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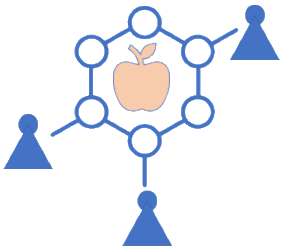

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Population interventions to improve diet in England: An evidence synthesis on the effectiveness of mandatory, voluntary and partnership approaches

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Cécile Knai[1], Laurence Blanchard[1], Cherry Law[1], Mark Petticrew[1], Matt Egan[1], Harry Rutter[2]

[1] London School of Hygiene and Tropical Medicine, UK

[2] University of Bath, UK

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Background and Scientific Rationale

Description of the problem

Despite significant commitments in England and globally, non-communicable diseases (NCDs, such as cardiovascular diseases, a range of cancers, and diabetes type II) continue as the leading cause of death and disability, warranting effective solutions. A central risk factor for the high burden of NCDs is poor diet. This evidence synthesis focuses on the effectiveness and cost effectiveness of population interventions to improve diet, with a view to informing more effective responses to poor diets in England.

It is difficult to overstate the role that poor diet plays in human ill-health, made worse by a strong social gradient in access to healthy foods and in diet-related diseases.[1] Poor diet is now estimated to be responsible for more deaths than any other risk globally.[2] This is also true for the UK, with diet driving the major chronic diseases currently faced by the population, estimated to be the largest contributor to overall disease [3] and to have the highest impact on the NHS budget.[4]

Much of this is because high fat, sugar and/or salt (HFSS) foods are often inexpensive, easily accessible, highly promoted and therefore highly consumed. Most of the salt consumed by the UK population is already in the foods people purchase.[5] The consumption of free sugars by adults accounts for 16–17% of their total energy intake, [6] more than triple the 5% maximum recommended by the WHO. [7]Intake of free sugars fail to meet the recommendations in all age groups, with poor diet starting at a very young age.[6]Toddlers consume suboptimal fruit, vegetables and fibre, and this worsens along the social gradient [6] as with adults.[8] Poor diet during preschool years has been associated with poorer school attainment, and both dietary patterns and diet-related disease have been shown to track from childhood into adulthood.[9]

It is in this context that countries such as England are implementing population interventions to promote diets which are health-promoting, support physical wellbeing, and reduce diet-related NCDs, by reducing consumption of energy-dense, nutrient-poor foods such as free sugars, salt, saturated and trans fats, and increasing consumption of fruit and vegetables, lean protein and other nutrient-dense foods.

In response to poor diet and diet-related disease in England, the Government has over the years introduced a range of interventions to improve diet for the whole population. Population interventions to improve diet can be designed in a range of ways, and here we broadly categorised them as: (1) mandatory interventions (public regulation with no involvement of private sector actors); (2) public-private partnerships (public and private sector organisations collaborate in the establishment of collective initiatives to improve health); and (3) voluntary mechanisms (whereby the private sector designs and monitors its own standards of conduct). (These are further explained in the next section on the Description of the intervention.)

Though all three types of interventions have demonstrated varying degrees of effectiveness and therefore potential, there are also risks and challenges to all, with studies indicating that they are not yet optimally designed and/or implemented to meet public health goals.[10,11] A population intervention to improve diet will be most successful if underpinned by clear accountability, monitoring and evaluation processes, as well as a stated public health objective and sufficient political will to sustain it in the face of resistance. For example, a tax on saturated fat was implemented in Denmark

in 2011 but was rapidly repealed; it was introduced to raise public revenue rather than to meet clear public health objectives, and as such was found to have few supportive policy makers. Later studies showed that it had a rapid positive effect in changing consumer behaviour.[12] Voluntary mechanisms and public-private partnerships often lack in accountability and oversight mechanisms; moreover they often do not include the most effective interventions, or well-defined, evidence-based, quantitative targets which push partners to go beyond 'business as usual' and require them to demonstrate progress against the targets, nor do they sufficiently involve the public in the development and monitoring of the interventions.[13]

It will be essential to understand how different policy instruments are meant to work in theory. This evidence synthesis will lead to sub-categorisations of approaches which cut across different governance arrangements: for example, incentive-based mechanisms can be employed in mandatory or partnership arrangements (e.g. SDIL vs the Responsibility Deal), but be quite different in their construction i.e. be driven by different actors and motivated by incentives of a different nature. For example, the SDIL establishes a clearly defined incentive to act (with manufacturers needing to reduce sugar in products by a certain date, at the risk of costing them a certain amount if this is not achieved); the Responsibility Deal was also an incentive-driven mechanism yet the parameters of that incentive were far less clearly outlined. Thus we categorise interventions first in terms of governance arrangements to enable an understanding not only of impact of effectiveness, but also the implementation and monitoring issues that contribute to their impact. We believe this to be a major added value of the review. Governance is a key overlooked mechanism in these interventions and reviews of these interventions, and it is a key part of the context which is rarely discussed. We are confident that studies identified in the systematic review will help to throw light on whether and how governance has an impact on effectiveness, by understanding what factors relating to interventions, providers, populations and settings affect implementation of such population interventions to improve diet.

This evidence synthesis assesses the evidence of effectiveness of these population interventions with a view to informing more effective responses to poor diet in England. We will review the different types (mandatory, voluntary, or partnerships) of population interventions to improve diet, and examine implementation, effectiveness, and cost-effectiveness, and factors influencing effectiveness.

Description of the intervention

Over the past decade, the effectiveness of a range of population interventions to improve diet has been evaluated. Those with most long-term promise are those targeting upstream determinants of poor health, aiming to improve conditions and opportunities, so that the majority of the population can eat healthily.[14,15]

As illustrated by **Error! Reference source not found.** below, population interventions can be driven by different types of actors and designed in various ways, ranging from mandatory interventions (where action is required by government and regulated by public authorities), to public-private partnerships (collaborative efforts primarily between private industry and government actors but also including other actors), to voluntary mechanisms (which are industry-led and without involvement from the public sector). This evidence synthesis will assess the effectiveness of all three types of population interventions, and here below we look at each of these in turn.

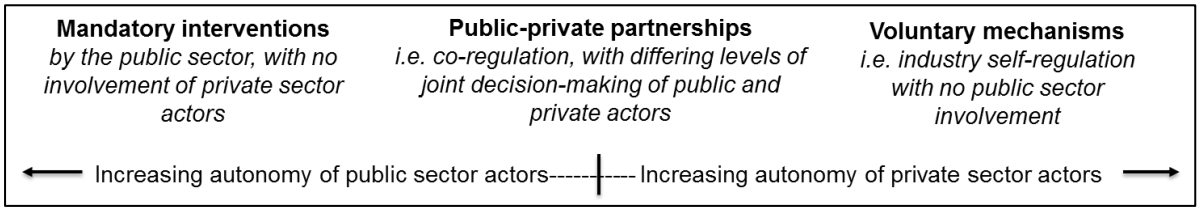


Figure 1. Taxonomy of engagement between the public and private sectors

Source: adapted from Risse and Boerzel [16]

A mandatory intervention entails public regulation with no involvement of private actors other than as observers or contributors to consultations. It is an initiative, rule or action by government in which participation is required and there is public sector enforcement.[17] Examples of mandatory policies to improve diet in England include the School Food Standards where maintained (state-funded) schools are legally required to meet certain goals to make school meals healthy. Compliance with the School Food Standards is mandatory for all maintained schools. Since 2014 the government has also made compliance with the standards an explicit requirement of funding agreements with all academies and free schools.[18] Provision of improved school food has had a demonstrable impact on diet and nutrition beyond the school dining room and the school gate, benefiting children from all socio-economic groups.[19] Another example is the current Soft Drink Industry Levy (SDIL), where manufacturers of soft drinks who do not reduce the amount of sugar in their drinks are taxed. The SDIL was announced by the government in March 2016 and came into force in April 2018.[20] It is an important part of the Government's plan to reduce obesity [21] and also prevent non-communicable diseases associated with excess sugar consumption.[22] The SDIL has led certain members of the soft drinks industry to reformulate products to contain less sugar in order to reduce their liability to pay the levy.[23,24] Early estimates suggest that the SDIL will be particularly beneficial to improving health and decreasing health inequalities.[25,26] Mandatory population interventions are generally the most effective but may be politically or commercially unacceptable.[10,27] Regulatory attempts to reduce consumption of harmful commodities are often met with opposition from producers and marketers of those commodities, and those stakeholders have been shown to use common strategies in resisting the introduction of such upstream regulation.[28]

Public-private partnerships: Population interventions can be neither entirely mandatory nor voluntary, but with formalized agreements entailing a degree of oversight from a public body, such as a government department of health. These arrangements are most usually referred to as public-private partnership (PPPs), involving public and private sector organisations (to varying degrees) in the establishment of collective initiatives to improve health.[13] A PPP in health involves collective work between at least one private for-profit organization with at least one public (not-for-profit) organization to jointly share efforts and benefits, with a common commitment to a health outcome.[29] PPPs can be a promising middle option between industry led voluntary mechanisms, which is argued to lack sufficient oversight, and mandatory interventions, which can be effective but politically contentious.[30] The rationale for PPPs is that health problems and their solutions should

involve all key stakeholders, and that these mechanisms may be cheaper, quicker alternatives to introducing and monitoring legislation, and may help to harness the private sector's efficiency, cost-saving and expertise to help achieve public health nutrition goals.[31] However, the fundamental purposes of being in PPPs may diverge significantly between the public and private sectors.[32] For public sector partners, PPPs can be a way to supplement funding for research on diet. For private sector partners, PPPs open opportunities to promote their brand and image, and present themselves as legitimate actors in the policy-making processes.[33] While PPPs have had some success in other fields, particularly in the field of environmental policy [13], some evaluations have shown limited positive impact of PPPs in diet improvement.[10,34]

Examples of PPPs to improve diet in England include the Public Health Responsibility Deal, where food and other industries worked with the then Department of Health to improve public health outcomes for the population in England.[35] Another example of a policy driven by the public sector but relying on voluntary actions by the private sector is the Sugar Reduction and Reformulation Programme driven by Public Health England, encouraging rather than forcing industry to reduce sugar in their products.[36]

Voluntary mechanisms entail actions by the private sector to create and/or enforce their own initiatives or rules, with no public involvement.[17] Examples of self-regulation or voluntary agreements to improve diet in England include codes of conduct set out by the UK Advertising Standards Authority, the self-regulatory organisation of the advertising industry in the UK, which agree cross-industry ways to protect children from advertisements for high fat, sugar and salt products. Voluntary approaches can be effective.[13] However, there are also risks and challenges to voluntary agreements, with studies indicating that in their current formats, voluntary agreements to improve diet are usually based on vague commitments, focused on easy but ineffective approaches (such as information sharing), and often hampered by limited monitoring and reporting, generating poor data.[10]

Rationale for the current study

To the best of our knowledge this would be the first comparison of evidence of effectiveness of voluntary, mandatory and partnership approaches to improving diet. It is also the first review that attempts to synthesise evidence to help us understand the theories that underpin these different approaches, and the implementation and monitoring issues that contribute to their impact.

In 2013 we conducted a scoping review of voluntary agreements and their success criteria. The scoping review was an important start but an incomplete exercise in that it was not a comprehensive, systematic review, and it was not specifically focused on diet. Moreover, and crucially, it only reviewed the evidence of effectiveness of voluntary agreements. Finally, the review was published in 2013, and an update of the latest literature is now warranted.

As noted below in the section on the size of the literature, other reviews exist on specific intervention types (e.g. voluntary agreements), and on the effectiveness of interventions to address specific aspects of the diet (e.g. comparisons between mandatory and voluntary approaches to reducing consumption of trans fatty acids [37]). However, we do not know of any review examining the

evidence on the effectiveness of these different intervention approaches to improving diet through the same lens.

Given the range of population interventions to improve diet in England, and the urgent need to resolve the disease burden related to poor diet, it is now essential to understand the effectiveness of different arrangements, levels and types of involvement of the public and/or private sector in improving diet, and what we can learn from the literature about how these could be made more effective at improving diet in England.

Research aim and questions

Aim

To search systematically for, appraise the quality of, and synthesise evidence on the effectiveness of population interventions to improve diet, including mandatory interventions, voluntary mechanisms and public-private partnerships, and to share the evidence synthesis, and formulate recommendations to improve interventions, with stakeholders with a view to informing more effective responses to poor diet in England.

Research questions

1. How are mandatory interventions, voluntary mechanisms and public-private partnerships to improve diet assumed to work in theory?

2. What mandatory interventions, voluntary mechanisms and public-private partnerships to improve diet, and reduce inequalities in diet improvement, have been evaluated?

3. What factors relating to interventions, providers, populations and settings affect implementation of such population interventions to improve diet?

4. Have such population interventions improved process, impact (intermediate and distal) and cost outcomes?

5. Are there any reported unanticipated effects of such population interventions?

6. What is the cost effectiveness of such population interventions?

7. How can the findings of the evidence review be translated into recommendations for improved interventions?

Overview of the review's components

This review includes seven inter-linked components (filled with colour, Figure 1). Information about each component is summarized in **Error! Reference source not found.Error! Reference source not found.**.

Figure 1. Overview of the review stages and components with the corresponding research questions (RQs)

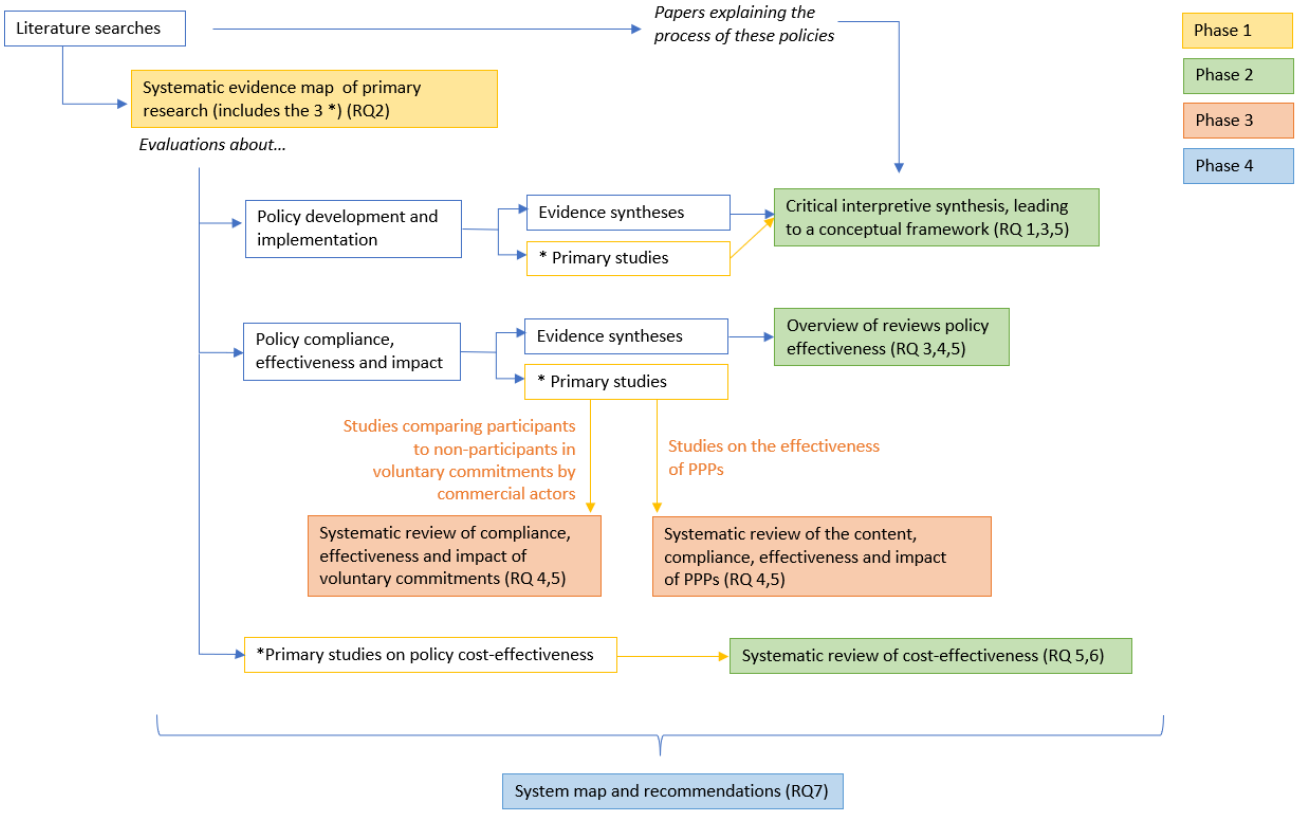


Table 1. Summary of review components

Review components	RQs	Detail
1. Systematic evidence map of mandatory, voluntary and PPP diet-related policies targeting the food environment	2	Includes primary research evaluating policy development, implementation, effectiveness, cost-effectiveness. **Objectives:** i) To document the breath and gaps in primary research evaluating the development, implementation, effectiveness, and cost-effectiveness of mandatory, voluntary and PPP diet-related policies; ii) To inform the next stages of the review.
2. Overview of reviews on the effectiveness of mandatory, voluntary and PPP diet-related policies targeting the food environment	3,4,5	The in-depth synthesis includes the most recent, relevant and high-quality systematic reviews on effectiveness from the systematic evidence map. **Objective:** i) To assess the effectiveness of mandatory, voluntary and PPP diet-related policies; ii) To assess how these policies work (mechanisms of action).
3. Critical interpretive synthesis of policy process factors in mandatory, voluntary and PPPs	1,3,5	Includes: - Evaluations of the development and implementation of mandatory, voluntary and PPP diet-related policies from the systematic evidence map. - Papers on how mandatory, voluntary and PPP diet-related policies work in theory, e.g., commentaries, theoretical pieces, evaluations in other fields **Objectives:** i) To assess how mandatory, voluntary and PPP diet-related policies work in theory and in practice (including factors influencing their development, implementation, and mechanisms of actions); ii) To organise the results in a theoretical framework.
4. S. Systematic review on the effectiveness of PPP diet-related policies targeting the food environment	4,5	Includes primary studies from the systematic evidence map assessing the effectiveness of diet-related PPPs. **Objective:** To compare the effectiveness of diet-related PPPs targeting the food environment.
5. Systematic review on the effectiveness of voluntary commitments by commercial actors to improve diet (comparing participants vs. non-participants)	4,5	Includes primary studies from the systematic evidence map comparing the effectiveness of voluntary commitments (e.g., pledges, signatures) by commercial actors between participants and non-participants. **Objective:** To compare the effectiveness of voluntary commitments by commercial actors between participants and non-participants.

Review components	RQs	Detail
6. Systematic review on the cost-effectiveness of diet-related policies targeting the food environment	5,6	Includes the primary cost-effectiveness evaluations from the systematic evidence map. **Objectives:** i) To assess the cost-effectiveness of mandatory, voluntary and PPP diet-related policies, ii) To identify factors that make some interventions more cost-effective than others.
7. System map	7	**Objectives:** i) To integrate the findings into a system map

List of modifications since December 2020

General modifications are listed here, and component-specific modifications are listed in each section.

Project overview and connections:

1. Two additional components have been added:
    a. A systematic review on the effectiveness of PPPs (component 4) since little information was found on these when screening the evidence syntheses for the overview of reviews on effectiveness (and we therefore expect the latter to barely cover PPPs).
    b. A systematic review on the effectiveness of voluntary commitments by commercial actors comparing participants to non-participants (component 5), for the same reason as above.
2. The interview analyses (previously component 2) have been removed because although they inform some of the research questions, they were not funded by NIHR and were started before this project. They will be reported separately.
3. Due to the points above, please note that the number of some components have changed.

General literature search & eligibility criteria (described in component 1):

4. The eligibility criteria for the overarching project have been detailed in Appendix 1. Notable changes include:
    a. Following the high number of studies potentially eligible for the evidence map, publications will be considered when published between 2010-2020 instead of 2000-2020 (which was already the case for evidence syntheses).
    b. We have specified that the general public's views will be excluded except when in the UK or collected during a state or national governmental consultation.

5. Details about the search strategy in the databases have been added (including in Appendix 2), and the screening of two websites and of overviews of reviews has been added to help identifying potential missing studies.

GRADE framework:

- When using the GRADE framework, since randomized trials are not applicable to the topics assessed, we will also consider a few observational study designs as 'high quality' and not only RCTs. This is to highlight the best quality evidence that can realistically be obtained.

Component 1: Systematic evidence map of mandatory, voluntary and PPP diet-related policies targeting the food environment

Overview

RQ: 2

Objectives

1. To identify the breath, purpose, and extent (including trends and gaps) of primary research evaluating the development, implementation, effectiveness, and cost-effectiveness of mandatory, voluntary and PPP diet-related policies
2. To identify relevant evaluations to be analysed further in the next review components.

Modifications to the protocol submitted to NIHR in December 2020

- The systematic evidence map will only focus on primary research (and not evidence syntheses) to limit the numerous overlaps that the inclusion of evidence syntheses would generate, and to limit the size of the systematic evidence map.
- Data extraction will be performed by one reviewer and checked by a second instead of having a sample extracted by two independent reviewers and the rest by one. This is to increase consistency while limiting the resources that a full independent extraction would require given the high number of studies.
- Due to the size of this evidence map, we will not contact people to obtain unpublished data nor the authors of protocols for which no results were retrieved as part of our search.

Methods

Evidence maps, also called systematic maps or evidence gap maps, are a type of evidence synthesis and a research translation tool that visually present the breath of research available on an area using a systematic approach. This systematic evidence map focuses on primary research. Evidence syntheses are excluded due to the numerous overlaps that they would generate by including the same papers several times. The evidence map will be reported using the Preferred Reporting Items for Systematic reviews and Meta-Analyses extension for Scoping Reviews (PRISMA-ScR) Checklist [38] with adaptations for evidence maps where needed.

Literature search strategy

Both primary research and evidence syntheses will be searched in 14 databases (Table 2), but only primary studies will be included in this component.

Table 2. Databases for the literature search

Database	Platform	Research tradition
ABI/INFORM Global	ProQuest	Business & management
Campbell Collaboration	Campbell Collaboration	Education, crime and justice, social policy (SRs only)
Cochrane Library	Cochrane Library	Health
EconLit	Ovid	Economics
EMBASE	Ovid	Health
Epistemonikos	Epistemonikos	Health (SRs only)
Medline	Ovid	Health
PsycINFO	Ovid	Psychology & mental health
- Science Citation Index Expanded - Social Sciences Citation Index - Arts & Humanities Citation Index - Conference Proceedings Citation Index-Science - Conference Proceedings Citation Index-Social Science & Humanities - Emerging Sources Citation Index	Web of science (searched all together)	Social sciences and humanities

The literature search will be structured around the following concept: (mandatory OR PPP OR voluntary) AND policy AND diet. Combinations of single search terms, blocks of words (e.g., "public-private partnership") and MeSH terms will be used to ensure that robust, transparent and consistent searches are run across the different databases. However, for some concepts, only free-text terms will be used despite having a MeSH term: for example, the MeSH term "self-regulation" refers in some databases to self-regulation of behaviours by individuals e.g. related to food consumption, rather than self-regulation of actions by the food industry. We are only interested in the latter definition. In each database, up to eight major or 'semi-final' search lines will be conducted depending on the availability of MeSH terms (five where there is no MeSH term at all) and be combined to generate the final results. Each semi-final line will deconstruct the concept "Mandatory-Voluntary-PPP + Policy + Food" in a different manner. For instance, the first consists of the MeSH term "food legislation", which encompasses several mandatory food-related policies. The second and third major lines combine a series of terms related to mandatory policies (e.g., law, taxation) with a series of terms related to food. The sixth line combines four categories of words together: terms related to governance, actors (public and private), policy, and food. The final search will then be limited by year (2000+). The searches will also be limited by publication format when several thousands of results will be found (in the databases ABI-INFORM, Embase, Medline, and the six databases in Web of Science). Where possible, ineligible formats will be excluded (e.g., NOT letters, editorials, etc); otherwise eligible formats will be selected (e.g. articles, reviews).

Furthermore, while the word "regulat*" is necessary to identify policies and governance, it is also widely used in biochemistry, pharmacology and agriculture. This leads to the identification of several thousands of irrelevant records. To address this noise, several free and MeSH terms about genetics, microbiology, pharmacology, as well as irrelevant nutrition fields (e.g., food hygiene) will be excluded using the Boolean operator "NOT". To ensure that the latter process does not exclude relevant articles, the search strategy was tested in Medline, Embase and PsychInfo using 38 papers: the first 30 primary research papers and the eight literature reviews that were listed in our initial protocol as pertinent papers and published from 2000. Note that exclusion criteria have been revised since, meaning that some of these papers have become ineligible. The full search strategy used in Medline and further explanations are provided in Appendix 1. It was peer-reviewed by a librarian using the Peer Review of Electronic Search Strategies (PRESS) statement [39].

In addition to searches in databases, we will scan the reference lists of the studies included in components 4,5,6, and contact experts to help us identifying missing publications, including:

- the steering committee members.
- the literature mentioned in interviews conducted with researchers prior to this review.

Eligibility criteria and screening

Primary research published between 2010 and 2020 and evaluating the development, implementation, effectiveness, or cost-effectiveness of diet-related policies focusing on the food environment will be included. Policies will have to target 'regular' food such as that represented in the Eatwell guide [40](e.g. not "natural" products, supplements, alcohol, functional foods, gluten free, GMOs, or sweeteners). The food environment includes physical, social and economic access to food and drinks, marketing and advertising as well as product and vendor properties [41], with the exceptions listed in Box 1 and Appendix 2. Policies must be in place, to be adopted but not yet implemented, to have been implemented and then revoked, or be studied as part of a state- or nationally-led public consultation. Experiments will be excluded as well as studies only describing ('mapping') which policies are implemented where or benchmarking them against criteria. Simulations and predictions are only included if they are based on data collected after the policy was implemented. Both the policies and evaluations will have to be conducted at the supranational, national or provincial/state level, except for the UK where it can be at any level. Audits of food products, shops and TV advertising can also be conducted at any level including locally if they involved large companies: we assume that the same products or features are then offered in other areas of the country. All health-related outcomes will be considered except food hygiene and safety. Studies assessing the general public's views will not be considered except for the UK and consultations. Studies that include several policies and do not report nor consider governance in their analyses will be excluded unless their governance approach is obvious (e.g., they all are taxes). No restriction on language and country will be applied. The full eligibility criteria are detailed in Appendix 2. Note that in the previous version of the protocol, papers published between 2000 and 2009 were also included, but this resulted in a higher volume of records that we could handle.

Box 1. Policy topics excluded

Policies primarily focusing on:

- Double/triple burden of malnutrition
- Food claims;
- Food fortification;
- Food security, except universal school meals;
- Food safety, hygiene and allergies;
- Food sustainability, except for evaluations of farm-to-school programmes assessing diet- or health-related outcomes;
- General sales taxes (e.g., VAT);
- Specialized foods and drinks and those that are not part of a regular diet (as per the Eatwell Guide), e.g., gluten-free, supplements, alcohol, GMOs, organic
- Specific population groups (e.g., athletes, army, policy targeting workplaces only);
- Trade.

Records will be uploaded to the software Eppi-Reviewer Web for the removal of duplicates, screening, data extraction as well as for part of the synthesis. Screening will be performed by teams of two independent reviewers. Before the reviewers perform it on their own, pilot screening of successive batches of 100 titles and abstracts will be conducted against the eligibility criteria to test the wording and the reviewers' understanding of the criteria; this until reaching batch-level agreement of a minimum of 90%. The reviewer teams will discuss conflicting findings together and call in a third reviewer to discuss disagreements where necessary. Full texts will be obtained for references that have met the inclusion criteria or where information in the title and abstract is insufficient to make a judgment. Screening of full texts will be conducted in the same manner as above. Studies in English, French, Spanish, Danish, Norwegian and Dutch, as well as abstracts in Mandarin will be directly used by the review team since at least one of the team members speaks one or more of these languages. For abstracts in other languages, we will ask for translation support from within our institutions and networks, which are highly international and diverse. Eligible full texts will also be translated although this will depend on the resources available. Lastly, when screening for this component we will also look for publications for the other review components.

Data extraction

A coding tool will be designed in Eppi-Reviewer Web to encompass the heterogeneity of study methods and topics. It will be inspired by tools used in other systematic reviews, overviews of reviews and systematic evidence maps. We will extract information on: i) basic study characteristics (e.g. publication year, study design, aim); ii) policy intervention characteristics (e.g. policy name, World Bank region [42], country using the World Bank classification, policy level, policy area using the categories of the NOURISHING framework that focus on the environment, i.e. 'NOURIS' (Figure 2)[43], governance approach; iii) categories of inequalities assessed using the PROGRESS-Plus framework[44]. To be consistent with the eligibility criteria, sections of papers relating to the following aspects will not be extracted: views of the general public (unless about the UK or eligible public consultations),

local policies (unless about the UK), and other topics beyond the scope of this project. Note that PPPs will have to involve both a public and a private actor.

Data will be extracted by one reviewer and checked by another. The coding tool will be first piloted and adjusted using a small number of papers. Reviewers will have the possibility to develop additional codes where relevant. Due to high number of publications that will be included, information will be taken at face value unless there is obviously an error. In that case, we will code the information as we think it should be and make a note. Missing or unclear data will be noted as such rather than contacting authors and extracting information from the primary studies included in literature reviews.

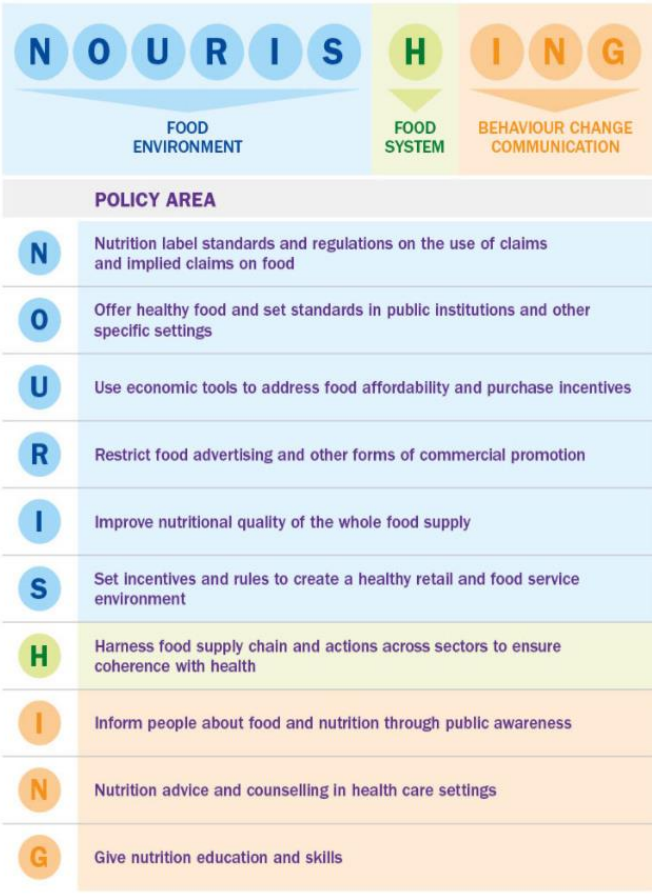


Figure 2. The NOURISHING framework, by the World Cancer Research Fund International [43]

Quality assurance initiatives for screening and data extraction will be conducted at three different levels by:

- using the double-screening and double-coding process.
- conducting data cleaning verifications, such as ensuring that all the included papers have codes for each of the essential characteristics, that no excluded paper is coded, and that the papers do not include contradictory codes including more than one code when the guidance says to select only one.

Data synthesis

Data will be analysed by characteristics and by looking at associations between these. Since this is a map, the key features will be synthetized narratively using descriptive statistics and presented visually in tables and graphs using Eppi-Reviewer and Excel. Both the data extraction and synthesis will also be informed by the views of the public advisory group. We will comment on whether the latter is aligned with the literature reporting results from public consultations.

Component 2: Overview of reviews on the effectiveness of mandatory, voluntary and PPP diet-related policies targeting the food environment

Overview

RQs: 4,5

Objective:

i. To assess the effectiveness of mandatory, voluntary and PPP policies related to diet.
ii. To assess how these policies work (i.e., their mechanisms of action).

Modifications to the protocol submitted to NIHR in December 2020

- To appraise the quality of evidence syntheses, we will use the checklist by SIGN for systematic reviews and meta-analyses rather than AMSTAR-2. This is due to AMSTAR-2 putting a strong emphasis on RCT characteristics, which are not relevant (or much less relevant) for natural experiments.
- An intermediate step has been included: all evidence syntheses rated as high or acceptable quality will have a high-level extraction. Then, as already planned, the most recent, high quality and most relevant (rather than comprehensive) evidence syntheses will be selected for an in-depth data extraction. This is for practical reasons (for collecting the information needed for the 2nd stage), as well as for comparing results between the two types of extraction.
- The 2nd data extraction will be applied to all eligible evidence syntheses together rather than by policy area (using the NOURISHING framework). This is because evidence syntheses can cover a wide range of policy areas, so would be screened several times.
- For identifying the most recent evidence syntheses, we had planned to develop questions relating to whether they reflect the current policy and evidence context. We have removed this given that it would require to document the policy landscape for a wide range of policies, which would require a high level of resources and is beyond the scope of this project.

Methods

This overview of reviews consists of two parts:

1. A high-level data extraction and synthesis (scoping or mapping of study characteristics and direction of effects)
2. An in-depth data extraction and synthesis of the most recent, relevant, and high-quality evidence syntheses

Literature search strategy and eligibility criteria

This component will use the same literature search as for the systematic evidence map. Overview of reviews will be excluded, but their reference lists will be screened against our eligibility criteria. We will ask the steering committee members for potentially missing evidence syntheses. The review will be reported with the PRISMA checklist.

Screening for this component will be conducted in two folds. First, the evidence syntheses will have to meet the three following criteria: 1) those of the systematic evidence map (apart from being primary research); AND 2) it assesses the effectiveness of policies; AND 3) it is considered as an evidence synthesis according to the criteria below:

- Must include a literature search in at least two databases (to ensure a minimum of comprehensiveness, which is a basic feature of systematic reviews [45,46]); AND
- Must list the eligibility criteria to ensure a minimum of transparency and rigor; two other basic features of systematic reviews [45,46]); AND
- Must clearly indicate which studies were included, e.g., in a tabulation or in a group of references without having to compile them manually (same justification as above); AND
- Are not overviews of reviews (because they do not provide details about individual studies, they are a different type of syntheses, and their scopes are less likely to be aligned with that of our overview of reviews).

For consistency, specific sections of syntheses that will not meet the eligibility criteria above will be excluded, e.g., sections focusing on mass media, clinical interventions, experiments, or only containing policies conducted at the local level. Once a synthesis section is included, all the studies within it will be included for avoid dissecting each section and reconducting the analyses.

Part 1: Quality appraisal & high-level data extraction and synthesis

The quality of the evidence syntheses will be appraised by two independent reviewers in EPPI-Reviewer Web using the checklist by SIGN for systematic reviews and meta-analyses [47].

Data the evidence syntheses rated as high or acceptable quality will be extracted by two independent reviewers in EPPI-Reviewer Web on successive batches of five evidence syntheses until reaching batch-level agreement of a minimum of 85%. The remaining will be extracted by one of the reviewers above. Data extracted will include:

i. **Evidence syntheses characteristics:** e.g., publication year, type of synthesis, date of literature search in the databases, categories of 'participants' assessed (humans, products, etc), categories of outcomes assessed (e.g., health, food and drinks behaviours, food environment & composition, and equity using the PROGRESS-Plus framework [44]), potential competing interests including funding sources, conflicts of interests declared, and authors' affiliations.
ii. **Policy intervention characteristics**: e.g., world regions and countries using the World Bank classification [42], policy areas assessed using the categories of the NOURISHING framework [43];

iii. **Findings:** general direction of effect for the following comparisons: mandatory vs voluntary (including PPPs) policies, mandatory alone, and voluntary alone.

Data will be synthesised by policy area and quality category. Given the nature of overviews of reviews, the topics and outcomes covered, we expect high heterogeneity between both the primary studies and the evidence syntheses. We will therefore attempt to adapt the effect direction plot developed by Thomson et al and Boon et al [48,49] to display non-standardised effects across multiple outcome domains, but at the review level rather than primary study level. These plots consider the quality or risk of bias assessment, effect direction, sample size, and calculations of p-values. However, given that this is an overview of reviews and that the types of participants can be mixed (e.g. humans and products), we are unsure whether we will be able to consider effect size and to calculate p-values for each aggregated outcome.

Part 2: In-depth data extraction and synthesis for a sample of evidence syntheses

Justification for the sampling approach

For this part, we will only select the evidence syntheses that are the most up to date, comprehensive and methodologically rigorous. This is to make the most of reviews that are the most useful (and time-efficient) to answer the research question rather than including all of them including those that are older, narrower in scope and/or of lower methodological quality, as well as to reduce study overlap as suggested in the Cochrane Handbook [47]. The judgment will be based on the Value of information approach [48] and inspired by the criteria that have been proposed by Tugwell et al [52] for deciding when and when not replicate systematic reviews (which also follow the Value of information approach).

A tool to select reviews and document the process will be developed closer in time around the characteristics below.

- **Up to date:** Publication date of the literature review as well as the policies and evaluations included, date of literature searches.
- **Comprehensiveness:** The scope of the review in terms of geographical location, types of policies, participants (or products/environments) and outcomes assessed, as well as relevance to governance.
- **Methodological rigour:** Using the quality appraisal conducted previously.

Data extraction and synthesis

Data from the evidence syntheses included in this second part will be extracted by one reviewer and verified by another using EPPI-Reviewer Web and Excel. The data extraction tool will first be piloted by two independent reviewers on a sample of papers. In addition to the information already extracted for the high-level extraction, the following will be documented:

- **Evidence syntheses characteristics**: e.g., review aim, N studies included in our analysis (which might differ from the review as a whole), study designs of primary studies, type of details provided (effect size, precision estimates).
- **Policy intervention characteristics**: e.g., N policies assessed, policy names, policy level;
- **Quality appraisal of primary studies**: summary of quality or risk of bias appraisal of primary studies and tools used. If the same appraisal tools are frequently used, the summary findings for each domain or question assessed within these tools will also be documented.
- **Findings**: data on effectiveness by category of outcomes and equity dimensions using the PROGRESS-Plus framework [44], including direction of effect, effect size and precision estimates; data relating to policy mechanisms.

We will verify potentially erroneous, missing, or contradictive information in the primary studies. Data will be synthesised in a similar manner to that of the high-level synthesis (i.e., by adapting the effect direction plot where possible). However, in this case we will also consider the category of outcomes and the direction of effects for each of them, and not just overall. This synthesis will then be compared with the high-level synthesis. Lastly, in accordance with Cochrane's guidance for overviews of reviews [50], if possible we will assess and report the level of certainty in the evidence (high, moderate, low, very low) for each outcome using the GRADE framework [50]. For this, we will extract the GRADE assessments presented in the evidence syntheses. When not available, we will attempt to conduct them using information reported in the evidence syntheses. Since randomized trials are not applicable to the topics assessed, we will also consider a few observational study designs as 'high quality' (e.g. time series analyses) and not only RCTs. This is to highlight the best quality evidence that can realistically be obtained for this topic.

Quality assurance for both parts of the overview of reviews

The quality of screening and data extraction for both parts will be ensured by:

- using the double-screening and -coding process.
- checking information in primary studies where necessary.
- conducting data cleaning verifications, such as ensuring that all the papers included in the overview have codes for each of the essential characteristics, and that they do not include contradictory codes.

Component 3: Critical interpretive synthesis of policy process factors in mandatory, voluntary and PPPs

Overview

RQ: 1,3,5

Objectives:

i. To assess how mandatory, voluntary and PPP diet-related policies work in theory and in practice (including factors influencing their development, implementation, and mechanisms of actions).
ii. To organise the results in a theoretical framework.

Modifications to the protocol submitted to NIHR in December 2020

- The synthesis method has been changed from a meta-narrative synthesis to a critical interpretive synthesis because like meta-narrative synthesis, critical interpretive synthesis is oriented towards theory-building, but it is better suited to synthesise different types of information together, including qualitative evidence, quantitative evidence, and theory.
- Data from interviews conducted before this project will be used for discussing the results rather than as results themselves.
- Given the focus on theory rather than on research results, no quality appraisal will be conducted. However, the presence of competing interests will be taken into account.

Methods

This is an evidence synthesis of theoretical information, primary studies and evidence syntheses. It will be reported using the ENhancing Transparency in REporting the synthesis of Qualitative research (ENTREQ) statement [52].

Literature search strategy and eligibility criteria

This component will start with the qualitative studies (e.g. interviews, focus groups, qualitative document analyses) included in the systematic evidence map (component 1) and the evidence syntheses included in the high-level data extraction of the overview of reviews (component 2) that will have assessed factors influencing policy development or implementation. In addition to this, publications that inform on theory such as commentaries, theoretical pieces, and discussion points in evaluations will be identified when screening the titles and abstracts and full-texts for the systematic evidence map. These will then be checked against the following inclusion criteria:

- It focuses on one or more governance approaches or mechanisms;
- It provides a theoretical perspective, findings or discussion points that explain why and how these governance approaches are developed, how they work, or it highlights factors that influence their development or implementation.

It is worth noting that the aim is not to identify every single publication that could be relevant, which would be unrealistic, but to identify those that can help addressing the research question among the publications that we have retrieved.

Data extraction

Some policy and evaluations characteristics for the research papers will already have been extracted in EPPI-Reviewer Web for the systematic evidence map and overview of reviews. Similar characteristics will be documented for the remaining publications. In addition to these, the general view of the paper towards the governance approach(es) explored (classified as being favorable, unfavorable, or neutral/balanced) will be extracted as well as the types of actors involved in the policies, information on potential competing interests (funding sources, conflicts of interests declared, and authors' affiliations), and the taxonomy used by the authors to describe the policies. Results relating to how these policies work in theory and factors affecting implementation will be documented using a framework inspired by the research questions and the framework by Cairney [53] on the contextual factors that influence public policy making (Figure 3). Our framework will be developed using a sample of papers. Data will be extracted by one reviewer in Excel. A second reviewer will independently verify 10% of the papers. For each field extracted, if an agreement rate of less than 85% is achieved, the first reviewer will revise the data extracted in the remaining papers and keep the second reviewer involved.

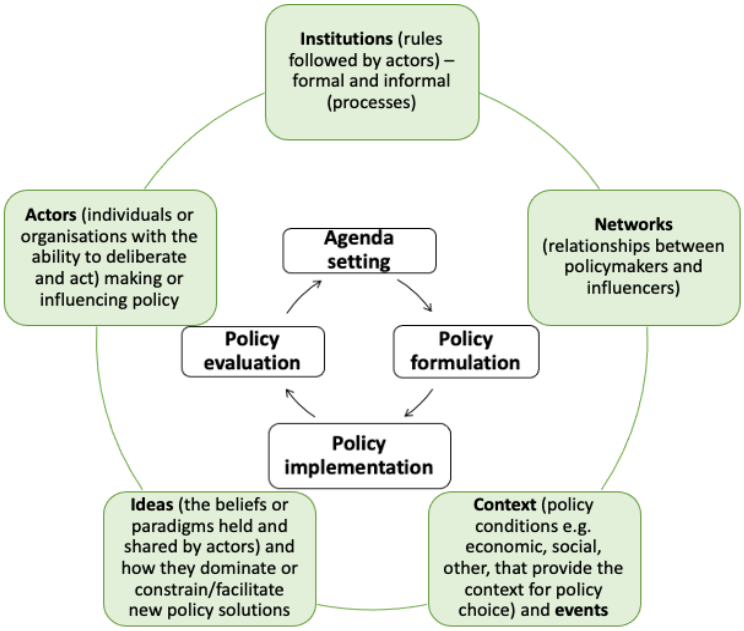


Figure 3. Framework by Cairney [53] *on contextual factors that influence public policy making*

Quality appraisal

Given the focus on theory rather than research results, no quality appraisal will be conducted. However, the presence of potential competing interests will be considered. We did consider using the Checklist for Text and Opinion by JBI [54], which is the only tool that we are aware of for appraising non-evaluation pieces. However, given that it focuses on the source of the opinion, references, and the presence of an analytical and logical process, we thought that it would not help to critically discriminate opinions pieces published in journal articles.

Data synthesis

The policy characteristics and general views about governance approaches will first be presented descriptively. A critical interpretive synthesis, originally developed by Dixon-Woods et al 2006 [55] will be employed for analysing study findings relating to the development and implementation of governance approaches. Critical interpretive synthesis comprises the development of an argument through a critical and reflexive approach to the literature, including triangulating the different types of data, and integrating evidence from across studies into a conceptual model. In our case we are building on the Risse and Börzel framework (Figure 1)[16]. A synthesising argument will be generated through detailed analysis of the evidence included in the review, analogous to the analysis undertaken in primary qualitative research.[55] Thus we will first identify themes and/or concepts in each study, systematically explore the influence of various contextual factors as reported in studies.

Component 4. Systematic review on the effectiveness of PPPs diet-related policies targeting the food environment

Overview

RQ: 4,5

Objective:

i. To assess the effectiveness of diet-related PPPs.
ii. To assess how these policies work (mechanisms of action).

Modifications to the protocol submitted to NIHR in December 2020

- This is a new proposed output, as the review of reviews does not specifically look at the effectiveness of PPPs and this was an important piece to contribute to RQ 4 and 5.

Methods

This systematic review will be reported using the Preferred Reporting Items for Systematic reviews and Meta-Analyses extension for Scoping Reviews (PRISMA-ScR) Checklist [38].

Literature search strategy and eligibility criteria

This component includes the primary studies included in the systematic evidence map (component 1) that have assessed the effectiveness of at least one PPP. To be considered as a PPP, the policies will need to either be clearly labelled as a PPP, or to clearly involve collaboration between at least one public and one private actor. In addition, the following reference lists will be checked against the eligibility criteria of systematic evidence map and for PPPs above: the studies included in this systematic review and of the evidence syntheses that will be part of the high-level data extraction in the overview of reviews and that have assessed a PPP (component 2).

Data extraction

As for the previous components, some policy and evaluation characteristics will already be extracted in EPPI-Reviewer Web for the systematic evidence map. In addition to these, we will document the potential competing interests (funding sources, conflicts of interests declared, and authors' affiliations), types of actors involved in the policy, the policy timelines, results about effectiveness including effect size and precision estimates, results about the policy mechanisms, and discussion points relating to the former. Data will be extracted by one reviewer and checked by another.

Risk of bias appraisal and data synthesis

The risk of bias will be assessed by two independent reviewers using the ROBINS-I tool [56]. Data will be synthesised by type of outcome, policy area using the NOURISHING framework [43], and study type. Given the nature of this research, the likelihood of having sufficient homogeneity across quantitative studies in order to perform statistical pooling is limited, however we will do so should it be possible. In order to synthesise heterogeneous evidence of intervention impacts on dietary health or on determinants of dietary health, we will adapt the effect direction plot developed by Thomson et al and Boon et al [48,49] to display non-standardised effects across multiple outcome domains. Heterogeneity in direction of effects between studies will be investigated and transparently reported, as will reflections on the limitations of the synthesis.

Summary of findings and evidence claims

We will determine the level of certainty in the evidence (high, moderate, low, very low) for each outcome using the GRADE framework [50]. The GRADE framework considers the risk of bias, imprecision, inconsistency, indirectness, publication bias, magnitude of effect, and dose-response gradient. However, these criteria were developed for clinical topics for which randomized controlled trials are the best source of evidence, which are not applicable to the policy topics that we will assess. Consequently, instead of reserving the 'high quality' claim for randomized trials only, which would be unfair and potentially misleading for decision-makers, we will also open it for the best quality studies that can realistically be conducted for our topics. These include:

- Pre-post time series analyses
- Potentially cohorts that involve a comparison group and data collected both before and after the policy was implemented. If this is the case, we will consider the following comparisons a) compares the policy to another policy, no policy, another state or another country; b) compares participants in a voluntary policy to non-participants; c) compares products or audience (e.g., TV audience) targeted by the policy to some not targeted by the policy. Both groups need to be part of a cohort (and not just the intervention group).

A second reviewer will conduct an independent assessment for one domain of the framework (and a minimum of 3 papers) and check broadly the use of the GRADE framework across the other different domains.

Component 5. Systematic review comparing the effectiveness of voluntary commitments by commercial actors between participants and non-participants

Overview

RQ: 4,5

Objective: To compare the effectiveness of voluntary commitments by commercial actors between participants and non-participants.

Modifications to the protocol submitted to NIHR in December 2020

- This is a new proposed output, as the review of reviews does not delve deeply into the effectiveness of voluntary commitments and this was an important piece to contribute to RQ 4 and 5.

Methods

This systematic review will be reported using the PRISMA 2020 Statement [57].

Literature search and eligibility criteria

This systematic review will include the primary studies included in the systematic evidence map (component 1) that compared the effectiveness of private voluntary commitments (as a governance mechanism) between participants and non-participants. To be qualified as a voluntary commitment, the policies will have to involve an official process for commercial actors to commit in a voluntary initiative (including PPPs), for instance by signing up or developing a pledge. Initiatives developed and implemented by a single company will be excluded. The references of the included studies will be checked against the above criteria.

Data extraction

Some policy and evaluation characteristics will already be extracted for the systematic evidence map (component 1) in EPPI-Reviewer Web. In addition to these, we will document the commitments, types of actors involved, the characteristics of the samples assessed, the policy timelines, results about effectiveness including effect size and precision estimates, and discussion points relating to the former. Data will be extracted by one reviewer and checked by another.

Risk of bias appraisal

The risk of bias will be assessed using the ROBINS-I tool [56] by two independent reviewers in EPPI-Reviewer Web on successive batches of five studies until reaching batch-level agreement of a minimum of 80% on each domain. The remaining will be extracted by one of the reviewers above.

Data synthesis

Data will be synthesized by policy area using the NOURISHING framework [43], type of outcome, and study type. Like for the previous components, given the nature of this research, the likelihood of having sufficient homogeneity across quantitative studies in order to perform statistical pooling is limited, however we will do so should it be possible. In order to synthesise heterogeneous evidence of intervention impacts on dietary health or on determinants of dietary health, we will adapt the effect direction plot developed by Thomson et al [48,49] to display non-standardised effects across multiple outcome domains. Heterogeneity in direction of effects between studies will be investigated and transparently reported, as will reflections on the limitations of the synthesis.

Summary of findings and evidence claims

We will determine the level of certainty in the evidence (high, moderate, low, very low) for each outcome using the GRADE framework [50] the same way as for the scoping review on the effectiveness of PPPs (component 4), i.e., the study designs below will have the possibility to be classified as high confidence. A second reviewer will conduct an independent assessment for one domain of the framework (and a minimum of 3 papers) and check broadly the use of the GRADE framework across the other different domains.

- Pre-post time series analyses
- Potentially cohorts that involve a comparison group and data collected both before and after the policy was implemented. If this is the case, we will consider the following comparisons a) compares the policy to another policy, no policy, another state or another country; b) compares participants in a voluntary policy to non-participants; c) compares products or audience (e.g., TV audience) targeted by the policy to some not targeted by the policy. Both groups need to be part of a cohort (and not just the intervention group).

Component 6. Systematic review on the cost-effectiveness of diet-related policies targeting the food environment

Overview

RQ: 5,6

Objectives:

i. To assess the cost-effectiveness of M-V-PPP diet-related policies.
ii. To identify factors that make some interventions more cost-effective than others.

Modifications to the protocol submitted to NIHR in December 2020

- The first version of the protocol mentioned that either a systematic review of primary studies or an overview of reviews would be conducted depending on the studies available. We can now confirm that this will be a systematic review.
- Given the very small number of primary studies found, additional searches in MEDLINE specific to some policy areas were conducted to verify whether relevant papers have been missed.
- The CHEERS checklist will be used to report the results of the review rather than for appraising its quality since it is a reporting checklist. The Drummond checklist will be used for rating the quality.

Methods

This systematic review will include primary studies assessing the cost-effectiveness of policies. It will be reported using the Consolidated Health Economic Evaluation Reporting Standards (CHEERS) statement [58].

Literature search strategy and eligibility criteria

This systematic review will include the primary studies included in the systematic evidence map (component 1) that assessed the cost-effectiveness of policies. Additionally, given the very small number of studies retrieved, two additional searches in MEDLINE (Ovid) were conducted to examine whether eligible studies could have been missed. If more than one will be identified in each search, similar searches will be conducted for the other policy areas (with a sensitive approach or not depending on the number of additional studies found in both searches). This included a very comprehensive and sensitive search on front-of-pack labelling largely based on the search conducted by Croker et al [59], and a less sensitive search on fat, salt and sugar reformulation. These two topics were chosen because they might have been less well captured by the literature search in the databases given the focus of the search on governance, compared for instance with taxes which are

automatically seen as mandatory and were therefore not combined with terms relating to governance. The two extra searches are presented in Appendix 3. Lastly, the references of the included studies will be checked.

Data extraction

Some policy and study characteristics will already be extracted for the systematic evidence map. In addition to these, we will document the target population and subgroups, study perspective, comparators, time horizon, discount rate, types of health outcomes assessed, measurement of effectiveness, types of costs considered (e.g., healthcare, productivity, other sectors), choice of model, analytical methods, results (e.g., study parameters, incremental costs and outcomes) as well as key study findings and the conclusion reached, following the CHEERS checklist. Cost estimates will be inflated and/or converted, when necessary, using country-specific Gross Domestic Product (GDP) deflator index and Purchasing Power Parity exchange rates. Data will be extracted by one reviewer and checked by another.

Quality appraisal and data synthesis

The quality of the studies will be assessed using the Drummond checklist [60] by two independent reviewers. Data will be presented in a descriptive manner. Measures of costs and cost-effectiveness will be summarised by policy area using the NOURISHING framework and by considering the quality appraisal. If feasible, outcome estimates from comparable studies will be pooled in a random-effect model meta-analysis to characterise average intervention impacts.

Component 7. System map

Overview

RQ: 7

Objectives

1. To integrate the findings into a system map

Modifications to the protocol submitted to NIHR in 23 December 2021

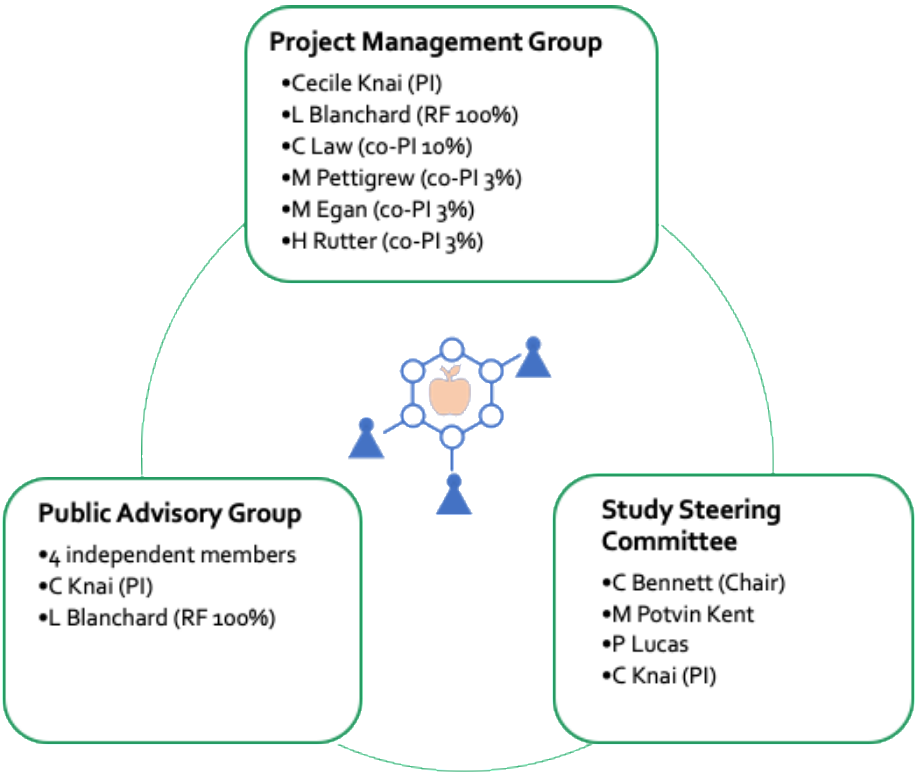
- Originally, we had planned for an in-person meeting with approximately 50 participants, and then a set of more focused online meetings, with fewer people in each meeting, due to COVID.
- Upon reflection a meeting with key stakeholders will not shape the findings and so engagement with stakeholders is now being moved to our Dissemination strategy.

Integration of findings into a system map

The notion of a system is a heuristic, a conceptual tool used to examine a complex issue. Thus a systems approach is a lens, a way of thinking, a way of conceptualising and thinking through a problem. A systems approach theorises that the behaviour of an element in the system depends on other conditions in the system, rather than the mechanisms or characteristics of that specific element alone.[1] Systems analysis of complex problems can be conducted in a range of ways, from using a systems' lens to conceptualise a problem, to specific systems methods.[2-3] It can lead to a practical illustration (most often through a system map) [4] of the complexity of pathways of impact, how different factors interact, and leverage points for change which may not appear in linear logic models or traditional theories of change as well as potential unintended consequences of an intervention.[2-3] We will use an approach tested by Knai et al 2018 to construct a system map of how the Public Health Responsibility Deal (a public private partnership in England) functioned, drawing on data generated by all components of the evaluation.[5]

Project management and governance

Figure 4. Project management and governance



Management Committee

Cecile Knai is responsible for the management and delivery of the work. The Head of Department sponsors this research and is Professor Ellen Nolte, Head of the Department of Health Services and Policy, London School of Hygiene & Tropical Medicine.

- Dr Cécile Knai (25% FTE) is the PI and provides scientific leadership and project oversight at all stages of the review. She provides expertise in food and nutrition policy, population interventions, voluntary agreements, and systematic reviews.
- Laurence Blanchard is a full-time (100%) Research Fellow on the project with expertise in conducting systematic reviews, and with a background in food and nutrition. Laurence leads the day to day work, and has designed much of the protocol.
- Dr Cherry Law, Research Fellow, LSHTM (10% FTE) brings expertise in health economics, economic evaluation of food / diet interventions. Cherry leads the review of relevant economic evaluations, and ensures that cost considerations are reflected throughout the research.
- Professor Mark Petticrew, Professor of Public Health Evaluation, LSHTM (3% FTE) brings expertise in systematic reviews (quantitative meta-analyses), policy evaluation, voluntary agreements and will use his time to critically contribute to the literature review and dissemination strategies throughout the project.
- Professor Harry Rutter, Professor of Global Public Health, University of Bath (3% FTE) bring expertise in food and nutrition, and national policy engagement and will use his time to critically contribute to the literature review and dissemination strategies throughout the project.

- Dr Matt Egan, Associate Professor, LSHTM (3% FTE) brings expertise in systematic reviews, and local policy engagement, and will use his time to critically contribute to the literature review and dissemination strategies throughout the project.
- Christine Rivett-Carnac is the project administrator, LSHTM (10% FTE) and supports with project administration and financial reporting.

The co-PIs form a Management Committee which meets monthly throughout the project to critically assess process, progress, deadlines and outputs. These Management Committee meetings are minuted to keep a record of tasks, deadlines and responsibilities.

Study Steering Committee

A Study Steering Committee contributes to shaping the conduct of the research, and the dissemination and translation of the research findings in various forums applicable to different publics. The Study Steering Committee will meet 3-4 times during the project. The PI represents the Management Committee on the Study Steering Committee, and will be sharing progress and any issues arising for advice and guidance.

Table 3. Composition of the Study Steering Committee

Title	First Name	Last Name	Job Title	Name of institution	Membership Type	Independent
Ms	Claire	Bennett	Senior Public Health Manager (Food and Health)	Greenwich Borough	Chair	Yes
Dr	Monique	Potvin Kent	Associate Professor	University of Ottawa	Member	Yes
Dr	Patricia	Lucas	Reader, Child Health Research	University of Bristol	Member	Yes
Dr	Cecile	Knai	Associate Professor of Public Health Policy	London School of Hygiene & Tropical Medicine	Member	No

Public Advisory Group (PPI component)

A Public Advisory Group has been established. It comprises 4 members of the public recruited from the People in Research (NIHR supported) programme. The main objectives of the PAG are to 1) provide a public view on the research (methods, results, dissemination) 2) provide their input on the role of the public in policies to improve diet in England and how this is reflected in our research. A first meeting took place in October 2020.

Ethics / Regulatory Approvals

The desk-based review of the literature will not in and of itself require ethics approval as it is drawn solely on evidence already in the public realm.

The final stakeholder meetings will require ethics approval from the LSHTM Research Ethics Committee. **Approval has been granted, however a change in protocol has moved stakeholder engagement to part of the Dissemination plan**.

Process for any stakeholder meetings as part of the Dissemination of findings: We will be inviting participants by email to which we will attach (1) an information sheet outlining the aims of the project, the scope and purpose of the activity, and their rights as participants, including confidentiality, anonymity, and withdrawal from the project; and (2) a detailed agenda. Once they have agreed to participate, participants will be asked to sign a consent form at the beginning of the meetings.

In terms of data management, lists of participants will be collected only for administrative purposes i.e., in order to contact those who have agreed to take part, to give them information about participating and the logistics for attending the meeting e.g. time and place. The lists of participants will consist of their first and second names, plus a method of contact i.e., an email address or phone number. These lists will be stored on password protected computers at LSHTM. Audio recordings will be taken (with the consent of participants) using an encrypted digital recorder, held as encrypted files on the LSHTM computer system, and shared (as encrypted files) with a professional transcription company (Way with Words), directly as uploaded files onto their system. The returned transcripts require password access, and are then password protected once received as Word files at LSHTM.

There is no anticipated physical or psychological discomfort or distress expected with participation of policymakers, experts, or the public in this research. As there will be diverse participants, the sensitivity of experience and information shared is acknowledged, however as the topic of discussions are not designed to touch on any specific personal issues, and so it is not foreseen that there will be any disadvantage to particular participants. All individuals and their diverse perspectives and positions will be respected and catered for during the research process.

Dissemination, Outputs and anticipated Impact

We are planning a series of peer-reviewed publications, policy reports and conference presentations on the literature review findings. Policy and practice recommendations will be formulated for improving the design and delivery of population intervention to improve diet in England, and specifically any recommended alterations to existing policies, how much they might cost, and how cost effective they are estimated to be. An important impact of this research will be to engage a range of stakeholder in discussions about population interventions, and the ways in which they should be involved, including members of the public.

We will work to identify the opportunities for dissemination with greatest impact. This specifically refers to engaging our Steering Committee on the above questions and using existing networks at national and local level, with practitioners and the public, to explore the most appropriate and effective form of, and venues or forums for, dissemination.

This can include hosting several small online meetings to present the findings of the evidence review with a group of key stakeholders, and discuss recommendations for strategies for better population interventions on diet in England, drawing on the evidence review findings, seeking informed perspectives on how to translate review findings into actionable recommendations for policy and practice. We will aim to co-formulate solutions to the design, implementation and other challenges identified in the literature review.

Existing networks and stakeholders include (but are not limited to) the Executive Members of the NIHR School for Public Health Research, the Equal North network of practitioners and researchers addressing health and social inequalities, which will be expanding into an NIHR SPHR funded 'Equal England' network over the next 18 months (ME co-leads that project); the Office for Health Improvement and Disparities (CK/MP have contacts there and specifically individuals involved in salt and sugar reduction programmes, and more widely exploring engaging with the food industry); the Department of Health and Social Care (e.g., those involved in designing the Childhood Obesity Programme, and in the Soft Drink Industry Levy); the Department of Education (e.g., those involved in the School Food Standards); Local Authority representatives (e.g., the Local Government Association, and public health departments at local authority level); National Institute for Health and Care Excellence (NICE) team on diet, nutrition and obesity; The Local Government Association team on public health issues; researchers on diet and diet interventions in England – who have conducted evaluations (including cost-evaluations) of population interventions for England (e.g., the Centre for Diet and Activity Research (CEDAR) at the University of Cambridge)

A stakeholder meeting would include presentation of the summary of findings, Highlight what they feel are priority issues emerging from the systematic review; Discuss strategies for change of those identified issues; Explore change readiness of institutions, in the current political and economic context – what might be trade-offs, what might be long-term opportunities where immediate change is deemed too difficult; Explore the level at which the public should be consulted, and specifically how to more effectively be involved in priority setting, defining research outcomes, and selecting methods and approaches to best improve diet in England; Translate ideas for meaningful application into a 'prototype' of what a modified intervention might look like.

Appendices

Appendix 1: Eligibility criteria for the whole review

The coding tool presented below is intended to be used in the order presented, e.g., studies must pass EXCL 1 in order to being assessed for EXCL 2.

EXCLUSION CODE	INCLUDED	EXCLUDED
EXCL 1: Before 2010	Published from 2010 and onwards	Published before 2010
EXCL 2: After 2020	Published until 2020	Published after 2020
EXCL 3: Not diet / Not food environment / Excluded diet topics	Policies that… - Targets "ordinary" food, e.g. as in the Eatwell guide (NHS 2019)*; AND - Aims to impact the food ENVIRONMENT of a public space (i.e., physical, social and economic access to food and drinks, marketing and advertising, product and vendor properties); AND - Aims to address the main dietary risk factors associated with the burden of disease in England * Baby formulas are considered as "normal food".	- Not diet-related, not targeting ordinary food, e.g., "natural" products, supplements, alcohol, functional foods, gluten free, GMOs, sweeteners, ingredients not intended to be sold to the general public (e.g., emulsifiers); - Not on the food environment, e.g., education campaigns and interventions, clinical or therapeutic interventions, interventions targeting individuals in an environment rather than the whole environment; - Energy drinks when about their interaction with alcohol or caffeine content (more of a safety issue). INCLUDE when considered as food; - Food security, undernutrition, or double/triple burden of malnutrition, e.g., feeding/supplementation programmes, IYCF for undernutrition, vouchers, cash-transfer programmes, food and milk banks & other food redistribution programmes, international food aid or assistance EXCEPT universal school and nursery meals which are all INCLUDED since they are considered as food policies modifying the environment for everyone. - Food fortification, health claims, breastfeeding; - Food safety, hygiene, allergies, accuracy of nutrition values on labelling; - Agriculture and farming as a primary focus rather healthy diet (e.g. involving local farms in schools to support the latter rather than to improve health); - International trade (e.g. exports/imports), finance, regulation of free markets, customs duties; - General taxes (e.g. sales taxes not specific to food, taxes on income), tax evasion, service charge; - Food sustainability as a primary focus rather than healthy diet (e.g. research on organic products, climate change or animal welfare not aiming to improve diet directly); - About research collaboration as a topic; - Historic research (about before 2000).
EXCL 4: Not general population	The policies aim to improve the health of the general public, including:	The policy only targets: - Staff in a workplace;

EXCLUSION CODE	INCLUDED	EXCLUDED
(e.g., specific for staff, athletes or patients only)	- The general public in a workplace, e.g., clients in a restaurant, visitors in a hospital canteen; - Children in schools and nurseries.	- Patients or people with specific health conditions; - Athletes; - The army.
EXCL 5: Not policy in place nor real-life setting	1. Evaluations in real-life settings AND - Assessing policies that have been implemented or implemented then revoked; OR - Doing a retrospective analysis (what happened) about the process of a policy that has been adopted, dropped, or was nearly adopted; OR - Projecting and simulating outcomes for policies that are already in place; OR 2. Results of governmental/public consultations.	- Experiments in non-real-life environment, e.g., online experiments or experiments in laboratories testing different food labels; - Policies not adopted yet (e.g., simulation or projection using data before a policy is implemented, research initiatives e.g., a trial testing a new approach developed for the trial that is not a state/national/international policy); - Evidence syntheses that mainly include the two points above and do not distinguish their results from those of real-world policies in their synthesis (e.g. using subgroup analyses). - Only presents or uses data that was collected before the policy was adopted or implemented.
EXCL 6: Not int'l/ national/state POLICY	Policies implemented at the: - Supra/international level; - National level; - Provincial/state level; - Anywhere from the UK.	Policies implemented at a lower level than the state (except in the UK in which case all levels are INCLUDED).
EXCL 7: Not int'l/ national/ state EVALUATION	Evaluations conducted: - At a state, national or international level - In the UK (any level); - Not at a state level but in a big part of a country, or in multiple places across a country or state; - Audits of food products, shops and TV advertising can also be conducted at any level including local if they involved large companies.	Evaluations conducted: - At a lower level than the state, e.g., city or a few institutions not selected to represent a state or more, or in rural areas only; - In one or several locations but these are not major places across the country, e.g., 2 schools in different regions.
EXCL 8: Not evaluation or eligible evidence synthesis	- Primary research evaluations - Evidence syntheses that have searched at least 2 databases, mention eligibility criteria, and clearly indicate which studies are included (e.g., in a table, series of references at the start of the results section or within each section without needing to track down each reference to make the whole list).	- Reviews that do not meet the inclusion criteria for evidence syntheses; - Theoretical papers, commentaries, viewpoints, editorials, letters; - Conference abstracts, dissertations, theses; - Websites, blogs, podcasts, book reviews, book chapters; - Study protocols, working papers, pre-prints.

EXCLUSION CODE	INCLUDED	EXCLUDED
EXCL 9: Not (cost)effectiveness or policy process	Studies assessing: - effectiveness or cost-effectiveness of a policy; - how a policy was developed; - factors affecting the implementation of a policy; - the mechanisms of action of a policy Studies assessing the views of the general public in the UK as well as governmental/public consultations pass this criterion.	- Only provides an inventory or description of policies implemented in one or more countries (i.e., policy maps); - Studies benchmarking different policies against some criteria
EXCL 10: Views from the general public outside the UK and consultations	- All primary studies not assessing the views of the general public; - Evidence syntheses and comparative studies that consider policy governance approaches in their analysis; - Evidence syntheses and comparative studies that only include policies implemented or that analyse these separately (may include a very small amount of non-eligible primary studies or policies if these are unlikely to influence the results).	- Studies assessing the views of the general public (except in the UK and in state or national government consultations in which case they are INCLUDED);
EXCL 11: Overviews of reviews	- Primary studies; - Evidence syntheses of primary studies (may also include very few overviews of reviews).	- Evidence syntheses of systematic reviews and other types of literature reviews (i.e., overview of reviews, also called 'umbrella reviews').
Duplicate	Documents that are not identical.	Identical documents (only keep one of them).
INCLUDE	Publications passing ALL the exclusion criteria above	Publications failing at least one of the exclusion criteria above.

Appendix 2: Search strategy for the whole evidence synthesis

1.1 Search structure and explanations

The search strategy will include five key lines (in green) and an additional three (in pink) for databases that use MeSH terms. They are built around the concepts below. Exclusion keywords will then be added.

➔ Diet + Actor + Policy + Governance (i.e., Mandatory-Voluntary-PPP)

Numerous individual keywords, MeSH terms, truncations and Boolean terms were tested individually and/or combined with other terms to verify their scope. For instance, the word "Act" was considered to identify policies but discarded because of its omnipresence due to the verb "to act". "Menu", "Portion size" and "serving size" were added to capture policies on these that are not described in titles and abstracts using food or nutrient terms. Regarding truncation, tax* was removed because it also includes "taxa", which is highly used in the biochemistry literature. Instead, we will be using tax, taxes, taxed, taxation and taxing. The use of AND vs ADJ5, as well as ADJ5 vs ADJ4 were also compared to verify what they include and exclude and therefore balance sensitivity with precision. The platform Web of Science does not use MeSH or thesaurus terms and produces several thousands of results. Therefore, only free terms can be excluded with "NOT", which is not sufficient. To help reducing the number of irrelevant papers about agriculture, microbiology, genetics and pharmacology, we will select the relevant fields using the Web of Science categories (e.g., any category about health, food, social sciences; not engineering nor agriculture.

Keywords related to: Diet

1. Diet free terms
2. Diet MeSH
3. 1 OR 2 (Diet terms & MeSH)

Keywords related to: Mandatory policies or PPP + Diet

4. MeSH Food Legislation
5. Law free terms ADJ5 1
6. (~~Legislation MeSH or~~ Tax MeSH or Fiscal policy MeSH) AND 3
7. (PPP free terms or MeSH) AND 3

Keywords related to: Diet-related policies + Governance

8. Governance free terms.mp
9. Governance MeSH terms

10. (MeSH Nutrition Policy OR MeSH food Labelling) OR MeSH Food Assistance AND (8 or 9)

Keywords related to: Actors + Policy + Governance + Diet

11. Government free terms
12. Government MeSH terms
13. Industry free terms
14. Industry MeSH terms
15. Policy free terms
16. Policy-Making MeSH

17. (11 or 12 or 13 or 14) AND (15 or 16) AND (8 or 9) AND 3

18. (13 adj5 partnerships free terms) AND 3

19. “policy option or policy options” AND 3

Combining the eight strategies

20. **4 or 5 or 6 or 7 or 10 or 17 or 18 or 19**

Keywords excluded

21. exp Pharmacology
22. exp Food safety/
23. exp Hygiene/
24. exp Food hypersensitivity
25. exp genetics/ or exp toxicology/
26. exp cell physiological phenomena/ or exp genetic phenomena/ or exp microbiological phenomena/
27. exp heterocyclic compounds/ or exp polycyclic compounds/ or exp macromolecular substances/ or exp "hormones, hormone substitutes, and hormone antagonists"/ or exp "enzymes and coenzymes"/ or exp "nucleic acids, nucleotides, and nucleosides"/ or exp complex mixtures/ or exp biological factors/ or exp "biomedical and dental materials"/
28. (Cell* or mitochondr* or enzym* or mononucl* or nucle* or reductase or molecul* or oxydat* or oxidase or homeostas* or overexpress* or phenotype* or embryo* or transcriptom* or PCR or RNA or gene or genes or genetic* or ((calcium or salt or sodium) adj2 ion)).mp
29. exp animals/ not humans/
30. 22 or 23 or 24 or 25 or 26 or 27 or 28 or 29…. and additional relevant terms
31. 21 NOT 31
32. From 2000 - current

1.2 Search strategy in MEDLINE (Ovid)

The eight key search lines are identified in green (five key lines) and pink (three additional lines depending on MeSH terms availability in each database) as in Appendix 2.1.

1	exp Diet/
2	exp Food/
3	beverages/ or exp artificially sweetened beverages/ or exp carbonated beverages/ or exp coffee/ or exp drinking water/ or exp energy drinks/ or exp "fruit and vegetable juices"/ or exp milk/ or exp milk substitutes/ or exp sugar-sweetened beverages/
4	exp Fruit/
5	exp Vegetables/
6	exp Sodium, Dietary/
7	exp Sugars/
8	exp Fats/
9	exp Dietary Fiber/
10	exp Portion Size/ or exp Serving Size/
11	exp Infant Food/ or exp Infant Formula/
12	(Diet or Nutrition or Food or foods or Snack or snacks or Drink or drinks or Beverage* or Soda or sodas or Fruit or fruits or Vegetable* or Salt or Sodium or Sugar* or Fat or fats or fatty acids or TFAs or Fibre or fibres or fiber or fibers or "Portion size*" or "Serving size*" or Menu or menus or Infant formula or infant formulas or baby formula or baby formulas or baby milk or infant milk or artificial milk or breastmilk substitute* or breast milk substitute*).ti,ab.
13	1 or 2 or 3 or 4 or 5 or 6 or 7 or 8 or 9 or 10 or 11 or 12 ***[Food free + MeSH terms]***
14	exp Legislation, Food/ ***[semi-final line 1; for food policies that are clearly mandatory]***
15	(Law or laws or Legislat* or Regulat* or Decree or "Executive order" or Tax or taxes or taxation or taxed or taxing or Levy or levies or levied or "Excise duty" or "fiscal policy" or "fiscal policies" or "fiscal measure" or "fiscal measures").ti,ab. ***[terms related to policies that are mandatory]***
16	((Law or laws or Legislat* or Regulat* or Decree or "Executive order" or Tax or taxes or taxation or taxed or taxing or Levy or levies or levied or "Excise duty" or "fiscal policy" or "fiscal policies" or "fiscal measure" or "fiscal measures") adj5 (Diet or Nutrition or Food or foods or Snack or snacks or Drink or drinks or Beverage* or Soda or sodas or Fruit or fruits or Vegetable* or Salt or Sodium or Sugar* or Fat or fats or fatty acids or TFAs or Fibre or fibres or fiber or fibers or "Portion size*" or "Serving size*" or Menu or menus or Infant formula or infant formulas or baby formula or baby formulas or baby milk or infant milk or artificial milk or breastmilk substitute* or breast milk substitute*)).ti,ab. ***[semi-final line 2; 15 adj5 12, for policies that are mandatory + food free terms]***
17	exp Fiscal Policy/ or exp Taxes/
18	exp Government Regulation/
19	17 or 18 ***[MeSH terms associated with policies that are mandatory or about governance]***
20	19 and 13 ***[semi-final line 3; MeSH policies that are mandatory + food]***
21	("Public-private partnership*" or "Responsibility Deal").mp. ***[terms clearly related to PPPs]***
22	exp Public-Private Sector Partnerships/
23	21 or 22 ***[free key words + MeSH clearly about PPP]***
24	23 and 13 ***[semi-final line 4; clearly PPP + food]***
25	(Mandatory or Compulsory or Obligat* or obliged or Voluntary or Option* or Non-compulsory or Non-mandatory or Non-obligatory or Public-Private).mp. ***[terms related to governance]***
26	exp Mandatory Reporting/ or exp Mandatory Programs/
27	exp Voluntary Programs/

28 25 or 26 or 27 ***[free and MeSH terms related to governance]***

29 exp Nutrition Policy/

30 exp Food Labeling/

31 exp Food Assistance/

32 29 or 30 or 31 ***[policies that are clearly about food]***

33 28 and 32 ***[semi-final line 5; governance + food-related policies]***

34 (Government* or Governance or Minist* or Senate or ((National or federal or state or provincial) adj (department or agency or institute))).ti,ab. ***[free words related to the national or state public sector]***

35 government/ or exp federal government/ or exp government agencies/ or exp state government/

36 (Industry or industries or Private or Business* or Public-private or Company or companies or Corporat* or Multinational* or Vendor* or Retail* or Shop or shops or Store or stores or supermarket* or Restaura* or Broadcaster*).ti,ab. ***[free terms related to relevant private sectors]***

37 exp Food-Processing Industry/ or exp Food Industry/

38 exp Restaurants/

39 exp Food Services/

40 34 or 35 or 36 or 37 or 38 or 39 ***[free and MeSH terms about the public and private sectors]***

41 (Policy or policies or Plan or Strategy or strategies or Standard or standards or Scheme* or Program* or Guide or guides or guidance or guidelines or Code or codes or Measure or Measures or Rulebook or Target or targets or Limit or limits or limitation or Reformulat* or Remov* or Restrict* or Prohibit* or Ban or bans or banned or Label* or Population intervention* or population-level intervention* or population-based intervention*).ti,ab. ***[free terms frequently used to name diet-related policies]***

42 exp Policy Making/

43 41 or 42 ***[free and MeSH terms about policy]***

44 13 and 28 and 40 and 43 ***[semi-final line 6; food + governance + public/private actors + policy]***

45 (Agreement* or Alliance* or Coalition* or Collaboration or Cooperation or "Joint deliver*" or Partnership* or Pledge* or Self-regulat*).ti,ab. ***[free terms related to partnership]***

46 ((Agreement* or Alliance* or Coalition* or Collaboration or Cooperation or "Joint deliver*" or Partnership* or Pledge* or Self-regulat*) adj5 (Industry or industries or Private or Business* or Public-private or Company or companies or Corporat* or Multinational* or Vendor* or Retail* or Shop or shops or Store or stores or supermarket* or Restaura* or Broadcaster*)).ti,ab. ***[45 adj5 36, to identify partnerships with private actors free terms]***

47 46 and 13 ***[semi-final line 7; partnerships with private actors + food]***

48 ("policy option" or "policy options").mp.

49 48 and 13 ***[semi-final line 8; policy options + food]***

50 14 or 16 or 20 or 24 or 33 or 44 or 47 or 49 ***[combination of the 8 strategies]***

51 exp Pharmacology/

52 exp Food Safety/

53 exp Hygiene/

54 exp Food Hypersensitivity/

55 exp Genetics/

56 exp Toxicology/

57 exp cell physiological phenomena/ or exp genetic phenomena/ or exp microbiological phenomena/

58 exp heterocyclic compounds/ or exp polycyclic compounds/ or exp macromolecular substances/ or exp "hormones, hormone substitutes, and hormone antagonists"/ or exp "enzymes and coenzymes"/ or exp "nucleic acids, nucleotides, and nucleosides"/ or exp complex mixtures/ or exp biological factors/ or exp "biomedical and dental materials"/

59 (Cell* or mitochondr* or enzym* or mononucl* or nucle* or reductase or molecul* or oxydat* or oxidase or homeostas* or overexpress* or phenotype* or embryo* or transcriptom* or PCR or RNA or gene or genes or genetic* or ((calcium or salt or sodium) adj2 ion)).mp.

60 exp animals/ not humans/

61 exp Animal Experimentation/

62 exp Hydrocarbons/

63 exp Forensic Genetics/

64 exp pharmacologic actions/

65 exp plant extracts/ or exp prescription drugs/

66 exp Drug Therapy/

67 exp Biopharmaceutics/

68 51 or 52 or 53 or 54 or 55 or 56 or 57 or 58 or 59 or 60 or 61 or 62 or 63 or 64 or 65 or 66 or 67

69 50 not 68

70 limit 69 to yr="2000 -Current"

71 exp address/ or exp bibliography/ or exp biography/ or exp collected work/ or exp collection/ or exp comment/ or exp congress/ or exp dataset/ or exp dictionary/ or exp directory/ or exp editorial/ or exp guideline/ or exp lecture/ or exp letter/ or exp news/ or exp newspaper article/ or exp overall/ or exp periodical index/ or exp video-audio media/ or exp webcast/

72 70 not 71

1.3 Articles used to test the search strategy

Especially for the testing the use of exclusion keywords with 'NOT'

Primary research

1. Allen K, Pearson-Stuttard J, Hooton W, Diggle P, Capewell S, O'Flaherty M. Potential of trans fats policies to reduce socioeconomic inequalities in mortality from coronary heart disease in England: cost effectiveness modelling study. BMJ. 2015;351:h4583.
2. Barquera S, Campos I, Rivera JA. Mexico attempts to tackle obesity: the process, results, push backs and future challenges. Obes Rev. 2013 Nov;14 Suppl 2:69-78.
3. Batis C, Rivera JA, Popkin BM, Taillie LS. First-Year Evaluation of Mexico's Tax on Nonessential Energy-Dense Foods: An Observational Study. PloS Med. 2016 13(7):e1002057.
4. Bertolo RF, Hentges E, Makarchuk MJ, Wiggins AKA, Steele H, Levin J, Grantham A, Gramlich L, Ma DWL. Key attributes of global partnerships in food and nutrition to align research agendas and improve public health. Appl Physiol Nutr Metab. 2018 Jul;43(7):755-758.
5. Buhler S, Raine KD, Arango M, Pellerin S, Neary NE. Building a strategy for obesity prevention one piece at a time: the case of sugar-sweetened beverage taxation. Can J Diabetes. 2013 Apr;37(2):97-102.
6. Cappuccio FP, Capewell S, Lincoln P, McPherson K. Policy options to reduce population salt intake. BMJ. 2011 Aug 11;343:d4995. **[not captured by the search because no abstract]**
7. Caro JC, Corvalán C, Reyes M, Silva A, Popkin B, Taillie LS. Chile's 2014 sugar-sweetened beverage tax and changes in prices and purchases of sugar-sweetened beverages: An observational study in an urban environment. PloS Med. 2018 Jul 3;15(7):e1002597.

8. Castronuovo L, Allemandi L, Tiscornia V, Champagne B, Campbell N, Schoj V. Analysis of a voluntary initiative to reduce sodium in processed and ultra-processed food products in Argentina: the views of public and private sector representatives. Cad Saude Publica. 2017 Jul 3;33(6):e00014316.
9. Cobiac LJ, Vos T, Veerman JL. Cost-effectiveness of interventions to reduce dietary salt intake. Heart. 2010 Dec;96(23):1920-5.
10. Collins M, Mason H, O'Flaherty M, Guzman-Castillo M, Critchley J, Capewell S. An economic evaluation of salt reduction policies to reduce coronary heart disease in England: a policy 44odelling study. Value Health. 2014 Jul;17(5):517-24.
11. Collins SM. Legislative perspectives on diabetes in America. Endocr Pract. 2002;8 Sppl 1:17-8. **[not captured by the search but focuses on diabetes]**
12. Cradock AL, Kenney EL, McHugh A, Conley L, Mozaffarian RS, Reiner JF, Gortmaker SL. Evaluating the Impact of the Healthy Beverage Executive Order for City Agencies in Boston, Massachusetts, 2011-2013. Prev Chronic Dis. 2015 Sep 10;12:E147.
13. Dixon J, Sindall C, Banwell C. Exploring the intersectoral partnerships guiding Australia's dietary advice. Health Promot Int. 2004 Mar;19(1):5-13.
14. Durand MA, Petticrew M, Goulding L, Eastmure E, Knai C, Mays N. An evaluation of the Public Health Responsibility Deal: Informants' experiences and views of the development, implementation and achievements of a pledge-based, public-private partnership to improve population health in England. Health Policy. 2015 Nov;119(11):1506-14.
15. Dutton DJ, Campbell NR, Elliott C, McLaren L. A ban on marketing of foods/beverages to children: the who, why, what and how of a population health intervention. Can J Public Health. 2012 Mar-Apr;103(2):100-2. PubMed PMID: 22530530. **[not captured by the search. The '/' seems to be problematic – Ovid doesn't see 'foods' and 'beverages' as separate terms]**
16. Elbel B, Mijanovich T, Kiszko K, Abrams C, Cantor J, Dixon LB. The Introduction of a Supermarket via Tax-Credits in a Low-Income Area. Am J Health Promot. 2017 Jan;31(1):59-66. doi: 10.4278/ajhp.150217-QUAN-733. Epub 2016 Nov 18.
17. Fernandez MA, Desroches S, Marquis M, Turcotte M, Provencher V. Facilitators and barriers experienced by federal cross-sector partners during the implementation of a healthy eating campaign. Public Health Nutr. 2017 Sep;20(13):2318-2328.
18. Fernandez MA, Desroches S, Turcotte M, Marquis M, Dufour J, Provencher V. Factors influencing the adoption of a healthy eating campaign by federal cross-sector partners: a qualitative study. BMC Public Health. 2016 Aug 30;16:904.
19. Godin KM, Hammond D, Chaurasia A, Leatherdale ST. Examining changes in school vending machine beverage availability and sugar-sweetened beverage intake among Canadian adolescents participating in the COMPASS study: a longitudinal assessment of provincial school nutrition policy compliance and effectiveness. Int J Behav Nutr Phys Act. 2018 Nov 27;15(1):121.
20. Grabovac I, Hochfellner L, Rieger M, Jewell J, Snell A, Weber A, Stüger HP, Schindler KE, Mikkelsen B, Dorner TE. Impact of Austria's 2009 trans fatty acids regulation on all-cause, cardiovascular and coronary heart disease mortality. Eur J Public Health. 2018 Oct 1;28(suppl_2):4-9.
21. Harris DM, Seymour J, Grummer-Strawn L, Cooper A, Collins B, DiSogra L, Marshall A, Evans N. Let's move salad bars to schools: a public-private partnership to increase student fruit and vegetable consumption. Child Obes. 2012 Aug;8(4):294-7.
22. He FJ, Brinsden HC, MacGregor GA. Salt reduction in the United Kingdom: a successful experiment in public health. J Hum Hypertens. 2014 Jun;28(6):345-52.
23. Kraak VI, Story M, Wartella EA. Government and school progress to promote a healthful diet to American children and adolescents: a comprehensive review of the available evidence. Am J Prev Med. 2012 Mar;42(3):250-62.

24. Kerins C, McSharry J, Hayes C, Perry IJ, Geaney F, Kelly C. Barriers and facilitators to implementation of menu labelling interventions to support healthy food choices: a mixed methods systematic review protocol. Syst Rev. 2018 Jun 23;7(1):88.
25. Knai C, James L, Petticrew M, Eastmure E, Durand MA, Mays N. An evaluation of public-private partnership to reduce artificial trans fatty acids in England, 2011-16. Eur J Public Health. 2017 Aug 1;27(4):605-608.
26. Lehmann U, Charles VR, Vlassopoulos A, Masset G, Spieldenner J. Nutrient profiling for product reformulation: public health impact and benefits for the consumer. Proc Nutr Soc. 2017 Aug;76(3):255-264.
27. Miller GF, Sliwa S, Brener ND, Park S, Merlo CL. School District Policies and Adolescents' Soda Consumption. J Adolesc Health. 2016 Jul;59(1):17-23.
28. Moore SG, Donnelly JK, Jones S, Cade JE. Effect of Educational Interventions on Understanding and Use of Nutrition Labels: A Systematic Review. Nutrients. 2018 Oct 4;10(10). pii: E1432.
29. Nakamura R, Mirelman AJ, Cuadrado C, Silva-Illanes N, Dunstan J, Suhrcke M. Evaluating the 2014 sugar-sweetened beverage tax in Chile: An observational study in urban areas. PLoS Med. 2018 Jul 3;15(7):e1002596.
30. Flaherty M, Flores-Mateo G, Nnoaham K, Lloyd-Williams F, Capewell S. Potential cardiovascular mortality reductions with stricter food policies in the United Kingdom of Great Britain and Northern Ireland. Bull World Health Organ. 2012 Jul 1;90(7):522-31.

Literature reviews

1. An R. Effectiveness of subsidies in promoting healthy food purchases and consumption: a review of field experiments. Public Health Nutr. 2013 Jul;16(7):1215-28.
2. Brownell KD, Farley T, Willett WC, Popkin BM, Chaloupka FJ, Thompson JW, Ludwig DS. The public health and economic benefits of taxing sugar-sweetened beverages. N Engl J Med. 2009 Oct 15;361(16):1599-605.
3. Campos S, Doxey J, Hammond D. Nutrition labels on pre-packaged foods: a systematic review. Public Health Nutr. 2011 Aug;14(8):1496-506.
4. Deliens T, Van Crombruggen R, Verbruggen S, De Bourdeaudhuij I, Deforche B, Clarys P. Dietary interventions among university students: A systematic review. Appetite. 2016 Oct 1;105:14-26.
5. Hashem KM, He FJ, MacGregor GA. Systematic review of the literature on the effectiveness of product reformulation measures to reduce the sugar content of food and drink on the population's sugar consumption and health: a study protocol. BMJ Open. 2016 Jun 9;6(6):e011052.
6. Hyseni L, Bromley H, Kypridemos C, O'Flaherty M, Lloyd-Williams F, Guzman-Castillo M, Pearson-Stuttard J, Capewell S. Systematic review of dietary trans-fat reduction interventions. Bull World Health Organ. 2017 Dec 1;95(12):821-830G.
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Thow AM, Jan S, Leeder S, Swinburn B. The effect of fiscal policy on diet, obesity and chronic disease: a systematic review. Bull World Health Organ. 2010 Aug 1;88(8):609-14.

Appendix 3: Additional literature searches for the systematic review on cost effectiveness

Front-of-pack labelling

Ovid MEDLINE(R) and Epub Ahead of Print, In-Process, In-Data-Review & Other Non-Indexed Citations and Daily <1946 to September 22, 2021>

Search lines	N
1. food packaging.mp. or exp food packaging/	11208
2. food labelling.mp. or exp Food Labeling/	4315
3. 1 or 2	11371
4. nutritive value.mp. or exp Nutritive Value/	19684
5. 3 and 4	939
6. (label* or content* sign* or symbol or symbols or ticket* or sticker* or logo* or diet* or health* or calori* or nutri* or "daily amount*" or "recommended daily amount*" or "reference value*" or "reference intake*" or "daily value*" or "reference nutrient intake*" or "nutritive value").ti,ab.	4366351
7. 1 and 6	4722
8. (((product adj2 label*) and food*) or "front of pack*" or "food label*" or ((prepack* adj1 food*) and label*) or (("pre-pack*" adj1 food*) and label*) or (("pre pack*" adj1 food*) and label*)).ab,ti.	2392
9. (food adj1 pack*).ab,ti.	3700
10. (food* or fat* or sugar* or salt or sodium or diet* or health* or calori* or nutritio* or "daily amount*" or "recommended daily amount*" or "reference value*" or "reference intake*" or "daily value*" or "reference nutrient intake*" or snack* or eat*).ti,ab.	5222426
11. product labelling.mp. or exp Product Labeling/	2927
12. 10 and 11	1224
13. exp Food Labeling/	4150
14. ((Nutriti* or Nutrient*) adj5 (label* or content* sign* or symbol or symbols or ticket* or sticker* or warning* or vignette* or logos)).ab,ti.	1742
15. ((nutrition* information or nutrient* information) and (pack* or label* or prepack* or "pre pack*" or content* sign* or symbol or symbols or tag* or ticket* or sticker* or vignette* or logo*)).ti,ab.	504
16. (Food* label* or food* content* label* or food* content* sign* or food* content symbol* or food* content* tag* or food* content* ticket* or food* content* sticker* or food* content* logo*).ab,ti.	1424
17. ((warning adj2 octagon*) or "octagonal black system*" or WOBS or "ley de etiquetado de alimentos" or "ley de alimentos" or(Law adj2 "20.606") or "Super 8"	971

or "Nutri-score*" or "Nutri score*" or "Nutriscore*" or "Health star*" or (HSR adj3 system*) or ("traffic light*" and (label* or food* or nutri* or diet* or pack*)) or ("Warning label*" and (food* or nutri* or diet*))).ab,ti.	
18. ((keyhole or "key hole") adj5 (Nordic* or label* or sign* or symbol* or vignette*)).ab,ti. 105	
19. (N?kkelhullet or N?glehullet or Nyckelh?let or "ley del S?per Ocho" or "Ley S?per 8").ab,ti.	1
20. (("guideline daily amount*" or "nutrient reference*" or "reference intake*" or "nutrient intake*" or "daily value*") adj5 (label* or content* sign* or symbol or symbols or ticket* or sticker* or vignette* or logo*)).ab,ti.	82
21. (recommended dietary allowance* adj5 (label* or content* sign* or symbol or symbols or ticket* or sticker* or vignette* or logo*)).ab,ti.	1
22. ((Calorific or calorie* or caloric or kilojoule* or kilocalorie* or kcal* or kJ* or energy) adj5 (label* or content* sign* or symbol or symbols or ticket* or sticker* or vignette* or logo*)).ab,ti.	1681
23. (((Calorific or calorie* or caloric or kilojoule* or kilocalorie* or kcal* or kJ* or energy) adj information) and (pack* or label* or prepack* or "pre-pack*" or "pre pack*")).ab,ti.	108
24. ((fat or fats or fatty) adj3 (label* or content* sign* or symbol or symbols or ticket* or sticker* or vignette* or logo*)).ab,ti.	2039
25. ((fat or fats or fatty) adj3 (label* or symbol or symbols or ticket* or sticker* or vignette* or logo*)).ab,ti.	1990
26. 24 not 25	49
27. ((salt or sodium) adj3 (label* or symbol or symbols or tag* or ticket* or sticker* or vignette* or logo*)).ab,ti.	1066
28. (sugar* adj3 (label* or symbol or symbols or tag* or ticket* or sticker* or vignette* or logo*)).ab,ti.	694
29. (sugar* adj3 (label* or content* sign* or symbol or symbols or tag* or ticket* or sticker* or vignette* or logo*)).ab,ti.	705
30. ((Label* adj2 (legislation* or regulation* or policies or policy or law or laws)) and (food* or diet* or nutri*)).ti,ab.	455
31. ("food law" and (label* or pack* or "pre-pack*" or "pre pack*")).ab,ti.	16
32. (drink or drinks or beverage or beverages or soda or sodas or "flavored water*" or "flavoured water*" or "fruit water*" or cordial or cordials or squash or squashes or juice* or smoothie* or milkshake* or tea or teas or coffee*).ab,ti.	136203
33. 11 and 32	109
34. ((drink* or beverage*) adj2 (label or labelling or labelling or labels)).ab,ti.	82
35. ((soda or sodas or "flavored water*" or "flavoured water*" or "fruit water*" or cordial or cordials or squash or squashes or juice or juices or smoothie* or milkshake* or tea or teas or coffee*) adj2 (label or labelling or labelling or labels)).ab,ti.	12

36. 5 or 7 or 8 or 9 or 12 or 13 or 14 or 15 or 16 or 17 or 18 or 19 or 20 or 21 or 22 or 23 or 25 or 27 or 29 or 30 or 31 or 33 or 34 or 35	17027
37. limit 36 to yr="2010 - 2020" 8712	
38. Cost-Benefit Analysis/ or cost-effect*.mp. 193257	
39. cost-benefits.mp. 1034	
40. (economic and (evaluation or impacts)).mp. [mp=title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms]	43545
41. costs.mp. or exp "Costs and Cost Analysis"/	398973
42. 38 or 39 or 40 or 41	515489
43. 37 and 42	320

Salt, sugar and fat reformulation

Ovid MEDLINE(R) and Epub Ahead of Print, In-Process, In-Data-Review & Other Non-Indexed Citations and Daily <1946 to September 22, 2021>

Search lines	N
1. (Policy or policies or Plan or plans or Strategy or strategies or Standard or standards or Scheme* or Program* or Guide orguides or guidance or guidelines or Code or codes or restrict*).mp. [mp=title, abstract, original title, name of substance word,subject heading word, floating sub-heading word, keyword heading word, organism supplementary concept word, protocolsupplementary concept word, rare disease supplementary concept word, unique identifier, synonyms]	5225242
2. (reformulat* or target or targets or reduction or limit or limits or prohibit*).mp. [mp=title, abstract, original title, name ofsubstance word, subject heading word, floating sub-heading word, keyword heading word, organism supplementary conceptword, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms]	2894771
3. (ban or bans or banned).mp. [mp=title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, raredisease supplementary concept word, unique identifier, synonyms]	14739
4. (Salt or Sodium or Sugar* or Fat or fats or fatty acids).mp. [mp=title, abstract, original title, name of substance word, subjectheading word, floating sub-heading word, keyword heading word, organism supplementary concept word, protocolsupplementary concept word, rare disease supplementary concept word, unique identifier, synonyms]	1286215
5. ((Salt or Sodium or Sugar* or Fat or fats or fatty acids) adj3 (reformulat* or target or targets or reduction or limit or limits orprohibit*)).mp.	10383

6. 5 and 1	3590
7. ((Salt or Sodium or Sugar* or Fat or fats or fatty acids) adj3 (ban or bans or banned)).mp.	75
8. exp Sodium, Dietary/	16239
9. exp Sugars/	419945
10. exp Fats/	106891
11. 8 or 9 or 10	533475
12. 1 and 2 and 11	14447
13. exp Cost-Benefit Analysis/ or cost-effect*.mp.	193257
14. cost-benefit*.mp.	93907
15. (economic and (evaluation or impacts)).mp. [mp=title, abstract, original title, name of substance word, subject heading word,floating sub-heading word, keyword heading word, organism supplementary concept word, protocol supplementary conceptword, rare disease supplementary concept word, unique identifier, synonyms]	43545
16. costs.mp. or exp "Costs and Cost Analysis"/	398973
17. 13 or 14 or 15 or 16	519845
18. 12 and 17	478
19. 6 or 7	3661
20. limit 19 to yr="2010 - 2020"	2096
21. 17 and 20	134

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