Title: Creating supportive eating places: A systematic review of food service initiatives

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1 **Creating supportive eating places: A systematic review of food service initiatives**

3 **Abstract**

4 Obesity and diet-related health problems are complex, multi-factorial issues. Individual
5 food choices are shaped by the wider context, and food environment level change is needed to
6 support individual behaviour change. The food service sector can play an integral role,
7 changing aspects of the food environment and contributing to improved consumer health. This
8 systematic review aimed to analyse food service schemes that aimed to improve consumer
9 health. Ten electronic databases were systematically searched to identify articles,
10 supplemented with checking of reference lists from similar reviews and forward and backward
11 searches to identify articles describing food service sector schemes. Sixteen schemes were
12 identified, documented in 36 articles/reports. The schemes aimed to improve consumer health
13 through one of three approaches—*informing*, *enabling* or *engineering*. In this order, these
14 approaches involved increasing levels of effort from food services, corresponding with
15 decreasing levels of effort for consumers. Half the schemes were *informing*, relying on an
16 informed consumer to make a healthy choice. Most *informing* schemes had been evaluated to
17 determine their impact on consumer choice and/or health, the evidence showed these schemes
18 were generally ineffective. The effect of the *enabling* or *engineering* schemes on consumer
19 choice and health had not been measured. Instead, evaluations focussed on process or business
20 engagement rather than behavioural change assessments. This review indicates the food sector
21 has the potential to contribute to consumer health through *enabling* and *engineering*, however
22 detailed outcome assessments are needed to draw definitive conclusions.

Introduction

Most strategies for overweight and obesity prevention or treatment focus on encouraging individuals to change dietary and physical activity patterns (Bray *et al.*, 2016). Whether these approaches can achieve clinically relevant and sustained weight loss has been questioned (Fildes *et al.*, 2015). Whilst individuals have some personal responsibility for food choices, it is increasingly understood that individuals interact with the places in which they choose and consume food in reciprocal ways (Roberto *et al.*, 2015). A multifactorial response is needed to encourage individuals to change behaviour and to create environments that support healthy food choices. Supportive environments encourage individuals to change and facilitate and amplify individual change. Evidence of the impact of these strategies in real-world settings is needed to encourage and support widespread adoption of strategies that benefit consumer health.

Changes in the global food system are considered to be one factor driving the rise of overweight and obesity worldwide (Popkin *et al.*, 2012, Swinburn *et al.*, 2011). Part of the global food system—the food service sector—prepares, serves and sells food to the general public for profit outside of the home. This includes full-service restaurants, fast food outlets, caterers, cafeterias and other places that provide food services to the public (US Department of Agriculture, 2017). Consumers are increasingly relying on eating outside the home, particularly at restaurants and fast-food outlets (Hillier-Brown *et al.*, 2017, Lachat *et al.*, 2012, Sinclair *et al.*, 2014). Researchers consider the out-of-home food environment to lack consumer information and provide fewer healthy food options, which leads to the consumption of non-core (unhealthy) foods, foods with higher energy density and larger portion sizes (Blumenthal and Volpp, 2010, Vandenbroele *et al.*, 2019). The evidence base suggests eating outside the home is associated with higher energy intake, poorer dietary quality and an increased risk of weight gain and obesity (Lachat *et al.*, 2012, Nago *et al.*, 2014, Ziauddeen *et al.*, 2017). Furthermore, research shows adults with obesity (one group needing support to change dietary behaviours) find eating outside the home to be a key barrier to adherence to specific dietary regimes (Guimarães *et al.*, 2010).

The food service sector can play an integral role in improving consumer health by changing the places in which food is chosen and consumed. Food service strategies range from those that require little or no effort from consumers to create a benefit (e.g. reformulation of foods to reduce salt content where consumers may not even be aware of the change) through to those that require high levels of consumer effort (e.g. displaying energy content information that requires consumers to read and act on the information which invokes deliberative processing

functions). Governments tend to favour population-level interventions that require individuals to use a high level of effort such as providing information to individuals to communicate the healthfulness of foods, or appeals to attract attention and motivate action (Adams *et al.*, 2016), whereas support can also be provided through policy action, product reformulation or changes to the range of alternatives provided. Commonly applied strategies (see Figure 1) are: nutrition labelling and information to assist consumers to make healthier food choices (Sinclair *et al.*, 2014); new or rebalanced options to increase the availability of healthier options (Pechey *et al.*, 2019); restricting advertising and commercial promotion (or focussing advertising and promotion on healthier options) (Roberts *et al.*, 2012); reformulation (including energy or sodium reduction, removal of trans fats and saturated fats) (Downs *et al.*, 2013); the use of pricing and promotions to incentivise or disincentivise purchases of particular products (Ball *et al.*, 2015); providing or promoting smaller portion sizes (Steenhuis and Poelman, 2017); removing high-energy or high-sodium condiments from tables in sit-in eateries (Jebb, 2012); and harmonising health promoting actions across sectors of the food system (Hawkes *et al.*, 2015).

[Figure 1 here]

A recent systematic review of consumer-level and/or food-outlet-level interventions to promote healthier food service meals found more ‘intrusive’ interventions that restricted or guided choice had a positive impact on food-outlet-level outcomes (such as retail practices, processes or profit) and customer-level outcomes (such as energy intake or purchasing behaviour) (Hillier-Brown *et al.*, 2017). This review found interventions that provided information or enabled choice had a negligible impact. Similarly, a review of experimental studies with predefined choice architecture interventions found health labelling at the point of purchase, assortment manipulation and payment option manipulation were associated with healthier food choices, while manipulating plate and cutlery size had an inconclusive effect on consumption volume (Skov *et al.*, 2013). The authors highlighted the need to evaluate these types of interventions in real-world settings to better determine their effectiveness (Skov *et al.*, 2013). Previous reviews have shown potential for a number of strategies to positively influence consumer behaviour (and health) in the food service environment, but these reviews have been limited to ready-to-eat meals (Hillier-Brown *et al.*, 2017), a narrow set of techniques (such as nudging) (Wilson *et al.*, 2016) or studies in an experimental setting (Skov *et al.*, 2013). Furthermore, these reviews do not compare strategies that rely on low or high levels of

individual human agency—which in turn does not answer questions of whether change efforts should primarily reside with individuals or the food sector, or whether they should be across both domains to maximise positive outcomes. Examination of a broad range of strategies deployed in real-world settings is needed. The purpose of this review was, therefore, to (i) examine initiatives deployed in the food service sector to positively influence consumer behaviour (ii) consider the impact these initiatives have had on consumer and public health and (iii) to highlight implications of findings for the development and implementation of strategies to improve consumer health.

Methods

A systematic review protocol informed by PRISMA guidelines (Liberati *et al.*, 2009) was used to identify, describe and evaluate the existing evidence on international food service initiatives. Search terms were trialled using five major databases (EBSCO, Emerald, ProQuest, Ovid and Web of Science) with records randomly chosen from each trial to determine whether records were within the intended scope. The final search used 10 databases—EBSCO, Emerald, ProQuest, Ovid, ScienceDirect, Web of Science, Medline, PsychINFO, Cochrane and Scopus. The final set of terms was: ("food service" OR "food producer" OR "food consumption" OR "food advertis*" OR "food compan*" OR caterer OR restaurant* OR supermarket* OR "fast food" OR cafe*) AND ("health* choice" OR "health* eat*" OR "health* food*" OR "health* beverage*" OR "unhealth* choice" OR "unhealth* eat*" OR "unhealth* food*" OR "unhealth* beverage*") AND (government* OR industr* OR NGO OR CSR OR "corporate social responsibility" OR policy OR regulat*).

Duplicates were removed, and titles and abstracts for the remaining records screened by three independent reviewers. Records were excluded if: not in English; published prior to 2006 (restricting to current evidence); not a peer-reviewed journal publication (e.g. conference papers or unpublished theses); not related to a food service; related solely to food security, affordability or accessibility rather than health; the article was a conceptual or discussion paper. Then, the following inclusion criteria were applied. The setting must be a food service (restaurant, cafe, takeaway, fast food, catering, club, pub), including institutional or government-run facilities, but not a school, hospital, or aged care facility. The review focussed on initiatives designed to benefit the general population, excluding those that were not open to the general public.

Second, the scheme must have deployed and evaluated a strategy to improve healthy eating (e.g. appropriate portion sizes; whole food consumption; increased availability visibility or

promotion of healthy food choices; reduced sugar, salt, saturated and trans fats; reduced energy content; menu labelling). It could not focus on accessibility or food security alone (unless health was also an objective); nor focus on environmentally conscious, organic or sustainability aims (unless health was also an objective).

Third, the scheme had to be voluntary, led by national/state/local government departments, non-government organisations (NGO), or industry bodies; or a mandatory initiative also deployed as voluntary initiatives in other regions. The creation of a health-supporting food service sector will require willing involvement by businesses. Focussing on schemes with voluntary elements allowed examination of business engagement and appetite for involvement. Additional papers were identified through backward searching of reference lists of included articles, forward searching using details of the identified food service initiatives, and through systematic reviews identified by the search. A PRISMA flowchart of the study selection process is provided is shown in Figure 2.

[Figure 2 here]

Full-text articles for records meeting the inclusion criteria were retrieved, and details of the studies, including title, author, year of publication, study type, level of evidence and key descriptive information recorded. Three independent reviewers performed this task, and all data extraction was checked and verified by the chief investigator. Consensus on data extraction was high and any discrepancies were resolved through team discussion. One scheme (HECTOR) was excluded at this point as evaluations were no longer available (<http://www.nut.uoa.gr/hector/about.asp>). The National Health and Medical Research Council (NHMRC) evidence assessment guidelines based on research question and design, taking into account the risk of bias, were used to assess the level of evidence with ratings from I (highest) to IV (lowest).

Data analysis adopted a narrative approach, qualitatively examining eligible studies (Thomas *et al.*, 2004). Each study was of intrinsic interest and combining such complex interventions was unlikely to provide actionable insights for improving future schemes (Higgins and Green, 2008).

Results

The search retrieved 3802 records comprising 1262 records after duplicate removal. Thirty-six articles, representing 16 schemes, were included in the evidence synthesis.

Supplementary file 1 provides a brief description of each of the schemes. Five were based in the United States (US), four in Canada, three in the United Kingdom (UK), two in continental Europe and two in Australia. Articles were published between 2009 and 2019.

Emerging categories of schemes

Following an inductive approach, three categories of intervention were thematically developed: *informing*, *enabling* and *engineering*, and the 16 schemes (Figure 3) were grouped into these three categories. The first group of *informing* schemes (eight schemes: 50%; Health Check, Informed Dining, Keyhole certification, Calorie Labelling (PPACA), Icon-based Menu Labelling, Quick Service Restaurant Initiative, Children's Food and Beverage Advertising Initiative, Children's Advertising Initiative) informed consumers about better food choices and/or portion sizes. These required consumers to read, interpret and understand information and then use that information to make a healthy choice. Although not a neat fit in this category, some schemes in this group restricted advertising to children to reduce potentially harmful persuasive content and substitute it with advertising for healthful products (Quick Service Restaurant Initiative, Children's Food and Beverage Advertising Initiative, Children's Advertising Initiative). Therefore, each of these schemes required a high level of consumer effort to act in response to information provided. The second group of *enabling* schemes (six schemes: 38%; Healthier Catering Commitment, Choose Health LA, Healthy Beverage Executive Order, Public Health Responsibility Deal, Healthy Food and Beverage Sales, Healthy Stadia) typically combined information provision with structural changes to make healthier choices easier. These schemes involved a medium level of consumer effort and required the food service to implement the structural change(s). The third group of *engineering* schemes (two schemes: 13%; Healthier Oils Initiative, National Salt Reduction Initiative) used only structural changes to make changes to products (through reformulation) or to the assortment of foods provided. Such changes mean the customer can consume a healthier choice without needing to identify it as being healthy. Therefore, these schemes involved the lowest level of consumer effort and were reliant on food services to faithfully implement the structural change.

[Figure 3 here]

Objectives of schemes

Most schemes (13 schemes: 81%; Health Check, Informed Dining, Keyhole certification, Calorie Labelling (PPACA), Icon-based Menu Labelling, Quick Service Restaurant Initiative, Children's Food and Beverage Advertising Initiative, Children's Advertising Initiative, Healthy Beverage Executive Order, Healthy Food and Beverage Sales, Healthy Stadia, Healthier Oils Initiative, National Salt Reduction Initiative) had a single objective; only three (19%; Healthier Catering Commitment, Choose Health LA, Public Health Responsibility Deal) had multiple aims. The most common was creation of healthy options (five schemes: 31%; Health Check, Keyhole certification, Icon-based Menu Labelling, Healthier Catering Commitment, Healthy Food and Beverage Sales) or identification of existing healthy options through labelling (three schemes: 19%; Informed Dining, Calorie Labelling (PPACA), Public Health Responsibility Deal) guided by pre-set nutrition criteria or nutrition professionals. Nutrition-specific goals included increasing fruit, vegetable or wholegrain consumption and/or reducing salt, fat and/or sugar consumption in the target group. Some simply provided nutrition information, including energy content, to inform choice; others aimed to increase the number of healthy options and/or promote healthy options. Three schemes (19%; Healthier Catering Commitment, Choose Health LA, Public Health Responsibility Deal) focussed on portion size offering smaller options in addition to regular-sized options. Two schemes (13%; Healthier Catering Commitment, Public Health Responsibility Deal) focussed on cooking practices (e.g. reduction of added fat and salt). Three schemes (19%; Public Health Responsibility Deal, Healthier Oils Initiative, National Salt Reduction Initiative) focussed on reformulation (to eliminate unhealthy fats and/or to reduce fat and/or salt content of foods) as an option, or as the sole focus of the scheme.

Scheme governance and approach

Five schemes (31%; Informed Dining, Calorie Labelling (PPACA), Choose Health LA, Healthy Beverage Executive Order, National Salt Reduction Initiative) were led by federal, state, or local government, five (31%; Health Check, Keyhole certification, Icon-based Menu Labelling, Healthier Catering Commitment, Healthier Oils Initiative) by NGOs, three (19%; Quick Service Restaurant Initiative, Children's Food and Beverage Advertising Initiative, Children's Advertising Initiative) by industry bodies, and three (19%; Public Health Responsibility Deal, Healthy Food and Beverage Sales, Healthy Stadia) were public-private partnerships. Four types of collaboration or partnership between the leading organisation and the food service outlets were observed. The first involved a high-level pledge (five schemes: 31%; Quick Service Restaurant Initiative, Children's Food and Beverage Advertising Initiative,

Children's Advertising Initiative, Public Health Responsibility Deal, National Salt Reduction Initiative), after which the food service had the flexibility to select actions within guidance provided by the scheme's organising body. The second invited businesses to opt-in through a certification process (six schemes: 38%; Health Check, Informed Dining, Keyhole certification, Icon-based Menu Labelling, Healthier Catering Commitment, Choose Health LA), which required businesses to submit health-oriented actions (e.g. menu items) for assessment against specified criteria. The food service decided the number and type of menu items to submit. The third adopting a consultative and collaborative to build capability within the business (three schemes: 19%; Healthy Food and Beverage Sales, Healthy Stadia, Healthier Oils Initiative) drawing on the expertise of the leading organisation. The fourth featured mandatory elements (two schemes: 13%; Calorie Labelling (PPACA), Healthy Beverage Executive Order) and were prescriptive in nature, with the expectation that businesses would become compliant with the scheme conditions.

Scheme targets and duration

The schemes targeted restaurants, cafes, fast food outlets, or a combination of these. One scheme restricted its focus to small- and medium-sized businesses while others targeted chain restaurants with multiple outlets. Most schemes (fourteen schemes, 81%) were ongoing, but explicit information pertaining to sustainability or longevity of the schemes was not provided such as source of funding, or risk identification and mitigation strategies (related to consumers, organisations, or businesses). One scheme (Health Check) no longer operating suffered heavy criticism because products with significant amounts of fat, sugar and sodium could still qualify for 'healthy' certification, and the scheme involved significant fees. Another, the UK Public Health Responsibility Deal suffered heavy criticism for having little impact on health, and responsibility for monitoring scheme targets was transferred from the public-private partnership to Government in 2016.

Food choice

Food choice, dietary intake and business engagement outcomes for the schemes are shown in Table 1.

[Table 1 here]

Quality assessment rated one randomised controlled trial study as level II, nine studies as level III-2, six studies as level III-3 and seven studies as level IV. Thirteen qualitative studies could not be assigned a level of evidence under the NHMRC assessment framework.

Few studies evaluated food choice outcomes or dietary intake outcomes, providing a very limited evidence base to assess scheme effectiveness on consumer choices or dietary intake. Of 36 studies, only five (assessing four schemes, 25%; Health Check, Keyhole certification, Calorie Labelling (PPACA), Icon-based Menu Labelling) evaluated food choice outcomes (Finkelstein *et al.*, 2011, Kerins *et al.*, 2016, Thunström and Nordström, 2011, Thunstrom *et al.*, 2016, White *et al.*, 2016). All were *informing* schemes, providing either calorie labelling or signposting of healthy options. One study (of Health Check) used self-report measures to assess the scheme and found 7.5% of patrons reported ordering at least one item containing the healthy symbol, but only 2% of patrons reported ordering items with the healthy symbol **and** stated they noticed the symbol **and** that it influenced their meal choice (White *et al.*, 2016). The study participants still indicated that the signposting helped them to choose a healthier item (White *et al.*, 2016). The other studies (of Keyhole certification, Calorie Labelling (PPACA), Icon-based Menu Labelling schemes) used sales records to assess food choice and found no increase in sales of healthier options or reduction in sales of less healthy products (Finkelstein *et al.*, 2011, Kerins *et al.*, 2016, Thunström and Nordström, 2011, Thunstrom *et al.*, 2016). Taken together, the findings indicate *informing* schemes had little effect on consumer food choice, with no change observed in sales (an objective measure) and limited self-reporting of healthier choices. Consumer food choices were not measured in any of the *enabling* or *engineering* schemes.

Dietary intake

Ten studies assessing three *informing* schemes (19%; Health Check, Keyhole certification, Calorie Labelling (PPACA)) measured consumer dietary intake (Dumanovsky *et al.*, 2011, Elbel *et al.*, 2009, Elbel *et al.*, 2013, Finkelstein *et al.*, 2011, Krieger *et al.*, 2013, Lassen *et al.*, 2014, Tandon *et al.*, 2011, Thunström and Nordström, 2011, Thunstrom *et al.*, 2016, White *et al.*, 2016). Results were mixed within and across studies. One study (of Health Check) found purchased meals were lower in saturated fat than in comparison restaurants (White *et al.*, 2016). However, there was no difference in total fat, sodium and total calories consumed (White *et al.*, 2016). An evaluation of a different scheme (Keyhole certification) found reductions in energy density, fat and sugar intake, as well as increases in fruits, vegetables and wholegrains (Lassen *et al.*, 2014), but further evaluations in other locations found no change in the

nutritional content of meals consumed (Thunström and Nordström, 2011, Thunstrom *et al.*, 2016). Mixed results were also observed across calorie labelling schemes. Five studies of US calorie labelling schemes (PPACA) found no decrease in calories consumed (Dumanovsky *et al.*, 2011, Elbel *et al.*, 2009, Elbel *et al.*, 2013, Finkelstein *et al.*, 2011, Tandon *et al.*, 2011), whereas one scheme found a modest decrease 18 months after implementation (Krieger *et al.*, 2013). In summary, assessments of the effect of *informing* schemes on dietary intake were inconclusive. Consumer dietary intake outcomes were not measured in any *enabling* or *engineering* schemes.

Business engagement

Evaluations of *informing* schemes generally did not measure business engagement. Two studies of calorie labelling (PPACA scheme; Bruemmer *et al.*, 2012, Namba *et al.*, 2013) found businesses had reformulated foods to decrease energy, saturated fat and sodium content, or introduced more healthy options, presumably to increase the number of items lower in calories. A further two studies of this scheme found no change in nutritional content of foods following introduction of labelling (Wu and Sturm, 2013, Wu and Sturm, 2014). In summary, when business engagement outcomes were evaluated for *informing* schemes, changes to practices beyond providing information were rarely observed.

Business engagement was important for *enabling* and *engineering* schemes, as implementation of food service changes was essential for success. Studies of *enabling* schemes (combining informing strategies and engineering changes) measured business engagement in various ways. One study found it was easy for businesses to engage with a UK certification scheme (Healthier Catering Commitment) because it required few or no changes to qualify (Bagwell, 2014). They found businesses were comfortable making structural changes when they considered them to be imperceptible to consumers, such as reformulations or substitutions that did not interfere with the taste of menu items (Bagwell, 2014). A study of the US Choose Health LA scheme found businesses perceived several barriers to making structural changes, including the need to respond to customer demand and fear of potential revenue losses (Gase *et al.*, 2014). However, some were motivated to be socially responsible industry leaders, and those that engaged readily adopted elements of the scheme (Gase *et al.*, 2015). The UK public–private partnership (PHRD) (Jebb, 2012) engaged 7-90 signatories for each food pledge (which varied in scope, and organisations could sign more than one pledge) from a pool of 7000 manufacturing, 213,000 wholesale and 52,000 retail food enterprises (Ulijaszek and McLennan, 2016). Evaluations indicate the strategies most readily adopted were *informing*,

and few businesses engaged with the PHRD to *engineer* the food environment, with most organisations pledging to actions they had already commenced prior to the scheme (Knai *et al.*, 2015). The authors stated missing information and different reporting styles made concrete evaluation difficult. Some pledges (e.g. reduction of trans fats) failed to attract participation of those most needing to act (e.g. fast foods and takeaways) (Knai *et al.*, 2017). Evaluations of two capacity building schemes (Health food and Beverage Sales; Healthy Stadia) found an increase in healthy policies within participating food services and a shift towards healthier sales mixes, but noted systemic barriers (existing contracts, profit concerns, lack of human and financial resources) to more extensive progress (Naylor *et al.*, 2015, Roncarolo *et al.*, 2014).

The two *engineering* schemes were opposites in terms of scale. The smaller scheme (Healthier Oils Initiative) attracted interest from businesses but noted that habit and routine stood in the way of making structural changes (Milson *et al.*, 2015, Milson *et al.*, 2019). The larger (and broader) scheme (National Salt Reduction Initiative) noted packaged food companies were substantially more engaged than restaurant companies (Curtis *et al.*, 2016). Comprehensive evaluations for the National Salt Reduction Initiative scheme were difficult to source. One evaluated two participating food services finding mixed results—one failed to meet the target (20% reduction in salt content over two years, managing 6%), while the other exceeded the same target by 15% (Losby *et al.*, 2014). Another evaluation compared the sodium content of foods from 35 chain restaurants (five of which were scheme participants) over a five-year period (NYC Health, undated). A small reduction in sodium content (1.5%) was observed across 800 food categories. Targets for 2012 were met in four of 25 categories in 2014, but no categories met the 2014 targets in that year (NYC Health, undated). The low proportion of scheme participants in the sample means decreases in sodium content may be due to industry changes, rather than scheme participation.

Discussion

Opportunities exist for creation of health supporting food environments by harnessing and channelling the actions of the food service sector to increase the nutritional content of foods and to guide consumer choices in a healthful direction. There is evidence to support the efficacy of food service strategies from experimental settings and pilot testing of single strategy types (Cecchini and Warin, 2016, Hillier-Brown *et al.*, 2017, Schwartz *et al.*, 2012, Skov *et al.*, 2013). However, reviews of schemes operating in the national or international food service sector are not readily available. This study responded to that gap by identifying and synthesising food service initiatives and examining their impact on consumer health.

This review identified international food service schemes in three categories—*informing*, *enabling* and *engineering* schemes. Across these categories, the individual effort needed to make a healthful choice decreases, ranging from high (informing) to low (engineering). *Informing* schemes aim to equip people to make the best possible choices for themselves, rather than removing choice or compelling change (UK Government, 2010). They rely on consumers to absorb information, to interpret and apply this information to their personal situation and then intentionally make a healthful choice. Evidence in this review indicates that *informing* schemes, when used in isolation, were ineffective. Other reviews and meta-analyses support this finding, finding information campaigns only affect a small proportion of the population (5% for nutrition behaviours) (Hillier-Brown *et al.*, 2017, Snyder *et al.*, 2004). Individuals may not be able to understand and apply the information to their particular situation (Blumenthal and Volpp, 2010). Furthermore, food choice decisions are often made under time pressure, with little conscious effort (Fürtjes *et al.*, 2020, Veling *et al.*, 2017), and in food environments that contain many signals that encourage unhealthy behaviour (Hoek and Jones, 2011). As a result, *informing* schemes may have narrow scope in which to bring about change.

Enabling and *engineering* schemes employed structural elements, in combination with informing elements or in isolation. They aimed to *enable* healthful choices by increasing the number of healthful options or facilitating healthful choice or *engineer* choices through reformulation or restriction of less healthful options. These schemes required a lower level of individual effort and are therefore likely to benefit a larger number of consumers, including those who are health conscious by removing barriers to the expression of healthy intentions, and those who are ambivalent or unengaged by providing an enabling environment that facilitates healthier selections and disrupts effortless actions that result in unhealthy choices (Hawkes *et al.*, 2015). These solutions can be embedded in environments and present several advantages—they tend to be more cost-effective and sustainable (than individual-level approaches), affect the whole population (including those difficult to reach), become systemic (affect default behaviours) and reverse some of the environmental drivers (Swinburn *et al.*, 2011). However, findings from the present review suggest that the effect of these schemes on consumer choice or consumer health has not been extensively or reliably measured. Evaluations focused on implementation (i.e. business engagement) which is only one measure of effectiveness. However, evaluations are needed to ensure structural changes have the intended flow on effect to consumer behaviour (and health), as there are a multitude of choices in any given food choice environment, and consumers respond and react dynamically and adaptively to contextual factors in complex choice tasks (Krefeld-Schwalb *et al.*, 2019).

The quality of studies used to assess these schemes was generally low. Future evaluations will need to employ rigorous study designs to accurately assess effectiveness in terms of consumer behaviour and, in turn, health. This highlights the need for improved evaluation designs to accurately assess food service schemes, to improve both the rigour and quality of evaluations, and the breadth of the evaluation to assess process, outcome and impact.

An increasing level of engagement is required from food service sector businesses to implement schemes that facilitate healthful choices—rather than simply informing people how to make a healthful choice within an existing environment. This review suggests some businesses will engage, particularly if the changes are imperceptible to consumers and have little impact on revenue. However, findings suggest that businesses often engage when it involves little effort or when their current actions already meet the conditions of the scheme (Bagwell, 2014, Knai *et al.*, 2015). Some schemes (e.g. the UK PHRD) included options that did not need significant effort from industry—simply requiring businesses to provide information (Ulijaszek and McLennan, 2016). These schemes did not include other evidence-based strategies as options for businesses to select, such as food pricing strategies, restrictions on marketing, and changes to products such as reducing sugar content (Knai *et al.*, 2015). Therefore, measures of business engagement may not reliably indicate a ‘changed environment’. Universal or consensus frameworks are needed to guide food service pledges to ensure accountability, consistency and transparency across business engagement. In addition, evaluations need to accurately measure business engagement, and in particular, verify the authentic application of strategies that have been demonstrated in controlled or simulated environments to real-world contexts.

Encouraging or facilitating the re-engineering of food services for consumer health is likely to require strong business or government leadership. Indeed, this review shows that most schemes were led by entities that were not food services. However, modern market-based economies favour economic growth (Swinburn *et al.*, 2011). As economic benefits are realised, commercial entities invest more resources to increase product sales and enhance their bottom-line, and additional investment in socially responsible initiatives is seen as inconsistent with profit maximisation principles (Moodie *et al.*, 2013). As such, the emergence of an obesogenic environment is considered a normal response to this broader economic and political environment (Gase *et al.*, 2014). Unfortunately, at this time, strong leadership appears to be absent. Food service businesses do not prioritise or publicly identify nutrition as a focus area, and do not disclose efforts to address obesity (Sacks and Robinson, 2018). Commonly adopted strategies are menu labelling and nutrition information—a legislative requirement for many

businesses (Sacks and Robinson, 2018). Governments use language suggestive of a gentle approach (Australian Government, 2019, UK Government, 2010) preferring to guide individuals to make informed decisions rather than introducing legislation that would require structural changes, despite evidence indicating the latter are more likely to be effective and equitable (Adams *et al.*, 2016).

Food and beverage consumption is still considered an issue of personal choice, and a commitment to freedom of choice prevents development of regulations that restrict when, where and what people eat favouring voluntary actions that are considered less effective, and that are perceived to disguise inaction (Kaldor, 2018). This is despite the significant contribution made by legislation in other public health areas (e.g. drink driving and smoking) and the current acceptability of those policies that prohibit those specific behaviours. Currently, government-led policy interventions for obesity can only be realistically directed at the environment. However, policymakers are reluctant to regulate production, distribution and marketing of obesogenic foods and beverages (Swinburn *et al.*, 2011), partly due to lobbying from food (and allied) industries (Tselengidis and Östergren, 2019) and public hesitancy to change environments to which they have become accustomed (Swinburn *et al.*, 2011).

Limitations and future research

A rigorous search process was a strength of this review, increasing the likelihood of capturing relevant articles, however, it is possible that some relevant articles may have been missed. Terms used to define the setting may have restricted the results to commercial settings and excluded government and institutional settings not identified as restaurants, cafes, or food services (or similar). An extension may be to specifically examine these settings for effective initiatives that may translate to the commercial sector. There is a body of literature focused on promotion of healthy eating in schools that is beyond the scope of this review with reviews available (Evans *et al.*, 2012, Fung *et al.*, 2012). Strategies from that context may be transferable to a broader range of food services.

The most significant limitation of this review lies in the small evidence base and quality of evaluations conducted. Only a small number of schemes was identified, particularly for *enabling* or *engineering* schemes. Furthermore, the quality of the evaluation studies used to assess these schemes was generally low. For example, outcome evaluation studies did not include measures that could verify the effect of upstream action (e.g. changes within the business) on changes to consumer choice and dietary consumption—changes to food choice and consumption would be required to benefit consumer health. This reduces the ability to

draw conclusions on the effectiveness of these *enabling* or *engineering* initiatives. In the context of the entire review, it means that for food choice and dietary intake, a lack of effectiveness was observed for *informing* schemes, however the effect of *enabling* or *engineering* was not measured and therefore does not permit conclusions on program effectiveness to be drawn. Rigorous evaluations are needed to determine the effect on consumer choice and health resulting from schemes that involve structural changes (i.e. those that go beyond providing information).

This review examined voluntary schemes, indicating which schemes may prompt enthusiastic engagement by food services. However, given businesses engaged in easily achievable activities, and some evidence-based strategies were not included as options within schemes, there may be a need to examine mandatory schemes to identify other strategies for consideration. This review provides some evidence that food services can be engaged in (easily achievable) initiatives to improve consumer health. Future research is needed to determine how to engage businesses when more effort is required.

Conclusion

Consumers are progressively more reliant on eating outside the home, particularly at restaurants and fast-food outlets. Given individuals are influenced by the places in which they choose and consume food, food services can assist motivated consumers to act (through information) and influence less motivated consumers by structuring the eating environment to aid healthier choice (by providing new options and reformulation). This review found most voluntary, population-level schemes have aimed to inform consumers and had little effect on consumer choice. Schemes that move beyond information provision to modify options, foods or service practices exist, and businesses have engaged with these schemes. However, the voluntary actions taken by businesses may need to extend further to substantially shape the food environment to achieve a health benefit. Rigorous evaluations are needed to verify the effect of food service modifications—this review found current evaluations focus on implementation rather than consumer behaviour or health outcomes. There remains significant opportunity for food services to contribute to improved consumer health. An evidence base demonstrating positive outcomes for consumers and business, coupled with strong government or business leadership, would assist to engage food services and realise this opportunity.

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Table 1. Food Service Scheme Outcomes

Informing schemes - Reliant on consumer choice to achieve health outcomes						
Scheme name, duration and governance	Scheme focus and approach	Evaluation study, type, evidence level and sample size	Outcomes			
			Food choice	Dietary intake	Business engagement	Other
Health Check						
Canada 1999-2014 (suspended) Heart & Stroke Foundation (NGO)	Healthy options Opt-in Certification Recognition (logo) at food item level	White, <i>et al.</i> , (2016) Case-control study III-2 n = 589 (intervention) n = 537 (comparison)	In intervention restaurants 15% of patrons ordered at least one HC item; 4% of patrons ordered a HC item and reported seeing HC symbol on item; and 2% of patrons in intervention restaurants ordered HC item, reported seeing HC symbol on item, and said the symbol influenced choice. Measure: Survey	Meals consumed at intervention restaurants significantly lower in saturated fat, higher in carbohydrate, fibre and protein (than comparison). No difference in calories, total fat, or sodium between HC and comparison restaurants Measure: Survey + analysis of menu	Not reported	Awareness: Significantly more intervention restaurant patrons (34%) noticed nutrition information than comparison restaurant patrons (28%). Intervention patrons (11%) significantly more likely to say their order was influenced by nutrition information than those in comparison restaurants (5%). Measure: Survey
Informed Dining						
Canada 2012-ongoing (healthcare facilities) 2012-2020 (commercial) Province of British Columbia (Government)	Nutrition information Opt-in participation Recognition (logo) at outlet level	Vanderlee <i>et al.</i> , (2019) Comparative study with concurrent controls III-2 n = 1533 (ID program) n = 1244 (calorie labelling) n = 2276 (no labelling)	Not reported	Not reported	Not reported	Awareness: No significant differences between program restaurants and ‘no program’ restaurants for awareness and self-reported influence of nutrition information on food choices. Participants in restaurants with calorie labelling on menu more likely to notice nutrition information (57%, compared to program restaurants, 22%, or ‘no program’ restaurants, 20%) and more likely to report nutrition information influenced food purchase (38%, compared to program restaurants, 12%, or ‘no program’ restaurants, 12%). Measure: Exit survey
		Heart & Stroke Foundation, (2016) Case study Could not assign n = 875 (survey) n = 42 (focus groups)	Not reported	Not reported	Approx. 15% of all restaurant outlets in British Columbia were participating. Restaurant participants (managers) were generally satisfied with the support they receive for program implementation. Measure: Survey	Awareness: Fewer than one-third of patrons could find information unassisted. Patrons who read it stated it helped them to make a choice. Consumer barrier: Consumers took 6-12 minutes to find the information. May deter use in quick-service environment. Measure: Focus Groups
Keyhole certification						
Sweden/Denmark 2009-ongoing (S) 2012 -ongoing (D) KeyHole Restaurant Association (NGO)	Healthy options Opt-in certification Recognition (logo) at food item and outlet level	Lassen <i>et al.</i> , (2014) Comparative study with concurrent controls III-2 n = 135 (intervention) n = 135 (comparison)	Not reported	Significant reduction in energy density, fat and sugar intake content of meals consumed in intervention restaurants, FV and wholegrains consumption increased. No change in comparison restaurants. Measure: Plate photography + menu analysis	Not reported	Consumer satisfaction: No significant changes in consumer food satisfaction and plate waste. Measure: Survey

		<p>Thunstrom & Nordstrom (2011); Thunstrom, <i>et al.</i>, (2016)</p> <p>Comparative study with concurrent controls</p> <p>III-2</p> <p>n = 170</p>	<p>No increase in healthy meal consumption when labelled with a healthy symbol.</p> <p>Measure: Restaurant sales data</p>	<p>No change in nutrient content of meals consumed with introduction of label.</p> <p>Measure: Sales data + menu analysis</p>	<p>Not reported</p>	<p>Business outcome: No effect of the Keyhole Label observed on restaurant sales.</p>
Calorie Labelling (PPACA)						
<p>USA</p> <p>2018-ongoing</p> <p>US Government (Government)</p>	<p>Calorie/KJ labelling</p> <p>Compliance</p>	<p>Finkelstein <i>et al.</i>, (2011)</p> <p>Comparative study with concurrent controls</p> <p>III-2</p> <p>(sample size not given)</p>	<p>No difference in sales across categories of foods/drinks after legislation.</p> <p>Measure: Restaurant sales data</p>	<p>No reduction in calories per transaction after legislation.</p> <p>Measure: Sales data + menu analysis</p>	<p>Not reported</p>	<p>Found consumers were making healthier purchases (compared to comparison group) prior to legislation.</p>
		<p>Tandon <i>et al.</i>, (2011)</p> <p>Prospective cohort study</p> <p>II</p> <p>n = 75 (intervention) n = 58 (comparison)</p>	<p>Not reported</p>	<p>No change in calories purchased (for children) for legislated or comparison areas. Non-significant decrease in calories purchased (adults) in both areas.</p> <p>Measure: Sales receipt + menu analysis</p>	<p>Not reported</p>	
		<p>Bruemmer <i>et al.</i>, (2012)</p> <p>Comparative study without concurrent controls</p> <p>III-3</p> <p>n = 1771</p>	<p>Not reported</p>	<p>Not reported.</p>	<p>Significant reduction in energy, saturated fat and sodium content of foods offered in chain restaurants. Number of items exceeding energy content guidelines reduced. Items reformulated, portion sizes adjusted, or both.</p> <p>Measure: Menu analysis</p>	
		<p>Namba <i>et al.</i>, (2012)</p> <p>Comparative study with concurrent controls</p> <p>III-2</p> <p>n = 3887 items [from 5 case and 4 control restaurants]</p>	<p>Not reported</p>	<p>Not reported</p>	<p>No change over time in nutrient averages and, no differences between case and control restaurants. Fewer than 25% of all entrées/sides qualified as 'healthier'. Healthier food options increased from 13% to 20% at case locations while remaining static at 8% at control locations, suggesting labelling motivated addition of healthier alternatives.</p>	

<p>Krieger <i>et al.</i>, (2013)</p> <p>Case series pre-test/post-test</p> <p>III-3</p> <p>n = 6125 (food chains) n = 1200 (coffee chains)</p>	Not reported	<p>No change at 6 months post-regulation in number of calories purchased. Modest decrease in caloric content of foods purchase at 18 months among women and patrons of coffee chains</p> <p>Measure: Sales receipt + menu analysis</p>	Not reported	<p>Awareness: Label awareness increased from 18.8% to 61.7% of customers (food chains) and from 4.4% to 30.0% of customers (coffee chains) at 18 months. Within the customers reporting seeing information, the proportion using information did not change (36% of customers in food chains and 28% in coffee chains).</p> <p>Measure: Survey</p>
<p>Elbel <i>et al.</i>, (2009)</p> <p>Comparative study with concurrent controls</p> <p>III-2</p> <p>n = 1156</p>	Not reported	<p>No change in calories purchased for entire sample or various subgroups.</p> <p>Measure: Sales receipt + menu analysis</p>	Not reported	
<p>Elbel <i>et al.</i>, (2013)</p> <p>Comparative study with concurrent control</p> <p>III-2</p> <p>[sales receipts] n = 1169 (intervention) n = 914 (comparison)</p> <p>[phone survey] n = 1395 (intervention) n = 1415 (comparison)</p>	Not reported	<p>No change in calories purchased for entire sample or various subgroups.</p> <p>Measure: Sales receipt + menu analysis</p>	Not reported	<p>Awareness: Increase of 33% in the number of customers reporting seeing labels, and a small increase of 8% in the number of customers who reported use of labels to inform purchase of fewer calories.</p> <p>Measure: Survey</p>
<p>Dumanovsky, <i>et al.</i>, (2011)</p> <p>Cross sectional study</p> <p>IV</p> <p>n = 7309 (pre) n = 8489 (post)</p>	Not reported	<p>No change in calories purchased post regulation.</p> <p>Measure: Sales receipt + menu analysis</p>	Not reported	<p>Awareness: At the post implementation timepoint, 15% of customers reported using the calorie information when deciding on their purchase for that day.</p> <p>Measure: Survey</p>
<p>Wu & Sturm (2013)</p> <p>Case study</p> <p>IV</p> <p>n = 30266 foods</p>	Not reported	Not reported	<p>There were no significant effects on energy, fat, sodium, carbohydrate or protein content for the outlets subject to state/local labelling policy</p> <p>Measure: Menu analysis</p>	

		Wu & Sturm (2014) Case study IV n = 12843 (pre) n = 13413 (post)	Not reported	Not reported	The mean energy and sodium levels of foods remained unchanged Measure: Menu analysis	
Icon-based Menu Labelling						
Ireland 2013 (pilot) W. Ireland Cardiac Foundation (NGO)	Healthy options Opt-in certification Recognition at food item level	Kerins <i>et al.</i> , (2017) Comparative study without concurrent controls III-3 n = 20436 (pre) n = 24190 (post)	No significant change in sales of healthier menu items. Measure: Sales receipt + menu analysis	Not reported	No association between the type of food service establishment and the change in sales for labelled menu item.	
Quick Service Restaurant Initiative						
Australia 2009-ongoing Australian Food and Grocery Council (Industry body)	Advertising Pledge Certification Compliance	Roberts <i>et al.</i> , (2012) Qualitative Could not assign n = 426 adverts	Not reported	Not reported	Not reported	Several breaches of mandatory and self-regulatory codes, including 29 breaches of the QSRI in the children's programming time (in 2 months). Children view outside children's program times, so are exposed to ads for unhealthy foods. Measure: coding against regulations
		Roberts <i>et al.</i> , (2014) Qualitative Could not assign n = 18850 adverts	Not reported	Not reported	Not reported	Fewer non-core food ads shown following introduction of self-regulatory code (63% of all foods vs 81% of all foods). Non-core foods appeared less during times covered by code. Majority of food ads promoted non-core foods. Code covers a small proportion of when children are viewing. Measure: content analysis
Children's Food and Beverage Advertising Initiative						
USA 2010-ongoing Council of Better Business Bureaus (BBB) (Industry body)	Advertising Pledge Certification Compliance	Kunkel <i>et al.</i> , (2014) Case-control study III-3 n = 145 shows (pre) n = 189 shows (post)	Not reported	Not reported	All participating companies in CBFAI complied with all aspects of their commitments as specified by each company	Food advertising post implementation was a smaller proportion of overall children's advertising. Proportion of non-nutritious foods in food advertising category increased post implementation. Measure: content analysis
Children's Advertising Initiative						

Europe	Policy to guide food service	Roncarolo <i>et al.</i> , 2014	Not reported.	Not reported.	Uptake: 27%-41% of stadia implemented healthy policies; most stadia focused on staff or visitors. Only 12%-25% of stadia created healthy policies for the community members. Barriers: Some partners cited lack of human and financial resources as barriers to further progress. Measure: survey	
2005-ongoing	Opt in Capacity building	Repeated measures case series IV n = 17 (Time 1) n = 33 (Time 2) n = 25 (Time 3) n = 26 (Time 4)				
Engineering Schemes – Reliant on food service changes to achieve health outcomes (not reliant on consumer choice)						
Scheme name, duration and governance	Scheme focus and approach	Evaluation study, type, evidence level and sample size	Food choice	Dietary intake	Business engagement	Other
Healthier Oils Initiative						
Australia	Reformulation (oils)	Milson <i>et al.</i> , (2015)	Not reported	Not reported	Uptake: Council inspections found 42% of outlets were using frying oil that met guidelines.	
2009-ongoing	Opt in Capacity building	Case study				
Heart Foundation (NGO)	Recognition (logo) at outlet level	Could not assign n = 147 outlets				
		Milson <i>et al.</i> , (2019)	Not reported	Not reported	Considerations: Fry life, cost, taste and general health. Facilitators: Competitive price, health implications, relationship with Council	
		Qualitative study Could not assign n = 16 managers				
		Johnson (2016)	Not reported	Not reported	Uptake: Data indicated that 29% of food outlets were already using healthier oils during frying prior to invention, which increased to 37% of outlets using healthier oils post intervention.	
		Case study Could not assign n = 139 outlets				
National Salt Reduction Initiative (NSRI)						
USA	Salt reduction (reformulation, sales mix)	Losby <i>et al.</i> , (2014)	Not reported	Not reported	Modest sodium reductions in prepared meals. Schenectady county set a target of 20% reduction in sodium content of meals in 2 years; and achieved a 7% reduction. Broome county set a target for 10% reduction in sodium content of meals in 2 years; and achieved 35%.	Lessons: find partners with common goals; engage experts; understand meals supply system; conduct sodium analysis; make gradual/voluntary reductions; work towards sustainable sodium reduction.
2009-ongoing		Case study				
Food & Drug Administration (Government)	Pledge Setting targets Monitoring	IV [Schenectady County] n = 105 meals (Yr1) n= 84 meals (Yr2) [Broome County] n = 43 meals (Yr1) n = 86 meals (Yr2)				

		NYC Health (undated) Case study IV n = 811 foods	Not reported	Not reported	Not reported	Small reduction in sodium content (1.5%) across all food from 35 chain restaurants. In 2014, 4 of the 25 categories met NSRI 2012 targets and no categories met NSRI 2014 targets.
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Figure 1. Opportunities within the food service sector to contribute to consumer health

Figure 2. PRISMA Flow Diagram

Figure 3. Food service sector schemes included in the review

Supplementary Table. Details of Food Service schemes

Scheme Name	Food service targeted	Mandatory/ Voluntary	Target Population
Health Check (Canada) Description: Voluntary nutrition labelling program developed by the Heart and Stroke Foundation of Canada. Created 1999, disbanded 2014. Food service must submit application with accompanying nutrient analysis for each menu item for assessment against nutrient criteria (certification). Items meeting criteria were identified with a HC symbol. Applicants pay a one-time evaluation fee per product (ranging from \$150 - \$750) and annual licensing fee (\$1,225 - \$3,625). Discounts available for multiple products, fees capped at 14 products in 4 categories (\$66,000 - \$180,000).	Restaurants (Fast food)	Voluntary	General public
Informed Dining Program (Canada) Description: Participating restaurants (full-service, fast casual and fast food) provide nutrition information for all standard menu items, can display Informed Dining logo and are listed on the program website. Restaurants sign up (opt-in) and can access resources to assist staff. Environmental Health Officers (EHO) verify program standards are met by participating restaurants. At June 30, 2015, 2,000+ restaurant outlets in British Columbia were participating in the program (15% of all restaurant outlets) https://www.healthyfamiliesbc.ca/home/informed-dining	Food services (any)	Voluntary	General public
Keyhole certification (Sweden/ Denmark) Description: Nordic Keyhole symbol introduced in the restaurant (fast food) and canteen sector in Sweden (2009) and Denmark (2012) (previously used on packaged food and widely recognised as a sign of healthy choice). Food items must fulfil criteria for fat, salt and sugars, dietary fibre and wholegrain in 25 different food groups. Restaurants and canteens opt in (certification process) and at least one Keyhole labelled meal must be present on the daily menu. Training requirement as part of the certification (75% of employees). http://norden.diva-portal.org/smash/get/diva2:700822/FULLTEXT01.pdf www.nyckelhalet.se	Restaurants (Fast food)	Voluntary	General public
Calorie Labelling Patient Protection and Affordable Care Act (USA) Description: Act approved in March 2010. Implementation delayed several times; some jurisdictions implemented pre-emptively (same requirements). Chain restaurants (full service, fast casual and fast food) with 15 or more outlets nationwide and annual gross sales over \$1 million required to provide nutrition labels (calories, saturated fat, carbohydrates, and sodium) for all standard food and beverage items at point of purchase. Quick-service restaurants required to display calories on menu boards and make carbohydrate, sodium, saturated fat, and daily recommended caloric intake information readily available (pamphlets, brochures, posters).	Food services (chain restaurants)	Mandatory ¹	General public
Icon-based Menu Labelling (Ireland) Description: Initiative for food service establishments. Delivered as a service to food service establishments in the West of Ireland and menu items meeting the heart healthy criteria were allocated one or more of five icon-based menu labels. This pilot scheme was trialled with 8 food outlets and funded by West of Ireland Cardiac Foundation.	Food services (any)	Voluntary	General public
AFGC Quick Service Restaurant Initiative (Australia) Description: Australian Food and Grocery Council (AFGC) initiative for responsible advertising of food and beverages to children. Food service providers commit to actions that meet the objective of the initiative. Commitments are developed by signatory and are assessed to determine whether they meet the QSRI objectives (reduce advertising to children for food/beverages that do not represent healthier choices; and use advertising to help promote healthy dietary choices and healthy lifestyles).	Food services (any)	Voluntary	Children
Children's Food and Beverage Advertising Initiative (USA) Description: Council of Better Business Bureaus (BBB) initiative for responsible food/beverage advertising to children. CFBAI standard is 100% of all child-directed ads must be for healthier foods. No uniform nutrition standard applied across all companies involved. Each participant indicating commitment in terms of: (a) overall restrictions on food advertising to children, such as a promise not to advertise any products to child audiences; (b) standards that must be met regarding the nutritional quality of food products that will be advertised to children; (c) limits on the use of licensed characters in food advertising to children (not at all, or only in ads for products meeting certain nutritional standards).	Food services (any)	Voluntary	Children
Children's Advertising Initiative (Canada) Description: Self-regulated industry initiative. In 2018, 18 companies were participating. Some companies committed to not advertise to children less than 12 years old, while remainder pledged to exclusively advertise “better-for-you” products (as defined themselves). The companies have adopted uniform nutrition criteria for 8 product categories (milk and alternatives, grains, soups, meat and alternatives, vegetables and fruit, occasional snacks, mixed dishes, and meals on the go). (Food service aspects of the evaluation were examined)	Food services (any)	Voluntary	Children

Healthier Catering Commitment (UK) Description: Chartered Institute of Environmental Health (CIEH) award scheme, administered by local government authorities (LGAs). Pre-requisite is businesses must achieve “broad compliance” standard or above for food hygiene. Food businesses must meet eight criteria—four essential criteria (plus a further three for those who fry food) and additional criteria of their choosing from a list of 22. Businesses choose to exceed 8 criteria. Criteria cover the main areas of healthier frying, reducing salt and sugar, increasing carbohydrates, health promotion and access to fruit or vegetables. Once certified, businesses can use the HCC logo.	Food services (any)	Voluntary	General public
Choose Health LA (USA) Description: Los Angeles County Department of Public Health initiative. Restaurants (full service, fast casual, fast food) apply to participate and must offer 1) smaller portion versions in addition to existing items 2) healthier children’s meals with fruits and vegetables, healthy beverages, and non-fried foods 3) chilled water, free of charge. No fees to participate. Choose Health LA staff available during application, and on-site when implementing changes. Participating restaurants display the logo, in-store promotional materials and are recognized on Choose Health LA website. http://www.choosehealthla.com/eat/restaurants	Food service (any)	Voluntary	General public
Healthy Beverage Executive Order (USA) Description: Mandatory for city food and beverage services, optional for privately run food service providers. City departments were required to eliminate the provision of sugar sweetened beverages. Some calorically sweetened beverages, (including some energy drinks, sports drinks, sweetened tea, and coffee drinks), were allowed if they contained less than or equal to 1 gram of sugar per fluid ounce. Standards also addressed portion size for certain categories of beverages (eg, milk, milk substitutes) and product mix (ie, diet or other non-calorically sweetened beverages must make up no more than one-third of total offerings).	Food services (any)	Mandatory ²	General public
Public Health Responsibility Deal (UK) Description: Voluntary, pledge-based, public–private partnership between government, business, public sector and non-governmental organisations (NGOs) to improve public health in the areas of food, alcohol, health at work and physical activity. For food aspects, food services pledge to one or more of 1) providing calorie information 2) reducing salt content of foods 3) ceasing to use ingredients with artificial trans fats 4) product or menu reformulation, reviewing portion sizes, education and information, and actions to shift the marketing mix towards lower calorie consumption 5) salt reduction through kitchen practices, salt availability, chef training. Actions are monitored through target setting and progress reporting.	Food services (any)	Voluntary	General public
Healthy Food and Beverage Sales (Canada) Description: A Healthy Living Alliance initiative, under leadership of the British Columbia Recreation and Parks Association (BCRPA), for Recreation Facilities and Local Government Buildings. Capacity-building intervention to: (1) support voluntary implementation of the vending guidelines and 2) encourage healthy food and beverage options across all recreation operations. Underpinning guidelines classify products as choose most, choose sometimes, choose least and not recommended; 50% (or more) should be choose most; and the remainder choose sometimes.	Public recreation facilities	Voluntary	General public
Healthy Stadia (Europe) Description: Developed, and now coordinated by Heart of Mersey (UK), but involving 30+ partners from several European countries. Offers support, guidance and case studies to help stadia to develop policies and practices in support of the health of their fans, their staff and the surrounding community, in the areas of food, alcohol, smoking, and physical activity. (Food service aspects of the evaluation were examined)	Recreation facilities	Voluntary	General public
Healthier Oils Initiative (Australia) Description: Local Government initiative working with Environmental Health Officer (EHO) teams and large independent meal providers to reduce community exposure to saturated and trans fats by encouraging local food outlets to switch to healthier cooking oils. Education sessions for food outlets on the Healthier Oils program, media promotion, recognition scheme for outlets adopting the program, and ongoing interaction between EHOs and food outlets within routine inspections. https://www.heartfoundation.org.au/programs/healthier-oils-program	Food services (small-medium)	Voluntary	General public
US National Salt Reduction Initiative (USA) Description: The NSRI developed targets to guide company reductions in the sodium levels in foods (packaged foods, fast food, fast casual and full service). For restaurants 2012 and 2014 targets were set for average sodium levels in 25 food categories as well as a maximum sodium level for all items served in restaurants. When restaurants sign on to NSRI they pledge that overall sales in a category will meet the relevant target for sodium content (even if some individual products don't). A restaurant that commits to the maximum, commits to keeping sodium levels per serving in all items below that threshold. The NSRI website will publicly recognize companies that agree to work toward sodium-reduction targets. http://www1.nyc.gov/site/doh/health/health-topics/salt-initiative-restaurantfood.page	Food services (any)	Voluntary	General public

¹ Mandatory for city owned premises; voluntary for privately owned businesses

² Legislation passed but not enforceable until 2018; several jurisdictions had voluntarily implemented ahead of the nationwide legislation