A rapid review of the acceptability and impact of approaches to reduce the salt, fat and sugar content of people's diets on consumers and industry

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Executive Summary

Various approaches have been tried or proposed across the world to reduce population intake of fat, salt and sugar. These include initiatives that directly target food producers or retailers, consumers, or both. In this report we summarise the findings of 49 systematic reviews identified through a search of published literature, reporting on the acceptability and efficacy of population-scale initiatives to reduce fat, salt and sugar consumption. Many of the reviews present a combined analysis across the three nutrient types or include initiatives targeting a type of food rather than a nutrient (i.e., less healthy foods high in fat, salt and/or sugar). Our report presents a similar combined review, however, relevant additional specific research findings relative to each nutrient are presented in Figures 1-3 (pages 15-16).

Public attitudes and acceptability

- Attitudes and acceptability on population-level approaches to reducing the consumption of high fat, salt and sugar (HFSS) foods are not widely studied.
- Public support for taxes is typically low, but can be increased when
    - the revenue raised is ring-fenced for health-supporting activities
    - when fiscal approaches are believed to be effective
    - when there is trust that governments will spend the revenue as is publicised.
- Reformulation of products to reduce their fat, salt or sugar content is more acceptable when introduced gradually and alongside a rationale as to the subsequent health benefits.
- Acceptability of reformulated foods rests mainly on perceptions of taste and sensory experience, relative to expectations. How easily this sensory experience, and therefore acceptability, can be maintained through reformulation varies across different food groups and products.
- Acceptability of advertising restrictions is not well researched beyond children. There is largely public support of this approach for children.

Effectiveness on influencing purchasing and consumption

- Nutrient taxes are likely to be effective in changing intake and improving health when at a high enough level, and particularly when combined with subsidies for healthy foods.
- Combined fiscal approaches are not regressive and can reduce health inequalities.
- Reformulation can reduce the intake of unhealthy food and improve health. More research is needed to explore whether and how best to alert consumers to reformulation to avoid compensation effects.
- Nutritional Fact Panel labels may be useful to influence the choices of people already motivated to improve their health. However, some claims (primarily low-fat) can lead to the unintended consequence of increasing consumption, through consumer interpretation of the product being 'good for me' or providing permission to consume more.
- Advertising restrictions on foods high in fat, salt and sugar to children are cost-effective when regulations are mandatory, but not when self-regulated by industry. Reducing the impact of the advertising of HFSS food targeted at children on their parents, as the purchasers of children's food, is also important but this is not well studied.

Influences on and from the food industry

- Nutrient taxes, and labelling requirements can influence the food industry to change product formulation and food preparation/content, moving towards healthier content and portion sizes.
- Pricing interventions that raise the cost of unhealthy food and lower the cost of healthy food can lead to changes in stocking and product placement by retailers and increase the sales of healthy food options.
- Targeting taxes, reformulation or labelling on individual nutrients or products can result in unintended/compensatory effects in different parts of the food industry. Engagement with industrial partners may help to predict, understand and avoid this.
- Industry opposition and lobbying has been a significant barrier to the introduction of healthy food policies, and a reason for their repeal, in many countries.

This report was written independently of, and without reference to, the National Food Strategy published in July 2021. However, we note that the findings of this rapid evidence review largely align with those recommendations, providing some direct links to the evidence which supports them, highlighting where the evidence is not yet robustly established, or where it could be important to consider compensatory effect from the food industry or the public.

Contents

1. Introduction

This report presents a rapid review of the evidence available in published systematic reviews on the acceptability and efficacy of population-level approaches to reduce salt, fat and sugar in people's diets.

As reflected in our search terms (see Appendix 1), the focus of the review was on approaches that are applied at scale at the social, political or financial environmental level, rather than on a one-to-one basis (for example, dietary counselling). We took an inclusive approach, retaining studies where the distinction between one-to-one vs population-level approach was unclear (for example, policies may be applied at scale to provide one-to-one support) even when this resulted in a small number of studies in some domains. For example, we did not explicitly seek studies relating to educational interventions, choice architecture (nudge) or school policies as these were not the focus of the review, but we did retain any that were retrieved through our search terms. More studies may be found on these topics with different search terms if further evidence is needed, but this would likely overlap considerably with the evidence underpinning our previous report on the 'Psychology of Food Choice'.

The objectives of this rapid review were:

a) To review the available literature on people's attitudes towards the reduction of sugar, fat and salt in their diet

b) To identify initiatives targeted at consumers aiming to reduce sugar, fat and salt in diets (including the use of incentives and disincentives), and review the evidence for their efficacy and acceptability with consumers
c) To identify initiatives targeted at industry aiming to reduce sugar, fat and salt in diets (including the Soft Drinks Industry Levy), and review the evidence for their efficacy and their impact on industry
d) To explore the literature on consumer attitudes and acceptability of the reformulation of products to reduce sugar, salt, fat or calories by manufacturers, and the effects on purchasing decisions and intentions
e) To consolidate the findings of objectives a-d to provide recommendations on extending measures such as the Soft Drinks Industry Levy
f) To identify evidence gaps and promising directions for interventions to change consumer or industry behaviour in reducing dietary content of sugar, salt and fat.

Many of the retrieved reviews reported the combined outcomes of initiatives to reduce consumption of salt, sugar and fat, rather than reporting evidence separately. In part, this was due to a focus on healthy/unhealthy food and acknowledgement that high levels of these nutrients often co-occur. Therefore, to most accurately reflect the conclusions of the evidence base this report focuses on the impact of different approaches on the combination of nutrients, highlighting differences between nutrients only where these are specifically identified (in Figures 1-3).

Similarly, tax, subsidy and pricing interventions could not be easily separated, as the majority of studies reporting on these approaches linked these together (along with incentives). The results for all fiscal approaches are therefore summarised together throughout the report.

The results are split into three sections; first (section 3), reporting on the evidence around the **acceptability** of different approaches to reducing fat, salt and sugar intake to the public, and subsequently reporting the evidence around **efficacy** of different approaches to reducing fat, salt and sugar intake (section 4). In section 5 we report on the impact of the introduction of approaches to the food industry, taking a broad definition of the industry itself, and the types of impact and response.

The potential impacts of initiatives to reduce consumption of salt, sugar and fat on health inequalities are presented after the main findings in section 4, but were primarily only available in relation to fiscal policies.

2. Evidence search

Data were extracted from 49 systematic reviews dated from 2012 to 2021 retrieved using the search terms and limitations set out in Appendix 1. Details of these 49 studies and key findings are set out in Appendix 2. There was limited information published in systematic reviews on public acceptability and efficacy of restricting advertising, so we therefore repeated the search of the literature, excluding the requirement for studies to be systematic reviews to explore whether there has been more recent research in this area. This resulted in an additional 18 papers reporting original empirical research published in the last 2 years.

Few studies reported on the reduction of sugar content outside of sugar sweetened beverages (SSBs) specifically, although studies looking at the overall profile of foods/consumption of 'junk food' included sugar content. Detail of the extent of the literature across nutrients and types of intervention are set out in Table 1.

2.1 Quality of the literature / confidence in findings:

The systematic reviews included in this report included a wide range of original empirical studies using different designs including interventions (which included policy intervention), natural experiments (i.e., observing the effects of policy intervention in an uncontrolled setting), survey research, lab experiments, qualitative studies and modelling of effects.

Thirty-one of the systematic reviews assessed the quality of the research studies they included; the majority were considered to be of low to moderate quality. Common factors limiting the quality of included studies were lack of randomisation to groups, lack of long-term follow-up in intervention studies, small sample sizes/inadequately powered, and reliance on modelling or self-report (for example, of consumption) rather than observed and objective data. However, in general there was consistency in findings across reviews, with larger high-quality studies using objective data (for example, items purchased/sold, BMI measures) reporting similar trends to those of smaller studies; this gives confidence in the findings reported here.

There was considerably less data on the impact of different approaches on producers, retailers and politicians compared with consumers, so confidence in these findings is necessarily lower.

Table 1: Number of systematic reviews exploring the acceptability and efficacy of policy approaches to reducing consumption of fat, salt and sugar, or combination in the promotion of a healthy diet

Fiscal measures

Food source	Tax	Subsidy	Pricing
Salt	5	0	1
Sugar	2	1	2
SSBs[a]	11	3	2
Fat	3	1	2
Healthy eating[b]	5	4	5
Total:	17	5	8

Consumer focussed

Food source	Education	Nudge	Advertising
Salt	4	2	3
Sugar	0	1	2
SSBs[a]	6	1	3
Fat	1	1	2
Healthy eating[b]	3	3	1
Total:	14	6	5

Industry focussed (non fiscal)

Food source	Labelling	Reformulation	Targets
Salt	6	9	2
Sugar	3	3	0
SSBs[a]	5	4	0
Fat	2	6	0
Healthy eating[b]	4	0	0
Total:	12	11	2

Total

Food source	Totals
Salt	11
Sugar	11
SSBs[a]	15
Fat	18
Healthy eating[b]	20

Notes: [a]there was overlap between studies that investigated general sugar reduction, and those that reported on SSBs, some studies will be listed here twice where separate outcomes were reported. [b]This line reports on studies that may have used combined indicators to indicating a more healthy diet, reviews that focussed on reducing fast food intake (n=1; pricing), calorie reduction (1 labelling, 1 reformulation), and increasing fruit and vegetable intake (n=1; indirect effect of labelling other foods). School and parent policies are not included here (n=1 for SSBs, and n=1 for healthy diets). Social marketing (n=1 for healthy eating) was classified as advertising

3. Acceptability of approaches to reducing salt, fat and sugar

Thirteen systematic reviews were found that reported on public attitudes and acceptability of interventions and policies to reduce fat (n=5), salt (n=8) and sugar (n=7). Most of those reporting on sugar reduction strategies referred to sugar-sweetened beverages (SSBs).

Evidence was available to assess attitudes and acceptability in relation to fiscal approaches and reformulation, but less so other approaches such as advertising, labelling, and educational approaches. Across a range of health behaviours (for example, smoking, alcohol consumption, physical activity and diet), support for government intervention in general is stronger for approaches that do not have a direct personal impact (for example, for labelling which people can choose to attend to or not, rather than for taxes), and for children as opposed to adults [1, 2]. However, support for these often grows after implementation where people perceive them to have been effective.

3.1 Fiscal approaches: tax, subsidies and pricing

Public support for proposed new consumption taxes or tax increases is generally low [3-5]. Acceptability is higher for SSB taxes in particular when credible commitments are made to ring-fencing the revenues raised for specific health activities and objectives, such as subsidising healthier foods or creating children's health initiatives [4-6]. Public support is lower where there is mistrust of what governments will use the revenue for, including some research conducted in the UK [5, 6].

Framing taxes around health promotion can help to increase acceptability to policy makers and get tax as a credible option on the policy agenda [5, 6].

3.2 Reformulation

Reformulated food products are likely to be accepted, purchased and consumed [7], but this can differ between groups of people, types of product and as a result of expectations. The evidence supporting this claim is consistent, but is limited by relying on relatively few studies, of which most are not conducted in real-world settings (i.e., they are based on many lab-based taste tests). Two aspects of acceptability of reformulation are referred to, firstly the acceptability of the principle of

reformulation (i.e., is it appropriate for the formulation of food be regulated by government to improve health?), and secondly the acceptability of the product itself following reformulation (i.e., is the taste and sensory experience pleasant and enjoyable/as pleasant and enjoyable as previously?).

Acceptability of the principle of reformulation was mostly tested through lab studies evaluating whether people make different judgements about taste and enjoyment when they are aware that a product has been reformulated before they try it, than when they are not. That is, studies testing whether our expectations change our experience. For example, a lab-based study found that compared with a control group receiving no information, front-of-pack (FOP) information about fat and sugar reduction negatively influenced people's enjoyment of the food during taste-testing, and their perceptions of sensory characteristics before tasting [8]. There is further preliminary evidence that the presence of nutrition claims on reduced fat products negatively effects consumers' perceptions of product 'pleasantness' [9].

Acceptability in relation to taste alone differs according to the type of food being reformulated. For example, salt-reduction is more acceptable in meat and bread products than it is in cheese [10]. Similarly, within products, reformulation can be more acceptable for some nutrients than others. For example, one study found that reducing fat content in biscuits had less impact on consumer acceptability in a taste test than reducing sugar content [11]. As acceptability is usually reported in relation to entire products rather than individual nutrients, it makes it challenging to separate effects in relation to specific nutrients. Nonetheless, reduced salt products appeared more acceptable than reduced sugar [7].

Interpreting the evidence on whether or not it is helpful to signal when a product has been reformulated is complex, and judgements may differ according to whose intake we most wnt to influence. Reformulation, and laws enforcing limits to lower salt and fat in processed foods are more acceptable to women, older people, and those in higher socio-economic positions (SEPs) [9, 12]. Women, and people who are more health literate tend to purchase more low-fat foods and thus may respond more positively to information about reformulation than men and people with lower health-literacy [9]. Similarly, health-conscious consumers may be less deterred by lowered taste expectations of reformulated foods, as they are more tolerant to changes in

taste in order to gain other benefits [9, 13]. However, consumers who are not driven by health motives may be actively deterred from purchasing or consuming reformulated products; yet it may be that these groups that are the most important to influence from the perspective of potential health gain.

To avoid deterring consumption among some groups, *not* flagging that food has been reformulated is an option, but the effects of this are not straight forward. This approach risks consumer rejection and mistrust; if a product doesn't meet our expectations and we can see no additional (for example, health) reason to accept a 'poorer' taste, we may soon switch back to the higher salt/fat/sugar alternatives that are more familiar to us.

3.3 Labelling

There was very little research exploring the acceptability of labelling, beyond whether or not people believed it would be helpful (in which case they were more supportive), and a preference for certain formats (for example, clear and concise) [12]. Support for labelling is lower when labels are found difficult to understand[12]; many consumers can find nutrition information/labelling about sodium content in particular to be confusing and difficult to understand. Low salt product labels have been found to have lower consumer appeal than lower fat and sugar products [14].

3.4 Advertising restrictions

Very few papers report on the acceptability of advertising, so we can only report on the findings recent individual studies that provide an initial indication of likely responses. The acceptability for initiatives to restrict advertising is more acceptable for children then for adults. A survey of over 9000 Australian adolescents is one of few to explore what children and adolescents think of such approaches which are designed for them; 27% supported advertising restrictions of unhealthy food and drink, with 45% neither for or against, indicating reasonable tolerance if not support [15]. Research with adults in Australia resulted in mixed findings, with 58.6% of adults feeling the government had 'not gone far enough' in restricting unhealthy food advertising for children [16].

3.5 Conclusions

While attitudes and acceptability of approaches to reduce sugar, fat and salt are not widely studied, the evidence available suggests the public may be encouraged to

support fiscal approaches or reformulation by governments if convinced this is in the pursuit of better population health, and importantly there is currently no evidence that they would strongly object. Similarly, reformulation can be acceptable, but varies according to product type and the characteristics of consumers. A planned approach to bringing in reformulation that ensures changes to taste and sensory characteristics are gradual and carefully signposted is more likely to be successful.

4. Effectiveness of approaches to reducing salt, fat and sugar

Thirty-one studies reported on the efficacy of interventions and policies on reducing consumption, 16 on sales and purchases, and nine on health outcomes.

4.1 Fiscal approaches: tax, subsidies and pricing

Overall, taxes result in improved dietary intake and purchasing, whether taxing specific nutrients [3, 17-20], or more generally "unhealthy" foods based on nutritional profile [5, 20-22]. The population-wide nature of taxes and the revenue they provide can make them particularly cost-effective approaches [23]. However, *price elasticity* (see box) values tended to be between -1 and 1, indicating that changes in demand and consumption are often low in proportion to the change in price due to a tax [18].

Price elasticity

Price elasticity (or price elasticity of demand) is the change in demand for a product relative to a change in the product's price. It can be calculated using the following formula:

Price elasticity = (% change in quantity demanded)/(% change in price)

Price elasticities of <-1 or >1 therefore indicate changes in demand that are greater in magnitude than changes in price.

Taxation on unhealthy foods needs to be high, ideally at a rate of around 20%, in order to produce beneficial health effects and cost effectiveness [5, 17, 22, 24]; it should be noted that the evidence in support of this mainly comes from modelling and experimental studies rather than studies conducted in real-world settings, and the majority focus on SSBs. Although taxes have been found to be effective at lower

levels, particularly when paired with subsidies [17, 22], small changes in price tend to have only small impacts on consumption leading to non-significant changes in health outcomes [5, 17, 18]. For example, a review of the implementation of taxes in practice found that a 10% price increase in fast foods and SSBs resulted in only a nonsignificant trend towards lower BMI (-0.06 kg/m2; 95% CI: -0.16 to 0.03) [19]. But, price increases as a result of tax are associated with reductions in sales and dietary intake of target nutrients [25].

Experimental studies using online supermarkets and modelling studies suggest that nutrient-based taxes may have larger effects than product-based taxes, but could also be more likely to have unintended substitution effects with a negative net effect on intake [3].

The majority of 'real-world' empirical studies show a positive effect of taxes on unhealthy food. In two reviews (one of mixed quality, one largely moderate quality), around half of studies show a beneficial impact on salt consumption and healthy/unhealthy food consumption respectively [3, 5].

The effects of taxes on consumption and overall dietary quality may be less than anticipated due to product substitution (i.e., compensation effects). For example, saturated fat taxes are estimated to increase consumption of sodium, energy and sugar as a result of people switching to other products rather than consuming lower-fat alternatives of the same product [22]. Substitution, or compensation effects, are particularly likely to result from taxes on single nutrients [21].

Taxes paired with subsidies on healthy food will have greater effect by mitigating for some of these compensation effects (particularly subsidies for fruit and vegetables) [3, 5, 17, 21-23, 26]. When tax on unhealthy food is paired with the subsidy of fruit and vegetables, there is no reported evidence of unintended negative impacts on health [22].

Price subsidies on healthful foods are associated with a reduction in BMI [19]. Subsidies ranging from 1.8% to 50% have all been found to increase the consumption of targeted foods of at least half the magnitude of the tax applied [21]; however, the total impact on calorie intake is unclear [21]. In an analysis of 55 studies to calculate the impact of price changes to consumer health outcomes, a 10% increase in price to the consumer resulted in a maximum calorie reduction of 50

calories per day, or up to 0.3 kilograms or 1.5 pounds of weight loss, or gain avoided, per year. This was not considered clinically significant [18].

Monetary incentives can increase purchasing and consumption in the short-term, but there is insufficient evidence that they work in the longer term [27]. Incentive-based interventions with pricing strategies at workplaces may have an influence on fruit intake, but there is little evidence the effects are enough to bring about health benefit [28].

Price increases appear effective to reduce intake of SSBs [29, 30], but there is not sufficient evidence for other food and nutrient types [31]. What evidence we do have suggests that more intrusive interventions (e.g., restrict choice and manipulate price) appear more effective than less intrusive interventions such as simply providing information and enabling choice (e.g., calorie labelling law) [31]. Young people are likely to be influenced by cost in addition to adults [32].

4.2 Reformulation

There is strong evidence that reformulation to reduce salt and trans fats can improve the nutrient content of consumers' supermarket purchases and subsequent dietary intake [7, 33]. As with taxation, the population-wide nature of reformulation approaches means they can be particularly cost-effective [23]. Evaluations of 'real-world' interventions targeting trans fats and salt showed significant reductions in these nutrients whether measured objectively (e.g., using biomarkers) or through self-report [7]. These findings are consistent with modelling studies, which also show the reduction of salt intake in a person's overall diet is greater when changes are made to all processed foods compared to more limited ranges of products [33]. Decreases in intake of salt and trans fats as a result of reformulation are sufficient to lead, in turn, to meaningful improvements in health [7, 33].

The evidence for the impact of reformulation on dietary intake and health is less clear for saturated fats and sugar; however, there was a trend for consumption in overall diet to reduce in line with the percentage reduction of reformulation [33].

4.3 Labelling

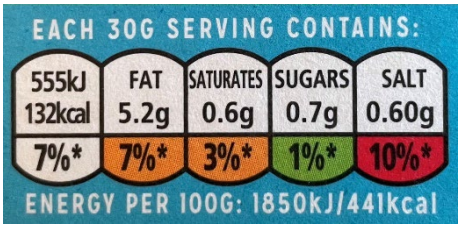
Nutrition Fact Panel (NFP) labelling is effective in reducing unhealthy food intake: NFPs (see example) are tables found on the back of food packets and provide the mandatory nutrition information (energy value and amounts of fat, saturates, carbohydrate, sugars, protein and salt) per 100g and sometimes also per serving of the food (see example). Evidence of the efficacy of front of pack (FOP) labelling is less consistent. FOP labels (see overleaf) tend to be less detailed, providing either the energy content of the food or the energy, fat, saturates, sugar and salt content.

Nutrition Typical values (as cooked)	per 100g	per 180g serving	% adult RI per 180g serving	adult RI
Energy kJ	503	905		8400
Energy kcal	119	213	11%	2000
Fat	<0.5g	0.7g	1%	70g
of which saturates	<0.1g	0.2g	1%	20g
Carbohydrate	25.7g	46.3g	18%	260g
of which				
- sugars	<0.5g	<0.5g	<1%	90g
- starch	25.7g	46.3g	-	-
Fibre	1.5g	2.7g	-	-
Protein	2.3g	4.1g	8%	50g
Salt	<0.01g	<0.01g	<1%	6g

RI = Reference Intakes of an average adult (8400kJ/2000kcal)

Example nutrition fact panel

NFP use was associated with healthier intake of at least one nutrient in 10/12 observational and experimental studies [34], including a higher intake of low-fat foods, lower fat and sugar intake, and lower intake of sweet foods, SSBs, high fat foods and salty snacks, and higher adherence to food group recommendations.



Example front of pack label illustrating the traffic light system

Only one of three studies exploring the use of FOP labels in promoting a healthy diet reported a positive effect [34], whereas other systematic reviews conclude that labelling can be only 'somewhat effective' for SSBs and salt [12, 35, 36]. There is therefore some promise, but limited evidence of a strong effect.

The use of '*low calorie*' labels, rather than referring to specific nutrients has a limited effect on purchasing and consumption, although this approach may result in increased sales relative to *low fat* labels [14]. Low calorie labels were not found to impact the purchase of drinks but did appear to encourage the purchase of vegetable and salad dishes in canteens [14]. Low fat labelling did influence consumer beliefs about how healthy a product is.

While nutrition information may lead some people to choose healthier options, there is also a risk that people perceive lower-fat claims as permission to eat more [37].

4.4 Advertising restrictions

In a review assessing the impact of approaches to limit advertising for foods high in fat, salt and/or sugar (HFSS) to children [38], some mixed findings were reported. Eleven of 18 non-industry funded studies found very small or *negative* impacts from industry self-regulation, while seven reported a reduction in children's exposure to, and industry expenditure on, advertising for HFSS foods. It was noted that studies funded by industry were positive about the success of self-regulation initiatives to reduce children's exposure to advertising of HFSS foods and their subsequent consumption; but these studies were of poor quality, using inadequate measures of nutritional outcomes so do not provide reliable evidence [38].

Our additional search of studies published in the past year showed that more recent research largely confirms these findings:

- Restrictions on child-directed advertising are likely to be highly cost effective in the longer term and are supported by both the public and health professionals [6].
- Restricting TV advertising is likely to be cost-saving and have greater health benefits for children from more disadvantaged socio-economic groups [39].
- Initiatives which are based on industry self-regulations have been found to only have marginal decreases in the presentation of unhealthy foods in promotions targeted at children [40]. In part this may be through companies not following through on their pledges to stop advertising [41].

Further, the extent to which advertising restrictions are successful at reducing children's sugar consumption depends on how effective they are at reducing exposure of both children *and* parents. Most of children's sugar consumption comes from food/drink which is purchased by adult family members [42]. None of the included reviews assessed the impact of altering adults' exposure to food and beverage advertising.

4.5 Education and behavioural approaches

We retrieved few studies on educational or behaviour change interventions using our search terms. Those that we did retrieve provide some evidence that school-based programmes that combine approaches of education with environmental restructuring

can reduce sugar, SSB and saturated fat intake, increase fruit and vegetable consumption, and facilitate more healthy food choices in the school setting [32, 36, 43-46, 66].

However, the case for educational approaches having a positive impact on adults is mixed. Two reviews found that public education programmes using multiple approaches but incorporating nutrition education as part of community level interventions (which may also include schools) had positive effects on salt intake [47, 48]. However, a study on using nutritional education to reduce SSB intake was not effective for adults, although moderately effective in children [49]. There was no clear impact of educational interventions run in supermarkets on adult food choices [27], and insufficient studies have been conducted on online shopping environments to draw conclusions.

4.6 Impact on inequalities

Initial responses to the introduction of nutrient taxes, and research around this, raised concerns as to whether fiscal approaches to nutrition may be regressive as a result of raising the price of food for poorer households without significantly improving health [50, 51]. However, more recent studies included in this review directly challenge the extent of any negative impact [52].

The impact of taxes (without subsidies) on inequalities were mixed, indicating that these either had a similar impact on health across socio-economic groups, or a slightly greater impact on those of lower socio-economic positions (SEPs) [5, 6, 22, 52-54]. The data that these conclusions were drawn from was of mixed to moderate quality, including simulation studies, but provide a consistent picture.

Interventions combining taxes with subsidies of fruit and vegetables however, are found to consistently reduce health inequalities by preferentially improving the diets of people with lower SEP [26]. Similarly, pricing interventions are more effective for people with lower SEP than those with higher SEP [26], and can improve food and nutrient consumption to a level predicted to result in health benefits [22]. These differential effects are a result of low-income households being more likely than high-income households to reduce their consumption in response to a tax [21], and although they may still end up spending a greater proportion of their income on unhealthy foods when taxes are introduced, the absolute cost of this is very low [52].

As lower socio-economic groups usually have a higher non-communicable disease prevalence, it is argued that the same relative reduction in disease across groups (i.e., a finding of no difference in the impact of an approach between SEP groups) would translate into a greater absolute impact in lower socio-economic groups [22].

Contrasting with the positive effect on inequalities on combined tax and subsidy interventions, providing universal subsidies for healthy foods alone is more likely to increase inequalities. Modelling studies have suggested that subsidies on healthy foods ranging from 3-30% can disproportionately benefit higher-income households by widening the existing gap in consumption [21]. However, subsidies which are specifically directed at low-income households (for example, food vouchers) can avoid this effect and reduce health inequalities [21].

Educational interventions and dietary counselling interventions are most likely to widen inequalities by disproportionately benefitting people of higher SEP who have greater social and financial resources to act on advice and learning [26].

5. Impact on industry

5.1 Fiscal approaches: tax, subsidies and pricing

Nutrient taxes such as the SSBs tax in Fiji, the repealed fat tax in Denmark, the Scottish Public Health Supplement, as well as unsuccessful attempts to implement SSBs taxes in multiple US states are highly likely to be strongly challenged by the food industry [5]. Industry lobbying and lack of support has been linked to the non-implementation and repeal of taxes [4, 5]. This is despite a recent review finding no high quality, robust evidence of negative economic impact on industry or job losses of diet-related fiscal policy [55].

Nonetheless, where taxes have been successfully implemented, they have been shown to have an impact on industry behaviour in addition to influencing consumer purchasing. For example, a study by the European Commission (although not peer reviewed) found that taxing products which exceed a minimum threshold of certain ingredients such as fat and sugar resulted in 40% of manufacturers modifying their recipes, 30% removing the ingredient entirely and 70% reducing the level of the ingredient [5, 56].

Salt taxes may be more difficult to apply in practice than sugar taxes as salt is found throughout the food supply and there is often no natural salt equivalent or replacement. Therefore, salt taxes are more appropriate to form part of a broader suite of 'unhealthy' food initiatives, rather than a single intervention, and it is noted that these approaches can be more technically challenging [3].

Pricing interventions involving industry (i.e., increasing the cost of unhealthy foods and reducing the cost of healthy foods) have a positive impact on stocking and sales in the retail sector. The most common effects were increased sales of healthy foods (from 15% to 1000% across 7 studies reporting on this), increased stocking of healthier foods (from 40-63%), improved total profits or revenues, decreased sales of unhealthy foods (from 5% to 47%), and an improved ratio of healthy to unhealthy foods [57]. Price interventions on fresh fruit and vegetables can be challenging to implement, particularly for small businesses, as these foods could be hard to source, have high perishability and raise concerns about safety and handling [57].

5.2 Advertising restrictions

Recent studies report substantial opposition from food and advertising industries for advertising restriction policies [6, 58, 59]. This opposition is often indicated by attempts by commercial companies to lobby for self-regulation rather than mandatory regulations; self-regulation is not effective [6, 38]. An example of the response of industry to the threat of advertising restrictions comes from evidence of corporate intervention in the attempt by Transport for London to restrict advertising of foods high in fat, sugar and/or salt in 2019 [58]. Activities to prevent the implementation of the regulation included challenges of the evidence driving policy, submission of counter arguments, and raising the threat of legal challenges [58]. Similar approaches are reported in other countries [6], and there is some admission by policy makers that consultation with commercial organisations leads to less strict implementation of advertising restrictions than originally proposed as necessary by public health advocates [59].

5.3 Regulation of restaurant food

Regulation of restaurant food has been considered separately to other approaches in some of the research literature, in part as restaurants can also be consumers of processed products (meaning some product formulation is outside their control), and

as people's reasons for eating out and behaviour when they do can be driven by different factors than other food purchasing that restaurants need to cater for (e.g., celebrations, a treat). National government and public health recommendations for healthy food procurement and nutrition standards in food service settings have been identified in Australia, Canada, the UK and the USA, however there is wide variation across countries, and no clear accepted standards relating to quantitative nutrient targets [60].

Requiring menu labelling can lead to positive effects on food content in restaurants. Positive effects have been found on energy content after labelling regulations are introduced, but sodium level of restaurant dishes is least likely to meet requirements [61]. Mandatory regulations are more successful than voluntary initiatives in influencing the nutritional content of restaurant food [60, 61]. For example, the 2010 US national menu labelling law resulted in reformulation to reduce the energy content of new menu items, but not existing or time-limited items (i.e., the law did not trigger a shift in overall approach, but simply adherence to minimal necessary criteria) [60]. Similarly, the law did not require nutrients to be labelled in addition to energy content, and therefore this approach may not have stimulated industry reformulation for fat, sugar, and salt reduction within menu items [60]. There has been, however, some evidence of reductions in population BMI in counties in which a calorie labelling law in restaurants has been implemented [62].

Voluntary menu labelling in some countries has been shown to have negative, rather than positive effects; Between 2009 and 2015, energy and sodium content of restaurant menu items in Australia *increased*, despite voluntary menu labelling legislation, and similar findings are reported for Canada, the UK and New Zealand [60]. Menu labelling in restaurants often combines nutrient and calorie labels.

5.4.1 Initiatives to reduce salt in restaurant food

Policies directed at restaurants to reduce salt content have emerged in the research literature only very recently, so longer term impacts are not yet visible. In the shorter term, requiring restaurants to provide nutrition information (and specifically salt content) on menu labels appears to have the most potential of influencing the food

industry [61]. Conducting analysis of the salt content of menus can raise the awareness of chefs and restaurant operators, leading to adjustments in ingredients and portion sizes [61]. Reducing portion size is more acceptable for children's meals than for adults [63] as restaurant owners are concerned about loss of revenue and lack of customer demand if applied to adult meals [64].

Setting upper limits for salt content across all items on restaurant menus have been trialled, but there is some evidence that this leads to off-setting across other menu items which would previously have had lower salt content; this approach is not considered effective [61].

Reformulation to reduce salt intake has not been found practical to implement on a voluntary basis [61]. This is in large part as creating new dishes can be challenging and costly, especially for small businesses, so unless there is assurance of generating extra profits participation in voluntary initiatives can be low or short-lived.

Salt reduction in restaurant food would also benefit from support in salt reduction in the wider food industry within the ingredients used in food preparation; this may reduce the challenges of reformulating menus, when some meal components are bought in and thus beyond the control of restaurants themselves [61].

6. Additional findings specific to each nutrient

The following three figures set out any additional considerations, specific to each type of nutrient, that provide an accessible overview of key points. The general points common to all are not repeated in these figures in order to keep the points clear. As such, they are presented as supplementary to the main text in this report, rather than a complete summary.

Figure 1: Acceptability and efficacy of approaches to sugar reduction

27 systematic reviews **362 individual studies** **89% targeting consumers**

Tax

Strong public support for sugar-sweetened beverage (SSB) taxes [4, 5]

- Used to promote health, particularly children's health [4]
- High tax rates (for example, 20%) have more beneficial impacts on health and purchasing, but lower rates from 10% can also be effective [5, 24, 25]
- Reductions in consumption are proportional to the size of the tax [21, 25]
- The public believe SSB taxes are effective and will improve health, despite relatively high mistrust of industry and government (49% and 61% respectively) [4]

SSB tax can have clinically significant impact on bodyweight [30]

- Likely to have similar or greater impact on health of lower vs higher socio-economic groups [5, 21, 22, 25, 52, 54]
- Any increased financial burden for lower SES groups is small.

Reformulation

Small reductions in sugar do not reduce

Labelling

Sugar content labels on SSBs have mixed effects.

Low-calorie labels on SSBs may not reduce purchasing [14]

Combining taxes *and* labels had a positive impact on intention to reduce sugar intake [24]

Nutrition Fact Panels (NFP) may be more effective than front-of-pack (FOP) labels [34]

Figure 2: Acceptability and efficacy of approaches to fat reduction

Tax

Variable evidence, but most research combines fat taxes with fruit and vegetable subsidies. This leads to net health gains [22]

Substitution effects can limit the health impact of fat taxes

Fat taxes can lead to compensatory purchasing which increases salt, sugar and overall energy intake [22]

Taxes can positively impact the food industry by stimulating reformulation [5]

Banning trans-fats in food production would result in net health gain but will take time for impact to occur [7, 33, 38, 60]

Education/Behavioural Programmes

Reformulation

Fat reduction can have different impacts on different groups

Women, older ages and health conscious people are more likely to support reduced-fat reformulation [9]

Reduced fat products may decrease perceived/expected enjoyment [9, 37]

Labelling

Low/lower fat labelling can be effective but risks unintended consequences

NFPs more effective than FOP labels [34]

Fat labelling may influence behaviour differently according to product

'Low/lower fat' claims can increase consumption and may reduce understanding by leading people to believe lower fat products are healthy, even in relation to chocolate bars/crisps etc. [37]

Advertising

- Reducing advertising

Figure 3: Acceptability and efficacy of approaches to salt reduction

Tax

Some evidence that the public find taxes acceptable [12], but taxes are less popular than other approaches to salt reduction [3]

Taxes on 'unhealthy' food reduce salt intake [5] but the impact is moderate [3]

Reformulation

Reformulation to reduce salt is acceptable [13, 20], but varies by product [10]

Salt can be reduced by 40% in breads and 70% in meat products without significantly reducing acceptability [13, 20]

Salt reduction in cheese is less acceptable.

Labelling

Labelling can reduce salt intake for some people - typically among those already motivated to reduce their intake [34, 47]

NFP are more effective than FOP labels [34]

Menu labelling in restaurants can influence customer meal choice and encourage industry to reduce salt in meals and portion sizes [61]

Government Targets

National initiatives for reducing salt intake have driven multi-faceted approaches

By 2014, 75 countries had salt reduction policies and 12 reported positive effects with reductions in population salt intake ranging from 5-36% [65]

Education/Behavioural Programmes

Can reduce salt intake and improve health outcomes [47]

Required to be intensive for effectiveness, so may not be cost-effective [65]

Likely more beneficial for people of higher SES, thus risk increasing inequalities [26]

7 Evidence Gaps

In answering the objectives of this rapid review, we identified the following areas where evidence was weak or insufficient to make firm conclusions and recommendations:

- Overall the literature base lacked longitudinal research that studies the long term behavioural and health impacts of both fiscal approaches and reformulation. We have good data from high quality modelling and simulation studies, but there is a need to test the practicalities and feasibility of implementing recommended fiscal approaches (i.e., combined tax and subsidies) in practice. This includes:
    - an account of the consequences of fiscal and reformulation approaches on health inequalities
    - an account of the consequences and feasibility of implementation for different types of retail outlet (for example, large chains, vs small independent shops and restaurants)
    - systematically comparing people's reaction to interventions in artificial environments (for example, experiments using a virtual supermarket) with real world environments. This would allow better extrapolation from the large number of simulation /experimental studies.

- In relation to reformulation, more research is needed on the unintended consequences of low-fat and low-sugar labels on people's behaviour, for example though substitution, compensation and portion size adjustment, as well as on their understanding of a healthy diet. The comparison of these effects across different groups is important, particularly those with the poorest diets or health.
    - Intervention research is warranted to explore what steps can be taken to minimise the unintended consequences of labelling

- More evidence is needed that is specific to the UK population. Many studies report on policy interventions from the US, Europe and Latin America, but cultural differences and norms in relation to different food products and habits

could lead to different impacts of the same approach. Even within the UK, different effects of cultural groups are observed and should be better studied.

- The interaction between approaches has been studied from the perspective of taxes and subsidies, but less is known about other combined approaches. Research to explore how fiscal approaches (e.g., pricing interventions) could be most effectively combined with other approaches, such as reformulation, choice architecture ('nudging') or labelling for example, may provide insight into how to reduce compensation effects and maximise the impact of any individual approach.

- The impact of reformulation appeared to vary according to the type of nutrient being reduced, and the type of product reformulated. More research is warranted into where the 'low hanging fruit' lies in order to make the biggest impact on population health, taking into account foods most frequently consumed, most accepted following reformulation and impact on inequalities. This would help to identify what the most impactful next target should be, following the SSB levy.

- While there is strong evidence for the negative influence of unhealthy food advertising on children and adolescents, research is needed to explore the potential of restricting advertising of unhealthy foods to adults. Future research could also explore the potential of advertising to promote healthy foods and diets among both children and adults.

- The food industry is a central player in the improvement of population diet, yet they are most frequently identified as a barrier to progress. More research is needed on;
    - Industry responses to different types of approach (for example, fiscal measures, reformulation requirements, labelling) that extend beyond intended impacts on target foods.
    - Design of sustainable approaches that allow continued profitability while reducing negative impact on diet quality that the food industry

can have (for example, advertising, formulating products with higher salt and fat to increase palatability).

8 Recommendations

In proposing recommendations, we have attempted to find the point where efficacy coincides with public acceptability; where an approach is effective but less acceptable, there may be a place for campaigns to increase acceptability directed at increasing public trust in government intentions and the efficacy of a proposed approach. In general, people are more supportive of policies that are demonstrated to work, even if it will affect them, and in many cases public support follows implementation when success is visible (as is the case with much of the tobacco control legislation). Therefore, lack of current public support is less a deterrent than an indication that additional action is needed to support implementation.

Conversely, lack of industry acceptability can lead to policy reversal and is a significant barrier to implementing effective approaches. Support from policy makers is likely to be a result of a mix of responses to public and industry acceptability, and unlikely to be achieved if both are low. Awareness of strategies used by industry to oppose policies is imperative to supporting those implementing evidence-informed approaches to avoid undue influence.

8.1 Fiscal approaches

- Taxes on sugar and salt are effective in reducing intake and improving health.
- Pairing tax with subsidies may be more effective than taxes alone. While maximal effects for tax are seen at around 20%, this is unlikely to be feasible or acceptable to industry or the public in practice. Pairing taxes with subsidies not only reduces the size of the tax that could bring about positive effects but can also reduce the negative impact of substitution/compensation effects. This approach may also avoid business losses, and thus be more acceptable to food outlets and industry.
- Taxes that increase the price of unhealthy foods, while reducing the relative price of healthy food can reduce health inequalities. If subsidies are used without taxes, these should be targeted to low-income groups rather than universally applied to avoid widening health inequalities. Pricing interventions

that are designed to have a neutral effect in profit margins can have a positive impact on both manufacturers (in terms of reformulation) and retailers (in terms of what they stock).

- Public support can be increased by dedicating increased revenues to health initiatives as was the case with the 2018 SSB levy.
- More research is needed before recommendations can be made around taxes on fat.

8.2 Reformulation

- Reformulation can result in healthier food intake and better health.
- Decisions on where to target reformulation should follow research around the acceptability of taste and sensory experience in real-world settings. This would allow the identification of food groups that are more acceptable following reformulation and eaten frequently enough to make an impact. This research should include analysis of how this is labelled and communicated to different groups.
- Public support is likely to be greater if the rationale for reformulation is linked to the promotion of population health, and if changes are introduced gradually. Better understanding of the unintended consequences of labelling reformulation is needed to inform how reformulated products are best presented to the public.

8.3 Labelling

- Nutritional Fact Panel labels have good potential to influence the behaviour of people aiming to make more healthy choices.
- More evidence is needed on how to reduce the unintended effects of low-fat labelling on public understanding of nutrition, and the relative healthiness of foods. Without this, the incidence of compensation effects (e.g., switching to higher-fat alternatives, unlabelled products, or increasing portion sizes) are common.
- Labelling requirements have led to some reformulation of menus within restaurants potentially through increased awareness. Greater engagement and education within the sector may increase compliance and willingness

from food producers and providers to introduce more healthily formulated meals as standard.

8.4 Advertising

- Restricting advertising of HFSS food to children and their parents can help to reduce children's unhealthy food intake. Restriction of advertising outside child-only programming is needed for a stronger impact, as children are otherwise exposed to advertising when watching as a family. Industry opposition is likely [58, 59], and harder to mitigate than for other approaches (i.e., through promoting alternative sources of revenue through healthy foods).

8.5 Combined approaches

- National targets for reducing salt content in food have proven feasible and effective across a number of countries [7, 23, 65]. Extending this in the UK and considering how this may be introduced for fat and sugar could be effective; this would reduce reliance on any one type of intervention given it is likely that different approaches will influence the diets of different sectors of the population and allow for the accumulation of smaller changes that may be more acceptable to both the public and industry. All parts of the food industry (e.g., manufacturers as well as the service sector) need to be included for maximal effects.
- National (and international) standards for the content of food served out of the home could help to drive reformulation and portion control in restaurants and take-aways; regulation needs to be mandatory rather than voluntary to be effective.
- Acceptability for portion control and reformulation is higher for children's food than it is for adults. Targeting children's food first may thus represent "low hanging fruit". This would not only benefit children immediately but help to develop familiarity for the taste of lower fat/salt/sugar products that may make reformulated products more acceptable in adulthood.

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Appendix 1: Search terms

No.	Search aim	Population	Intervention	Food/nutrient component	Psychological/behavioural component	Title	'Not'	Date range	Number of results
1	Impact of interventions on consumers	consumer* OR social OR societ* OR public OR population* OR buyer	educ* OR substit* OR alternat* OR consum* OR reformulat* OR incentiv* OR "portion siz*" OR "pack siz*" OR tax OR levy OR pricing OR advert* OR marketing OR policy OR subsid*	fat OR salt OR sodium OR sugar OR "*processed food" OR "junk food"	attitude* OR motiv* OR intention* OR habit* OR behav* OR choice* OR decision* OR support OR norm* OR self-efficacy OR nudg* OR emot* OR willing* OR perception* OR accept* OR opinion OR aware* OR purchas* OR spend*	AND "systematic review"	Animal	2011-2021	127
2	Impact of interventions on industry	industr* OR producer OR manufactur* OR compan* OR business	reduc* OR substit* OR alternat* OR reformulat* OR incentiv* OR "portion siz*" OR "pack siz*" OR tax OR levy OR pricing OR advert* OR marketing OR policy	fat OR salt OR sodium OR sugar OR "*processed food" OR "junk food"	attitude* OR motiv* OR intention* behav* OR support OR action OR respons* OR willing* OR perception* OR accept*	AND "systematic review"	Animal	2011-2021	20

No.	Search aim	Population	Intervention	Food/nutrient component	Psychological/behavioural component	Title	'Not'	Date range	Number of results
3*	Impact of interventions on consumers	consumer* OR social OR societ* OR public OR population* OR buyer	educ* OR substit* OR alternat* OR consum* OR reformulat* OR incentiv* OR "portion siz*" OR "pack siz*" OR tax OR levy OR pricing OR advert* OR marketing OR policy OR subsid*	fat OR salt OR sodium OR sugar OR "*processed food" OR "junk food"	attitude* OR motiv* OR intention* OR habit* OR behav* OR choice* OR decision* OR support OR norm* OR self-efficacy OR nudg* OR emot* OR willing* OR perception* OR accept* OR opinion OR aware* OR purchas* OR spend*	AND "systematic review"	~	2011-2021	201
4*	Impact of interventions on industry	industr* OR producer OR manufactur* OR compan* OR business	reduc* OR substit* OR alternat* OR reformulat* OR incentiv* OR "portion siz*" OR "pack siz*" OR tax OR levy OR pricing OR advert* OR marketing OR policy	fat OR salt OR sodium OR sugar OR "*processed food" OR "junk food"	attitude* OR motiv* OR intention* behav* OR support OR action OR respons* OR willing* OR perception* OR accept*	AND "systematic review"	~	2011-2021	21

Total: 369

*Searches 1 and 3 were combined, and searches 2 and 4 were combined. All duplicates were removed before title/abstract screening.

Appendix 2: Table of extracted systematic reviews

Ref no.	Authors	Date	No. of studies	Country /Region	Domain	Intervention	Aims	Outcomes	Key finding(s)
19	Afshin et al.	2017	30 (23 intervention, 7 prospective)	USA (n=25), Netherlands (n=2), South Africa, France, New Zealand (n=1)	Fast foods and SSBs	Price changes of foods/beverages (for example, taxes, subsidies)	Investigate prospective effects of food price changes on dietary consumption.	• Effects of price decreases for 'healthful foods/beverages' and price increases for 'unhealthful foods/beverages' • Effects of pricing on adiposity	• Results supported efficacy of subsidies and taxes. • Subsidies and combined multi-component interventions most effective.
34	Anastasiou et al.	2019	26 (20 cross-sectional, 5 RCT, 1 cohort)	USA (n=20), Europe (n=4), South Korea	Packaged foods: various nutrients	Food labels	Summarise evidence for the association between food label use and dietary intake.	• Observational studies: effect of food label use/non-use on dietary intake	• Inconsistent results on relationship between diet and food label

Ref no.	Authors	Date	No. of studies	Country /Region	Domain	Intervention	Aims	Outcomes	Key finding(s)
				(n=2), Australia (n=1)				• Experimental studies: effect of manipulation of presence/type of food label on dietary intake	use, but suggest reading NFP is associated with healthier diet. • Insufficient evidence about ingredients lists, service size information and FOP labels.
52	Backholer et al.	2016	11	USA (n=7), UK, Ireland, Australia, New Zealand (n=1)	SSBs	SSB taxation	Review effect of SSB tax on purchase, consumption, weight and/or amount of tax paid according to SEP.	• Purchase, consumption and weight impacts of SSB tax according to SEP. • Amount paid in SSB tax	• SSB tax will result in similar population weight benefits across SEP, or greater benefits for lower SEP groups.

Ref no.	Authors	Date	No. of studies	Country /Region	Domain	Intervention	Aims	Outcomes	Key finding(s)
								according to SEP following increase in SSB price.	• SSB tax is consistently financially regressive but only to a small degree.
12	Bhana et al.	2018	24 (all cross-sectional)	Australia (n=8), USA (n=7), Canada (n=2), Baltics, Barbados, Croatia, Greece, Ireland, New Zealand South	Salt	N/A	Examine knowledge, attitudes and behaviours (KAB) related to dietary salt intake among adults in high-income countries.	• Knowledge, attitudes and behaviours related to dietary salt intake. • Parental KAB related to dietary salt intake of children.	• KAB related to salt intake are low. Consumers are aware of health implications of high salt intake but lack knowledge of recommendations, food sources and

Ref no.	Authors	Date	No. of studies	Country /Region	Domain	Intervention	Aims	Outcomes	Key finding(s)
				America, South Korea, UK (n=1)					salt/sodium relationship. • Many people confused by nutrition information panels, but FOP labels positively influence food purchasing.
9	Bimbo et al.	2017	42	Northern Europe, North America and Uruguay were most investigated areas.	Dairy products	Reformulation	Review research on consumer acceptance and preferences for nutrition-modified/functional dairy products.	• Consumer related characteristics: gender, age, diet-related knowledge and lifestyles, psychological factors	• Female consumers show high acceptance for some functional dairy products. • Acceptance also increases with higher

Ref no.	Authors	Date	No. of studies	Country /Region	Domain	Intervention	Aims	Outcomes	Key finding(s)
								• Product related characteristics: intrinsic and extrinsic	health-related knowledge and with age. • Products with 'natural' matches between carriers and ingredients are most acceptable. • Brand familiarity drives acceptance for health-enhanced products for consumers with

Ref no.	Authors	Date	No. of studies	Country /Region	Domain	Intervention	Aims	Outcomes	Key finding(s)
									low health interest.
13	Bolha et al.	2021	38	Not stated	Salt (n=20), sugar (n=16) and fat (n=16)	Reformulation	Determine how intrinsic/ extrinsic food attributes influence consumers' choices of reformulated foods.	• Consumer responses to reformulated products.	• Consumers struggle to swap potential health benefits for hedonic attributes. • Traffic light/nutrition labels can influence consumer choices. • Heterogeneity between food groups. • Gradual nutrient reduction has

Ref no.	Authors	Date	No. of studies	Country /Region	Domain	Intervention	Aims	Outcomes	Key finding(s)
									greatest potential to encourage acceptance.
38	Chambers et al.	2015	47	Worldwide (majority US and Canada)	Foods high in fat, sugar and salt (HFSS)	Advertising restrictions and educational messages.	Review evidence on effectiveness of statutory and self-regulatory actions to reduce volume/exposure/impact of HFSS food advertising to children.	• Volume of advertising, advertising exposure, advertising patterns by nutritional content, cost-effectiveness, eating behaviour, antecedents of eating behaviour and	• Results suggested statutory regulation could reduce volume of and exposure to advertising for foods HFSS, with potential for wider impact. • Self-regulatory approaches show varied results in

Ref no.	Authors	Date	No. of studies	Country /Region	Domain	Intervention	Aims	Outcomes	Key finding(s)
								health outcomes.	reducing children's exposure. • Some limited support for educational measures.
47	Christofo rou et al.	201 6	39	USA (n=14), Europe (n=6), China (n=5), Canada and Japan (n=4), Australia (n=3), New Zealand,	Salt	Nutrition education, public education, changes to food environment, novel/multifac eted approaches	Review state and community level salt reduction interventions and where evaluated, report on impact.	• Reported intervention impact in relation to salt reduction.	• 28 studies evaluated intervention effectiveness. Community and state salt reduction programmes may be effective but more robust evaluation

Ref no.	Authors	Date	No. of studies	Country /Region	Domain	Intervention	Aims	Outcomes	Key finding(s)
				Ghana and Mongolia (n=1)					methods needed. • Significant reductions in salt intake were observed from dietary assessment, urinary sodium levels, blood pressure and sodium in foods. • 6 studies reported positive changes in consumer KAB.

Ref no.	Authors	Date	No. of studies	Country /Region	Domain	Intervention	Aims	Outcomes	Key finding(s)
61	Ding et al.	2020	78	58 countries/regions worldwide (most policies from USA and Europe)	Salt	Various restaurant policies	Provide an overview of global salt reduction policies in restaurants.	• Identification of salt-reduction policy • Policy effectiveness (if known)	• 62 independent policies identified. • Most common strategy was menu labelling. Others included: target setting, reformulation, education, chef training, table salt removal, media campaigns and government assistance. • Evaluations were limited

Ref no.	Authors	Date	No. of studies	Country /Region	Domain	Intervention	Aims	Outcomes	Key finding(s)
									and showed inconsistent results. Of the 17 evaluation studies, 6 reported positive impacts, 8 showed little/no effect. • Positive impacts mainly from menu labelling/menu nutrition information.
3	Dodd et al.	2020	18	*Real-world implementation:*	Salt	Salt taxation	Review the effectiveness and	• Effects of salt taxes	• Some evidence of potential effectiveness

Ref no.	Authors	Date	No. of studies	Country /Region	Domain	Intervention	Aims	Outcomes	Key finding(s)
				Hungary, Fiji, Mexico, Tonga, St Vincent & the Grenadines (n=1). Modelling studies: USA, UK and New Zealand (n=2), Australia and Chile (n=1).			feasibility of salt taxation policies.	• Perceptions of taxation of high-salt foods	from modelling studies, but uptake of salt taxation is limited. • Risk of unintended outcomes e.g. reduced consumption of healthy foods or increased consumption of unhealthy substitutes. • Combining taxes with subsidies may

Ref no.	Authors	Date	No. of studies	Country /Region	Domain	Intervention	Aims	Outcomes	Key finding(s)
									have increased benefits. • Taxing all foods based on salt content likely more effective than taxing specific 'high-salt' products.
4	Eykelenboom et al.	2019	40 (16 qualitative, 23 quantitative, 1 mixed-methods)	USA (n=19), Mexico (n=3), China, France, Israel, New Zealand (n=1), Pacific	SSBs	SSB taxation	Synthesise literature on political and public acceptability of SSBs tax.	• Political and public acceptability of SSBs tax through qualitative synthesis. • Quantitative estimation of	• Beliefs about effectiveness and cost-effectiveness, appropriateness, economic and socioeconomic benefit, policy adoption and public mistrust

Ref no.	Authors	Date	No. of studies	Country /Region	Domain	Intervention	Aims	Outcomes	Key finding(s)
				countries (n=4), European counties (n=14)				acceptability of SSBs tax.	of the industry, government and public health experts all have important implications for political and public acceptability of SSBs tax. • Four recommendations suggested to enhance success of SSB tax implementation.
4	Eyles et al.	2012	32	OECD countries	Soft drinks,	Food pricing strategies	Investigate association between	• Estimated impact on food	• Based on modelling

Ref no.	Authors	Date	No. of studies	Country /Region	Domain	Intervention	Aims	Outcomes	Key finding(s)
					saturated fat and fruits and vegetables		food pricing strategies and purchasing, intake, health outcomes and differences by socioeconomic group.	and nutrient consumption • Impact on health and non-communicable diseases • Differences in impact by socioeconomic group.	studies, taxation on soft drinks, saturated fat and fruit and vegetable subsidies would be associated with benefits to dietary intake and potential for improved health. • Additional research required into possible compensatory purchasing and population

Ref no.	Authors	Date	No. of studies	Country /Region	Domain	Intervention	Aims	Outcomes	Key finding(s)
									health outcomes.
33	Federici et al.	2019	33 (modelling studies only)	Not stated	Sodium (n=20), sugar (n=5), fats (n=3)	Reformulation	Explore impact of reformulation on nutrient intakes, health outcomes and quality of life.	• Impact of interventions to reduce sodium intake • Impact of interventions to reduce sugar intake • Impact of interventions to reduce fat intake	• Evidence of positive effects of reformulation was stronger for sodium interventions, less conclusive for sugar and fats. • Consistent relationship between percentage of reformulation and reductions in individual consumption.

Ref no.	Authors	Date	No. of studies	Country /Region	Domain	Intervention	Aims	Outcomes	Key finding(s)
									• Positive results also found for health and quality of life outcomes. • Comparisons are limited by heterogeneity in model designs.
57	Gittlesohn et al.	2017	30	USA (n=17), Australia (n=2), New Zealand (n=2), Canada, UK, South Africa, Denmark,	'Healthy and unhealthy foods'	Pricing interventions	Investigate effect of price interventions on purchasing and consumption of healthy and unhealthy foods.	• Access to and purchasing and consumption of healthy/unhealthy food and beverage options.	• Pricing interventions generally increased stocking, sales, purchasing and consumption of promoted foods and beverages.

Ref no.	Authors	Date	No. of studies	Country /Region	Domain	Intervention	Aims	Outcomes	Key finding(s)
				Belgium, Peru and Mexico (n=1),					• Few studies discouraged purchase/consumption of unhealthy foods. • More research needed to differentiate impact of selected pricing strategies over others.
7	Gressier et al.	2020	59	Majority in high-income countries (n=56)	Sodium (n=31), Trans fatty acids (TFA,	Reformulation	Review empirical evidence on impact of reformulation on food choices, nutrient intakes and health status.	• Effect on consumer behaviour and food choices • Effect on nutrient intakes	• Reformulated products were accepted and purchased by consumers, leading to

Ref no.	Authors	Date	No. of studies	Country /Region	Domain	Intervention	Aims	Outcomes	Key finding(s)
					n=13), Sugars (n=3), other (n=12)			• Effect on health status • Isolated effect of reformulation • Effect on population subgroups	improved nutrient intakes in 73% of studies. • Meta-analysis showed reduction in salt and TFA intake. • Studies on TFA reformulation showed improvement in health outcomes. Unclear for other nutrients.
35	Gupta et al.	2020	21	USA (n=11), UK (n=3),	SSBs	Labelling	Review effect of sugar- or health-related SSB warning	• SSB health-related knowledge/awar	• FOP labels and point-of-sale signage were

Ref no.	Authors	Date	No. of studies	Country /Region	Domain	Intervention	Aims	Outcomes	Key finding(s)
				Australia and Canada (n=2), New Zealand, Germany and Switzerland (n=1).			labels/signage on knowledge, attitudes, beliefs, purchase and consumption.	eness of ill-effects of SSBs • Preferences for SSBs • SSB purchases	associated with reduced SSB purchases and improved health knowledge, attitudes and beliefs regarding SSBs. • Warning labels with health consequences were particularly effective.
31	Hillier-Brown et al.	2017	30	USA (n=27), Australia	'Ready-to-eat' meals	Various interventions	Assess the impact of interventions to promote healthier	• Consumers: dietary outcomes, purchasing	• Most interventions focused on providing

Ref no.	Authors	Date	No. of studies	Country /Region	Domain	Intervention	Aims	Outcomes	Key finding(s)
				(n=2), UK (n=1)			ready-to-eat meals sold by food outlets.	behaviour, attitudes and preferences. • Food outlets: changes in retail practices, process outcomes and profit.	information aimed at adults, in USA fast-food restaurant chains. • More 'intrusive' interventions restricting/guiding choice generally showed positive impacts on consumer and food outlet outcomes. • Simply providing information or enabling choice

Ref no.	Authors	Date	No. of studies	Country /Region	Domain	Intervention	Aims	Outcomes	Key finding(s)
									had negligible impact.
10	Jaenke et al.	2017	50	Europe (n=21), North America (n=16), South America (n=8), Australia (n=2), Mediterranean Basin (n=1)	Salt	Reformulation	Investigate extent to which salt can be reduced in foods without impacting consumer acceptability.	• Consumer acceptability following salt reduction, salt replacement and flavour compensation (in bread, cheese, processed meats, soups and other).	• Salt could be reduced by 37% in breads and 67% in processed meats without significantly impacting consumer acceptability. • Salt reduction in cheese products is less acceptable.
48	Johnson et al.	2017	41	High-income countries	Salt	Various interventions	Periodic review summaring studies of salt reduction	• Identify studies relevant to strategy design,	• Of 41 strategies identified, 7 evaluated

Ref no.	Authors	Date	No. of studies	Country /Region	Domain	Intervention	Aims	Outcomes	Key finding(s)
				(n=27), low-middle income countries (n=14)			strategy implementation.	assessment and implementation. Appraisal of studies evaluating strategy impact.	impact (3 national and 4 community level). 4 studies found significant decreases in dietary salt intake, 1 showed significant decreases in sodium density of packaged food products.
60	Kraak et al.	2019	50	USA (n=29), Canada and Australia	Restaurant meals: energy, fats,	Various interventions (restaurant focused)	Examine whether transnational restaurant chains reformulated products or	• Scoping review of healthy guidelines for restaurants	• Found some recommendations/targets for restaurants but no

Ref no.	Authors	Date	No. of studies	Country /Region	Domain	Intervention	Aims	Outcomes	Key finding(s)
				(n=9), New Zealand (n=7), UK (n=5), Africa (n=3), Latin/South America (n=4), UAE (n=2)	sugars, sodium, portion size		standardised portions to align with healthy guidelines.	• Review studies on nutrient profile and portion size changes made by restaurants over 18 years.	internationally accepted standards. • No standardised assessment method to evaluate practices. • Wide variation across countries and chains to reduce energy, fats, sodium and portion sizes.
45	Langford et al.	2015	67	North America	Fat intake	Various interventions	Review effect of the WHO's Health	• Health-related outcomes	• Neither nutrition only

Ref no.	Authors	Date	No. of studies	Country /Region	Domain	Intervention	Aims	Outcomes	Key finding(s)
				(n=29), Europe (n=19), Australasia (n=11), middle/low income countries (n=8)	and fruit and vegetable intake.	(aligned to Health Promoting Schools framework)	Promoting Schools framework.	• Educational outcomes	interventions (n=7) nor physical activity and nutrition interventions (n=10) following the HPS framework significantly reduced fat intake. • Nutrition-only interventions did lead to modest increase in fruit and veg intake of 30g per day.

Ref no.	Authors	Date	No. of studies	Country /Region	Domain	Intervention	Aims	Outcomes	Key finding(s)
27	Liberato et al.	2014	32	USA (n=23), Canada, Australia and South Africa (n=1), Netherlands (n=2), New Zealand (n=3).	Healthier food purchasing	Various interventions at point-of-sale	Review effectiveness of point-of-sale interventions to encourage purchasing of healthier foods.	• Nutrition education and promotion alone • Education plus better availability of healthy food • Monetary incentive alone or education and incentive. • Vending machine and online shopping interventions.	• No clear impact of educational interventions in supermarkets. • Monetary incentives short-term effective in increasing purchase and/or intake of healthier food options, insufficient evidence long-term • Insufficient strong studies

Ref no.	Authors	Date	No. of studies	Country /Region	Domain	Intervention	Aims	Outcomes	Key finding(s)
									to look at interactions. • Insufficient online studies.
18	Maniadakis et al.	2013	55	USA (n=40), UK (n=2), Norway and Italy (n=2) Denmark, Germany, France, Netherlands and Mexico (n=2), Brazil, Taiwan,	SSBs and foods high in fat, sugar and salt	Taxes	Assess the effects of taxes on high fat/salt/sugar foods and beverages.	• Price elasticity of demand estimates • Effects of interventions on product consumption • Energy intake and weight-related outcomes.	• Price increase can lead to reduction in consumption of targeted products, but effects on calorie intake may be much smaller. • Limited number of studies reported weight outcomes, most

Ref no.	Authors	Date	No. of studies	Country /Region	Domain	Intervention	Aims	Outcomes	Key finding(s)
				Singapore and Australia (n=1).					insignificant or very small. • Need to investigate underlying mechanisms behind price increases, purchasing and obesity.
66	Marcano-Oliver et al.	2019	25	N/A	Healthy foods, fruit and vegetables	Nudges, choice architecture	Review studies using behavioural nudges to promote health school cafeteria environments.	• Children's food selection and/or consumption.	• 17 studies reported positive effects on children's selection. 11 studies reported improvements in consumption

Ref no.	Authors	Date	No. of studies	Country /Region	Domain	Intervention	Aims	Outcomes	Key finding(s)
									of target foods, influenced by: changing order of serving, increasing convenience, variety and attractiveness of healthy options.
26	McGill et al.	2015	36	Europe, North America, Australia and New Zealand	Salt, sugar, fats, calories, fruit and vegetables and wholegrain	Various interventions	Review interventions to promote healthy eating to identify whether impacts differ by socioeconomic position.	• Effects of: price interventions, place interventions, product interventions, prescriptive interventions and person	• Taxes: 10/18 studies had favourable results for lowering inequality. • Education: most likely to widen inequalities.

Ref no.	Authors	Date	No. of studies	Country /Region	Domain	Intervention	Aims	Outcomes	Key finding(s)
								interventions on dietary intake.	8/18 interventions had more impact in higher SEPs. • Taxes on HFSSFs and combined taxes with subsidised fruit and veg are likely to reduce health inequalities by preferentially improving eating outcomes in lower SEPs.

Ref no.	Authors	Date	No. of studies	Country /Region	Domain	Intervention	Aims	Outcomes	Key finding(s)
53	Mizdrak et al.	2015	8	Netherlands (n=3), USA (n=2), New Zealand, France and Sweden (n=1)	Energy, nutrient profiling, fruit and vegetables	Price interventions	Examine how personal characteristics moderate changes in purchasing in response to price changes in experimental settings.	• Price elasticities (PE) for target foods • Influence of personal characteristics • Impact of magnitude, target, direction and information on responses to interventions.	• PE for target foods differs according to ethnic group. Large differences in PE by personal characteristic for 1 food type did not mean large differences in other target foods. • Evidence on whether people with obesity show different PE on energy

Ref no.	Authors	Date	No. of studies	Country /Region	Domain	Intervention	Aims	Outcomes	Key finding(s)
									dense food from non-overweight is equivocal. • Insufficient data about how direction or magnitude of price change might differentially impact different groups.
55	Mounsey et al.	2020	11	USA (n=4), Mexico, UK and South Africa (n=2),	SSBs	Fiscal policies	Assess evidence for macroeconomic impacts of diet-related fiscal policies on industry revenue, government revenue and employment.	• Industry revenue • Gross domestic product • Government revenue • employment	• 1 study found potential employment increases following taxation, 2 found no

Ref no.	Authors	Date	No. of studies	Country /Region	Domain	Intervention	Aims	Outcomes	Key finding(s)
				Brazil (n=1)					significant job losses, 8 found reduced employment. • Taxes reduced sales volume and revenue within sugar/beverage industry. • Government revenue generation was positive in all studies. • No robust evidence for negative

Ref no.	Authors	Date	No. of studies	Country /Region	Domain	Intervention	Aims	Outcomes	Key finding(s)
									macroeconomic impacts.
17	Niebylski et al.	2014	78	Not stated	Healthy and unhealthy foods and beverages	Subsidies and taxation	Evaluate the evidence base on the effect of subsidies and taxation.	• Cost-effectiveness reviews • Modelling studies • Empirical studies • Experimental studies • Miscellaneous	• Consistent evidence that taxation and subsidy intervention influence dietary behaviours. • Taxes and subsidies should be a minimum of 10-15% and preferably used together.

Ref no.	Authors	Date	No. of studies	Country /Region	Domain	Intervention	Aims	Outcomes	Key finding(s)
30	Nakhimovsky et al.	2016	9	Middle income countries: Brazil, Ecuador, India, Mexico, Peru and South Africa	SSBs	SSB taxation	Compile evidence from middle income countries about effectiveness of SSB taxation.	• Assess post-tax price increases • Changes in demand for SSBs and other products (overall and by socioeconomic groups) • Effects on overweight/obesity prevalence	• In Mexico, evidence that tax is passed to consumer through price increase. • Milk is a likely substitute, mixed findings on juice, but overall still a desired effect in energy intake. • 3 studies found negative relationship between SSB price and obesity

Ref no.	Authors	Date	No. of studies	Country /Region	Domain	Intervention	Aims	Outcomes	Key finding(s)
									outcomes, after accounting for substitution effects.
37	Oostenbach et al.	2019	11	USA (n=5), Germany and UK (n=2), Australia and Netherlands (n=1)	Fat, sugar and energy content	Nutrition claims on packaging	Assess influence of nutrition claims on product packaging on food choices.	• Influence of nutrition claims on: perceived healthfulness of products, expected and experienced tastiness, perceived appropriate portion size and calorie estimation, purchasing and intentions,	• Products with nutrition claims can seem healthier and less tasty. • Claims can make appropriate portion sizes seem larger and lead to underestimation of energy content.

Ref no.	Authors	Date	No. of studies	Country /Region	Domain	Intervention	Aims	Outcomes	Key finding(s)
								consumption and calorie intake.	• Claims can also influence consumption and purchasing, moderated by perceived healthfulness and consumer health consciousness.
46	Osei-Assibey et al.	2012	35	USA (n=23), Netherlands and UK (n=4), Germany (n=3), Sweden (n=1)	Dietary intake	Food environment	Review evidence on the influence of the food environment on overweight and obesity in children <8yrs.	• Environmental determinants of dietary influences on obesity in children <8yrs.	• Moderately strong evidence supporting interventions on food promotion, large portion sizes and SSBs.

Ref no.	Authors	Date	No. of studies	Country /Region	Domain	Intervention	Aims	Outcomes	Key finding(s)
									• Reducing food promotion, increasing availability of smaller portions, and providing SSB alternatives should be considered for young children.
20	Perez-Ferrer et al.	2019	84	Brazil (61%), Mexico (18%), Guatemala (6%)	All foods	Food environment policies	Review literature from Latin America on the food environment, targeted policies, and associations with obesity.	• Food retail, provision, labelling, marketing, price and composition.	• Consistent associations between fruit and vegetable market availability and higher consumption.

Ref no.	Authors	Date	No. of studies	Country /Region	Domain	Intervention	Aims	Outcomes	Key finding(s)
									• Health claims on food packaging were prevalent and often misleading. • Widespread marketing of unhealthy foods aimed at children. • Processed foods lower in price than fresh foods. High sodium in industrially processed foods.

Ref no.	Authors	Date	No. of studies	Country /Region	Domain	Intervention	Aims	Outcomes	Key finding(s)
43	Paes et al.	2015	44	Americas, Europe, Asia	SSBs	Various interventions/ consumption determinants	Synthesise evidence on the determinants and correlated of SSB consumption in young children (0-6yrs).	• SSB consumption by various correlates (child-level, interpersonal, environmental)	• Consistent evidence of positive influence of school nutrition policy in reducing SSB consumption (5 studies). • Some evidence attending out-of-home care was associated with higher SSB consumption (2 studies). • Evidence supports potentially

Ref no.	Authors	Date	No. of studies	Country /Region	Domain	Intervention	Aims	Outcomes	Key finding(s)
									modifiable determinants of SSB consumption at parental, child and environmental levels.
24	Redondo et al.	2018	17	USA (n=10), Mexico (n=2), Canada, UK, Australia, Netherlands and New Zealand (n=1)	SSBs	SSB taxation	Synthesise evidence on impact of taxes on consumption, purchase or sales of SSBs.	• Evidence from naturalistic experiments, virtual or experimental studies. • Studies evaluating behavioural intent.	• Purchases/sales of SSBs decreased significantly with tax amounts of 8-10%. Reductions higher in low socioeconomic settings. 1 study found no effect

Ref no.	Authors	Date	No. of studies	Country /Region	Domain	Intervention	Aims	Outcomes	Key finding(s)
									on sales of a 5.5% soda tax. • Virtual experiments showed effective results of taxes between 8-30%, and more so for 10-25%. • Tax over 19% effective in reducing intent to purchase.
32	Rose et al.	2021	27	Europe only: Netherlands (n=6), UK (n=4),	Sugar, SSBs, fat, fruit and	School interventions and policies	Explore effectiveness and young people's perceptions of school nutrition	• Nutrition knowledge • Dietary behaviours • BMI	• Education programmes can reduce sugar, SSB and fat intake,

Ref no.	Authors	Date	No. of studies	Country /Region	Domain	Intervention	Aims	Outcomes	Key finding(s)
				Italy (n=3), Spain, Finland, Greece and Turkey (n=2), Norway, Portugal, France and Denmark (n=1)	vegetables		interventions/policies.	• Wellbeing	increase fruit and vegetable intake and facilitate healthier choices in schools. • Young people are influenced by cost and other behavioural factors. • Free fruit and vegetables and nudging may be most powerful. • Some students leave school for

Ref no.	Authors	Date	No. of studies	Country /Region	Domain	Intervention	Aims	Outcomes	Key finding(s)
									lunch so in-school setting only works for some.
28	Sawada et al.	2019	3	USA (n=2), Netherlands (n=1)	Worksite foods	Financial incentives and social marketing strategies (in worksite cafeterias)	Evaluate effectiveness of financial incentives or social marketing interventions.	• Health outcomes • Food intake behaviours	• Lack of evidence made it difficult to draw conclusions. • Incentive-based interventions with pricing strategies at workplaces provided no clear evidence of significant reduction in risk of weight gain.

Ref no.	Authors	Date	No. of studies	Country /Region	Domain	Intervention	Aims	Outcomes	Key finding(s)
									• Such interventions may have an influence on fruit intake.
36	Scapin et al.	2020	23	USA (n=8), Uruguay (n=4), Australia, Canada and UK (n=3), Singapore (n=2), France, Germany and New Zealand (n=1)	Sugar	Labelling	Examine the influence of sugar label formats.	• Consumer understanding of sugar information • Amount of sugar in consumers' food choices	• Labels using 'high in sugar' interpretive texts (traffic lights or warning signs) were most effective in increasing understanding of sugar content. • Health warning messages,

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									graphical images of sugar in teaspoons and warning signs were most effective in influencing choice of lower sugar products.
23	Schorling et al.	2017	14	OECD countries	Salt	Various interventions	Analyse cost-effectiveness of interventions to reduce salt consumption.	• Life years gained • Disability-adjusted life years • Quality-adjusted life years	• 59/62 scenarios were cost saving. • Most cost-effective interventions were taxes, salt reduction by food

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									manufacturers and labelling. • Combinations of different population-wide interventions were also cost saving. • Targeted dietary advice was less cost-effective.
14	Shemilt et al.	2017	26	USA (n=10), UK (n=8), Finland (n=4), Netherlands,	Food (n=19), alcohol (n=1), tobacco (n=6)	Labelling	Examine effects of 'low-alcohol' and equivalent labelling on alcohol, food and tobacco products.	• Selection and consumption (intentions and behaviours) of products. • Perceptions of products	• Low quality evidence of mixed effects. Impact likely to vary by specific label descriptors,

Ref no.	Authors	Date	No. of studies	Country /Region	Domain	Intervention	Aims	Outcomes	Key finding(s)
				Thailand, Australia and Canada (n=1)				(appeal, understanding of label etc.)	products and population characteristics. • 'Reduced fat' margarine label increased use compared to 'full fat' label. 'Low fat' label on vending machine snacks led to no difference in selection. • 'Low calorie' popcorn label led to higher sales, 'low fat'

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									label decreased sales. • Guilt not necessarily reduced consuming snacks labelled ‘low fat’, but people believed they were healthier. 8 studies found no effect of ‘low fat’ label on appeal, but lower appeal for ‘low salt’ products.

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51	Sobhani & Babashahi	2019	7	USA (n=3), Mexico (n=2), not stated (n=2)	SSBs	SSB taxation	Review evidence about impact of SSB tax.	• Purchase and consumption of SSBs	• 6/7 studies found consumers were responsive to price changes. • SSB tax could reduce purchasing and consumption and positively impact weight outcomes.
25	Teng et al.	2019	18	USA (n=8), Chile (n=2), Mexico (n=4), Finland,	SSBs	SSB taxation	Review real-world SSB tax evaluations and examine impact on dietary intake.	• Consumption of taxed and untaxed beverages	• Equivalent of 10% SSB tax was associated with average decline in beverage

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				Hungary, France, Spain (n=1)					purchase and intake of 10%, with considerable heterogeneity between results. • Equivalent of 10% SSB tax also associated with 1.9% nonsignificant increase in consumption of untaxed beverages (e.g. water).
21	Thow et al.	2014	38	N/A	Various foods	Taxes and subsidies	Consolidate evidence on the	Effects of:	• 2 RCTs showed price changes

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							effect of tax and subsidy policies on consumption.	• subsidies on healthy food • taxes on SSBs • taxes on individual nutrients • taxes based on nutrient profiling • distributional effects	were effective in store and away-from-home purchasing. • Most robust modelling studies showed greater effects for taxes on foods/beverages which have close untaxed substitutes (e.g. soft drinks/unhealthy foods). • Taxes and subsidies are likely to be

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									effective interventions to improve consumption patterns.
65	Trieu et al.	2015	75 strategies identified	Europe (n=34), Western Pacific (n=21), Americas (n=12), South East Asia (n=5), Eastern Mediterranean (n=2), Africa (n=1)	Salt	Salt reduction initiatives	Quantify progress with initiation of salt reduction strategies across the world.	• Countries with national salt reduction strategies • Leadership and strategic approach • Baseline assessment and monitoring • Implementation strategies	• (by 2014) 75 countries had a national salt reduction strategy. • Most programmes are multifaceted. Legislative action implemented in 33 countries.

Ref no.	Authors	Date	No. of studies	Country /Region	Domain	Intervention	Aims	Outcomes	Key finding(s)
								• Reported programme impact	• 12 countries had reported reductions in population salt intake. • Increasing number of strategies is encouraging. Activity remains low in low/middle income countries.
62	Tseng et al.	2018	5	N/A	Various foods	Food environment and calorie labelling	Identify policies and built-environment changes and evaluate	• Effectiveness of policies, programmes and built environment	• 0/5 studies targeting food and beverage environment showed a

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							effectiveness in obesity outcomes.	changes on obesity, weight or BMI.	weight/BMI reduction. High risk of bias across studies. • 1 study on calorie labelling was associated with a reduction in BMI in 11 counties in New York which implemented a law. • Limited evidence of low strength.
49	Vargas-Garcia et al.	2017	40	Australia, Belgium, Brazil,	SSBs	Various interventions	Evaluate effects of interventions to reduce SSB or	• SSB intake • Water intake	• Interventions significantly decreased SSB

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				Canada, Chile, Germany, Malaysia, Mexico, New Zealand, Norway, Portugal, Turkey, Netherlands, UK and USA			increase water intakes and examine impact of BCTs on consumption.		consumption in children but not in adults. • For children, modelling the behaviour helped reduce SSB intake. Home-based interventions more effective than school-based. • Nutrition education interventions are moderately successful in reducing SSB

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									intake in children.
44	Vercammen et al.	2018	27	USA (n=12), Europe (n=11), Australia (n=4)	SSBs	Various interventions	Summarise evidence for strategies designed to reduce SSB consumption in children 0-5yrs.	• Findings from healthcare settings, daycare/school based settings, home-based settings, community settings and other.	• Strategies which successfully reduced SSB consumption included: in-person individual and group education, passive education, use of technology, training for child/healthcare providers, changes to

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									physical access of beverages.
29	Von Philipsborn et al.	2020	58	USA (n=38), Australia (n=4), Netherlands (n=3), Canada and UK (n=2), other (n=9)	SSBs	Environmental interventions	Examine effects of non-tax environmental interventions to reduce SSB consumption.	• Effects on SSB and milk consumption • Adverse outcomes • Effects by indicators of social disadvantage	• Moderate-certainty evidence for consistent associations with decreased SSB consumption for: traffic light labels, SSB price increases, in-store healthier beverage promotions, food benefit programmes

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									with incentives and restrictions, community campaigns and improving availability of low calorie beverages in home environment. • Other interventions had low-certainty evidence.
5	Wright et al.	2017	102	Predominantly USA (n=51) and	Unhealthy foods,	Taxation	Generate insight into impact of health taxes.	• Consumption of targeted products (and related harms)	• High tax rates (>20%) on unhealthy products such

Ref no.	Authors	Date	No. of studies	Country /Region	Domain	Intervention	Aims	Outcomes	Key finding(s)
				Europe (n=34)	including SSBs			• Revenues for health objectives and distribution of tax burden across income groups • Political sustainability	as SSBs are likely to positively impact health behaviours and outcomes. • While taxes on products reduce demand, they add to fiscal revenues. • Earmarking health taxes for health spending increases public support.

Notes:

- SSBs = sugar-sweetened beverages
- OECD = Organisation for Economic Co-operation and Development

- BMI = body mass index
- BCTs = behaviour change techniques

References in the reference list but not in this table were not retrieved through the systematic search terms.