

Governmental policies to reduce unhealthy food marketing to children

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Reducing children's exposure to food marketing is an important obesity prevention strategy. This narrative review describes current statutory regulations that restrict food marketing; reviews available evidence on the effects of these regulations; and compares policy design elements in Chile and the United Kingdom. Currently, 16 countries have statutory regulations on unhealthy food marketing to children. Restrictions on television advertising, primarily during children's programming, are most common. Schools are also a common setting for restrictions. Regulations on media such as cinema, mobile phone applications, print, packaging, and the internet are uncommon. Eleven evaluations of policies in 4 jurisdictions found small or no policy-related reductions in unhealthy food advertising, in part because marketing shifted to other programs or venues; however, not all policies have been evaluated. Compared with the United Kingdom, Chile restricts marketing on more products, across a wider range of media, using more marketing techniques. Future research should examine which elements of food marketing policy design are most effective at reducing children's exposure to unhealthy food marketing.

INTRODUCTION

Across the globe, food marketing to children is pervasive, and the vast majority of products most heavily marketed to young people—sugary breakfast cereals, soft drinks, candy, salty snacks, and fast foods—are calorie dense, nutrient poor, and high in added saturated fat and/or *trans* fat, sugar, or sodium (HFSS).^{1–13} Marketing of unhealthy foods influences children's food and brand knowledge, preferences, requests, purchases, and eating behaviors.^{1,9,14–17} As a result, public health scholars and advocates as well as leading global health agencies such as the World Health Organization (WHO) have recommended implementation of policies to restrict or eliminate unhealthy food marketing to children as a critical strategy for obesity prevention.^{18,19}

Several regulatory approaches have emerged to reduce children's exposure to unhealthy food marketing.^{1,14,19} First, and most commonly, food and beverage industry groups have voluntarily established national and international self-regulatory programs to encourage more-responsible advertising.^{20,21} Comparatively few jurisdictions have enacted statutory policies to regulate HFSS food marketing to children, and some have coregulatory environments with both industry and statutory regulations in place (or government-endorsed industry self-regulation).²² Other jurisdictions have statutory policies that restrict the marketing of any commercial product to children, including but not limited to unhealthy foods and beverages.

A growing body of literature indicates that attempts at voluntary self-regulation by food, beverage, and

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restaurant industries have not meaningfully reduced children's exposure to marketing for unhealthy products,²³ but less is known about the effects of governmental policies on the measures that regulations are designed to address (eg, marketing exposure). Evidence on governmental food marketing policies is timely and critical, considering that a number of countries, including Colombia²⁴ and Canada,²⁵ have proposed statutory regulations to protect children from unhealthy food marketing.

The overarching objective of this review is to provide researchers and policymakers with information on existing governmental regulations that restrict unhealthy food marketing to guide the development of future policy. Specifically, in accordance with the WHO's 2012 Framework for Implementing the Set of Recommendations on the Marketing of Foods and Non-alcoholic Beverages to Children (WHO 2012 food marketing policy framework),²⁶ which outlines the process, key components, and key outcomes of food marketing regulations, this review aims to describe existing statutory regulations that limit unhealthy food marketing to children; review available evidence for these regulations' effects on output and outcome indicators, and conduct an in-depth comparison between regulations in the United Kingdom and Chile, 2 jurisdictions with recent governmental food marketing policies in place, on key elements of food marketing policy design.

METHODS

To identify existing statutory policies on food marketing to children, the following were reviewed: (1) the World Cancer Research Fund International's NOURISHING database,²⁷ which provides a regularly updated overview of worldwide policy actions implemented to promote healthy diets and reduce overweight and obesity, including "restricting food advertising and other forms of commercial promotion;"²² (2) the WHO Global Database on the Implementation of Nutrition Action;²⁸ (3) published surveys of policy actions on food advertising and food marketing;^{21,29-32} and (4) systematic reviews examining initiatives to reduce food and beverage advertising to children.^{23,33} From these sources, countries or jurisdictions with policies that are statutory in nature (ie, legally binding and mandatory for all companies); that have clear implementation guidelines; that were implemented by December 1, 2018; and that restrict unhealthy food and beverage marketing to children were identified. This includes regulations that specifically restrict unhealthy food marketing directed at children, regulations that restrict unhealthy food marketing (to all populations, including children), and regulations that restrict marketing of all

commercial products (including but not limited to food products). The dimensions of statutory food marketing policies are outlined in Table S1 in the Supporting Information online. Laws focused only on specific products or single categories (eg, energy drinks or early childhood food and beverage products like formula or toddler milks) were excluded.

For each policy, the most primary documentation of the law available, as well as implementation guidelines, was obtained from government websites and primary and secondary legislation databases.³⁴⁻³⁶ Each regulation was then categorized into 1 of 2 categories: regulations that specifically restrict unhealthy food marketing, and regulations that restrict all forms of commercial marketing to children (including but not limited to food). Next, descriptions of key policy specifications, as outlined in the WHO 2012 food marketing policy framework,²⁶ were extracted (Table 1^{27,30,37-69}). These include the following: (1) which children receive protection (definition/age ranges of children protected by the law); (2) which foods and beverages are subject to the law and how this is determined (eg, by applying nutrient profile models⁷⁰ or restricting certain categories); (3) how exposure is limited (defining child-directed media, communications, or settings subject to the law and in/on what communication channels marketing activities are restricted, eg, television [TV], the internet, etc); and (4) how power of HFSS food marketing is limited (describing what, if any, restrictions are placed on marketing techniques used to appeal to or persuade children and in what communication channels these restrictions apply).

Information on policy monitoring and enforcement were not included because of difficulty finding sufficient information for a number of countries or policies.

To assess available evidence on the effects of identified statutory regulations, a search was conducted for English-language, peer-reviewed evaluations that examine changes before and after implementation of the regulation or differences in outputs or outcomes between populations who were exposed vs unexposed to the regulation. Policy outputs and outcomes were categorized according to the WHO 2012 food marketing policy framework.²⁶

The following output indicators (ie, shorter-term effects) were examined: (1) exposure, or the reach, frequency, and media impact of the message (eg, frequency or proportion of advertisements for unhealthy foods; number of websites popular among children with links to commercials; presence in schools of branded materials; etc.); and (2) power, or the extent to which a message achieves its communications objective (eg, number of advertisements using child-attractive graphics or themes; number of food company websites with child-directed content; number of product

packages with messages or graphics designed to attract a child's attention; etc).

The following outcome indicators (ie, longer-term effects) were examined: (1) children's awareness, attitudes, beliefs, and preferences for food; (2) children's food consumption and dietary patterns (eg, a reduction in intake patterns characterized by high levels of added sugar, sodium, saturated or *trans* fats); and (3) children's weight status (eg, a reduction in the prevalence of overweight and obesity).

Evaluations cited in previous systematic reviews of this subject^{23,33} were examined first, along with evaluations listed in the World Cancer Research Fund International's NOURISHING database.²⁷ These yielded 10 studies for inclusion.^{7,71-79} Then, Web of Science and PubMed databases were searched for studies published between April 1, 2013, and December 12, 2018, as earlier studies would have been captured in previous systematic reviews that searched through March 2013³³ and April 2013²³ (see Appendix S1 in the Supporting Information online for search terms). This search returned a total of 987 unique results, of which only 4 met all criteria for inclusion.^{73,74,76,80} Of these 4, only 1 study was not already captured in an audit of previous reviews and the NOURISHING database.⁸⁰ The final 11 papers were examined by 2 authors (L.S.T. and E.A.B.) for relevance and suitability.

Data were extracted by 1 author (E.B.), reviewed by another author (L.S.T.), and entered into tables adapted from those used by Galbraith-Emami and Lobstein,²³ with the addition of a column for evaluation strengths and limitations to summary findings table (Table 2^{2,7,30,38-40,58,59,71-85} and Table 3^{7,30,37-40,58,59,71-80}).

Finally, a more in-depth comparison was conducted between the food marketing regulations in Chile and the United Kingdom. These regulations were chosen because the Chilean Law on Nutritional Composition of Food⁵⁰ and Law on Food Advertising⁵² and the UK Code of Broadcast Advertising³⁷ (British Committee of Advertising Practice [BCAP] Code) are both statutory regulations that are designed specifically to protect children from unhealthy food and beverage marketing, with the aim of preventing childhood obesity.⁸⁶⁻⁸⁸ This is in contrast to other regulations that restrict all forms of commercial marketing to children, which are not focused on food and are not motivated by specific concerns about childhood obesity. These regulations also shared specific similarities that permitted a useful comparative case study: (1) they define unhealthy foods and beverages on the basis of a specified set of nutrient criteria applied across all product categories; (2) they have the similar age groups of interest; (3) they share similar definitions for identifying and targeting TV advertising in terms of audience composition;

and (4) they are not limited to a single setting (eg, schools). The UK advertising industry's Code of Non-broadcast Advertising and Direct & Promotional Marketing⁶⁷ (CAP Code), updated in 2017 with guidance on advertising food and soft drinks to children in non-broadcast media,⁶⁸ is also considered. This code extends the protections of the BCAP Code to online and other nonmedia forms of marketing. While the CAP Code is not a true statutory regulation, it is included for comparison because it is applied uniformly to all food and beverage companies, and it has a monitoring and enforcement system in place (more detail provided below, in section *Comparison of policies in Chile and the United Kingdom*). These countries' regulations and codes were compared alongside the aforementioned policy design criteria, including the definition of children protected, the foods included, the limitations on exposure and power, and the monitoring and enforcement mechanisms.

RESULTS

Statutory regulations. Sixteen countries were found to have statutory regulations on food marketing to children that met the study criteria (Table 1). Of these, 10 countries specifically restrict marketing of unhealthy food to children, while 6 countries restrict marketing of all commercial products to children, including but not limited to food. Regulations in 5 countries define the target child population as less than 18 years of age, while regulations in 7 countries use lower age cutoffs ranging from less than 12 years to less than 15 years. Regulations in the remaining 4 countries do not specify a target age group but only restrict marketing or advertising in school settings.

Television is the most frequently restricted medium (10 jurisdictions), with the most common approach being to prohibit advertising on children's channels or during children's programming, defined as broadcast programs with a child audience share exceeding a specified threshold or proportion (5 countries) and/or as programs or channels with content directed primarily at children (7 countries). Four countries utilize time-based scheduling restrictions (ie, times of day when children are likely to watch TV), but these vary greatly in timing and duration. In South Korea, for example, advertising for unhealthy foods is prohibited on TV from 5:00 PM to 7:00 PM (as well as during children's programming outside of those times), whereas Mexico prohibits TV advertising of unhealthy food to audiences of greater than 35% children from 2:30 PM to 7:30 PM on weekdays and from 7:00 AM to 7:30 PM on weekends. Chile is the only country to combine advertising restrictions on the basis of content (devoted children's

Table 1 Overview and key features of statutory regulations that restrict food and beverage marketing to children^{a,b}

Which foods to include/exclude		Exposure: communication channels and settings		Power: marketing techniques	
Jurisdiction (year implemented)	Definition of children	Criteria/model used	Items to which regulation apply	How are regulated child-directed communications, media, advertising, or settings defined?	How are marketing techniques of particular appeal to children restricted (applies to channels and settings at left marked with an asterisk)?
Regulations specific to food and beverage products					
United Kingdom (broadcast media 2007 ³⁷ ; non-broadcast code excluded here ³)	4–15 y	How is it determined which foods and beverages are included/excluded?	All foods, drinks	Placement and audience: broadcasting during children's programs or when 120 Index is met (ie, proportion of viewers ages 4–15 y is ≥ 20% higher than in general population)	Ads for HFSS products that directly targeted children ages 4–12 y may not use licensed characters, celebrities popular with children, or promotional offers and may not make health claims
South Korea (2010) ³⁹	< 18 y	Thresholds set by the Korean Food and Drug Administration ³⁹ for calorie, total sugar, saturated fat, and sodium content of children's preferred foods (thresholds differ for snack foods vs meal substitutes)	✓	Time and placement: TV broadcasting before, during, and after programs aired from 5:00 PM to 7:00 PM and during children's programming	Advertisers prohibited from offering gratuitous incentives (eg, free toys) in ads for HFSS products on TV, radio, or the internet
Ireland (2005, ³⁰ updated 2013) ⁴⁰	< 18 y (stipulations for children < 13 y, < 15 y)	UK Nutrient Profiling Model ³⁸ : points for vegetable, fruit, nut, fiber, and protein content subtracted from points for energy, saturated fat, total sugar, and sodium content; > 4 total points for foods or > 1 point for beverages = "less healthy" (HFSS)	✓	Audience: programs broadcast to > 50% of audience < 18 y of age; or commercial communications targeting children < 15 y or < 13 y or broadcast to > 50% of audience in these age groups	HFSS food ads outside children's programs must not include current program characters, licensed characters, celebrities, or sports stars (if targeting children < 15 y); health/nutrition claims; or promotional offers (if targeting children < 13 y)
Mexico (2014) ⁴¹	< 13 y	Category-specific thresholds set for energy, sodium, saturated fat, total sugar, along with minimum amounts of components to encourage (categories include potato chips, sweetened drinks, confectionery)	✓	Time and audience: TV broadcasting from 14:30 to 19:30 on weekdays and from 7:00 to 19:30 on weekends to > 35% of child audience; TV broadcasting during films rated A or AA	No restrictions specified
Ecuador (2014) ^{42,43}	Not specified	Processed foods exceeding set thresholds for total fat, saturated fat, total sugar, and sodium ⁴³ ; beverages containing caffeine or noncaloric	✓	Setting: advertising in educational establishments	No restrictions specified
				TV	✓ *
				Radio	✓ *
				Cinema	✓
				DVD/CD-ROM	
				Internet/online	*
				Mobile	
				Interactive games	
				Print	
				Signs and outdoor	
				Direct marketing	
				Packaging	
				Point of Sale	✓
				Product placement	✓
				Sponsorships	✓
				School settings	✓
				Events/venues	

(continued)

Table 1 Continued

			Exposure: communication channels and settings											Power: marketing techniques							
Which foods to include/exclude			Items to which regulation apply																		
Jurisdiction (year implemented)	Definition of children	Criteria/model used	All foods, drinks	Select categories	TV	Radio	Cinema	DVD/CD-ROM	Internet/online	Mobile	Interactive games	Print	Signs and outdoor	Direct marketing	Packaging	Point of Sale	Product placement	Sponsorships	School settings	Events/venues	How are marketing techniques of particular appeal to children restricted (applies to channels and settings at left; marked with an asterisk)?
Poland (2015) ⁴⁴	Not specified	How is it determined which foods and beverages are included/excluded? sweeteners or whose content is < 50% of the natural food characterized in its formulation Products not included in food groups permitted for sale in schools or that exceed thresholds for total sugar, total fat, or sodium density set by the Ministry of Health ⁴⁵	✓	✓															✓		No restrictions specified
Uruguay (2015) ⁴⁶	Not specified	Products not included in the list of food and beverage groups recommended for sale in educational centers; packaged, processed foods exceeding set thresholds for energy, fats, saturated fats, trans fats, total sugar, and sodium ⁴⁷	✓	✓															✓	*	Within school settings, prohibits use of logos on school materials or other objects (eg, shirts, caps, backpacks); distribution of free samples or prizes; and use of competitions or raffles
Taiwan (2016) ⁴⁸	< 12 y	Thresholds set by Taiwan Food and Drug Administration ⁴⁹ for sodium content per serving and for percentage of calories from fats, saturated fats, or free sugar	✓		✓	*															Regulated products may not offer free toys
Chile (2016) ^{50,51} updated May 2018 ^{52,53}	< 14 y	Thresholds set by the Chilean Ministry of Health for calorie, saturated fat, sugar, and sodium content in products containing added free sugars, sodium, or saturated fats	✓		✓	*			✓	*									✓	*	Prohibits, in any marketing for regulated products, use of the following: celebrities, characters, cartoons (including brand equity); toys; stickers; animations; children's music; people/animals that capture children's interest; fantastic statements about product or its effects; situations representing children's daily life; children's expressions or language; interactive contests, games, or applications; or "hooks" unrelated to the product itself

(continued)

Table 1 Continued

Which foods to include/exclude			Exposure: communication channels and settings													Power: marketing techniques						
Jurisdiction (year implemented)	Definition of children	Criteria/model used	Items to which regulation apply																			
			All foods, drinks	Select categories	How are regulated child-directed communications, media, advertising, or settings defined?	TV	Radio	Cinema	DVD/CD-ROM	Internet/online	Mobile	Interactive games	Print	Signs and outdoor	Direct marketing	Packaging	Point of Sale	Product placement	Sponsorships	School settings	Events/venues	How are marketing techniques of particular appeal to children restricted (applies to channels and settings at left marked with an asterisk)?
Turkey (2011, ⁵⁴ updated March 2018 ⁵⁵)	< 18 y	Ministry of Health places foods into red, orange, and green categories; red categories (high in fats, trans fatty acids, sodium, or sugars; eg, confectionery, chips, sodas) subject to restrictions; orange categories subject to restrictions if foods exceed category-specific thresholds for energy, total fat, saturated fat, total sugar, free sugar, nonsugar sweeteners (milk drinks only), or salt; green categories unrestricted ^{56,57}	✓	✓	Placement: broadcasting before, during, and after children's programs	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	Advertisements for products in red or orange categories broadcast outside of children's programming must stream easily legible text at the bottom of the screen with warnings promoting a regular and balanced diet
Regulations that limit marketing for all commercial products Quebec, Canada (1980, ⁵⁸ updated guidance issued 2012 ⁵⁹) ^e	< 13 y	No nutrient profiling model used; regulation applies to all commercial products	✓		Time, placement, and audience (considers 3 criteria): (1) Whether product is intended for/appeals directly to children; (2) whether ad is designed to attract children's attention; and/or (3) whether timing and placement are such that children are exposed (> 15% of child audience) ⁵⁸	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	No restrictions specified
Norway (1992, ⁶⁰ additional guidance issued 1997 ⁶¹)	< 18 y	No nutrient profiling model used; regulation applies to all commercial products	✓		Placement: any advertising broadcast before, during, or after children's TV programs; any advertising for products or services of particular interest to children or in a form that particularly appeals to children	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	Prohibits featuring popular people or figures from Norwegian TV or radio programs aimed at children or young adults
Hungary (2008 ⁶²)	< 18 y	No nutrient profiling model used; regulation applies to all commercial products	✓		Setting: advertising in child welfare and child protection institutions, kindergartens, primary and secondary schools, and their dormitories																	No restrictions specified
Sweden (2010 ⁶³)	< 12 y	No nutrient profiling model used—regulation applies to all commercial products	✓		Placement: broadcasts immediately before, during, and after programs aimed primarily at children	✓																Prohibits featuring in advertising persons or characters who play a prominent role in programs primarily aimed at children

(continued)

Table 1 Continued

		Exposure: communication channels and settings											Power: marketing techniques							
		Which foods to include/exclude										Items to which regulation apply								
		Criteria/model used																		
Jurisdiction (year implemented)	Definition of children	How is it determined which foods and beverages are included/excluded?	How are regulated child-directed communications, media, advertising, or settings defined?	TV	Radio	Cinema	DVD/CD-ROM	Internet/online	Mobile	Interactive games	Print	Signs and outdoor	Direct marketing	Packaging	Point of Sale	Product placement	Sponsorships	School settings	Events/venues	How are marketing techniques of particular appeal to children restricted (applies to channels and settings at left; marked with an asterisk)?
Spain (2011) ⁶⁴	< 15 y	No nutrient profiling model used; regulation applies to all commercial products	Setting: advertising in public/private kindergarten or primary or secondary school settings Setting: advertising in preschools and primary schools and secondary public educational centers or institutions attended by children															✓		No restrictions specified
Costa Rica (2012, updated 2013) ⁶⁵	Not specified	No nutrient profiling model used; regulation applies to all foods and beverages	Setting: advertising in public/private kindergarten or primary or secondary school settings Setting: advertising in preschools and primary schools and secondary public educational centers or institutions attended by children															✓		No restrictions specified

Abbreviations and symbols: ad(s), advertisement(s); HFSS, high in saturated fat, salt, or sugar; POS, point of sale;

✓, indicates marketing activity restricted;

*, indicates technique restricted.

^aSee Table 51 in the Supporting Information online for descriptions of policy dimensions and definitions of the communication channels and settings used here.

^bThis table provides summary information about each regulation, on the basis of the available information, for the purposes of documenting existing policies and facilitating comparison between different policy approaches around the world. It presents information on policies implemented as of December 1, 2018, and does not include all existing policies related to food marketing, does not capture all nuances of different regulations, and does not describe detailed coverage for every type of marketing. Not included here are so-called coregulatory arrangements made between government bodies and industry groups; advertising restrictions that are not specifically intended to protect children; and countries that have taken steps to restrict unhealthy food advertising to children but have not yet published implementation guidelines (eg, Brazil, Peru). For more information about these policies and others not included here, see the World Cancer Fund International's NOURISHING database.

^cThe United Kingdom also has a Code of Non-broadcast Advertising and Direct & Promotional Marketing^{67,68} (CAP Code) that, as of 2017, applies restrictions on unhealthy food marketing to non-broadcast media, including print advertisements, posters, cinema commercials, internet/online ads, commercial emails, viral ads, advergames, in-game ads, text messages, direct mail, competitions, special offers, and sales promotions. The CAP Code was not included in this table because it is not truly statutory in nature, but instead is a form of self-regulation by the advertising industry. While the advertiser-funded Committee of Advertising Practice and Advertising Standards Authority writes and oversees, respectively, both the CAP and the BCAP Codes, the UK government's Office of Communications (Ofcom) is responsible in law for only the BCAP Code.

^dIn addition, no more than 25% of advertising sold by a broadcaster may advertise HFSS foods or drinks, and no more than 1 in 4 ads included in any advertising break may advertise HFSS foods or drinks.

^eQuebec's Consumer Protection Act, though passed and implemented before the advent of the internet and other new media and communication channels, is applied to all media and formats used to distribute or broadcast commercial advertising.^{58,69}

^fException: Commercial advertising aimed at children is permitted in children's magazines if the magazine or insert containing the advertisement is intended for children; if the magazine or insert is offered for sale or is inserted in a publication offered for sale; and if the magazine or insert is published at least every 3 months.

channels or programs targeting children), audience composition (> 20% child audience), and time, with broad scheduling restrictions extending from 6:00 AM to 10:00 PM, regardless of programming type or audience. Schools or educational institutions are the next most common setting for marketing restrictions (7 countries). All but one of these countries (Chile) regulate marketing only in schools and do not address any other communication channels or settings.²² Restrictions on marketing via other forms of media, such as cinema, mobile, print, packaging, and the internet, are uncommon.

The types of foods and beverages covered also vary, as do the nutritional criteria used to identify unhealthy products subject to regulation. Jurisdictions with regulations that apply to all commercial products (Quebec [Canada], Norway, Hungary, Sweden, Spain, and Costa Rica) do not use nutritional criteria, since marketing for all foods is restricted. Of the 10 countries with regulations specific to food marketing, 10 employ a method of nutrient profiling to identify which products are subject to restrictions. Four countries apply a nutrient profile model to all foods and beverages (United Kingdom, Ireland [except cheese products], Taiwan, and Chile), while 6 countries apply a nutrient profile model only to specific food and beverage categories (South Korea, Mexico, Ecuador, Poland, Uruguay, and Turkey). Turkey and Poland are unique in that they apply a nutrient profile model to certain food and beverage categories to identify specific products subject to marketing restrictions, while other categories face marketing restrictions for all products within the category, regardless of nutrient profile. Eight countries include thresholds for saturated fat content, while only 2 include limits on *trans* fats. Regarding sugar, 1 country includes limits on free sugar only; 7 include limits on total sugar only, and 2 (Chile and Turkey) include limits on both free sugar and total sugar. Only Turkey uses thresholds for nonsugar sweeteners, and this applies only to milk drinks. All 10 countries include limits on sodium content, and 7 countries include limits on energy (calories). Three countries use nutrient profile models that account for content of beneficial nutrients or ingredients: the UK model (also used in Ireland) uses a scoring approach in which points for beneficial nutrients or ingredients (ie, vegetable, fruit, nut, fiber, and protein content) are subtracted from points accrued from nutrients to limit (energy, saturated fat, total sugar, and sodium content),³⁸ while Mexico's regulation has set thresholds for "nutrients to encourage".

With regard to power, or the types of marketing techniques addressed, most commonly restricted were the use of free gifts and toys, celebrities, and licensed or other types of characters. Restrictions on promotions/

promotional offers and health/nutrition claims were less common. Seven of the 16 policies specified no limits to the types of techniques or appeals permitted.

Evaluation studies. Eleven studies evaluating the effects of these statutory regulations were identified for Ireland,⁷⁷ South Korea,^{75,76} the United Kingdom,⁷¹⁻⁷⁴ and Quebec, Canada^{7,78-80} (Table 2). These studies focused primarily on the prevalence and proportion of HFSS food advertising on TV by examining either changes in these measures following implementation of regulations^{71,74,75} or by comparing the measures between jurisdictions with and without restrictions (ie, groups more or less likely to be exposed to the effects of the regulation).^{7,77,79,80} Three studies examined children's estimated exposure to HFSS food advertising on TV.^{72,75,77} Three studies analyzed the use of child-directed marketing techniques on TV^{77,79} or online.⁸⁰ Only 2 studies examined changes in household purchase behavior,^{73,78} and 2 examined changes in industry advertising expenditures⁷³ or budgets.⁷⁵ No studies examined changes in individual awareness, attitudes, beliefs, or preferences, and only 1 examined changes in food intake, but these changes were not linked to changes in food marketing exposure.⁷⁸ No studies examined changes in weight status or other health outcomes. All studies were observational in nature and thus could not evaluate causal effects of regulations.

In general, findings were mixed as to whether the prevalence of HFSS food advertising decreased after the regulation (Table 3). In some cases, apparent decreases were accompanied by other changes in HFSS food marketing. For example, a 2012 evaluation in South Korea comparing TV broadcasts recorded for 1 month each in 2009 (preimplementation of advertising restrictions) and 2010 (postimplementation) found an 81% drop in the number of HFSS food ads placed during regulated children's prime time hours, an 82% reduction in children's gross rating points (GRPs, a proportion of audience reached) for HFSS food ads during regulated hours, and a 50% reduction in children's GRPs for HFSS food ads during other times.⁷⁵ However, a 2013 study in South Korea that surveyed HFSS and non-HFSS food companies to learn about changes in company marketing practices postimplementation found that more HFSS food companies introduced online, mobile, and social marketing than did non-HFSS food companies and found some evidence of product reformulation and reductions in package sizes among the latter.⁷⁶

Evaluations of Quebec's regulation banning all commercial marketing to children showed mixed results for food advertising.^{7,78-80} One content analysis comparing viewing diaries of English- and

Table 2 Peer-reviewed studies evaluating statutory regulation of food and beverage marketing to children

Reference	Design and objectives	Data sources	Sample	Media assessed	Coding	Output and outcome indicators
United Kingdom (Code of Broadcast Advertising [BCAP Code³⁷]; phased implementation: April 2007, January 2008, January 2009) Boylard et al (2011) ⁷¹	Design: cross-sectional survey Objectives: investigate extent and balance of food advertising for core and noncore foods and pattern variations across peak and nonpeak children's viewing times, channel types, program types, and broadcast month	Authors' survey: TV transmissions (6:00–22:00 recorded 1 weekday and 1 weekend day per month, January–December 2008)	N/A	TV: 5233.5 h (147 672 ads) recorded from 14 UK commercial stations with greatest viewing shares for children ages 4–15 y	Ads: channel, channel type, and program category; month of broadcast; time of broadcast (peak/non-peak children's viewing); product type Foods: 29 categories assigned to core, noncore, or miscellaneous	Output (exposure): • Number of ads featuring core, noncore, and miscellaneous foods
Adams et al (2012) ⁷²	Design: repeated cross-sectional survey (pre-/postimplementation) Objectives: examine (1) restrictions' impact on relative exposure to HFSS food ads among all TV viewers and children; and (2) adherence to restrictions	Commercial broadcast data (6 mo pre-/postregulation): 1 wk in October 2006, 1 wk in July 2009	N/A	TV: 1 036 953 ads from all 288 channels broadcast in Tyne Tees region; 1 672 417 TV advertising PMVs for viewers aged ≥ 4 y, including 190 955 PMVs for children ages 4–15 y	Foods: HFSS status per UK FSA Nutrient Profiling Model ³⁸	Outputs (exposure): • Exposure to HFSS food ads (measured as PMVs) • Adherence to restrictions (measured as PMVs for HFSS products during restricted broadcasting times)
Silva et al (2015) ⁷³	Design: repeated cross-sectional survey Objective: quantify households' impact on household expenditures during periods of no regulation, voluntary self-regulation, and co-regulation	UK Living Costs and Food Survey ⁸¹ : Commercial advertising expenditure data (per capita quarterly household food and drink expenditures and advertising expenditures, April 2001–December 2009)	6000 UK households	HFSS food advertising in press, cinema, radio, outdoor, TV, direct mail, and the internet	Advertised foods: aggregated into categories of fruits and vegetables; HFSS foods; HFSS drinks; or others Advertising expenditures: media (press, cinema, radio, outdoor, TV, direct mail, the internet)	Outcomes: • Household HFSS food and drink expenditures • Industry advertising expenditures
Whalen et al (2017) ⁷⁴	Design: repeated cross-sectional survey Objective: compare nutritional quality of food advertising on UK TV in 2008 and 2010 (mid-/postimplementation)	Authors' survey: TV transmissions (6:00–22:00 recorded 1 weekday and 1 weekend day during February, April, June, August, October, and December 2010)	N/A	TV: 1931.5 h (56 162 ads) recorded from 13 UK commercial stations with greatest viewing shares for children ages 4–15 y and top 5 channels watched in previous week by 5- to 16-year-olds; compared with similar 2008 data from Boyland et al (2011) ⁷¹ (5233.5 h of recorded TV; 147 672 ads)	Ads: channel, channel type, program category, month and time of day of broadcast, and product advertised (eg, food/beverage, toys) Foods: 29 categories assigned to core, noncore, or miscellaneous	Outputs (exposure): • Food and beverage advertising prevalence (overall, during peak child viewing times, and by channel type) • Proportion of food advertising for core, noncore, and miscellaneous foods (overall and by channel type) • Proportion of food commercials broadcast by product category

(continued)

Table 2 Continued

Reference	Design and objectives	Data sources	Sample	Media assessed	Coding	Output and outcome indicators
<p>South Korea (Special Act on Safety Management of Children's Dietary Life,³⁹ implemented September 2010) Kim et al (2012)⁷⁵</p>	<p>Design: repeated cross-sectional survey</p> <p>Objectives: examine impact of regulation on food companies' TV advertising practices and changes in children's exposure to TV ads for EDNP foods</p>	<p>Commercial data: TV transmissions, advertising budget, and audience ratings (24 h/d during January, April, July, and October of 2009 and 2010)</p>	<p>N/A</p>	<p>TV: 9259 EDNP food and beverage ads recorded from 4 terrestrial channels and 1 cable channel in South Korea</p>	<p>Foods: EDNP status per Korea Food and Drug Administration guidelines³⁹ Broadcast period: regulated (5:00–7:00 PM) vs nonregulated</p>	<p>Outputs (exposures):</p> <ul style="list-style-type: none"> • Number of ad placements • Exposure to EDNP food ads (measured in gross rating points or GRPs for ads that reached children aged 4–18 y) <p>Outcome:</p> <ul style="list-style-type: none"> • Total TV advertising budget
<p>Lee et al (2013)⁷⁶</p>	<p>Design: cross-sectional survey</p> <p>Objective: examine postimplementation changes in food companies' marketing mix</p>	<p>Authors' survey: Online questionnaire (July 12–August 4, 2011)</p>	<p>63 questionnaires completed by 32 EDNP and 31 non-EDNP food and beverage company representatives</p>	<p>All media ("4 Ps" of marketing mix: product, price, place, promotion)</p>	<p>Companies: EDNP vs non-EDNP (classified as EDNP if company produced any products in EDNP categories, per Korean national guidelines)</p>	<p>Outputs (exposure, power):</p> <ul style="list-style-type: none"> • Changes in company strategies or activities within "4 Ps" of marketing mix
<p>Ireland (Children's Advertising Code, implemented 2005;³⁰ superseded by BAI Children's Commercial Communications Code,⁴⁰ implemented 2013) Tatlow-Golden et al (2016)⁷⁷</p>	<p>Design: cross-sectional content analysis</p> <p>Objective: identify (1) extent and HFSS nature of children's advertised diet on island of Ireland; (2) differences in HFSS food advertising between 2 jurisdictions on island of Ireland; and (3) persuasive techniques used to promote HFSS and healthier foods at times and on channels when young children are most likely to be viewing</p>	<p>Authors' survey: TV transmissions (15:30–20:59 on Mondays and Thursdays and 9:30–10:59 and 18:30–21:59 on Saturdays and Sundays, for 5 consecutive weeks, from October 8 to November 11, 2012)</p>	<p>N/A</p>	<p>TV: 210 h (7698 ads) recorded from 7 channels in 2 jurisdictions (Republic of Ireland and Northern Ireland) with highest viewership among children ages 4–6 y</p>	<p>Foods: (1) HFSS status per UK FSA Nutrient Profiling Model³⁸; (2) marketing permitted/not permitted per WHO Regional Office for Europe Nutrient Profile Model⁸²; (3) categorization to 13 food groups; (4) comparison of food groups with UK Eatwell Plate⁸³ recommendations Ads: food type (37 codes) and marketing techniques (76 codes; eg, ad features, settings, characters, and persuasive and informational appeals)</p>	<p>Outputs (exposures):</p> <ul style="list-style-type: none"> • Prevalence of TV food advertising (overall, by jurisdiction, by channel, and per hour) • Proportion of TV food ads from each food group, healthy vs less-healthy • Estimated children's exposure to TV food ads in each jurisdiction (overall and for less-healthy foods) • Percentage of food groups represented in advertised diet vs recommended representation in Eatwell Plate⁸³ <p>Output (power):</p> <ul style="list-style-type: none"> • Frequencies of use of advertising techniques (overall and by HFSS status)

(continued)

Table 2 Continued

Reference	Design and objectives	Data sources	Sample	Media assessed	Coding	Output and outcome indicators
Quebec, Canada (Consumer Protection Act⁵⁸, implemented 1980, updated guidance issued 2012⁵⁹) Dhar & Baylis (2011) ⁷⁸	Design: natural experiment following implementation Objective: examine whether advertising ban affected fast food consumption	Statistics Canada FOODEX ⁸⁴ and Famex ⁸⁵ surveys (1984, 1986, 1990, 1992)	9177 households (5024 in Ontario; 4153 in Quebec)	N/A	N/A	Outcomes: • Fast food purchasing propensity • Fast food expenditures • Fast food calories consumed
Potvin Kent et al (2011) ⁷⁹	Design: cross-sectional content analysis Objective: compare TV food marketing exposure among Quebec French- and English-speaking children and Ontario English-speaking children	Authors' survey: • 7-d TV viewing diaries to establish children's preferred programs • TV transmissions (6:00–24:00, March 26–April 1, 2009)	428 children aged 10–12 y (1 aged 13 y) from 2 metropolitan regions in Canada (225 English-speaking children in Ontario, 156 French-speaking children in Quebec, and 47 English-speaking children in Quebec)	TV: 90 h of children's preferred programs recorded from 32 Canadian stations; 1511 ads (387 food and beverage ads)	Promotions: ads, contests, or sponsorships Ads: day and time; type of program and station; type and length of promotion; product type; promotional techniques; and target audience	Outputs (exposure, power): • Number of ads, contests, and sponsorships by food and beverage product category • Cumulative frequency and percentages of food and beverage promotions, overall and by food and beverage category
Potvin Kent et al (2012) ⁷	Design: cross-sectional content analysis Objective: compare nutritional quality of foods advertised during children's preferred TV viewing in Ontario and Quebec	Authors' survey: • Children's viewing diaries and TV transmissions from previous study ⁷⁹ • Nutritional content from company websites and informants, product labels, Canadian Nutrient File, and USDA National Nutrient Database	428 children aged 10–12 y (1 aged 13 y) from Ontario and Quebec (same sample used in previous study ⁷⁹)	TV: 90 h of children's preferred programs recorded from 32 Canadian stations; 1809 TV ads (449 food and beverage ads)	Foods: nutrition profiling (using nutritional content per 100 g for 427 products) based on the following: (1) criteria ² for high fat, high saturated fat, high sugar, high sodium, low fiber, high fat or high sugar, and high fat, sugar, or sodium vs less healthy per UK Nutrient Profiling Model ³⁸	Outputs (exposure): • Nutrient density of advertised products • Proportion of advertised products classified as high fat, high saturated fat, high sugar, high sodium, low fiber, high fat or high sugar, and high fat, sugar, or sodium • Proportion of advertised products classified as healthy vs less healthy

(continued)

Table 2 Continued

Reference	Design and objectives	Data sources	Sample	Media assessed	Coding	Output and outcome indicators
Potvin Kent et al (2013) ⁸⁰	Design: cross-sectional content analysis Objective: assess influence of Quebec's Consumer Protection Act and industry self-regulations in Ontario on food manufacturer and restaurant websites in Canada	Authors' survey: • Children's viewing diaries and TV transmissions from previous study ⁷⁹ • Canadian food manufacturer and restaurant websites (3-wk period in spring 2010)	428 children aged 10–12 y (1 aged 13 y) from Ontario and Quebec (same sample used in previous study ⁷⁷)	Websites: 147 Canadian websites corresponding to food and beverage products advertised during children's preferred TV programs in Ontario and Quebec (excluded if unlikely to include child content or if product/company did not have a Canadian website)	Websites: English or French language; membership in CAI industry self-regulation Content: marketing features; links to other pages or websites; games and activities; child protection features; or healthy lifestyle messages	Outputs (power): • Number of websites with child-directed content • Number and percentage of websites with marketing features, child protection features, games and activities, and healthy lifestyle messages

Abbreviations: ad(s), advertisement(s); BAI, Broadcasting Authority of Ireland; CAI, Canadian Children's Food and Beverage Advertising Initiative; EDNP, energy-dense, nutrient-poor; GRP, gross rating point; HFSS, high in saturated fat, salt, or sugar; N/A, not applicable; PMVs, person-minute-views; USDA, US Department of Agriculture; WHO, World Health Organization.

French-speaking children aged 10 to 12 years in Quebec and Ontario found that the French-speaking Quebec group (expected to be most affected by the law) and the English-speaking Quebec and Ontario groups saw similar amounts of food advertising on TV (4–5 food ads per hour). There was, however, a higher prevalence of child-targeted food advertisements and child-directed appeal techniques (ie, use of fun theme or media characters and celebrities) in the sample viewed by the 2 English-speaking groups than in the sample viewed by the French-speaking Quebec group.⁷⁹ A second evaluation using the same TV sample found that the Quebec French group saw slightly fewer ads for “less healthy” foods and beverages (as described in the UK Nutrient Profile Model³⁸) than the 2 English-speaking groups, yet the overall prevalence of ads for “less healthy” products was still high for all groups (60.6% of food and beverage ads seen by Quebec French vs 68.9% seen by Quebec English and 68.3% seen by Ontario English).⁷ A third evaluation of Canadian French- and English-language food and restaurant websites found no significant differences between the English and French websites in the proportion of sites with child-directed content or in the frequencies or average number of various marketing features used, including advergames, spokescharacters, and branded virtual activities.⁸⁰ Finally, an evaluation of food expenditure survey data found households most likely to be affected by the Quebec regulation (ie, French-speaking households with children) had a 13% reduction in likelihood of purchasing fast food compared with households less likely to be affected by the regulation (ie, English-speaking households in Quebec and neighboring Ontario),⁷⁸ although the study did not include any data on these households' actual HFSS food advertising exposure.

In the United Kingdom, relative exposure to HFSS food advertisements did not change greatly following introduction of the BCAP Code. A cross-sectional survey examining TV advertising in 2008, midimplementation of broadcast restrictions, found that over half of the food and beverage ads surveyed from TV channels most popular with children were for noncore, less healthy foods.⁷¹ A follow-up study comparing a similar 2010 TV sample with the 2008 sample found that the proportion of food advertisements for noncore products declined only slightly from 2008 to 2010 (–2.2%).⁷⁴ This proportion increased, however, during children's peak viewing times overall (+0.5%), on music channels (+11.6%), and on a sports channel (+7.7%). Similarly, another study that compared TV ads broadcast pre- and postimplementation found that children's exposure to advertisements for HFSS food products did not change after the regulation.⁷² A 2015 study that

Table 3 Key findings, strengths, and weaknesses of peer-reviewed papers evaluating statutory regulations to limit advertising of food and beverage products to children

Reference	Key findings	Author conclusions	Strengths and limitations
<p>United Kingdom (Code of Broadcast Advertising [BCAP Code]⁷¹); phased implementation: April 2007, January 2008, January 2009 Boyland et al (2011)⁷¹</p>	<p>Across the whole sample, ads for noncore foods appeared at a mean rate of 2.0 ads/h (maximum, 7.4), ads for core foods at 0.7 ads/h (maximum, 4.3), and ads for miscellaneous foods at 0.9 ads/h (maximum, 10.2). There were significantly more ads for noncore foods across all recorded samples (mean, 30.4 ads; 56% than for miscellaneous (mean 14.8 ads; 25.9%) or core foods (mean, 10.4 ads; 18.1%) ($P < 0.001$ for all). The sports channel broadcast the greatest proportion of ads for noncore foods (78.3%), which was significantly greater than that on children's (59.8%), music (51.8%), or family channels (50.4%) ($P < 0.001$). Of the 10 most-advertised food products, 6 were non-core foods (fast food, unhealthy breakfast cereals, chocolate/confectionery, HFSS spreads, alcohol, and snack foods); only 1 was a core food (low-fat dairy items).</p>	<p>Author conclusions</p> <p>"Despite regulation, children in the UK are exposed to more TV advertising for unhealthy than healthy food items, even at peak children's viewing times. There remains scope to strengthen the rules regarding advertising of HFSS foods around programming popular with children and adults alike, where current regulations do not apply. Ongoing, systematic monitoring is essential for evaluation of the effectiveness of regulations designed to reduce children's exposure to HFSS food advertising on television in the UK."</p>	<p>Strengths:</p> <ul style="list-style-type: none"> • Large sample covered major holidays and all seasons, examined relatively large number of TV channels • Examined differences in ad placement by channel type, programming type, and broadcast month <p>Limitations:</p> <ul style="list-style-type: none"> • Products were not categorized according to the Nutrient Profile Model used in the UK regulation; rather, used core (foods/drinks required to meet nutrient requirements), noncore (foods/drinks that provide nutrients and/or energy in excess), and miscellaneous foods • Did not examine ads aired between 22:00 and 06:00 • Outcome measured only number of ads, not viewers' exposure • Only examined changes in TV advertising—didn't capture any changes in HFSS food marketing or advertising via other channels/strategies
<p>Adams et al (2012)⁷²</p>	<p>Exposure (measured in PMVs) of children aged 4–15 Y, week 2 (2009, postimplementation) vs week 1 (2006, preimplementation):</p> <ul style="list-style-type: none"> • Lower odds of ad PMV being for food (OR = 0.85; 99%CI, 0.82–0.89) • No change in odds of ad PMV being for HFSS food (OR = 1.05; 99%CI, 0.99–1.12) • Greater odds of food ad PMV being for HFSS food (OR = 1.25; 99% CI, 1.15–1.37) <p>In 2009, after full implementation of scheduling restrictions:</p> <ul style="list-style-type: none"> • 60.4% of TV food advertising seen by all viewers aged ≥ 4 y advertised HFSS foods, vs 38.6% 6 mo preimplementation. • 55.7% of TV food advertising seen by children (4–15y) advertised HFSS foods, vs 43.2% 6 mo preimplementation. <p>Adherence to restrictions was nearly universal: of 68 545 PMVs among child viewers in study week 2 (2009) that were subject to the restrictions, 8 (0.01%) were for HFSS food products.</p>	<p>"Despite good adherence to the restrictions, they did not change relative exposure of children to HFSS advertising and were associated with an increase in relative exposure of all viewers to HFSS advertising. Stronger restrictions targeting a wider range of advertisements are necessary to reduce exposure of children to marketing of less healthful foods."</p>	<p>Strengths:</p> <ul style="list-style-type: none"> • Use of PMVs offers a more accurate measure of exposure than gross rating points, since it considers different ad lengths and number of individuals watching • Sampled all ads on all channels (within study weeks and region) <p>Limitations:</p> <ul style="list-style-type: none"> • Measured short-term effects (6 mo after full implementation of broadcast restrictions) • Sampled data from different months pre and postimplementation (October in 2006 and July in 2009), likely capturing seasonal differences in advertising • Majority of nutritional information was collected from manufacturers in 2009, which could affect proportion of foods classified as HFSS in week 1 (2006) • Authors imputed estimated nutritional data for $\approx 50\%$ of food ads; may have reduced accuracy of results and estimated adherence, owing to exclusion of imputed products from that analysis • Secondary broadcast data provided access to group-level data only; authors were not able to assess effects on individual-level exposure • Only examined changes in TV advertising; didn't capture any changes in HFSS food marketing or advertising via other channels/strategies

(continued)

Table 3 Continued

Reference	Key findings	Author conclusions	Strengths and limitations
Silva et al (2015) ⁷³	<p>From 2001 to 2009, TV HFSS food advertising expenditures accounted for the majority, though a decreasing share, of HFSS food advertising expenditures. Press, cinema, and internet advertising expenditures had increasing trends.</p> <p>Self-regulation did not lead to significant changes in total or TV HFSS food advertising expenditures.</p> <p>Co-regulation led to a 9.7% reduction in total advertising (– £11.4 million, $P < 0.01$), driven by a 19.4% decrease in TV HFSS food advertising expenditures ($P < 0.01$), which was partially offset by increased non-TV advertising.</p> <p>Under both self-regulation and co-regulation, households with children spent less per capita/quarter on HFSS foods and HFSS drinks and more on fruits and vegetables ($P < 0.01$ for all).</p> <p>Households without children spent significantly less per capita/quarter on HFSS drinks under self-regulation, but significantly more on HFSS drinks under subsequent co-regulation ($P < 0.01$ for both).</p>	<p>“... While co-regulation has been effective at reducing HFSS TV advertising expenditures, it has led to advertising reallocation from TV to non-TV media. In contrast, self-regulation does not appear to affect HFSS advertising expenditures... Changes in child-directed food advertising regulations significantly impacted the expenditure of households with children on healthy and unhealthy food... Advertising regulations may have had a bigger impact on households with children compared to those without children, though regulations may have spillover effects to households without children, at least in terms of expenditures of HFSS drinks.”</p>	<p>Strengths:</p> <ul style="list-style-type: none"> • Long sample period included periods of industry self-regulation alone and subsequent co-regulation (self-regulation plus statutory broadcast regulations) • Examined downstream changes in household demand for HFSS products • Examined advertiser spending across different media, capturing changes in overall marketing practices in response to broadcast-only restrictions • Used models to control for seasonality and economic growth in order to isolate regulation effects from secular trends <p>Limitations:</p> <ul style="list-style-type: none"> • Relied on expenditure data for food and drink consumed at home only • Household expenditures self-reported on a weekly basis, allowing for possibility of misreporting
Whalen et al (2017) ⁷⁴	<p>The proportion of ads broadcast for foods decreased 4.3% on children's channels but increased across all other channel types (+ 0.3% on family channels, + 3.0% on music channels, and + 4.3% on the sports channel).</p> <p>The proportion of food advertising for noncore foods decreased 8.6% on children's channels (to 51.2% in 2010) and 30.1% on the sports channel (to 48.2%) but increased on family channels (+ 3.6%, to 54.0% in 2010) and music channels (+ 7.6%, to 59.4%). CITY (a British free-to-air children's channel) broadcast the largest proportion of noncore commercials of any channel surveyed (68.8%).</p> <p>The proportion of food advertising for noncore foods was higher during peak vs nonpeak children's viewing times (+ 0.5%), especially on music channels (+ 11.6%) and the sports channel (+ 7.7%).</p> <p>Seasonal variation was indicated by an increase in the proportion of food advertising for noncore foods from June (46.9%) to August (64.3%), when UK schools close for summer. This difference was greater on dedicated children's channels, on which the proportion of food advertising for noncore foods climbed from 32.0% in June to 62.0% in August. These seasonal differences were more pronounced in 2010 than in 2008.</p>	<p>“... Despite statutory regulation, frequency and balance of food commercials (core, non-core and miscellaneous) remained relatively static over the 2 yr. Children are still exposed to high amounts of unhealthy food advertising on television. Continued monitoring of television food advertising remains crucial and policymakers should examine the comparative efficacy of other restrictions.”</p>	<p>Strengths:</p> <ul style="list-style-type: none"> • Longitudinal comparison with similar baseline data⁷¹ • Surveyed TV programming during peak children's viewing times rather than only on dedicated children's channels <p>Limitations:</p> <ul style="list-style-type: none"> • Provided descriptive statistics only (did not test for statistical significance) • Only examined changes in TV advertising; didn't capture any changes in HFSS food marketing or advertising via other channels/strategies

(continued)

Table 3 Continued

Reference	Key findings	Author conclusions	Strengths and limitations
<p>South Korea (Special Act on Safety Management of Children's Dietary Life Safety Management, 39 implemented September 2010) Kim et al (2012)⁷⁵</p>	<p>For all food ads across all hours, the 2010 sample had significant decreases in total advertising budget (– 31%, $P < 0.05$), number of ads placed (– 58%, $P < 0.01$), and GRPs (– 58%, $P < 0.01$) compared with the 2009 sample.</p> <p>During regulated hours (5:00–7:00 PM):</p> <ul style="list-style-type: none"> • EDNP advertising budget dropped 77% ($P < 0.01$) • Number of EDNP ads placed dropped 81% ($P < 0.01$) • GRPs for EDNP food ads dropped 82% ($P < 0.01$) <p>During nonregulated hours:</p> <ul style="list-style-type: none"> • EDNP advertising budget did not decrease significantly • Number of EDNP ads placed dropped 52% ($P < 0.05$) • GRPs for EDNP food ads dropped 50% ($P < 0.05$) 	<p>“...Results suggested that within only one year, such a regulation can have a positive impact on the health environment by inducing changes in the TV advertising practices of South Korean food companies. Through these changes, the regulation may contribute to decreasing children's exposure to the promotion of unhealthy foods, thereby creating a protective environment and facilitating child health improvement in South Korea.”</p>	<p>Strengths:</p> <ul style="list-style-type: none"> • Sampled quarterly to account for seasonal changes (including months on/off school year) • Examined multiple quantitative outcome measures <p>Limitations:</p> <ul style="list-style-type: none"> • Relatively short-term results, and postimplementation sample only captures 1 month truly postregulation, as enforcement date was pushed back to September • Did not examine any qualitative changes in content (eg, use of techniques that appeal to children) • Only examined changes in TV advertising; didn't capture any changes in EDNP marketing or advertising via other channels/strategies
<p>Lee et al (2013)⁷⁶</p>	<p>EDNP food companies reported significantly greater changes than did non-EDNP companies for Product, Price, and Promotion, but not Place, because of restrictions.</p> <ul style="list-style-type: none"> • Significantly more EDNP companies reported reducing energy by lowering free sugar content ($P = 0.031$) and reducing fat and <i>trans</i> fatty acid content ($P = 0.023$ and $P = 0.018$, respectively). • A significantly greater percentage of EDNP companies fortified with vitamins or minerals ($P = 0.014$) or with protein ($P = 0.022$). • Significantly more EDNP companies introduced online marketing ($P = 0.014$), mobile marketing ($P = 0.042$), and social marketing ($P = 0.042$). • Most companies reported no effect on production costs and/or product sales prices. 	<p>“...Restrictions on TV food advertising may contribute to improvement of the food environment for children's health by encouraging EDNP companies to adjust their products to become more health friendly. Additional positive changes could be expected in the long term, because the current study was performed 1 year after the introduction of these regulations. However, the results showed that some food companies employed strategies to bypass the regulations by changing marketing channels from TV to others or by reducing products' serving sizes. Therefore, it is imperative that efforts be made to determine optimal ways to prevent food companies from bypassing these regulations and that the regulation be extended from to other marketing channels.”</p>	<p>Strengths:</p> <ul style="list-style-type: none"> • Assessed multiple aspects of marketing mix, rather than focusing solely on TV advertising <p>Limitations:</p> <ul style="list-style-type: none"> • Study findings based on self-report by food company marketers or R&D managers via online survey (with a response rate of 58%, ie, 63 of 108 companies completing the survey) • Relatively short-term results (1 y postimplementation) • Definitions of EDNP vs non-EDNP companies were broad and thus the number of EDNP companies may have been overestimated

(continued)

Table 3 Continued

Reference	Key findings	Author conclusions	Strengths and limitations
Ireland (Children's Advertising Code, implemented 2005;³⁰ superseded by BAI Children's Commercial Communications Code, implemented 2013⁴⁰) Tatlow-Golden et al (2016) ⁷⁷	55.2% of food and beverage ads in the Republic of Ireland and 53.5% in Northern Ireland advertised HFSS products. ³⁸ Dedicated children's channels showed fewer food ads (< 1/h) than general commercial TV channels (up to 5.8/h). Audience panel research indicated, however, that young children view more general TV channels than children's channels. Young children (ages 4–6 y) in the Republic of Ireland were exposed to an estimated 2.84 TV ads for less healthy foods per day (1037/y), compared with 1.87/ (683/y) in Northern Ireland. 71.9% of all food ads would not be permitted to be advertised to children if the WHO Nutrient Profile Model was used. Compared with ads for healthy foods, ads for HFSS foods significantly more frequently evoked taste/aroma, humor, and novelty; ads for healthy foods referred significantly more frequently to fun/play, magic, imagination, and physical activity and were also significantly more likely to employ a nutrition/health claim or to have disclaimers on screen.	"The [island of Ireland's] 'advertised diet' viewed by young children primarily features dairy and fast foods, pizza, sweets and chocolate, normalizing this consumption and associating it with taste/aroma, fun, magic/imagination, physical activity, humor and exaggerated pleasure. HFSS ads primarily featured taste/aroma, humor and novelty. Despite complying with statutory regulations, more than half of [of] [island of Ireland] food advertisements featured HFSS items; young children see over 1000 HFSS ads annually in the Republic of Ireland, nearly 700 in Northern Ireland. Policy implications for remedying children's HFSS ad exposure include (i) applying food advertising restrictions to times when higher proportions of young children watch television—not just child-directed programming—as well as to digital media, (ii) employing a stricter nutrient profiling method and (iii) normalizing children's 'advertised diet' by exploring ways to advertise healthy foods."	<ul style="list-style-type: none"> • Sampled TV channels and broadcast times most likely to have high viewership among young children • Compared nutritional analyses using multiple nutrient profiling models <p>Limitations:</p> <ul style="list-style-type: none"> • Sampling based on viewing patterns of children aged 4–6 y may have underestimated older children's exposure, as older children view even more programming that is not solely child-directed • Channel and time selections were based on an audience panel from the Republic of Ireland only (Northern Ireland viewing data was not available) • Study sampled from only 1 time of year (autumn-winter) and thus could not capture potential seasonal shifts in advertising • Only examined changes in TV advertising; didn't capture any changes in EDNP marketing or advertising via other channels/strategies
Quebec, Canada (Consumer Protection Act,⁵⁸ implemented 1980, updated guidance issued 2012⁵⁹) Dhar & Baylis (2011) ⁷⁸	French-speaking households with children in Quebec were 13% less likely than English-speaking households to consume fast food each week ($P < 0.05$).	"... The current study provides evidence that a ban on advertising targeting children can be effective in lowering or moderating consumption, and estimates of the effect in expenditures suggest that the social-welfare impact of such a ban can be significant... We find that it is primarily French-speaking children who are affected by the Quebec ban, while English-speaking children—who have greater access to media from the neighboring U.S. states and Canadian provinces—are less affected. This finding indicates that media spillover can blunt the effect of an advertising ban, which suggests that a ban imposed by a single state or province may not be effective if there is substantial media overlap and that advertising regulations are likely to be more effective if several jurisdictions can coordinate their effort."	<p>Strengths:</p> <ul style="list-style-type: none"> • Large sample size • Data gathered at multiple points over relatively long period • Difference-in-difference-in-difference approach used to identify households most and least likely affected by the ban (ie, French-speaking and English-speaking households in Quebec and Ontario, as well as households with/without children) • Models controlled for many possible demographic covariates and for year-specific and seasonal effects on outcome measures <p>Limitations:</p> <ul style="list-style-type: none"> • Unable to examine data from before the ban (data not available) • Data on expenditures not linked to exposure to HFSS food marketing • FOODEX and Famex data is self-reported; potential for misreporting • Examined only 1 food category: fast food • Focused on urban areas; may not be generalizable to smaller cities/rural locations

(continued)

Table 3 Continued

Reference	Key findings	Author conclusions	Strengths and limitations
Potvin Kent et al (2011) ⁷⁹	<p>Overall frequency of food and beverage advertising was similar across all 3 groups (French- and English-speaking Quebec and English-speaking Ontario).</p> <p>Compared with the preferred viewing of both English groups, the preferred viewing of Quebec French children featured the following:</p> <ul style="list-style-type: none"> • less frequent use of fun child appeals ($P < 0.001$) • fewer appearances of media characters or celebrities ($P < 0.04$) • fewer food and beverage contests ($P < 0.05$) • fewer ads for candy and snacks ($P < 0.001$) and grain products ($P < 0.004$) • more ads for beverages ($P < 0.01$) <p>While fewer French Quebec food ads targeted pre-schoolers, children, or teens ($P < 0.001$), up to 30% of food ads that aired during French Quebec children's preferred viewing still targeted children.</p>	<p>"The Quebec advertising ban does not appear to be limiting the amount of food/beverage advertising seen by children aged 10–12. However, food categories and marketing techniques used differ in the preferred viewing of French Quebec children... A focus on TV marketing is not sufficient. More research on the influence of broadly based marketing bans is clearly needed."</p>	<p>Strengths:</p> <ul style="list-style-type: none"> • Authors analyzed what children actually watched, per viewing diaries, rather than relying on ratings data to determine children's preferred viewing times <p>Limitations:</p> <ul style="list-style-type: none"> • Small child sample used to establish preferred TV viewing; not randomly selected, may not be representative; narrow age range • Relled on children's self-report to determine preferred viewing times • Possible nonrepresentativeness of days used for TV diaries/recordings • Narrow scope for child appeal techniques (only examined use of "fun" themes and characters/celebrities) • Only examined changes in TV advertising; didn't capture any changes in HFSS food marketing or advertising via other channels/strategies • Authors' definition of children's preferred viewing was not consistent with the Consumer Protection Act's 15% viewership threshold, so results cannot be viewed as a direct evaluation of the Act
Potvin Kent et al (2012) ⁷	<p>The majority of advertised products in all 3 markets (65%) were classified as "less healthy" using both nutrition profiling systems.</p> <p>Both English groups included significantly more ads for "less healthy" foods and beverages than did the Quebec French group ($P < 0.001$).</p> <p>Compared with both English groups, Quebec French ads featured products significantly lower in sugar, total carbohydrates, and energy per 100 g and as percentage of energy and significantly higher in total fat, saturated fat, <i>trans</i> fat, and protein per 100 g and as percentage of energy ($P < 0.05$ for all).</p>	<p>"Our research suggests that, regardless of the advertising policy environment, children aged 10–12 years in Ontario and Quebec are viewing significant amounts of food and beverage advertising and, that overall, the nutritional quality of food advertisements seen on television is not in line with recommended nutritional guidelines... [The Quebec law] does seem to have some minor influence on the healthfulness of these advertisements, however, the majority of advertisements viewed by children still remain unhealthy."</p>	<p>Strengths:</p> <ul style="list-style-type: none"> • Authors analyzed what children actually watched, per viewing diaries, rather than relying on ratings data to determine children's preferred viewing times • Used broad (inclusive) definition of food and beverage promotions • Testing was conducted using multiple nutritional criteria. Results reported specific nutrient densities and their contribution total energy, in addition to more common binary coding (ie, healthy vs less healthy) <p>Limitations:</p> <ul style="list-style-type: none"> • For child and TV samples: same limitations as previous study⁷⁷ (sample size, representativeness, self-report, limited duration of sample period) • Excluded food and beverage brand ads (such as those for fast food restaurants) because of inability to include nutrition data (22 of 449 ads) • Authors' definition of children's preferred viewing was not consistent with the Consumer Protection Act's 15% viewership threshold, so results cannot be viewed as a direct evaluation of the Act

(continued)

Table 3 Continued

Reference	Key findings	Author conclusions	Strengths and limitations
Potvin Kent et al (2013) ⁸⁰	<p>There was no significant difference in the number of French (31%) and English (35%) websites with child-directed content or in the frequencies or average number of the various marketing features between English and French websites.</p> <p>Spokescharacters and advergames were present on the majority of English (52% and 70%) and French (50% and 55%) websites.</p> <p>Child protection features were present on 15% of English websites and on 18% of French websites.</p> <p>41% of English websites and 46% of French websites encouraged a physically active lifestyle.</p>	<p>"Systematic surveillance of the Consumer Protection Act in Quebec is recommended. In the rest of Canada, the [self-regulatory Canadian Children's Food and Beverage Advertising Initiative] needs to be significantly expanded or replaced by regulatory measures to adequately protect children from the marketing of foods/beverages high in fat, sugar, and sodium on the Internet.... Given that the border of Internet regulations is permeable, international agreements between countries will be necessary."</p>	<p>Strengths:</p> <ul style="list-style-type: none"> Quantified prevalence of food marketing in regulated and nonregulated websites (1 of the first evaluations to examine websites) Analyzed website content to examine marketing strategies used Website sample likely represented heavily advertised foods, as websites were selected on the basis of TV ads aired during children's preferred viewing <p>Limitations:</p> <ul style="list-style-type: none"> For child and TV samples: same limitations as previous study⁷⁷ (sample size, representativeness, self-report, limited duration of sample period) Websites were not randomly selected, and results are therefore not generalizable to all Canadian food and beverage websites

Abbreviations: ad(s), advertisement(s); BAI, Broadcasting Authority of Ireland; EDNP, energy-dense, nutrient-poor; GRP, gross rating point; HFSS, high in saturated fat, salt, or sugar; OR, odds ratio; PMVs, person minute views; R&D, research and development; WHO, World Health Organization.

examined household HFSS food and drink expenditures and industry advertising expenditures pre- and postimplementation of broadcast restrictions found that postimplementation spending on TV ads promoting HFSS food products declined (−19.4%), but this was partially offset by increases in non-TV HFSS food advertising.⁷³

Finally, a postregulation content analysis of TV advertisements on the island of Ireland (comparing broadcasts recorded in Northern Ireland and the Republic of Ireland) found that, despite regulations in both jurisdictions, over half of food advertisements were for HFSS products, and children continued to have high levels of exposure to advertisements for these products.⁷⁷

Comparison of policies in Chile and the United Kingdom. Table 4^{37,38,50-53,67,68} presents a detailed comparison of Chile's and the United Kingdom's approaches to food marketing regulation. The United Kingdom's BCAP Code was implemented in 2008, with a subsequent code on non-broadcast advertising implemented in 2017. Chile's Law on Nutritional Composition of Foods⁴⁵ was implemented in June 2016 and amended by the Law on Food Advertising⁵² implemented in May 2018. While both the United Kingdom and Chile were among the first countries to specifically restrict HFSS food marketing to children, and the populations protected under the regulation are similar (children aged 4–16 years in the United Kingdom and < 14 years in Chile), there are notable differences between these regulations.

First, while the Chilean regulations are statutory and are overseen by a governmental body (the Ministry of Health), the UK broadcast code is coregulatory between the government and the advertising industry. The United Kingdom's non-broadcast code is entirely self-regulated by advertisers. In practice, while the UK government's Office of Communication (Ofcom) is legally responsible for the broadcast code, agencies funded by or comprised of members of the advertising industry actually write, monitor, and enforce both the broadcast and non-broadcast codes, which has raised questions about the objectivity of monitoring and enforcement efforts.⁸⁹ The UK broadcast code does require companies to submit advertisements for approval to a media-specific preclearance body (also funded by advertisers), which is intended to prevent ads for HFSS food or beverage products from being placed during restricted broadcasting.⁹⁰ Penalties for violating the UK codes vary by media type. For online advertising, for example, the Advertising Standards Authority (ASA) uses a "name and shame" approach in which violators are listed on the ASA website.⁹¹ For both broadcast and non-broadcast media, the ASA can also request that an ad be amended or removed and can refer repeat

offenders to other bodies for additional review, but it is not always clear what this process or possible sanctions entail.⁹² Under the BCAP Code, for example, broadcasters that “persistently run ads that fall foul of the Broadcast Advertising Code” can be referred by the ASA back to Ofcom, which can impose fines or withdraw the broadcaster’s license.⁹²

In contrast, the Chilean regulation does not require preclearance of ads. The Chilean Ministry of Health monitors and enforces its marketing policy by coordinating a regulation control action plan, which is implemented by regional health authorities.⁹³ Two additional governmental organizations assess compliance and provide reports to the Ministry of Health on compliance with the TV advertising regulations. The public can report violations through the Ministry of Health and the National Consumers Service, which then report to the regional health authorities for an investigation and inspection. Depending on the findings of the investigation, the company can be given a reprimand, fined (up to 1000 monthly tax units), or prohibited from selling the product. Despite these differences in monitoring and enforcement, governmental agencies have reported high levels of compliance with regulations in both Chile and the United Kingdom.^{90,93,94}

Additional key differences between these countries’ regulations are related to elements of policy design. For example, to identify HFSS foods and beverages, the UK codes use a nutrient profiling model³⁸ that allocates points for healthy or beneficial nutrients/ingredients and points for less healthy nutrients/ingredients, and then subtracts “healthy” points from “unhealthy” points to achieve a final score that determines which products are less healthy or HFSS.³⁸ This model has been demonstrated to be more effective at capturing HFSS products than industry profiling schemes used in the United States and the European Union but less effective than a model used in other nutrient profile models.⁹⁵ Public Health England is in the process of reviewing and modifying the model to “bring it in line with current UK dietary recommendations,”⁹⁶ which may increase the number of products classified as HFSS. In contrast, the Chilean model focuses only on nutrients of concern and does not incorporate beneficial nutrients. The Chilean regulation defines “high in” products as foods or beverages that contain free (added) sugar, sodium, or saturated fat and that also exceed set nutrient density thresholds for these nutrients and/or energy (in kilocalories). These nutrient thresholds grew significantly more strict from the first phase of implementation in 2016 to the final implementation phase in 2019 (eg, the sugar threshold decreased from 22.5 g of sugar per 100 g or 100 mL in 2016 to 10 g of sugar per 100 g or 100 mL in 2019), so the number of products that fall

under regulation will likely increase unless products are reformulated. For example, a recent study on TV advertising prior to the Chilean regulations found that 34% of TV ads in Chile contained at least 1 HFSS product when 2016 thresholds were used to classify HFSS products, but 47% of TV ads contained an HFSS product when the 2019 thresholds were used.⁹⁷ Both the UK and Chilean models use ingredient or nutrient content per 100 g or 100 mL portion; both are applied consistently across all food and beverage categories (as opposed to using different requirements for different food groups); and neither allows for exemptions by product or category type.

Regarding communication channels covered, both Chile and the United Kingdom restrict HFSS food advertising on websites that target children or have a child audience share greater than 20% (Chile) or greater than 25% (United Kingdom) as well as during TV programs on devoted children’s channels or during TV programs that target children. Chile defines these as programs as having greater than 20% child viewers out of total viewers, whereas the United Kingdom defines these as programs for which the child audience exceeds a “120 Index” ($[\text{percentage of all children aged 4–15 years watching} \div \text{percentage of people watching out of the total population}] \times 100$). Both formulas can lead to large gaps in coverage, as a program with high viewership from all ages can have a relatively low proportion of child audience, even with a high absolute number of children watching the program. In addition, the Chilean formula is not robust to population shifts: If the population ages (ie, birth rate decreases, as is the current trend in industrialized countries), the ratio of children to adults in the viewing audience would need to be more pronounced (ie, more child viewers needed) to reach the 20% cutoff. However, starting in June 2018, Chilean TV restrictions were expanded to prohibit HFSS food advertising on all TV (and cinema) from 6:00 AM to 10:00 PM to all age groups, except during sporting and cultural events that meet certain criteria. This is the most expansive scheduling restriction on TV advertisements for HFSS foods in any country to date. Chile’s regulation also prohibits marketing and sales of these products inside of schools, whereas the UK codes do not.

Compared with the UK codes, Chile’s law also defines a larger range of more specific types of marketing techniques that appeal to children and are prohibited for use in HFSS marketing, regardless of media placement. A key difference is that, while both the United Kingdom and Chile prohibit the use of licensed characters, Chile’s policy has also effectively limited the use of brand equity characters or mascots that appeal to children (eg, Kellogg’s Tony the Tiger). The Chilean

Table 4 Policies in Chile and the United Kingdom to restrict unhealthy food and beverage marketing to children

		United Kingdom	
		Broadcast media	Non-broadcast media
Laws or codes	Law No. 20.606 on Nutritional Composition of Food and Food Advertising (Ley 20.606 ^{50,51}), amended by Law No. 20.869 on Food Advertising (Ley 20.869 ^{52,53})	The UK Code of Broadcast Advertising ³⁷ (BCAP Code)	The UK Code of Non-broadcast Advertising and Direct and Promotional Marketing ^{67,68} (CAP Code)
Date of implementation	June 27, 2016 (Ley 20.606; phased implementation through June 27, 2019 ⁵); May 29, 2018 (Ley 20.869)	Phased implementation: April 1, 2007–January 1, 2009 ⁶	July 1, 2017
Regulatory bodies, monitoring, and enforcement	<ul style="list-style-type: none"> Ministry of Health: monitors and enforces via a "regulation control action plan" Regional health authorities: implement regulation control action plan, investigate complaints The National Council of Television (Televisión Nacional de Chile) and the National Consumers Service (SERNAC): assess compliance and provide monthly reports to the Ministry of Health Penalties for violations: reprimand, fines (up to 1000 monthly tax-units), prohibition from selling advertised product 	<ul style="list-style-type: none"> Advertising Standards Authority (ASA): self-regulatory organization of UK advertising industry; applies and enforces codes Committee on Advertising Practice (CAP): organization of UK advertising industry; writes codes UK Office of Communications (Ofcom): governmental body responsible in law; contracts ASA to regulate broadcast advertising Preclearance bodies (vary by media): check that commercials meet code and that claims can be substantiated Penalties for violations: persistent violators can be referred by ASA to Ofcom, which can impose fines or withdraw the broadcaster's license 	<ul style="list-style-type: none"> Advertising Standards Authority (ASA): self-regulatory organization of UK advertising industry; applies and enforces codes Committee on Advertising Practice (CAP): organization of UK advertising industry; writes codes Penalties for violations: "name and shame" policy (violators listed on ASA website); request for ad to be amended or removed; referral for repeat offenders to other bodies for additional auctioning/sanction
Nutrition criteria: How is it determined which foods and beverages are included/excluded?	If a product contains free (added) sugar, added sodium, or added saturated fat and exceeds set nutrient thresholds per 100 g (of food) or 100 mL (of beverage), it is considered a "high in" product and is subject to regulation. Thresholds have been implemented in phases with increasing stringency, ^a and, as of the final phase in June 27, 2019, will be as follows: 275 kcal/100 g of product (70 kcal/100 mL for beverages), 400 mg of sodium/100 g (100 mg/100 mL), 10 g of total sugar/100 g (5 g/100 mL), or 4 g of saturated fat/100 g (3 g/100 mL).	Nutrient Profiling Model ³⁸ : Points are allocated for nutrient content per 100 g of product. Points for 'C' (fruit, vegetable, nut, fiber, and protein content) are subtracted from points for 'A' nutrients (energy, total sugar, and sodium) to get a final nutrient profile score. Foods that score > 4 points and beverages that score > 1 point are classified as "less healthy" (HFSS) and are subject to regulation.	Nutrient Profiling Model ³⁸ : Points are allocated for nutrient content per 100 g of product. Points for 'C' nutrients (fruit, vegetable, nut, fiber, and protein content) are subtracted from points for "A" nutrients (energy, saturated fat, total sugar, and sodium) to get a final nutrient profile score. Foods that score > 4 points and beverages that score > 1 point are classified as "less healthy" (HFSS) and are subject to regulation.
	No food or beverage groups are exempt, and there are no category-specific criteria for foods or beverages.	No food or beverage groups are exempt, and there are no category-specific criteria within foods or beverages.	No food or beverage groups are exempt, and there are no category-specific criteria within foods or beverages.

(continued)

Table 4 Continued

		United Kingdom	
		Broadcast media	Non-broadcast media
Definition of children	< 14 years of age	4–15 years of age (< 12 years of age for restrictions on marketing techniques)	< 16 years of age
Exposure: Method of determining communication channels and settings subject to restrictions	<p>Time of day (for TV and cinema): from 06:00–22:00 Content: on dedicated children's channels or websites; during programs/movies or on websites targeting children</p> <p>Audience: when child audience share exceeds 20% Exception: advertising for "high in" products permitted during restricted hours or under some conditions for sports, cultural, artistic, or charity events if certain criteria are met</p>	<p>Audience indexing: exceeds 120 Index (ie, programming is considered appealing to children if indexing score exceeds 120 for [percentage of all children aged 4–15 y watching ÷ percentage of people watching out of the total viewing population] × 100)</p> <p>Content: on dedicated children's channels; during or adjacent to programs appealing to children (determined using the 120 Index)</p>	<p>Audience: when child audience share exceeds 25% Content: in media specifically for children</p>
Media to which restrictions apply	TV, cinema, the internet/online ^c , marketing in school settings	TV, radio	Cinema, video, DVD, Blu-Ray, the internet/online ^d , mobile, signs and outdoor media, direct mail, sales promotions
Power: Restrictions on use of persuasive marketing techniques/creative child appeals	<p>Any form of marketing for "high in" products may not use the following:</p> <ul style="list-style-type: none"> • Characters, child figures, animations, or cartoons (brand equity characters are considered to meet these descriptions and are thus not allowed) • Children's music • Premiums, toys, accessories, or stickers • People or animals that capture children's interest • Statements or fantastic arguments about the product or its effects • Situations that represent children's daily life, expressions, or language • Interactive applications, games, contests • "Hooks" not related to the product itself 	<p>In all media covered by the BCAP Code, if ad is for HFSS product(s) and directly targets children < 12 y, ad may not use the following:</p> <ul style="list-style-type: none"> • Licensed characters • Celebrities popular with children • Promotional offers <p>Use of brand equity characters is not restricted</p>	<p>In all media covered by the CAP Code, if ad is for HFSS product(s) and directly targets children < 12 y, ad may not use the following:</p> <ul style="list-style-type: none"> • Licensed characters • Celebrities popular with children • Promotional offers <p>Use of brand equity characters is not restricted</p>
Media to which restrictions apply	TV, radio, cinema, the internet/online ^c , mobile, interactive games, print, signs, and outdoor media	TV, radio	Cinema, video, DVD, Blu-Ray, the internet/online ^d , mobile, signs and outdoor media, direct mail, sales promotions

(continued)

Table 4 Continued

	Chile		United Kingdom	
	Broadcast media	Non-broadcast media	Broadcast media	Non-broadcast media
Other features:				
Packaging	Mandatory FOP warning labels are required on packages for "high in" foods	N/A	N/A	N/A
Marketing in schools	"High in" products cannot be sold or advertised inside preschool, elementary, or secondary schools	N/A	N/A	N/A
Health/nutrition claims	Health/nutrition claims are permitted in ads or on packaging for "high in" products; but claims may not refer specifically to the "high in" nutrient(s)	No nutrition or health claim may be used in TV or radio HFSS product advertising targeted directly at children aged < 12 y	Claims referring to children's development and health are permitted if authorized by the European Commission	
Disclaimers	Advertising for "high in" products must carry disclaimer: "Choose foods with fewer logos"	N/A	N/A	

Abbreviations: ad(s), advertisement(s); DVD, digital video disc; FOP, front-of-package; FSS, high in fat, salt, or sugar; HFSS, high in saturated fat, salt, or sugar; N/A, not applicable.

^aChile's phased nutrient threshold implementation schedule: *June 27, 2016*: 350 kcal/100 g of product (100 kcal/100 mL for beverages), 800 mg of sodium/100 g (100 mg/100 mL), 22.5 g total sugar/100 g (6 g/100 mL), or 6 g of saturated fat/100 g (3 g/100 mL). *June 27, 2018*: 300 kcal/100 g of product (80 kcal/100 mL for beverages), 500 mg of sodium/100 g (100 mg/100 mL), 15 g of total sugar/100 g (5 g/100 mL), or 5 g of saturated fat/100 g (3 g/100 mL). *June 27, 2019*: 275 kcal/100 g of product (70 kcal/100 mL for beverages), 400 mg of sodium/100 g (100 mg/100 mL), 10 g of total sugar/100 g (5 g/100 mL), or 4 g of saturated fat/100 g (3 g/100 mL).

^bBCAP Code phased implementation: *April 1, 2007*: ads for HFSS products not permitted in/around programs made for children or in/around programs likely to be of particular appeal to children aged 4–9 y. *January 1, 2008*: ads for HFSS products not permitted in/around program likely to be of particular appeal to children aged 4–15 y. *January 1, 2009*: ads for HFSS products not permitted on dedicated children's channels.

^cChile's law does not explicitly list all types of online media but is intended to apply to the full breadth of online media.

^dIncludes online ads, UK-based company websites, social media sites, video-on-demand, text messages, email, advergames, and viral ads.

policy also prohibits the use of movie tie-ins, cartoons, child figures, interactive games, applications, contests, child voices and actors, and references to children's lives such as playgrounds or school settings as well as the offering of premiums such as toys, accessories, or stickers. These elements are prohibited in HFSS marketing across all media—not just those covered by ad placement restrictions—and on food and beverage packaging, which is not restricted under UK policy. For example, the use of a cartoon bear would be prohibited on the box of an HFSS breakfast cereal in Chile, whereas it would be permitted in the United Kingdom.

The policies also differ with regard to other types of information that can be conveyed on packages or in advertisements. The Chilean policy is unique in that all products that have marketing restrictions must also carry front-of-package warning labels (eg, “high in sugar”). These warning labels could increase the law's salience for consumers by signaling to them that the product is subject to marketing restrictions, presumably making it easier for the public to identify and report violations of the regulation. When HFSS food advertisements are permitted (eg, between 10:00 PM and 6:00 AM), Chile requires a disclaimer on all HFSS food advertisements advising consumers to “choose foods with fewer warning labels”). In contrast, the United Kingdom has a separate policy that allows for voluntary use of front-of-package “traffic light” labels.⁹⁸ This policy is not linked to the marketing policy and, to the best of knowledge, does not require the use of disclaimers on HFSS food advertisements. Finally, the Chilean policy has minimal restrictions on the use of health or nutrition claims: packages or advertisements for HFSS products may feature health/nutrition claims, provided they do not refer specifically to the regulated nutrients that the product contains in excess. The United Kingdom's BCAP Code bans the use of any nutrition or health claim in TV or radio HFSS food advertisements that directly target children under age 12, but the CAP Code permits claims in marketing for HFSS products in all non-broadcast media, only requiring that they be supported by evidence.

The Chilean and UK regulations also share some important limitations. For example, neither prohibits the use of price promotions, in-store product placement, multipack strategies, or other key point-of-sale forms of marketing for HFSS products. Neither country restricts brand advertising, thereby allowing companies to promote brands that may contain both HFSS and non-HFSS products, nor do the regulations of either country restrict corporate sponsorships of sporting events or teams, thereby allowing companies to promote HFSS products both at local-level sporting

events and at large national or international sporting events.

DISCUSSION

The results of this review show that there are relatively few governmental policies to reduce food marketing. For example, only 16 jurisdictions were found to have statutory food marketing regulations meeting study criteria. Of those, 10 jurisdictions specifically restrict unhealthy food marketing to children, while the remaining 6 restrict marketing of all commercial products to children. In contrast, 36 countries currently have health-related food or beverage taxes.⁹⁹ With the exception of Quebec's and Norway's regulations, however, the remaining marketing policies included here have all been implemented since 2007, suggesting that such regulations are becoming more common.

In addition, few studies have been published evaluating governmental policies on reducing unhealthy food marketing to children. Most evaluations to date have either examined only short-term changes in exposure and power of TV food advertising or have consisted of cross-sectional comparisons between groups considered more vs less likely to experience a policy's effects. The majority of these evaluations have found relatively small policy-related reductions in TV advertising for HFSS food and beverages, with some evidence that these reductions are offset by increases in HFSS food advertising during unrestricted broadcasting or via marketing in other media. Few studies examined changes in marketing across multiple media, however, making it difficult to understand changes in the overall prevalence of HFSS food marketing.

Relatively small reductions in unhealthy food advertising could also result from weak policy designs. Most existing regulations cover a limited scope of media formats, and restrictions on TV advertising often apply only to dedicated children's programming or very narrow windows of time. The Chilean regulation is the first to limit placement of TV ads for HFSS products both on children's programs and on all general audience programs from 6:00 AM to 10:00 PM, but this approach has not yet been evaluated, so the effects of the additional time-based restriction on children's exposure to HFSS food marketing are unknown. In general, this review found the Chilean regulation to be more comprehensive than the UK regulation, both in scope of communication channels covered and in restrictions on marketing techniques. However, neither country's regulations placed any limits on corporate sponsorship, which could allow high levels of unhealthy food marketing during sports, cultural events, or other activities. More

research is needed on the effects of each country's policies.

There is, of course, a tradeoff between policies that may be optimal in their potential to impact health and those that are politically feasible. Indeed, considerable homogeneity was found across some design components, such as the age of children protected, along with heterogeneity among other components, such as which foods are included. More research will be needed to identify which policy components are most critical for a regulation to effectively reduce children's exposure to unhealthy food marketing, improve children's diet, and prevent obesity. A discussion of key policy features, the implications of these in existing regulations, and the research needed for evidence-based policy design follows.

Which children receive protection. The results show that most food marketing regulations to date have focused on protecting preadolescent children aged 12 to 15 years or younger, in line with evidence that food marketing influences younger children's nutrition knowledge, perceptions, preferences, purchases, and intake.^{9,100} Evidence for a causal effect of food marketing on older adolescents' knowledge, preferences, purchases, and intake is less clear.¹ However, because older adolescents remain vulnerable to advertising and have increased purchasing power, and because eating patterns and weight status in adolescence track into adulthood, the inclusion of adolescents up to age 16 to 19 years could have important implications for diet and obesity.^{89,100} Future research will be needed to identify the optimal age range of children to protect from HFSS food marketing in order to develop healthy preferences and eating behaviors across the lifespan.

Which foods and beverages are covered. All policies intended specifically to limit food marketing use a nutrient profile model to identify products to be restricted. However, about half of these countries apply the nutrient profile model to all foods and beverages, whereas the others apply the model only to certain food and beverage categories or used varying, category-specific nutritional criteria. Two countries apply additional restrictions to entire categories of food, regardless of the nutrient profile of the categories. This latter approach is similar to that recommended by the WHO Regional Office for Europe, which stipulates that entire categories of products should be restricted from marketing, regardless of their nutritional content (eg, chocolates and candies, cakes and grain-based desserts, juices, energy drinks), while other categories are subject to meeting nutrient thresholds to determine eligibility.⁸² Which model should be used to identify which foods get restricted likely depends on the policy's goals. For

example, policies that use nutrient thresholds may be more likely to incentivize reformulation as a strategy for avoiding the marketing restriction, whereas policies that restrict entire categories are less likely to incentivize reformulation, since a product would still receive the marketing restriction regardless of its nutritional content. Similarly, category-specific nutrient thresholds might encourage consumers to shift to healthier products within a category, whereas nutrient thresholds applied to all foods and beverages might encourage consumers to choose fewer HFSS products overall (ie, less within-category shifting but an overall downward shift with regard to critical nutrients). More research will be needed to understand how both industry and consumers respond to different nutrient profile models in food marketing policies.

Most countries' nutrient profile models include saturated fats, sugars, and sodium, consistent with a recent study of nutrient profile models for government-led policies on obesity and noncommunicable diseases.¹⁰¹ Few countries include *trans* fats in their nutrient profile model, possibly because few countries have mandatory labeling on *trans* fats.¹⁰² Similarly, most countries specify limits on total sugar rather than on free sugar, as recommended by WHO, possibly owing to lack of information about free sugars on labels or in food-composition databases. The Chilean regulation addresses this by first determining whether a product contains added sugar as an ingredient in the product and then applying a total sugar threshold, thereby eliminating the need for an actual amount of added sugar to be stated. This option provides a relatively easy solution to identifying added sugar without labels. However, with this approach, products that contain relatively high levels of natural sugar will more rapidly exceed the total sugar threshold, even if they have a relatively smaller amount of added sugar. The degree to which free or total sugars should be prioritized is controversial and changing, with more policy-oriented nutrient profile models increasingly emphasizing free sugars.¹⁰¹

A relatively unexplored feature of nutrient profile models that has marketing implications as well as nutritional implications is whether the model is based on the volume or weight of a product, on total calories, or on portion sizes. In Chile, where nutrients per 100 g of food or per 100 mL of beverage is used as the basis for the nutrient profile model, the food industry has argued for the use of portion sizes instead.^{103,104} This contention has played out in changes to product marketing. For example, the use of nutritional messages based on portion sizes has increased. On a box of chocolate children's cereal, for instance (see [Figure S1](#) in the Supporting Information online), next to 2 warning labels stating the product is high in sugar and high in

calories appear images of cups with text stating that 100 g equals 3.5 suggested portions (30 g or $\frac{3}{4}$ cup), along with an image indicating that a single portion of the cereal contains only 8.6 g of sugar. It is unclear what effect these marketing strategies have on consumers' understanding of nutritional knowledge or their perceptions or purchases of these products. Future research will be needed to understand the effects of nutritional profiles, not only on the nutritional impact of the law but also on industry's response, including changes in food marketing strategies.

How exposure to food marketing is limited. The communication channels covered by a policy affect how much the policy is likely to reduce children's exposure to food marketing across their environment. This review found that most existing regulations apply to very limited communication channels. The most common settings covered are TV and school, with few regulations applying to digital media, packaging and point-of-sale settings, events and sponsorships, print media, and others. Limiting coverage to only a few communication channels (eg, only broadcast media)—or even covering all media but excluding nonmediated venues (eg, sports arenas)—allows companies to shift HFSS food marketing to channels and venues that are not regulated, reducing the impact of policies on children's exposure to unhealthy food marketing. To avoid this, policymakers could apply restrictions across all print and electronic media and could also include nonmediated venues, such as corporate sponsorship of sporting or cultural events and educational settings. More research will be needed to understand industry response to limitations on different channels, as well as which communication channels are most important for reducing children's exposure.

Another important consideration is how to identify, within each communication channel, the content to which children are likely to be exposed and thus what should be restricted. Most existing regulations use either audience definitions to identify programs that disproportionately attract child audiences or location-based definitions in which the surrounding content is intended for children. Many statutory regulations and industry pledges, alike, rely on relatively high thresholds for child audience share (ranging from 15% to 30%) to identify child-directed media. Lower thresholds will capture more programming,¹⁰⁵ including more programs oriented toward a general audience, because children are permitted to comprise a smaller percentage of viewers. In contrast, higher thresholds will capture less programming overall but more programs that are intended for children specifically. The appropriate

threshold level may depend, in part, on whether a time-based restriction is also used, as the latter can address programs that are popular with children but also watched by adults.

In addition to the child audience threshold used, the formula used to calculate child audience share can also affect how much food marketing exposure is prevented. For example, if the formula depends on the percentage of children in the total population (such as in the Chilean regulation), the amount of programming included could increase or decrease, depending on whether birth rates increase or decrease. This problem can be addressed by using measures that are not dependent on the population distribution, such as comparing the relative reach of a program among children to the relative reach of the program among adults (eg, TV rating for children vs TV rating for adults), as in the UK regulation. This simpler ratio redirects the focus of the formula to directly assess whether the proportion of children exposed to a marketing message (out of all children in the TV universe) is equivalent to, if not lower than, the proportion of adults exposed (out of all adults in the TV universe).

Specific definitions for time-based restrictions on TV broadcast advertising are also used in 4 countries. Mexico and Taiwan use time-based definitions to determine when other child audience thresholds (Mexico) or restricted placement on children's channels (Taiwan) should apply. South Korea combines a modest time-based restriction (5:00 PM to 7:00 PM) with a restriction on placement during children's programming. Chile has by far the broadest time-based restriction (6:00 AM to 10 PM) and also applies child audience thresholds outside of restricted times. Time-based restrictions have the advantage of reducing children's advertising exposure to media that appeal widely to both children and adults, rather than to media that only appeal to children. This is important, because programs that have high levels of coviewing (ie, a large number of children and parents watching together) will have a smaller percentage of child audience, making it more difficult for these programs to be captured by a child audience-based definition. Of course, in order to be effective, time-based definitions will need to include hours when children are viewing media, which may vary by country as well as by sociodemographic factors such as gender, region, or socioeconomic status. Future research will be needed to identify the optimal definitions to reduce children's exposure to unhealthy food marketing. The Chilean regulation, in particular, provides a valuable opportunity to evaluate the differential effects of an audience- and location-based definition vs a time-based restriction, since it implemented the former in 2016 and the latter in 2018.

Reducing the power of advertising. Reducing the harmful effects of HFSS food marketing on children requires not only limiting children's exposure but also limiting the persuasive power of marketing by restricting the use of marketing techniques that appeal to children.¹⁹ This review found that restrictions on the use of free gifts and toys, celebrities, and licensed or other types of characters are most common. Countries or jurisdictions with regulations on all forms of commercial marketing to children, not just food marketing, are less likely to include specific restrictions on child-directed marketing techniques. That is, they are more likely to use broad definitions. Quebec's regulation, for example, simply prohibits advertisements designed to attract children's attention. Currently, there is scant evidence about which approach—using lists of specific techniques or using broad-based definitions—is better. However, identifying which techniques are truly appealing to children can be difficult, as these vary depending on culture, age of the target population (young children vs early adolescents vs later adolescents), and context within the advertisement, among other factors. Moreover, poorly defined restricted techniques can increase the complexity of assessing compliance and can also elicit challenges from industry about the subjectivity of these judgments.

Most regulations focus only on limiting child-directed techniques and not on other techniques that might influence children's consumption of unhealthy foods. For example, health and nutrition claims and messages are highly prevalent,¹⁰⁶ including on children's products like sugar-sweetened fruit drinks,¹⁰⁷ and have been shown to increase misperceptions about the healthfulness of the product (ie, the health halo effect) among both children and adults.^{108–112} In addition, some evidence suggests that the use of nutrition-related claims on unhealthy foods and beverages may be increasing as alternative marketing strategies as policies to reduce child-directed food marketing become more widespread.^{113,114} Similarly, other techniques, like fruit depictions, can lead children and parents to think a product is healthier, regardless of its actual fruit content.^{115,116} More research will be needed to determine which definition of child-directed marketing best captures all marketing that appeals to children and to ascertain the potential effects of expanding this definition to include additional techniques, such as claims or fruit depictions, that target both parents and children.

Finally, most existing food-specific marketing regulations have not addressed marketing for brands—which may produce and sell both HFSS and non-HFSS foods—as opposed to products. For example, a regulation might prohibit commercial advertising for the

specific product Coca-Cola during children's programming because of the beverage's high sugar content but permit commercial advertising of the Coca-Cola brand, even though the brand promotes both regular Coca-Cola as well as other products. More research is needed to understand the impact of including restrictions on brands as well as on products as part of unhealthy food marketing regulations.

Monitoring and enforcement. Strong systems for monitoring and enforcement will improve the likelihood that a marketing regulation will reduce children's exposure to unhealthy food marketing. It was difficult to find detailed information on monitoring and enforcement in most countries with regulations. This lack of information is concerning, as both the content of the regulations as well as the process for monitoring and enforcing them should be easily accessible and understood by the general population. In the case of Chile and the United Kingdom, where this information was available (though not always clear or detailed), it was not clear which system is more effective. On one hand, the government oversees and enforces Chile's regulation, whereas the advertising industry largely enforces the UK system, representing a potential conflict of interest. On the other hand, the UK system includes both a prevetting process and complaints as ways of identifying noncompliant advertisements, a process that is recommended by the WHO framework.²⁶ The WHO framework also notes that penalties for violations should be large enough to disincentivize violations and include publicity about the offense. However, there is virtually no research on the effects of different penalties and what size or type of penalty is sufficient to effectively disincentivize violations. Future research will be needed to evaluate the monitoring and enforcement systems currently in place and to examine how these are associated with the impact of policies.

Evaluating outcomes. Overall, there were relatively few studies evaluating statutory governmental policies. Of the evaluation studies, nearly all focused on what the WHO 2012 food marketing policy framework refers to as *outputs*, or short-term outcomes such as changes in children's exposure to food marketing and changes in marketing techniques, with a dearth of studies on longer-term outcomes, such as changes in food awareness, attitudes or beliefs, industry behavior (eg, product reformulation), consumer behavior (eg, food purchases or intake), and weight status. Of course, most policy evaluations are observational in nature, making it difficult to disentangle the effect of a policy from an ongoing secular trend.¹¹⁷ Moreover, measuring changes in outcomes like obesity can be complex, given that

obesity is complex and multifactorial, with a long latency period. One option to address this is to examine pre-post changes in children's individual-level exposure to unhealthy food marketing by measuring children's media use and linking this to data on food advertising. Longitudinal measures of food marketing exposure can then be examined along with changes in outcome measures to understand whether reductions in exposure are associated with changes in children's food attitudes, knowledge, perceptions, dietary intake, and health outcomes.¹¹⁸ In addition, the use of additional data such as sales, expenditures, or household food purchase data can enable a richer understanding of both industry and consumer behavior, and the larger sample sizes typical of these data sources allow assessment of a policy's differential effects by key sociodemographic factors such as socioeconomic status.¹¹⁷

Longitudinal research, however, may not always be possible. For example, several of the Quebec evaluations were conducted years after policy implementation; these studies used cross-sectional comparisons between groups of children who were more or less likely to be exposed to Quebec's regulation (depending on their location and language) to examine policy-related effects. While such study designs may not be ideal because of their observational, cross-sectional nature and the time elapsed since the policy was enacted, policy evaluations are often not ideal because researchers are responding to real-life events rather than proactively (and randomly) assigning a treatment. Additional research will be needed to strengthen natural experimental methods to evaluate food marketing policies and their effects on children's exposure to unhealthy food marketing, diet, and health.

Limitations. A major challenge when comparing different policies is understanding the differential effects of various policy design components. For example, if one policy appears to have impacted children's food marketing exposure more greatly than another policy, it is difficult to disentangle whether this was due to the scope of the policy regarding media coverage, the limitations on marketing techniques, the use of stronger nutritional criteria, or something else. Another limitation is that the lack of comprehensive policy evaluations makes it difficult to analyze and identify best practices for reducing children's exposure to unhealthy food marketing through policy action. Standardized monitoring procedures, such as those proposed by the International Network for Food and Obesity/noncommunicable disease Research, Monitoring and Action Support (INFORMAS),¹¹⁹ could be expanded to include additional outcomes recommended by the WHO 2012 framework, including enforcement of the regulation;

exposure to marketing; marketing strategies; effect of marketing on attitudes, preferences, and beliefs; effects on industry behavior; and effects on dietary behavior. Finally, this review is limited only to existing statutory regulations and does not include countries such as the United States, which has voluntary but not statutory regulations. Future research should examine the legal and political feasibility of potential statutory regulations in the United States and elsewhere, including the feasibility of different types of marketing regulations (restrictions on child-directed food marketing, all unhealthy food marketing, or child-directed marketing for any commercial products).

CONCLUSION

Governments are increasingly implementing statutory policies that restrict HFSS food marketing to children, with all food-marketing-specific policies implemented since 2007. While current policies vary with regard to the foods they include, which children are protected, and which communication channels and marketing techniques are covered, there are some commonalities. Most regulations protect children aged 12 to 15 years or younger. Restrictions on TV advertising are most common, with most restrictions in effect during children's programs only. Schools are also a common setting. Restrictions on media such as cinema, mobile, print, packaging, and the internet are uncommon. Most policies focus on limiting child-directed marketing strategies such as licensed characters, with little attention paid to other marketing strategies like health and nutrition claims. For the most part, existing evaluations of policies have found small or no policy-related reductions in unhealthy food advertising; however, not all policies have been evaluated. Moreover, there is virtually no evidence on policies' effects on children's food purchases, dietary intake, or weight status. Future research should examine which elements of food marketing policy design are most effective at reducing children's exposure to unhealthy food marketing, improving dietary quality, and preventing obesity.

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Supporting Information

The following Supporting Information is available through the online version of this article at the publisher's website:

[Appendix S1 Search terms used in the literature search](#)

[Table S1 Dimensions of statutory food-marketing policies](#)

[Figure S1 Example of industry front-of-package messaging relating nutrient warning labels to suggested portion size \(from Chile\)](#)

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