, in order to change our food environment from an obesogenic to a healthier environment.
- Kegler clearly pointed out the importance of availability and accessibility of fruit and vegetables in the home environment. More access is related to and increased consumption of these products.
- Finally, the article of Matsuzaki focused on the school food environment. Findings showed that access to unhealthy food products in the broader school environment, e.g. access to fast food outlets, is associated with an increased prevalence of obesity among students.

Enjoy reading, take advantage of the outcomes of these studies, and let's make healthy choices accessible for everyone.

# Influencing for the good: Promoting fruit and vegetable consumption could improve children's food intake and reverse the obesogenic food environment

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*Children's media environment is full of representations of unhealthy and energy-dense food products, having harmful effects on children's eating behavior. In addition, mounting evidence suggests that when food is positively shown in advertising then this product is significantly more likely to be a non-core, unhealthy food, compared to a fruit or vegetable . Nowadays, the YouTube videos of influencers, that are extremely popular among young people, have been found to often feature unhealthy food cues, described positively with reference to social contexts. As a consequence, the majority of children worldwide do not consume the recommended amount of fruit and vegetables (Folkvord, 2016; Matthes, 2019).*

The main aim of this review is to reinforce the message of how children and adolescents react to food promotions and how food promotional efforts might be a useful tool to increase the attractiveness of fruit and vegetables, in order to change our food environment from an obesogenic to a healthogenic environment.

## Products high in fat, sugar and salt account for 65-80% of all food marketing

There is ample evidence that the presentation of unhealthy foods is connected to children's and adolescents' unhealthy food choices. Particularly young children and adolescents might be vulnerable to long-term negative effects of unhealthy food promotion as they are exposed to extensive marketing efforts on social media and are not typically covered by regulatory efforts. Unhealthy foods have higher intrinsically rewarding properties that make them more "wanted" and "liked" than fruit and vegetables, thereby inducing unhealthy eating behavior among children and reducing their intake of healthier foods. Additionally, promotion for unhealthy foods is omnipresent and increases the rewarding value of these foods. Studies consistently found that products high in fat, sugar and salt (HFSS) were the main type of products advertised in media popular with children. According to content analyses, HFSS products account for 65-80% of all food marketing in digital media (including social media) which is currently children's preferred media. In addition, studies have indicated that the majority of foods promoted by influencers are classified as being unhealthy, and that this marketing significantly impacts young people's food consumption. The World Health Organization asserts that the promotional strategies used in the pervasive and persuasive marketing of HFSS foods contribute significantly to the childhood obesity crisis (WHO, 2019).

## Promoting fruit and vegetable consumption could improve their intake among children

A limited amount of research suggest that it is challenging to increase fruit and vegetables intake among children, especially over the long term. Fruit and vegetables are less intrinsically rewarding than HFSS foods, considering the automatic physiological (e.g., saliva, increased activation in brain areas related to reward and food motivation systems) and psychological (e.g., craving, hunger, liking and wanting) reactivity that HFSS foods induce. Additionally, the food industry uses incessant, sophisticated, and personalized advertising to effectively increase the hedonic and rewarding value of HFSS foods by modifying attitudes, emotions, intentions, and ultimately consumption behavior, while these strategies are lacking to promote fruit and vegetables. Nonetheless, several studies have shown that exposure to fruit and vegetables can be stimulated by simply exposing children at a very young age.

Therefore, there is an urgent need to systematically test novel and effective methods to make fruit and vegetables more appealing and increase the intake among children through influencing for the good in order to improve children's eating behavior. While there are many strategies involved in making them desirable for children, for instance health-literacy programs in schools, or parents' communication strategies and feeding practices, a whole-systems approach is often cited as being fundamental to creating an environment whereby the healthy choice is the easy choice. While the personal environment, and thus family practices, are crucial to the socialization of a health-promoting environment, this is an area that is difficult to intervene in directly.

## Creating a World where the healthy choice the easy one

Interventions from the public sphere are needed to create a health-promoting environment that also affect the private space. For example, in addition to a ban on unhealthy food marketing, radical interventions on price, product composition, labelling and the availability of junk food are needed to see an impact. Recently, the COVID-19 pandemic has highlighted the importance of a healthy food environment. The current globalized food system cannot sustainably promote healthy people and a healthy planet without significant actions being implemented.

## KEY MESSAGES

- Reducing the marketing of energy-dense snacks to children and increasing the promotion of healthier foods, such as fruit and vegetables, may be an effective and necessary instrument to improve the dietary intake of children and reduce the risk of their experiencing some chronic diseases later in life.
- Changing the advertising and media environment of children and adolescents could help create a world where the healthy choice is the easier choice, which would reduce childhood obesity and improve children's health, as well as to make the food system more sustainable.

Based on: *Folkvord, F., Naderer, B., Coates, A., & Boyland, E. (2022). Promoting Fruit and Vegetable Consumption for Childhood Obesity Prevention. Nutrients, 14(1), 157.*

References:


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- Matthes, J.; Naderer, B. Sugary, fatty, and prominent: Food and beverage appearances in children' s movies from 1991 to 2015. Pediatric Obes. 2019, 14, e12488.

# Associations between home food environment and overweight/obesity among U.S. adults

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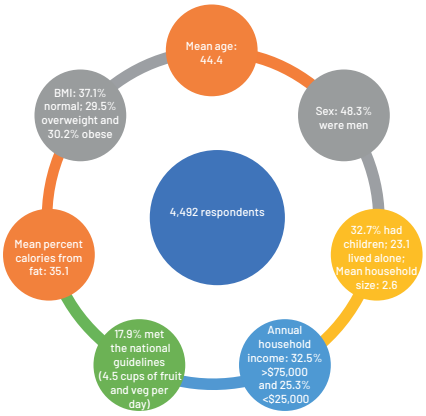
*U.S. Dietary Guidelines are not met by most Americans which makes identifying levers to improve diet a public health priority (USDA, 2020). With the majority of food being consumed at home, although this proportion has declined in recent decades, home is considered an immediate environment that may influence Americans eating behaviour (Lin, 2012). A number of studies have examined one or two aspects of the food environment such as food availability or the frequency of shared family meals (Bruening, 2017; Quick, 2017; Grant, 2017; Chai, 2018), but few have analyzed the full set of home environment characteristics and their possible association with weight and diet quality.*

Thus, the following study examined the association between eleven dimensions of the home food environment (see methodology) among a national sample of U.S. adults and diet quality and overweight/obesity.

## Characteristics of the respondents

Figure 1 below describes the characteristics of the survey respondents.




## More diverse fruit and vegetable availability was associated with an increased likelihood meeting the recommended fruit and vegetable intake guidelines and lower odds of overweight/ obesity

Results reported an association between seven of 11 features of the home food environment with meeting national guidelines for fruit and vegetable intake and only two were directly associated with overweight/obesity.

A greater variety of fruit and vegetables available in home was associated with an increased likelihood of meeting the recommended fruit and vegetable intake guidelines. It was also associated with lower odds of overweight/obesity. These findings are consistent with other studies showing associations between fruit and vegetable inventory and their intake among children (Callender, 2017; Bryant, 2011; Ding, 2012) and adults (Gichunge, 2016). Frequency of shopping for fruit was also associated with fruit and vegetable intake.

However, surprisingly, results showed that a greater variety of fruit and vegetables available in the home was associated with increased percent energy from fat.

Other components of home food inventory, such as the availability of salty snacks/sweets and less healthy beverages, were associated an increased level of percent calories from fat, and surprisingly, salty snacks were associated with an increased likelihood of meeting fruit and vegetable intake.

## Food placement and healthier meal preparation were associated with decreased percent calories from fat and increased likelihood of meeting national fruit and vegetable guidelines

Food placement was estimated by asking participants how often fruits, vegetables, and high calorie snack foods are kept in a place where they are easily seen and reached (5-point scale from never to almost always). According to this study, this feature was associated with decreased percent calories from fat and increased likelihood of meeting national fruit and vegetable guidelines.

In addition, healthier meal preparation, but also increased frequency of restaurant food for family meals, were associated with increased likelihood of meeting fruit and vegetable intake guidelines. Healthier meal preparation was also associated with a lower level of energy from fat, while restaurant food for family meals was associated with higher percent energy from fat.

Finally, eating family meals and snacks with the TV on was associated with both increased percent intake from fat and odds of overweight/obesity.

## KEY MESSAGES

- Numerous dimensions of the home food environment, including food and beverage availability and variety, food placement, meal preparation, frequency of shopping, serving restaurant meals, and TV and eating practices, were associated with diet quality.
- A greater diversity of fruit and vegetable was associated with lower odds of overweight/ obesity, while more frequent family eating while watching TV was associated with an increased odd.
- Targeting these dimensions of the home food environment may be a promising approach for future intervention research.

## METHODOLOGY

- A national sample of U.S. adults aged 18 to 75 was recruited from an online survey panel.
- In this cross-sectional study, participants (n = 4,942) reported on the following eleven dimensions of the home food environment:
  - o foods available in the home including fruit and vegetables, salty snacks/sweets, and less healthy beverages,
  - o food placement,
  - o shopping practices for fruits and vegetables,
  - o food preparation,
  - o portion control methods,
  - o family meals from restaurants,
  - o family household practices around TV and eating,
  - o presence of a TV in the dining area,
  - o ownership of a scale.
- Self-reported height and weight, fruit and vegetable intake, and percent calories from fat were also assessed.
- Regression models were realized to examine which dimension of the home food environment were associated with meeting national guidelines for fruit and vegetable intake, percent calories from fat and overweight/obesity (adjusted for age, gender, race, income, and type of neighborhood).

**Based on:** Kegler MC, Hermstad A, Haardörfer R. Home food environment and associations with weight and diet among U.S. adults: a cross-sectional study. BMC Public Health. 2021;21(1):1032.

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# Food environment near school and body weight by demographic and socioeconomic subgroups

*With more than 340 million children and adolescents being overweight or obese in 2016 (WHO, 2021), childhood obesity has become a public health crisis around the world. Children suffering from obesity are more likely to develop a variety of health problems as adults such as cardiovascular disease, insulin resistance, musculoskeletal disorders, some cancers, disability, and mental disorders. Numerous studies highlight the role of the food environments near schools in shaping children's dietary behaviors and body weight. A previous systematic review reported associations between the presence of fast-food outlets near schools and childhood obesity, but the associations by race/ethnicity, gender and income level have not been previously synthetised (Williams, 2014).*

Therefore, this review evaluated the existing evidence on the associations between the food environments (examining the presence of fast-food outlets, convenience stores, supermarkets, and grocery stores) near schools and obesity by demographic and socioeconomic subgroups.

## Fast food outlets near schools were associated with obesity among Latino students and in all school grades

Fast-food outlets were mostly examined with twelve studies reporting results on their availability near schools and weight status.

There was consistent evidence of positive associations between greater availability of fast-food outlets near schools and obesity among Latino students with three studies reporting clear evidence (Currie, 2010; Grier, 2013; Sanchez, 2012). For other racial/ethnic groups (African American, White, and Asian), the magnitudes, directions of the effects, and the strengths of evidence were less consistent. For example, among White students, two studies showed weak to moderate of evidence for positive association (Currie, 2010; Sanchez, 2012) while one study showed a negative one between distance to fast food outlets and weight status (Grier, 2013).

Positive associations were also consistent between obesogenic food environments near schools and weight status across students in all school grades, though the strengths of evidence varied. Potentially large effects could be seen for children in younger grades.

In the gender-stratified analysis, there was some variation in the evidence of association between fast-food outlets near schools and weight status. Two studies from California found positive association for both boys and girls (Currie, 2010; Sanchez, 2012), one study from Taiwan saw stronger evidence for boys while a study from Korea showed stronger evidence for girls (Park, 2013; Chiang, 2011).

When stratified by socioeconomic status, some evidence suggested greater positive associations between food environments near schools and obesity among children and school-neighborhoods at lower socioeconomic status.

## Convenience stores near schools were associated with obesity among Latino and African American students

Eight studies investigated convenience store availability near schools and weight status. Three studies reported generally positive associations between convenience stores and obesity among Latino and African American students (Langellier, 2012; Powell, 2007; Sanchez, 2012), while mixed associations were noted among White and Asian children. Concerning associations by school grades, weak evidence reported that greater availability of convenience stores within 0.5 mile radius of a school was associated with higher prevalence of overweight/obesity among 5th and 7th grade students, while no clear evidence of association was observed among 9th grade students (Powell, 2007).

## Supermarkets and grocery stores were less commonly studied

A smaller set of studies examined influences of grocery stores (n=3) (Park, 2013; Powell, 2007; Harrison, 2011) and supermarkets (n=3) (Powell, 2007; Leatherdale, 2011; Williams, 2015). According to this review, there were negative associations between grocery stores/supermarkets and weight status in some subgroups. However, much fewer studies examined such associations, thus, the evidence for associations on these specific food outlets in subgroups remains unclear.

However, longitudinal studies are needed to better understand causal mechanisms of the effects of food environment near schools on weight status within each subgroup.

## KEY MESSAGES

- Fast food outlets were most commonly examined.
- Positive associations were seen between fast food outlets near schools and obesity with consistent evidence among Latino children as well as children in all grade levels, with potentially large effects for children in younger grades.
- Additional studies are needed to evaluate whether the presence of supermarkets, convenience and grocery stores near school may influence childhood obesity.

## METHODOLOGY

- PubMed and Scopus were used to identify studies (in English) between 1980 and 2019 examining presence of fast-food outlets, convenience stores, supermarkets, and grocery stores near schools and estimates overweight/obesity by race/ethnicity, gender, grade (elementary, middle, or high schools between ages 6 to 18), and income level.
- Twelve cross-sectional and two ecological studies were included with data from U.S. (national, Los Angeles, and Minnesota), Canada (Ontario), Korea (Seoul), Taiwan (national), Finland (national), and England (national and Norfolk County).
- The modified version of the Quality Assessment Tool for Observational Cohort and Cross-Sectional Studies from the National Heart, Lung, and Blood Institute was used to evaluate the quality of the selected articles.

**Based on:** Matsuzaki M, et al. Food environment near schools and body weight-A systematic review of associations by race/ethnicity, gender, grade, and socio-economic factors. Obes Rev. 2020;21(4):e12997.

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## Assessment of a Fruit and Vegetable Prescription Program in the Northern Manhattan Community

American researchers evaluated the effectiveness of an intervention that consists of prescribing fruit and vegetables in addition to nutritional monitoring. Nearly 250 patients who referred to Nutrition at a medical center in New York between June and November 2019 received for produce at local Greenmarkets to purchase fruit and vegetables ($20 for patients with food insecurity and $10 for others). The evaluation of this intervention shows that people with food insecurity and those with high hemoglobin A1c used these prescriptions more than others, showing that the action is reaching its target audience. The main common barriers to using these prescriptions were distance, lack of time and forgetting or losing the prescription.

Abel D, et al. Am J Health Promot. 2022 Mar 24:8901171221076778.

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## Cruciferous vegetable consumption and multiple health outcomes: an umbrella review of 41 systematic reviews and meta-analyses of 303 observational studies

An umbrella review (41 meta-analyses of 303 individual studies, involving nearly 14 million participants) examined the evidence for the health benefits of cruciferous vegetable consumption. Their role was assessed for 24 health outcomes, including cancers (n = 23), cardiovascular disease (n = 12), mortality (n = 5) and metabolic diseases (n = 1). According to the authors, cruciferous vegetables consumption is associated with protective effects against 3 cancers (stomach, lung, endometrium) and all-cause mortality. Further studies are needed to confirm these results and to analyze the effects on other pathologies

Li YZ, et al. Food Funct. 2022 Mar 30. doi: 10.1039/d1fo03094a.

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## What makes interventions aimed at improving dietary behaviours successful in the secondary school environment? A systematic review of systematic reviews

Researchers in the UK systematically reviewed evidence from 13 systematic reviews of interventions to improve eating behaviours and reduce waste in secondary schools (aged 11–18) published between 2000 and 2020. This work identified the key characteristics of interventions to improve adolescents' food choices and reduce food waste. The approaches that appear to be most relevant are those that combine education and environmental restructuring, incorporation of computer-based feedback, media or messaging, peer and/or parent involvement, an increase in the availability of healthy foods, and the use of behavioural theory as a core component of the intervention. However, the types of interventions that specifically contributed to a reduction in sugar-sweetened beverage consumption or an increase in fruit and vegetable consumption could not be determined.

Capper TE, et al. Public Health Nutr. 2022 Mar 31:1-50.

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## Stress eating: an online survey of eating behaviours, comfort foods, and healthy food substitutes in German adults

This online study was conducted during the Covid-19 pandemic (2021) among a panel of German adults (n=1,234) to identify foods consumed during stress (comfort foods), as well as foods considered as healthy alternatives. Almost half of the participants (80.6% women, average age 31, average BMI 23.4 kg/m2) identified themselves as stress-eaters. Nearly 2 out of 3 people reported eating «very often more than usual» in subjective stress situations. Chocolate and coffee are the most consumed products in stress situations, with 48% and 46% of participants respectively having declared to consume them often or very often. Fresh fruit was the most frequently cited as healthy alternative to chocolate (74%) and biscuits (64%), while tea (without added sugar) was the most frequently mentioned as substitute for coffee (64%).

Gemesi K, et al. BMC Public Health. 2022;22(1):391.

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## Maternal diet quality during pregnancy and its influence on low birth weight and small for gestational age: a birth cohort in Beijing, China

A recent cohort study examined the dietary quality of 3,856 pregnant women and its relationship to the prevalence of low birth weight and small for gestational age. In the first two trimesters, more than 80% of the participants had inadequate intakes of vegetables (87.3% and 86.6%), dairy products (95.9% and 96.7%) and seafood (80.5% and 85.3%), while inadequate fruit intake was much higher in the 2nd trimester (85.2%) than in the first (22.5%). After adjusting for potential confounders, consumption of fruit and dairy products in the second trimester was associated with a reduced risk of low birth weight and small for gestational age.

Yang W, et al. Br J Nutr. 2022 Mar 7:1-34.