

# Predatory Food and Beverage Marketing: *A Scan of the Literature*

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## Abstract

Over the past couple of decades, research on food marketing, both academic and corporate, has rapidly expanded. Yet, despite the significant theoretical advances in marketing research, to date, predatory food and beverage marketing (PFBM) practices and policy measures have received only limited attention. To draw lessons and help chart this emerging field of work, this review used the existing literature to seek answers to three main questions: How is predatory food and beverage marketing being defined? What research approaches have been used to document predatory food & beverage marketing practices? And, what strategies and policies have been used to limit or prevent predatory marketing by multinational food and beverages industries and with what outcomes?

The review of peer-review publications on the topic revealed that while, at present, there is no single unified definition of PFBM, common characteristics of PFBM practices include the misleading, aggressive, emotional, and pervasive marketing of unhealthy products at certain populations for whom existing health disparities are likely to be exacerbated by normalizing the consumption of these products in their diets. Research approaches used to study PFBM in the built environment varied with the field currently being dominated by cross-sectional observational research designs conducted in neighborhoods with specific sociodemographic characteristics and near schools, public transit, streets, and supermarkets among others.

There is a dearth of research on the impact of outdoor PFBM on eating behavior and health but existing evidence points to a positive association between PFBM and higher dietary intake and likelihood of obesity in the individuals exposed to this marketing. Most existing evidence focuses on the PFBM impacts on children which presents opportunities for focusing future research on other affected populations as well. Lastly, among the papers that addressed policy approaches to limit PFBM, many pointed to the use of zoning laws, bans on marketing in public places or points-of-sale, higher taxation on the products being marketed, and health promotion initiatives in targeted areas, among other approaches.

The findings of this literature scan have implications for public health scholars interested in designing future studies on predatory food and beverage marketing practices as well as practitioners and policymakers engaged in developing interventions and policy solutions to limit PFBM in their communities.

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## 1. Introduction

Over the past couple of decades – and especially after the growth of digital media broadcasted through television, the internet, and smart mobile devices – research on food marketing, both academic and corporate, has rapidly expanded.<sup>1-3</sup> Researchers have extensively examined different dimensions of the tactics, tools, and activities that food producers, distributors and retailers engaged in seeking to persuade individuals to buy their products. Some studies have focused on the product itself,<sup>4</sup> others on its price,<sup>5</sup> others still on the most effective promotional activities<sup>6</sup> or on the place of sale.<sup>7,8</sup> These four attributes of marketing have been commonly referred as “the 4 Ps” of marketing<sup>9</sup> and the building blocks of a conceptual framework that can aid research in this field.

While there is no established theory or definition of “predatory food and beverage marketing” yet, we argue that the concept is useful because it helps public health researchers, professionals, and policymakers capture and act upon marketing activities that are designed to convince consumers to purchase products that may harm them or undermine their autonomy. Specifically, the term “predatory” implies that marketers regard their consumers as prey whose purchasing power can be captured even if such purchases end up harming the customer. Drawing on limited available literature and an empirical study currently under way, in this paper, we define predatory food and beverage marketing (PFBM) as the practice of aiming misleading, aggressive, emotional, and pervasive marketing of unhealthy products at certain populations.

Despite the significant theoretical advances in marketing research, to date, predatory marketing practices and policy measures concerning food and beverages have received only limited attention. This hinders the ability of families, advocates, and local governments to acknowledge, resist, and ultimately reduce predatory marketing influences and practices in their communities. To help address this omission, this review sought to use the existing literature to provide answers to the following central questions:

1. How is predatory food and beverage marketing being defined?
2. What research approaches have been used to document predatory food and beverage marketing practices?
3. What strategies and policies have been used to limit or prevent predatory marketing by multinational food and beverages industries? What have been the outcomes of these strategies?

Following the introduction, this report is organized in three main sections. Section 2 briefly summarizes the research methods used to scan the existing literature on the topic. Section 3 presents key findings the review yielded on each of the three research questions. Finally, Section 4 offers concluding remarks and a synthesis of selected operational definitions of predatory

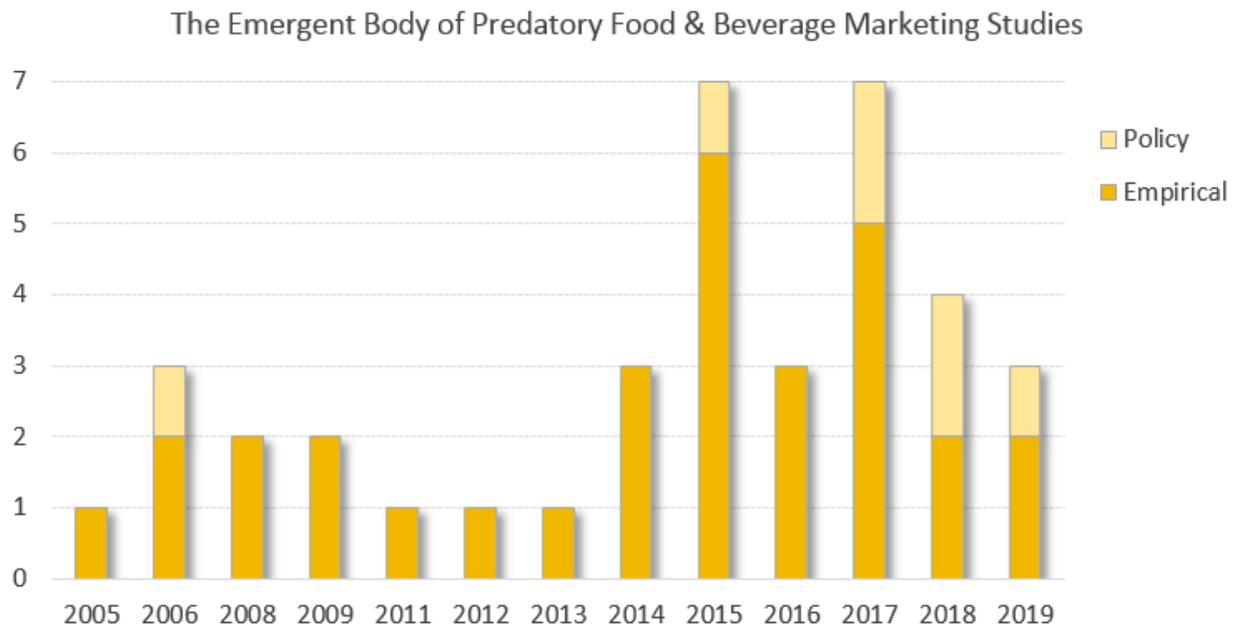
marketing. These were later used to inform the research design for the field work and primary data collection for the empirical component of research project carried out by the CUNY Urban Food Policy Institute.

## 2. Methods

To address the central research questions noted above, this review focused on the scan of existing literature on the advertisement of unhealthy food and beverages in the built environment. Influential papers focusing on tobacco and alcohol marketing were also included as appropriate. Data for the review were collected between April and August 2019 using Google Scholar and other databases for scientific publications. After reviewing abstracts to assess relevance to the research questions of interest, a subset of articles and reports were subsequently identified as relevant sources for the third research question focusing on the policy solutions that have been suggested in literature and tested so far. All articles were examined through thematic analysis and, for the second question, a matrix focusing on several specific aspects of research – including geographic location, setting, exposure, methodology, and key findings (See Appendix, Tables S1, S2, and S3) – was developed to aid the comparative assessment of the studies.

## 3. Findings

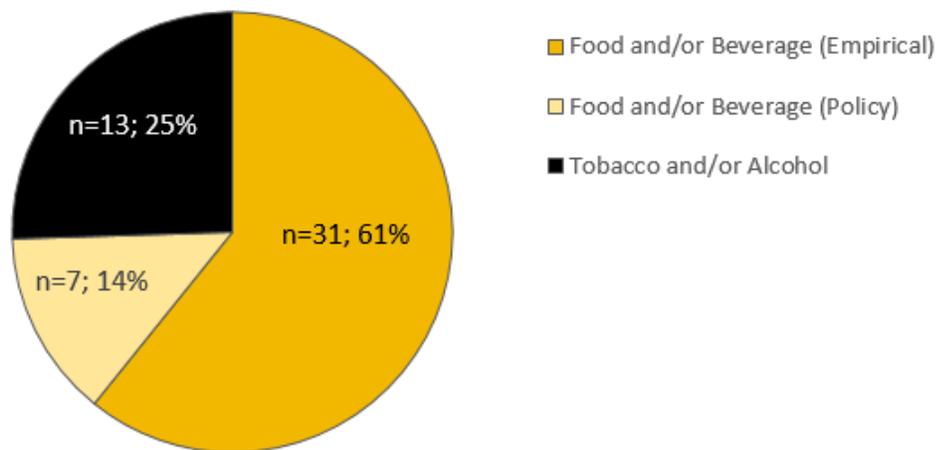
The literature scan of peer-reviewed publications on PFBM research yielded a total of 31 empirical articles and 7 policy focused articles. An additional set of 13 articles focusing on tobacco and alcohol marketing were subsequently included based on their relevance in terms of influence based on the extent they have been cited by authors in the field or methodological approach. The 51 articles examined were published within the last twenty-five years thus capturing a diverse set of predatory marketing research as well as the growing body of food and beverage predatory marketing research over the last fifteen years. Articles published in the first decade were predominantly focused on tobacco and alcohol advertising while articles published more recently focused on food marketing. Figure 1 illustrates the makeup of the PFBM literature in terms of empirical, or applied PFBM research, and articles with an emphasis on policy solutions. The sections that follow summarize key aspects of the state of the art of scholarship on predatory marketing, as assessed through this body of literature, and highlight common methodological approaches and findings.



**Figure 1.** The Emergent Body of Predatory Food & Beverage Marketing Studies. *Note:* Empirical studies here include meta-reviews of empirical work in addition to applied research.

### Predatory Marketing Articles Examined by Thematic Focus

*Select relevant tobacco/alcohol studies included at a later stage*



**Figure 2.** Predatory Marketing Articles Examined by Thematic Focus. *Note:* Select relevant tobacco/alcohol studies included at a later stage

### 3.1 Defining Predatory Marketing

Current literature on targeted marketing lacks a clear definition of “predatory food marketing” and thus limits opportunities to advance a stand-alone body of scholarship and practice in this sphere of public health research. To fill this gap, in this section, we combine the widely-accepted framework of the “four Ps of marketing” — promotion, placement, product, and price — with the existing literature on targeted marketing of unhealthy food and beverages in order to propose a working definition of predatory marketing.

#### ***Misleading Promotion***

Predatory food marketing entails the promotion of unhealthy food and beverage products through messaging which is misleading. Misleading messages consist of claims, buzzwords, slogans, and images that make food products appear to be more healthful than they really are. For instance, labels such as “organic” or “low-fat,” “low-calories,” “sport /athletic images” are, per se, no guarantee that the product as a whole is healthy. Misleading promotion may also use healthy sounding names for products such as “Cheesecake de’ Lite.” Some researchers have referred to this approach as the “halo effect.”<sup>10</sup>

Equally important, misleading promotion often resorts to emotional marketing. Emotional marketing, which is by no means limited to predatory food marketing, seeks to tap into an emotion to appeal to the audience by distorting or amplifying certain perceptions of the product by means of association (e.g., happiness, admiration, love, less stress, deservingness, nostalgia, and local pride).

#### ***Pervasive Placement***

Predatory food marketing is also characterized by the pervasive placement of unhealthy food and beverage products. Predatory food ads commonly exhibit higher density than non-predatory ones, both in brick-and-mortar settings as well as online/TV environments.

#### ***Aggressive Product Design and Promotion***

Another trait of predatory food marketing, common to all targeted marketing practices, is the tailoring of products to have a strong appeal for a specific group such as children, adolescents, parents, individuals of select race/ethnicity, or individuals speaking a language different from English at home. What is distinctive for predatory food marketing is the aggressive tactics used to appeal to the group being targeted.

For instance, children-targeted predatory food marketing may involve ads featuring cartoon characters, movie, TV, or sports figures, and ads of kids' meal toys,<sup>11</sup> (e.g., Happy Meals). The products seek to have a “fun appeal,” with children laughing, smiling, giggling, or playing, or “action appeal” with excitement or energy associated with a product through children running, jumping, or playing sports.<sup>12</sup> For adolescents and teens, the aggressive promotion often suggests sex as an expected result of or reward for consuming advertised products,<sup>13</sup> individuals are dressed in a provocative or revealing clothing or with provocative facial expressions<sup>14</sup> or uses sexually suggestive language. Promotion outlets include movies, videos, computer games, television, celebrities, and automobiles, among others.

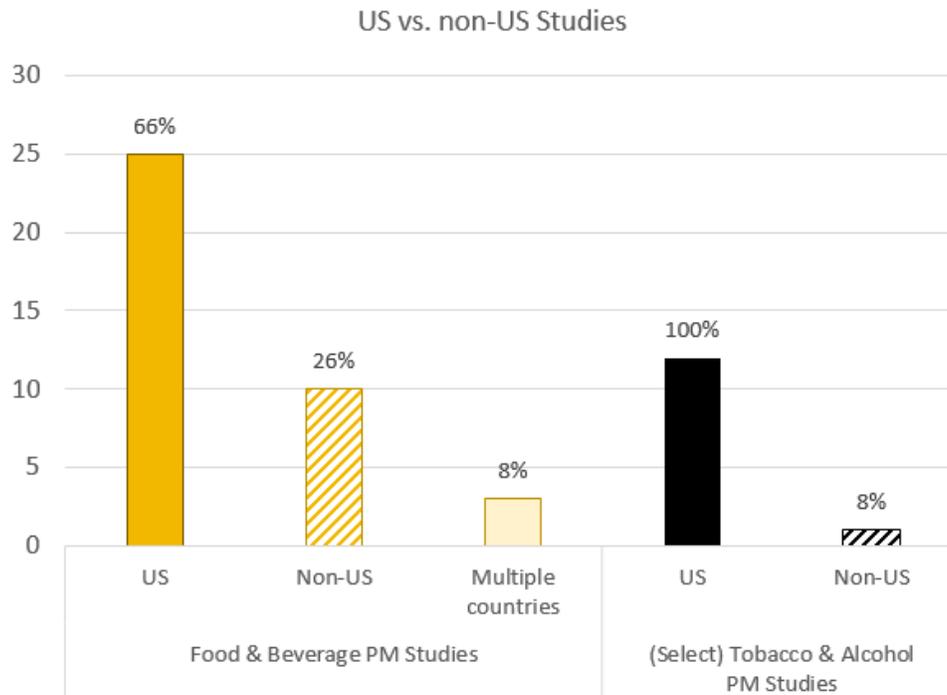
Additionally, aggressive product promotion can entail designing the product and its ads to emphasize the race or ethnicity of the targeted population, speak directly to the targeted population by using ads translated in non-English languages (e.g., Spanish, Mandarin), or appealing to parents through messaging aimed at persuading them to buy products for kids (e.g., Pepsi “fun for you”).

### ***Appealing Prices and Services***

Last but not least, predatory food marketing typically couples the misleading, emotional, pervasive, and aggressive promotion tactics with convenience — either in terms of price or ease of access. Promotional deals such as “value meals” are designed to impress upon the audience to purchase the items advertised as they are associated with financial savings (i.e., larger food or beverage quantities at a lower price per unit). Convenience may also be portrayed in terms of time savings. Fast and easy delivery of food or beverages by the restaurant, or an intermediary company, are conveyed through text or images in the ads of the product.

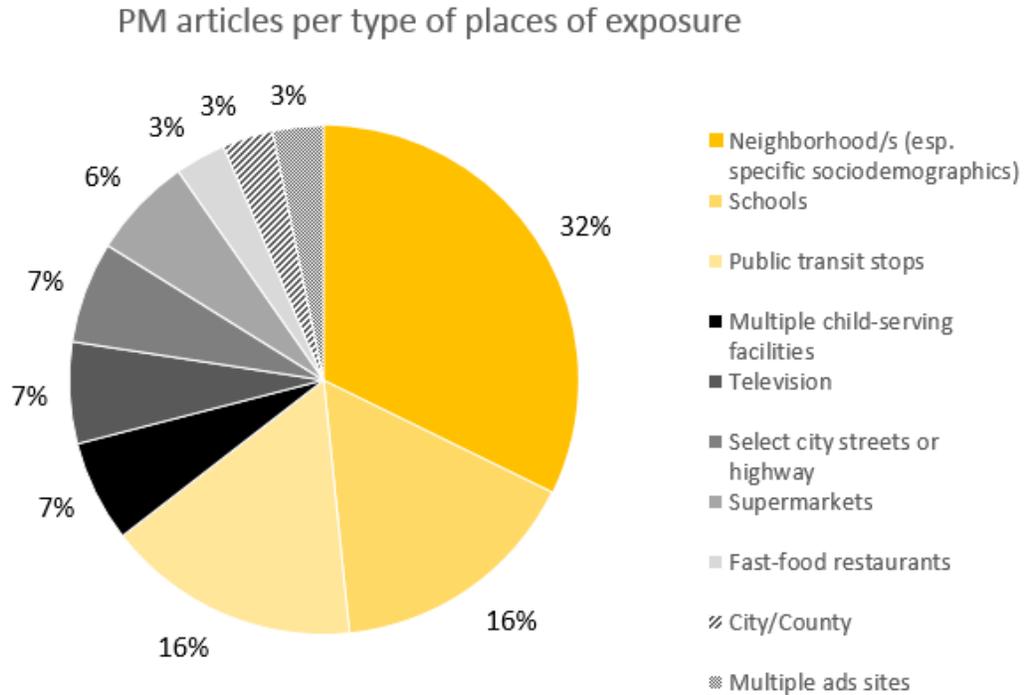
### 3.2 Research approaches

Studies in the sample varied by geographical setting, place of exposure, and research methods. In terms of geographical setting, of the food and beverage studies nearly two thirds (66%) assessed predatory marketing in the US (Figure 3). Studies that examined the phenomenon as it manifests outside the US included research from Canada, Australia, New Zealand, South Africa, and Ghana.



**Figure 3.** Proportion of predatory food and beverage marketing and predatory tobacco and alcohol marketing studies in sample in the United States.

In terms of scale and setting, a third of the articles explored predatory marketing at the neighborhood scale by either randomly selecting zip codes within a city<sup>15</sup> or by purposefully focusing on specific neighborhoods because of their density<sup>16</sup> or socioeconomic and demographic profiles.<sup>17-20</sup> Another frequently examined category of places in the sample were schools and multiple child-serving facilities (e.g., childcare centers, playgrounds, recreation centers) (see Figure 4). Researchers explored the clustering of unhealthy food ads in around these institutions mostly in urban settings,<sup>17,21-25</sup> but some included schools in rural areas as well.<sup>26</sup> The third most-explored setting was public transit with studies focusing reporting on the prevalence of targeted unhealthy food and beverages ads at subway stations,<sup>27</sup> bus stops,<sup>20,28</sup> and train and tram stations.<sup>28,29</sup> Other places of exposure included television,<sup>30</sup> select city streets<sup>31,32</sup> and highways,<sup>33</sup> fast-food restaurants,<sup>11</sup> supermarkets,<sup>34,35</sup> or an entire city or county.<sup>36</sup>



*\*Some articles were excluded because literature reviews or not using a specific place of PM as unit of analysis*

**Figure 4.** Predatory marketing articles included in the sample classified by place of exposure.

Research methods used to explore the manifestations of predatory marketing and provide evidence on the target communities included both cross-sectional<sup>11,16,17,25,27,31,37</sup> and longitudinal approaches.<sup>38-40</sup> In terms of data collection approaches, several articles constituted observational studies<sup>20,21,29,34</sup> (as opposed to solely relying on secondary data) and all employed, to a varying degree, content analysis of the ads being examined. There was only one article offering a systematic review of the literature on targeted food and beverage marketing and its health implications for African Americans,<sup>41</sup> published in 2008, and only two review articles on the available evidence on the impact of food advertising<sup>42</sup> and advertising of unhealthy foods and beverages on children’s dietary intake and preferences.<sup>43</sup> The current dearth of studies in this area indicates the need for additional research that can glean the available evidence on the health impacts and implications of PFBM on the populations most impacted.

***Evidence of “predatory” targeting of vulnerable populations***

The goal of the overwhelming majority of studies was to test the hypothesis that the marketing of unhealthy goods – fast food, sweetened beverages, tobacco, alcohol specifically – is purposefully targeted at specific social groups based on their race/ethnicity, socioeconomic status, and age. Several authors reported that white, wealthier communities are generally “protected” against

predatory marketing of unhealthy food and beverages, alcohol, and tobacco.<sup>18,19,31,44</sup> Across all studies, researchers found that some populations – specifically Black,<sup>11,15,46,17,18,20,21,25,31,41,45</sup> Hispanic,<sup>15,17,21,25,27,45,47</sup> and Asian<sup>40,48</sup> communities – are disproportionately targeted and inundated with ads promoting unhealthy foods and beverages. Additionally, three contributions also underscored the disproportionate targeting of youth by marketing focusing on tobacco<sup>17</sup> or unhealthy foods.<sup>27,34</sup> One study also called attention to some of the perhaps less obvious interconnections between target populations with Latinx communities being targeted for the higher proportion of youth<sup>47</sup> in addition to other factors.

Overall, with the exception of one study,<sup>21</sup> lower socioeconomic status helped predict the density of predatory marketing ads. Interestingly, one study<sup>28</sup> found that even when the quantity of ads may be the same across neighborhoods with different socioeconomic profiles, the type of ads varies significantly; with the ratio of ads featuring fast food and soda being disproportionately higher in lower income, communities of color. Sugar-sweetened beverages were often found to be the most heavily marketed item<sup>26,29,32,34,37,48</sup> among all unhealthy food and beverages advertisements. Another key finding from several of the studies is that big, multinational brands with national coverage as well as chain restaurants account for the majority of the products being advertised.<sup>23,29,33</sup> Notably, while several studies focused on the assessment of outdoor PFBM in lower income neighborhoods, none explicitly focused on PFBM around public housing complexes, such as the New York City Housing Authority (NYCHA) complexes in New York City. This later became the focus of the environmental scan of PFBM conducted as part of the research project this literature review is an integral component of.

### ***Evidence on the impact of predatory food and beverage marketing on health***

Despite the growing body of research and consensus on the deployment of predatory food and beverage marketing practices, to date, still few studies exist on the impact of predatory marketing on the eating behavior and health of the targeted populations, and even less so for outdoor marketing occurring in the built environment. Of notice are two systematic reviews focusing on children. Sadeghirad and colleagues (2016) conducted a meta-analysis of 17 existing empirical studies and showed that in children exposed to unhealthy dietary marketing, dietary intake significantly increased during or shortly after exposure to advertisements. Additionally, children exposed to the marketing of unhealthy foods and drinks were found to have a higher risk of selecting the advertised products.<sup>43</sup>

Similarly, Boyland and Whalen examined international research on the topic within a five-year period (2010-2015) and found that "when food advertising is prevalent, it promotes largely energy dense, nutrient poor foods, and even short-term exposure results in children increasing their food consumption."<sup>42</sup> However, an earlier pilot study, looking specifically at the influence of video marketing on children's food choices, underscored that these can be used to influence, also

positively, children's short-term food choices.<sup>49</sup> These findings are in line with review results published in Institute of Medicine (IOM) study, *Food Marketing to Children and Youth: Threat or Opportunity?*, on the link between TV food marketing and behavioral outcomes in children, reporting that "statistically, there is strong evidence that exposure to television advertising is associated with adiposity in children ages 2–11 years and teens ages 12–18 years."<sup>50</sup>

Overall, there was only one study focusing specifically on assessment of the available evidence on the health implications of PFBM targeting communities of color, specifically black and brown communities.<sup>41</sup> Researchers examined the findings of available empirical studies on food and beverage advertising focusing on media and neighborhoods through the prism of place, price, and placement tactics. One of the overarching findings of the review was that "the marketing environments of African American consumers are less likely to support the development and maintenance of healthful eating."

Importantly, in the sample of predatory food and beverage marketing studies examined, only one empirical study explored the link between outdoor food ads and health. Specifically, the research by Lesser and collaborators (2013) focusing on Los Angeles and Louisiana provides evidence that "the higher the percentage of outdoor advertisements promoting food or non-alcoholic beverages within a census tract, the greater the odds of obesity among its residents, controlling for age, race and educational status."<sup>16</sup>

Finally, the literature search yielded only one randomized controlled trial study, published in 2018, focused on the impact of unhealthy food sponsorship on young adults' food preferences.<sup>51</sup> The study was carried out in New Zealand and focused on marketing associated with elite sport sponsorship. Researchers carried out a web-based experiment, which revealed that "unhealthy food sponsorship promoted higher awareness of, and more favorable attitudes towards, unhealthy food sponsor brands." An exposure to an obesity prevention campaign, however, did not have an influence on food attitudes or preferences for unhealthy versus healthier foods.

### 3.3 Policy strategies

While most studies assessing the geography of unhealthy food and beverage advertising at the neighborhood scale noted distances within which predatory marketing images tend to cluster, less than a fifth (see Figure 2) pointed to specific policy recommendations or discussed outcomes of possible policy strategies. Comprehensive accounts as the one offered by Kline and colleagues<sup>52</sup> touched on multiple policy approaches and emphasized policy innovations in tobacco control that can be useful in reducing unhealthy food marketing as well. Overall, the analysis of the subset of articles mentioning policy approaches to affect the current regime of predatory marketing, revealed eleven main types of strategies. These are summarized in Table 1 below.

**Table 1.** Policy approaches to counter predatory marketing of unhealthy foods, beverages, tobacco, and alcohol mentioned in the sample of articles examined.

#	Policy strategy
1.	Zoning laws that limit advertising in certain areas or give more control to government officials over the introduction of new advertisements in their jurisdictions <sup>19,21</sup> ( <i>Note possible limitations.</i> <sup>40</sup> )
2.	Laws that regulate or ban marketing in public places (e.g., streets, public transit, bus stops, playgrounds, parks, sports stadiums) <sup>19,24,28,29,47</sup>
3.	Laws that ban advertising ultra-processed products during television viewing hours for children <sup>24,30,53</sup>
4.	Prosecution for false or misleading advertising <sup>19</sup>
5.	Self-regulation and partnerships in which companies agree to limit marketing to certain populations. Specifically, restrictions on unhealthy food advertising to children and limits on the use of licensed characters <sup>19,54</sup> For specific recommendations on how the food industry can close off loopholes in self-regulatory measures, please see Handsley & Reeve (2018). <sup>55</sup>
6.	Health promotion initiatives in targeted areas <sup>28,29</sup>
7.	Taxation (e.g., an excise tax) on unhealthy beverages and use of tax revenues to reduce health and socioeconomic disparities <sup>29,54</sup>
8.	Higher pricing for posting unhealthy food ads combined with a commitment to overall reduction targets <sup>29</sup>
9.	Policies that help ensure access to credible nutrition information, including on nutrition labels, restaurant menus, and advertisements for children, adolescents, and their families <sup>54</sup>
10.	Holistic, intersectoral strategies that prevent the “overspill” effect of policies that ban or restrict unhealthy marketing in one domain (e.g., public places) but result in an increase in unhealthy ads in others (e.g., television, social media) <sup>24</sup>
11.	Ban of product display and promotion at point of sale (e.g., side panels, outdoor signs, countertop displays) <sup>39</sup>

Among the articles examined, few commented on the outcomes of the policies discussed; a limitation of current literature also noted by Taullie and collaborators.<sup>53</sup> For instance, in Sydney, analysts observed that, even in the presence of unhealthy food ads, healthy food advertising and campaigns had a small, but significant effect on increasing healthy food choices and reducing caloric intake among consumers.<sup>29</sup> Similarly, in the US, the introduction of a new standard by the Children's Food and Beverage Advertising Initiative of the Better Business Bureau in 2010 – recommending that all child-directed ads be for healthier foods – led to a decrease in the frequency with which food ads appeared during children’s shows. Nevertheless, it should be noted that, while the overall number of broadcasted ads decreased, the marketing of some unhealthy foods, including fast food, dairy, and sugared snacks, increased.<sup>30</sup>

Another example of voluntary self-regulation is restaurants’ decision to change the default menu options for beverages on children menus. While some restaurants have shifted to water or milk, in

place of soda and other sugary drinks, when considering the overall industry these initiatives still represent a small fraction of all restaurants. In fact, more than three quarters of the fifty largest chain restaurants still have unhealthy beverages as their default option on their menus.<sup>56</sup> Conversely, a non-voluntary, regulation-based approach was recently pursued in New York City through the adoption of Local Law 75 of 2019. The law will go into effect on May 1, 2020 and impose monetary penalties on restaurants that fail to serve water, low-fat milk, or 100% juice as the default drinks with children's meals.

Positive health outcomes have been associated with the increase of access to credible nutrition information for consumers. For instance, researchers<sup>57</sup> noted that when exposed to a warning label, parents chose significantly fewer sugary drinks for their children and are less likely to purchase them in the future. Additionally, modelling studies<sup>58</sup> have estimated that the elimination of advertising subsidies for nutritionally poor foods and beverages marketed to children would result in both health and economic benefits. It is projected that the elimination of the tax would generate about \$80 million in tax revenue per year and help prevent 129,000 cases of obesity over a decade at a cost \$0.66 per unit of BMI reduced.

#### **4. Concluding remarks**

The goal of this review was to summarize current knowledge on predatory marketing of unhealthy food and beverages and describe the role of predatory food and beverage marketing (PFBM) in maintaining or exacerbating unhealthy and inequitable food environments and inequitable dietary health outcomes by class, race, and community.

The review of peer-review publications on the topic revealed that while, at present, there is no single unified definition of PFBM, common characteristics of PFBM practices include the misleading, aggressive, emotional, and pervasive marketing of unhealthy products at certain populations for whom existing health disparities are likely to be exacerbated by normalizing the consumption of these products in their diets. This working definition was used to shape the empirical phase of an applied predatory marketing research project led by the CUNY Urban Food Policy Institute of which this review constitutes an integral part.

Research approaches used to study PFBM in the built environment varied with the field currently being dominated by cross-sectional observational research designs conducted in neighborhoods with specific sociodemographic characteristics and near schools, public transit, streets, and supermarkets among others. There is a dearth of research on the impact of outdoor PFBM on eating behavior and health, but existing evidence points to a positive association between PFBM and higher food intake and likelihood of obesity in the individuals exposed to this marketing. Most

existing evidence focuses on the PFBM impacts on children which presents opportunities for focusing future research on other affected populations as well.

Lastly, among the papers that addressed policy approaches to limit PFBM pointed to the use of zoning laws, bans on marketing in public places or points-of-sale, higher taxation on the products being marketed, and health promotion initiatives in targeted areas, among other approaches.

The findings of this literature scan have implications for public health scholars interested in designing future studies on predatory food and beverage marketing practices as well as practitioners and policymakers engaged in developing interventions and policy solutions to limit PFBM in their communities.

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## Appendix

### Key research papers on predatory marketing

**Table S1. Evidence of predatory food, beverage, alcohol, and tobacco marketing practices**

Year	Authors	Study Design	Geographic Setting	Exposure(s) of Interest	Content Analysis (Y/N)	Main Findings
2015 <sup>11</sup>	Ohri-Vachaspati P, Isgor Z, Rimkus L, Powell LM, Barker DC, Chaloupka FJ	Cross-sectional	Fast food restaurants located in a nationally representative sample of public middle- and high-school enrollment areas across 46 states. (2010-2012)	Child-directed marketing (CDM) inside and on the exterior of fast food restaurants. CDM was defined as the presence of one or more of seven components inside or on the exterior of the restaurant. (e.g. indoor play area; indoor display of kids’ meal toys; ads with cartoon characters, ads with movie, TV, or sports figures; ads of kids’ meal toy; exterior play area; and other CMD such as 3D cartoon characters and ads for hosting children’s birth days)	Y	CDM inside and on the exterior of fast food restaurant is prevalent in chain restaurants. Majority black neighborhoods, rural areas, and middle-income communities are disproportionately exposed to CDM, particularly indoor displays of kids’ meal toys, the most widely used CDM strategy among chain restaurants. About 60% of the restaurants belonged to a chain. Over 20% of all restaurants and 31.4% of chain restaurants had presence of CDM.
2015 <sup>15</sup>	Cassady DL, Liaw K, Miller LM.	Cross-sectional: Pilot Study	Sixteen randomly selected zip codes in economically and racially diverse urban areas in Sacramento County, Northern California, USA	Food and beverage-, obesity-, and physical activity-related outdoor advertisements found on billboards, bus shelters, bus benches, and posters on storefronts large enough to be seen from the street.	Y	The density of unhealthy food and beverage ads was highest for Latino, African-American, and low-income communities. These findings reaffirms other studies that have found similar patterns of racial and income disparities in outdoor food and beverage ads and obesity.
1998 <sup>17</sup>	Pucci LG, Joseph Jr	Cross-sectional	Buffer zones around public schools in Boston	Stationary outdoor tobacco advertising or anything with a recognizable tobacco logo and/or	Y	The Food and Drug Administrations enacted regulations in 1996 to restrict outdoors cigarette ads within 1,000 feet of schools and

	HM, Siegel M.		neighborhoods with varying ethnic, cultural, and socioeconomic characteristics	message (e.g. billboards, placards, posters, stickers, banners, neon signs, and free-standing signs)		playgrounds in order to protect adolescents from ad exposure. Youth exposure to outdoor cigarette ads was the most in areas close to public schools, and neighborhoods with more children, with black and Hispanic populations, and with low socioeconomic status.
1997 <sup>18</sup>	Stoddard JL, Johnson CA, Boley-Cruz T, Sussman S	Cross-sectional	Four ethnic groups in neighborhoods near downtown Los Angeles.	Tobacco outdoor advertising, particularly on billboards.	Y	The density of tobacco billboards was significantly greater in all minority neighborhoods than White neighborhoods. African-American neighborhoods displayed significantly higher tobacco ads density than Hispanic and Asian neighborhoods
1995 <sup>19</sup>	Hackbarth DP, Silvestri B, Cosper W	Descriptive cross-sectional study	50 wards in Chicago, New York.	Outdoor advertising on billboards (including freestanding outdoor signs; signs attached to buildings; advertisements painted on buildings; and placards, posters and devices which are used to advertise on any public way, street or alley). Particularly alcohol and tobacco advertising	Y	The total number of billboards identified in the study was 5,924. There were 805 (13.6%) billboards in white wards and 5,119 (86.4%) in minority wards. Tobacco billboards constituted 24.5 % of all billboards in Chicago. Alcohol billboards constituted 23.9% of all billboards in Chicago. In white wards, the number of tobacco ads was 3-25 and 1-15 ads of alcohol. In minority wards, number of tobacco billboards ranged 8-117 and alcohol billboards ranged 1-111. Poorer, minority neighborhoods are inundated with many more billboards than white neighborhoods, which are generally more affluent and better able to control their environment.
2000 <sup>20</sup>	Luke D, Esmundo E, Bloom Y	Observational (field study; which is cross-sectional)	City and county of St Louis, Missouri.	Tobacco and non-tobacco billboard geographic distribution; billboard type and product brand frequencies; and billboard neighborhood characteristics.	Y	Almost 20% of the billboards contained tobacco advertising. Four of the top five and nine of the top 22 brands displayed on billboards were tobacco products. Billboards were located in all areas of St Louis except for the communities with the highest average incomes. Tobacco billboards were more likely to be found in low income areas and areas with

						a higher percentage of African Americans. Images of African American figures on tobacco billboards were concentrated in the most heavily African American populated regions of the city. Approximately 74% of all billboards in the city of St Louis were within 2000 feet (700 meters) of public school property.
2009 <sup>21</sup>	Hillier A, Cole BL, Smith TE, Yancey AK, Williams JD, Grier SA, McCarthy WJ	Observational (field study; which is cross-sectional)	Geographic information system and spatial statistical analyses were used to assess location and content of outdoor ads in Austin, Los Angeles and Philadelphia.	Clustering of unhealthy outdoor ads around child-serving institutions (e.g. schools, day-care centers, public recreation centers, public libraries). Researchers also looked for association between the demographic characteristics (e.g. racial/ethnic minority and low-income areas) of neighborhoods and outdoor advertisements that could be found in these neighborhoods for high-fat, high-sugar foods and beverages and/or products promoting a sedentary lifestyle.	Y	Results did vary by city. Ads for unhealthy products did not cluster around child-serving institutions in Austin, but they did cluster around such institutions in Los Angeles and Philadelphia. We found that the presence of blacks and Latinos helped predict that clustering, but median household income did not. Many of the land use variables—major streets, food outlets, alcohol outlets, and bus stops—also helped to explain clustering, but they did not explain away the influence of racial/ethnic composition.
2018 <sup>22</sup>	Herrera AL, Pasch KE	Observational (field study; which is cross-sectional)	Area within a half-mile of 34 middle and 13 high schools in Central Texas	Outdoor food and beverage (FB) advertising, particularly its relationship to the Hispanic composition in schools	Y	Researchers found significantly more outdoor FB establishment and price promotion around Hispanic schools as compared to non-Hispanic schools. Differences in freestanding advertisements by school type approached significance with Hispanic schools having more freestanding FB advertisements on average.
2019 <sup>23</sup>	Velazquez CE, Daep MI, Black JL	Observational (field study; which is cross-sectional)	26 geographically and socioeconomically	Food and beverage advertisements (e.g., posters or other physical materials with branded or non-branded information, images related	Y	Identified 6535 advertisements within 400m of 25 schools. All but four schools had at least one advertisement within 400 m. While 40% of schools had fewer than ten advertisements

			diverse schools (20 elementary and 6 secondary) in Vancouver, Canada	to food, or logos for provincially or nationally recognizable food or beverage retailers with the intent to relay information and/or increase awareness about a particular food or beverage product).		within 400 m, 20% had 50 or more advertisements. Majority of advertisements were located on retail food outlets including limited-service restaurants (n=204, 31.2%), convenience stores (n=274, 42.0%), or grocery stores (n=22, 3.4%). The remaining advertisements were located on full-service restaurants (n=72, 11.0%), bus stops (n=17, 2.6%), and other built environment features. Most advertisements included branding associated with a provincially or nationally recognizable company (n=485, 74.3%), but the presence of other common marketing strategies like cartoons/celebrity characters (n=18, 2.8%) and premium offers (n=64, 9.8%) on advertisements were infrequent.
2015 <sup>24</sup>	Moodley G, Christofides N, Norris SA, Achia T, Hofman KJ	Observational ((field study; which is cross-sectional)	5 areas in Soweto: Klipspruit West, Mofolo South, Dube, Meadowlands, and Orlando East, Johannesburg, South Africa	Density of outdoor sugar sweetened beverage (SSB) advertising (e.g. billboards, bus stop advertisements, signs placed along the sidewalk, urban art on streets or buildings, large posters, and signage for restaurants or food vendors) and the number of formal and informal vendors selling SSBs.	Y	A total of 145 advertisements for SSBs were found over a driven or walked distance of 111.9 km. The density of advertisements was 3.6 per km <sup>2</sup> in relation to schools, and 50% of schools had branded advertising of SSBs on their school property. Most (n=104; 58%) of the 180 vendors in the study sold SSBs.
2001 <sup>25</sup>	Hackbarth DP, Schnopp-Wyatt D, Katz D, Williams J, Silvestri B, Pflieger M.	Cross-sectional	Licensed billboards that were 500-, 1,000-foot radiuses of schools, parks, and play lots in Chicago urban neighborhoods (1997)	Alcohol and tobacco outdoor advertising, specifically billboards	Y	Outdoor ads of alcohol and tobacco were more prevalent in poor, African American- and Hispanic communities, despite Outdoor Advertising Association of America's voluntary code of principles, which restricts placement of ads for age-restricted products and prevent billboard saturation of urban neighborhoods. 10-year collaborative research between academic, practice, grassroots community groups on disproportionate

						targeting of poor and minority communities for outdoor ads led into community and legislative action to address one of the social causes of health disparities.
2005 <sup>26</sup>	Maher A, Wilson N, Signal L	Observational (field study; which is cross-sectional)	10 New Zealand secondary schools (6 urban and 4 rural schools). Rurality was defined as towns with a population of less than 20,000 people.	Extent and content of outdoor food advertisements and food availability from outlets in the vicinity of secondary schools. Outdoor advertisements were defined as stationary objects containing either a recognizable logo and/or an intended message (e.g. billboards, neon signs, posters, stickers, banners, etc.). Outlets were defined as places primarily offering food or non-food products for sale.	Y	Out of 1408 outdoor advertisements for products, 61.5% were for food. The major categories were soft drinks (21.6%), frozen confectionary (16.2%), savory snacks (11.4%), and alcohol (8.1%). Overall, 70.2% of food advertisements were for foods classified as 'unhealthy'. A majority of the 224 outlets sold food (i.e. 56.3%). Those that primarily sold food were (on average) closer than other outlets to the secondary schools. Out of those schools that sold meals, the proportion of these that advertised a salad option was significantly lower.
2017 <sup>27</sup>	Lucan SC, Maroko AR, Sanon OC, Schechter CB	Cross-sectional	68 MTA Subway stations on 7 lines in the Bronx, NY, USA (2012)	Subway-station Food and beverage print ads appearing from entrances to exits along train platforms, wall posters, free-standing billboards, free-standing billboards, or other signage (e.g., on trash receptacles, turnstiles, station clocks, or benches) promoting any product, service, or organization.	Y	The vast majority of ads were for less-healthy items (e.g., candies, chips, sugary cereal, frozen pizzas, energy drinks, coffee confections, hard alcohol, and beer), but none for healthy items (i.g., fruits, vegetables, whole grains, nuts, water, or milk). Ads for less-healthy items, specifically those that were in Spanish, featured minorities, and/or targeted youth, tended to be in subway stations in higher-risk residential areas home to vulnerable populations (areas characterized by high rates of poverty, high percentage of Hispanics and children, and low graduation rates). Ads for less-healthy items were disproportionately placed in areas affected by diet and diet-related health problems such as high sugary drink consumption, low fruit and vegetable intake, and high rates of diabetes,

						hypertension, and high cholesterol. The fact that ridership did not relate to ad placement, suggests that ad placement and exposure was influenced by targeting specific groups, rather than the biggest audiences.
2014 <sup>28</sup>	Settle PJ, Cameron AJ, Thornton LE	Observational (field study; which is cross-sectional)	A total of 20 Melbourne, Australia neighborhoods (suburbs) from across the least and the most socioeconomically disadvantaged areas	Outdoor food advertisements at public transit stops within suburbs of varying levels of socioeconomic disadvantage	Y	Similar proportion of transit stops in least and most-disadvantaged suburbs displayed food advertisements (total n=203). However, some differences in type of advertisements across suburbs were noted with advertisements for fast food restaurants, flavored milk and fruit juice more common in the most-disadvantaged neighborhoods and advertisements for diet soft drink, tea, coffee and convenience stores more common in the least-disadvantaged neighborhoods.
2009 <sup>31</sup>	Yancey AK, Cole BL, Brown R, et al.	Cross-sectional	Selected streets w/ a high probability of having billboards in zip codes in Los Angeles, Austin, NYC, and Philadelphia	Outdoor advertisements (e.g. billboards, bus bench and shelter advertisements, sidewalk “sandwich” signs, murals painted on the sides of buildings, and some large store window posters) for high-calorie, low nutrient–dense foods and beverages; nutritious foods and beverages; for sedentary entertainment and transportation; and services promoting physical activities	Y	Living in an upper-income neighborhood, regardless of its residents’ predominant ethnicity, is generally protective against exposure to most types of obesity-promoting outdoor advertising. The density of advertising varied by zip code area race/ethnicity, with African American zip code areas having the highest advertising densities and white zip code areas having the lowest densities. The most ads for sugary beverages were found in low-income African American neighborhoods. Advertising content also varied considerably in these cities. Sugary beverage ads made up about 4% of the sheet space in LA and 7% of the sheet space in Philadelphia, but they were absent from the sampled zip code areas in Austin and in NYC.
2019 <sup>32</sup>	Dowling EA, Roberts	Observational	Street segments were grouped into	The density of outdoor, street-level, stationary advertisements	Y	Sugary drink image density was twice as high in medium and high-poverty versus low-

	C, Adjoian T, Farley S, Dannefer R	(field study; which is cross-sectional)	three levels of neighborhood poverty, following the recommended guidelines of the NYC Department of Health and Mental Hygiene (DOHMH) (low-poverty, where under 10% of residents live below the federal poverty threshold, medium-poverty, where 10 to <20% of residents live below the threshold, and high-poverty, where 20% or more of residents live below the threshold)	of consumable products (non-alcoholic beverages, food products, tobacco products, and alcoholic beverages) within each of the five boroughs that constitute NYC		poverty census tracts in Brooklyn. In Bronx, Brooklyn, Manhattan, Queens, and NYC overall, sugary drink image density was positively associated with increased percentages of Non-Latino Black residents.
2017 <sup>33</sup>	Bragg MA, Hardoby T, Pandit NG, Raji YR, Ogedegbe G	Descriptive study (field study; which is cross-sectional)	A 4.7 km <sup>2</sup> area of Accra, Ghana and a 151 km region along the highway represented the target areas for collecting photos of outdoor beverage ads.	Number and types of beverage ads, sugar content of beverage products featured in ads and marketing themes used in ads.	Y	Seventy-seven photographed ads were analyzed. Seventy-three per cent (72.7%) of ads featured sugar-sweetened beverages (SSBs), and Coca-Cola accounted for 59.7% of ads. Sixty-five per cent (64.9%) of all ads featured sodas, while 35.1% advertised energy drinks, bottled or canned juice drinks and coffee based, milk-based and water-based beverages. 13% of ads featured children and 5.2% were located near schools or playgrounds. 9.1% of ads contained a reference to health and 7.8% contained a reference to fitness/strength/sport. Along the

						Accra-Cape Coast Highway, Coca-Cola accounted for 60% of branded ads.
2013 <sup>34</sup>	Bragg MA, Liu PJ, Roberto CA, Sarda V, Harris JL, Brownell KD	Observational, descriptive, cross-sectional study	Two major supermarkets in Connecticut, USA (2010)	Sports references in food and beverage products	Y	Sport references appearing in food and beverage products marketed by companies are unhealthy and child-targeted. Food and beverage products with sports references featured a character exercising, were endorsed by a professional sports entity, and were marketed specifically to children. Food products had a median nutrition score of 36 from 1 being unhealthy and 100 being healthiest. More than two-thirds of the beverages were sugar-sweetened. Children compared to adults are disproportionately exposed to commercials for these products.
2017 <sup>35</sup>	Disantis KI, Kumanyika S, Carter-Edwards L, Young DR, Grier S, Lassiter V	Qualitative study (focus group)	Durham, North Carolina, and Prince George's (PG) County, Maryland, in partnership with a local community-based organization at each location.	Ethnically-targeted marketing to black Americans of sugar sweetened beverages, fast foods, and other products that may contribute to caloric overconsumption	Y	Conventional qualitative content analysis of transcripts identified several salient themes: seeing the marketer's perspective ("it's about demand"; "consumers choose"), respect for community ("marketers are setting us up for failure"; "making wrong assumptions"), and food environments as a social justice issue ("no one is watching the door"; "I didn't realize"). Effects of sensitization were reflected in participants' stated reactions to the information in the booklet, and also in the relative occurrence of marketer-oriented themes and social justice-oriented themes, respectively, less and more after sensitization.
2008 <sup>36</sup>	Kelly B, Cretikos M, Rogers K, King L.	Cross-sectional	Areas around 500m radius of select primary schools in Sydney and Wollongong using random sampling	Outdoor commercial food ads categorized as core foods (consumption recommended to meet daily requirements), non-core foods (foods that are surplus to daily requirements), and miscellaneous	Y	There was a higher density of outdoor non-core food ads within 500m of primary school, with 25% of the ads identified were food-related, and of those, 80% of them were non-core food ads. The food products most commonly advertised around primary schools

			within population density and socio-economic-strata	drinks (tea and coffee) in the form of posters and billboards		were soft drinks and alcoholic beverages. Non-core food products were two times more likely to be advertised near a primary school.
2005 <sup>37</sup>	Barbeau EM, Wolin KY, Naumova EN, Balbach E	Longitudinal observational study	Main commercial districts in Boston area with urban and suburban communities of differing socioeconomic profiles with a high probability of exposure to tobacco ads and promotion (2000-2002)	Tobacco control, tobacco brands, or promotional ads in the main commercial district, including convenience and liquor stores, and other retail outlets, bars and restaurants, billiard halls, union halls, and other public or semipublic gathering places (e.g. government signs about selling restrictions to minors, smoke-free policies, industry-sponsored signs prohibiting sales to minors); and in newspapers and magazines	Y	Tobacco industry marketing heavily targets low-income communities and other high-risk population. The density of ads varied by income levels, with fewer ads in higher socioeconomic communities, compared to lower socioeconomic communities. There were three times more brand ads than youth access signs in low socioeconomic communities. Brand ads were found in greater volume in contrast to smoke-free signs, and their ratios was the same in low and high socioeconomic communities.
2011 <sup>38</sup>	Cohen JE, Planinac L, Lavack A, Robinson D, O'Connor S, DiNardo J.	Longitudinal observational study	Randomly selected stores (convenience stores, gas stations, and grocery stores) in cities across Ontario (2005-2009)	Retail tobacco promotions (e.g. visible cigarettes, countertop displays, indoor signs, side panels on powerwalls, outdoor signs)	Y	Ontario, Canada implemented a government policy banning the retail display of tobacco products (powerwall features, countertop displays, and signage) at point of sale in 2006. The impact of a complete ban on retail tobacco displays was a significant decrease in tobacco promotions to nearly none, with tobacco products hidden in 99% of stores after the restrictions went into effect. Tobacco control policies like the ban on tobacco product displays at the point of sale can effectively reduce people's exposure to tobacco marketing and reinforce tobacco control messages in discouraging the use of tobacco products.
2014 <sup>39</sup>	Lowery BC, Sloane DC.	Longitudinal observational study	Identically zoned communities in Los Angeles, California varying in ethnicity/race,	Outdoor advertisements (billboards) that were harmful and positive. Harmful content categories include encouraging addictive behaviors such as alcohol use, tobacco use, and	Y	Outdoor ads showing harmful content, and proportion of outdoor ads overall were hosted more in poorer, minority (Asian Americans and Latino Americans) and at-risk (lower educational attainment, greater youth)

			income, education, and youth population (2012)	gambling; unhealthy eating; unsafe environments for women; inappropriate content for young children. Positive content categories included empty or available to rent; promotion of community event, public service, or nonprofit organization; or other type of ads unrelated to negative public health outcomes.		communities than others, despite being regulated by the same land-use zoning and regulations intended to protect residents. At least 24% of outdoor ads comprised of harmful content across all communities. These results suggest that harmful content on outdoor ads is inequitably distributed among ethnic/racial and low socioeconomic communities, and have potential adverse impacts.
<b>2016</b> <sup>43</sup>	Isgor Z, Powell L, Rimkus L, Chaloupka F	Multivariable analyses of pooled cross-sectional data	Cross-sectional pooled data covering the years 2010 through 2012	Prevalence of outdoor food and beverage ads on the exterior and property of retail food outlets in relation to community demographic and socioeconomic characteristics in a nationwide sample of communities in the U.S.	Y	Food and beverage ads and regular soda ads were significantly more prevalent in supermarkets/grocery stores located in low-income communities and majority non-Hispanic black and Hispanic communities and food and beverage price promotion ads were significantly more prevalent in supermarkets/grocery stores of majority non-Hispanic black communities, as compared to stores located in majority non-Hispanic white communities. Also, study is consistent to the results that showed that living in an upper income neighborhood was protective against exposure to obesity-promoting outdoor ads regardless of the neighborhood racial/ethnic composition.
<b>1995</b> <sup>44</sup>	Ammerman SD, Nolden M	Prospective observational study	Bus-stop-shelter billboards in Eureka Valley District and Mission District, San Francisco, USA.	Tobacco advertising on bus-stop-shelter billboards	Y	About 10% (9% in Mission District and 11% in Eureka Valley District) of all bus-stop-shelter billboard advertisements in each area promoted tobacco use. Possible exposures to these advertisements were greater in the Latino neighborhood because of a greater adolescent population. Qualitative analyses of tobacco ads suggested that adolescents are the primary targets.

<b>2017</b> <sup>45</sup>	Bragg MA, Pageot YK, Hernandez-Villarreal O, Kaplan SA, Simona CK	Cross-sectional	Lower East Side, a neighborhood located in the borough of Manhattan in New York City, USA.	Advertisements (ads) located in a Chinese-American neighborhood in a large, urban city (NYC, USA).	Y	Food/beverage ads were the largest ad category (29.7%, n=407), followed by services (e.g. mobile phone services; 21%, n=288). 66.9% of beverages featured were sugar-sweetened, and 50.8% of food ads promoted fast food. 54.9% of food/beverage ads targeted Asian Americans through language, ethnicity of person(s) in the ad or inclusion of culturally relevant images. 50.2% of ads were associated with local/small brands.
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**Table S2. Evidence on the impact of predatory food and beverage marketing on health**

<b>Year</b>	<b>Authors</b>	<b>Study Design</b>	<b>Geographic Setting</b>	<b>Exposure(s) of Interest</b>	<b>Content Analysis (Y/N)</b>	<b>Main Findings</b>
<b>2013</b> <sup>16</sup>	Lesser LI, Zimmerman FJ, Cohen DA	Cross-sectional	Selected areas with densely populated (>2000 residents/sq mile) census tracts in LA County and Southeastern Louisiana (2004-2005)	Outdoor ads promoting alcohol, tobacco, food and/or restaurants, and other products. (e.g. posters, flyers, flags, banners, or transit shelters, or benches, billboards with exception to storefront ads)	Y	A positive correlation was found between outdoor ads for food or non-alcoholic beverages within a census tract and obesity. They found that with every 10% increase in food ads, the odds of being overweight or obese increased by 5%.
<b>2008</b> <sup>40</sup>	Grier SA, Kumanyika SK.	Systematic review	20 studies related to the promotion of food and beverages to African Americans vs Whites and others (1992-2006) were based in the USA and state varied across studies	Eight studies reported on product promotion (television ads, magazine ads, in-store,), 11 on retail food outlet locations, and 3 on food prices.	Y	Studies indicated that African Americans compared to whites are consistently exposed to food promotion and distribution patterns that can potentially lead to harmful health effects. This study supports the basis that targeted marketing of unhealthy food and beverage to ethnic minority populations contributes to diet-related health disparities. However, price disparity was inconclusive due to limited evidence.

2015 <sup>41</sup>	Boyland EJ, Whalen R	Narrative Review	Reviewed evidence on how food advertising effects dietary intake of children from the preceding 5 years	A focus solely on children's exposure to food advertising via television and the Internet and on food intake	No?	When food advertising is prevalent, it promotes largely energy dense, nutrient poor foods, and even short-term exposure results in children increasing their food consumption which may have profound effects on diet both at critical stages of development and across the lifespan.
2016 <sup>42</sup>	Sadeghirad B, Duhaney T, Motaghipisheh S, Campbell NRC, Johnston BC	Systematic Review and Meta- Analysis of Randomized Trials	Systematic review and meta-analysis of randomized trials aimed to assess the effects of unhealthy food and beverage marketing among children 2 to 18 years of age up to January 2015	Randomized trials that assessed the effects of unhealthy food and beverage marketing compared with non-dietary advertisement or no advertisement in children were considered eligible. Outcomes were changes in dietary intake and influenced dietary preferences in children exposed to unhealthy food marketing	Y	The evidence indicates that unhealthy food and beverage marketing increases dietary intake (moderate quality evidence) and preference (moderate to low quality evidence) for energy-dense, low-nutrition food and beverage. Unhealthy food and beverage marketing increased dietary intake and influenced dietary preference in children during or shortly after exposure to advertisements.
2006 <sup>46</sup>	Bannon K, Schwartz MB	RCT: Pilot Study	Forty-nine kindergarten students in three elementary class rooms	Three classrooms in an elementary school were randomly selected and exposed to one of three 60 second clips (gain-framed, loss-framed, or control video) then given pre and post-test questionnaires to assess food preference and healthy food identification which involved a choice between animal crackers and an apple for their snack	Y	Among children who saw either the gain or loss-framed nutrition videos, 56% chose apples rather than animal crackers. This suggests videos containing varying nutrition information may have positive effects on children's short-term food choices.
2006 <sup>47</sup>	Kraak VI, Gootman JA, McGinnis JM	Narrative Review	Review of 123 empirical studies assessing the effects of food marketing to	Assess the influence of food marketing to children and adolescents on food intake, preference and various health outcomes	Y	Food and beverage marketing influences the preferences and purchase requests of children, influences short term consumption, is a likely contributor to less healthful diets, and may

			children and adolescents.			contribute to negative diet-related health outcomes and risks among children and youth
2018 <sup>48</sup>	Dixon H, Scully M, Wakefield M, Kelly B, Pettigrew S, Chapman K, et al	Randomized control trial	Australian adults were exposed to promotional videos and news stories about an upcoming international, multi-sport events with and without sponsoring	The effects of sponsorship of an elite sporting event by: (A) non-food brands (control), (B) unhealthy food brands, (C) healthier food brands, or (D) an obesity prevention public health campaign on young adults' brand awareness, attitudes, image perceptions, event-sponsor fit perceptions, and preference for food sponsors' products.	Y	Unhealthy food sponsorship promoted higher awareness of, and more favorable attitudes towards, unhealthy food sponsor brands. Unhealthy food sponsorship also led to greater perceived event-sponsor fit and transfer of perceptions of the sporting event to the unhealthy food sponsor brands, relative to the control group. Exposure to sponsorship for healthier foods produced similar sponsorship effects for healthier food sponsor brands, as well as prompting a significant increase in the proportion of young adults showing a preference for these products. Obesity prevention campaign sponsorship promoted higher campaign awareness but did not influence food attitude or preference for unhealthy versus healthy foods.

**Table S3. Policy and predatory food, beverage, alcohol, and tobacco marketing**

Year	Authors	Study Design	Geographic Setting	Exposure(s) of Interest	Content Analysis (Y/N)	Main Findings
2017 <sup>29</sup>	Sainsbury E, Colagiuri S, Magnusson R	Prospective observational study	178 train stations on the Sydney metropolitan train network were surveyed in summer and winter.	Food and beverage advertising (e.g. product, brand, location and advertisement format) on the Sydney metropolitan train network, and assessment of the nutritional quality of advertised products against the Australian Guide to Healthy Eating.	Y	Of 6931 ads identified, 1915 (27.6%) were promoting a food or beverage. The majority of food and beverage ads were for unhealthy products; 84.3% were classified as discretionary, 8.0% core and 7.6% miscellaneous. Snack foods and sugar-sweetened beverages were the most frequently advertised products, regardless of season. Coca-Cola and PepsiCo were the

						largest advertisers on the network, contributing 10.9% and 6.5% of total ads respectively.
2014 <sup>30</sup>	Kunkel D, Castonguay J, Wright PJ, Mckinley CJ	Cross-sectional	Five national broadcast networks that deliver children's programming: ABC, CBS, Fox, NBC and CW. In addition, Cartoon Network and Nickelodeon	Food advertising in a broad base of children's programming on broadcast and cable television channels.	Y	The frequency with which food ads appear during children's shows has declined over the four-year time span of this study. In 2007, an average of 8.5 foods ads were aired each hour. An average of 6.1 food commercials was aired in 2011, and this change proved statistically significant. The decline in number of food ads was more pronounced on broadcast than cable television, although significant reductions occurred in each medium. the overall number of commercial messages included in children's programming remained relatively stable
2016 <sup>50</sup>	Roberto CA, Wong D, Musicus A, Hammond D	Randomized Control Trial?	2381 demographically and educationally diverse primary caregivers of a child aged 6 to 11 recruited to conduct online survey	Examined how health warning labels on sugar sweetened beverages may influence parent's beverage selection for their children. Parents were randomly assigned to 1 of 6 conditions: (1) no warning label (control); (2) calorie label; or (3–6) 1 of 4 text versions of a warning label (eg, Safety Warning: Drinking beverages with added sugar[s] contributes to obesity, diabetes, and tooth decay).	Y	Significantly fewer parents chose a SSB for their child in the warning label condition (40%) versus the no label (60%) and calorie label conditions (53%). Parents in the warning label condition also chose significantly fewer SSB coupons, believed that SSBs were less healthy for their child, and were less likely to intend to purchase SSBs.
2015 <sup>51</sup>	Gortmaker SL, Wang YC, Long MW, Giles CM, Ward ZJ, Barrett JL, et al	Modelling Study	Utilized systematic reviews and microsimulation model to assess cost effectiveness of	Estimated the cost-effectiveness of seven interventions high on the obesity policy agenda: a sugar-sweetened beverage excise tax; elimination of the tax	Y	Three of the seven interventions— excise tax, elimination of the tax deduction, and nutrition standards for food and beverages sold in schools outside of meals— saved more in health care costs than they cost to implement.

			<p>childhood obesity prevention programs over a proposed 10 year span</p>	<p>subsidy for advertising unhealthy food to children; restaurant menu calorie labeling; nutrition standards for school meals; nutrition standards for all other food and beverages sold in schools; improved early care and education; and increased access to adolescent bariatric surgery.</p>		<p>Adolescent bariatric surgery had a negligible impact on obesity prevalence</p>
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