

# Blueprint for halving obesity: rapid review

Effectiveness of applying standards to public sector food procurement on physical and/or behavioural outcomes relating to obesity



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## Summary table

<b>Title</b>	<a href="#">Evaluating the impact of the Healthy Beverage Executive Order for city agencies in Boston, Massachusetts, 2011-2013</a>
<b>Author and year</b>	Cradock et al. (2015)
<b>Type of study</b>	Pre-post natural experimental design
<b>Outcome variable</b>	<ul style="list-style-type: none"> <li>Beverage nutrient information (including total energy [kcal]), sugar [grams] per serving and where applicable, noncaloric sweetener type (artificial or natural noncaloric)</li> <li>Beverages (ie, brand, type, flavour, size, price) at access points on city properties, parks and recreational facilities</li> </ul>
<b>Treatment</b>	Policy called 'Healthy Beverage Executive Order' (HBEO); designed to promote access to healthy beverages; the: "executive order directed city departments to eliminate the sale of [sugar-sweetened beverages] SSBs on city property and to adhere to the City of Boston's HBEO standards in vending machines and city-managed food or beverage services programs".
<b>Control</b>	<ul style="list-style-type: none"> <li>Baseline data from the area (before the policy was implemented); and</li> <li>Data from local recreation sites not subject to the policy.</li> </ul>
<b>Magnitude of effect (Children)</b>	No information available
<b>Magnitude of effect (Adults)</b>	<p>Average beverage sugar grams and calories at access points decreased (sugar, -13.1g; calories, -48.6 kcal; <math>p &lt; .001</math>) following the implementation of the HBEO.</p> <p>Note: The outcome measure in this paper is in terms of <b>calorie availability in the environment, not calorie intake at an individual level</b>. As such, during Nesta's modelling work, we would need to convert this effect size into a calorie reduction for people's energy intake, rather than availability.</p>

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# Rapid umbrella review

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## Background

[“Unhealthy eating is the leading risk for death and disability globally. As a result, the World Health Organization \(WHO\) has called for population health interventions. One of the proposed interventions is to ensure healthy foods are available by implementing healthy food procurement policies”](#). This report relates to the impact of applying food procurement standards in the public sector (including settings such as schools, hospitals, social services, prisons, military).

## Aim

To identify and synthesise reviews that include quantitative and/or qualitative research synthesis of the effectiveness of applying standards to public sector food procurement on outcomes relating to obesity.

## Objective

To summarise the best available evidence on the impact of applying procurement standards in the public sector on energy intake or body weight.

## Methods

We aimed to identify reviews that included quantitative research synthesis (ie, meta-analysis) of the effectiveness of applying procurement standards in the public sector on outcomes relevant to calorie consumption, energy intake, weight loss or obesity. If more than one review was identified that answered our research question, we would select the review that was reflective of the best evidence, based on (a) year published and (b) best fit to the research question.

## Eligibility criteria

*Types of review.* To be eligible for inclusion, articles are required to use systematic review methodology (ie, use of systematic search and inclusion strategy to identify

all available studies) and include quantitative data synthesis (ie, meta-analysis) of multiple studies. They should be published from 2010 onwards.

If the search does not identify any studies where a meta-analysis has been conducted due to heterogeneity of outcomes of interest, we will include reviews with narrative synthesis. We will not set inclusion criteria on the number or type of databases searched.

*Participants.* To be eligible for inclusion, articles are required to examine the effect of applying standards in food procurement within the public sector. We anticipate that the resulting papers may identify subpopulations for intervention effects such as children, adults and incarcerated populations (eg, if papers relate to schools and nurseries, hospitals, prisons, military). If not, the population will be the general population. If multiple reviews are identified that split the effects of the intervention by adults and children we will then report more than one review for the research question.

*Intervention.* Reviews must synthesise interventions that aim to put standards in place about how food is procured within the public sector. Settings will include hospitals, schools, publicly-managed nurseries, social care settings (for adults and young people), and publicly-managed prisons, along with any other public sector environments where food procurement takes place.

*Comparator.* We will not restrict inclusion by the comparator group. For reviews of randomised controlled trials the comparator may be no intervention or a lower intensity intervention. For reviews of natural/quasi-experimental studies, a comparator group may be pre- versus post-interventions or may not be included.

*Outcomes.* To be eligible for inclusion, reviews must include either clinical (eg, weight, BMI, % fat change of individuals), behavioural (including, but not limited to: eating behaviour, food diaries, physical activity), or population prevalence outcomes related to obesity (eg, obesity prevalence rates). Reviews that only include measures of intentions/plans for future behaviour will be excluded due to evidence of the gap between intended and actual behaviour.

## Information sources and article selection

The search strategy was designed to identify syntheses of research evidence such as systematic reviews between the year 2010 and the date of search. Initial keywords were identified via scoping review of relevant papers and reports as well as via PubMed using the MeSH function. A search was performed in PubMed and the Cochrane Database of Systematic Reviews (search run in Jan 2024; see [appendix 1](#) for search strategy), as well as searching for relevant information in the NOURISHING database (search run in September 2023).

## Screening

Due to the rapid nature of the reviews, a single reviewer screened titles and abstracts and discussed any uncertainty with a second reviewer. For relevant titles/abstracts, the full text was retrieved for full text review. One reviewer reviewed the full texts and discussed uncertainties with a second reviewer.

## Data extraction

The JBI Data Extraction Form for Review for Systematic Reviews and Research Syntheses (see [appendix 2](#)) was used to inform data extraction for the final included review.

## Results

Our literature searches ultimately resulted in no appropriate studies for our purposes.

We identified no relevant reviews through searches in Cochrane Reviews or the NOURISHING database. Four potential papers ([Micha et al. \(2018\)](#), [Niebylski et al. \(2014\)](#), [Osman et al. \(2021\)](#), and [Storcksdieck genannt Bonsmann \(2014\)](#)) were identified through searching PubMed. However, these papers either did not explicitly cover procurement or include appropriate outcome measures for the purpose of modelling percentage reduction in obesity. As such, we could not use them for our purposes.

Nevertheless, the results of these four papers are presented in [appendix 3](#) (in PICOS format); issues of each paper (for the purposes of the present review) are **written in red**.

## Consultation with our Expert Advisory Group

In the absence of our searches resulting in any appropriate literature, we also consulted with our Expert Advisory Group (EAG), asking for recommendations of literature which may not have been identified through our searches.

The EAG suggested a paper by [Cradock et al. \(2015\)](#) which can be used to inform our modelling work for this policy. Though it was not a systematic review or meta-analysis, our protocol allowed us to select good evaluations as alternative sources of evidence if reviews were unavailable. A summary of this review is presented in Table 1 below.

Table 1: Summary of the review

<b>Paper reference and link</b>	<a href="#">Cradock et al. (2015)</a>
<b>Caveats to the inclusion of this paper</b>	<p>Some important context and caveats to consider about this paper:</p> <ul style="list-style-type: none"> <li>• It is a single evaluation rather than a systematic review or meta-analysis.</li> <li>• The focus was limited to reducing sugar-sweetened beverages (SSBs) and increasing healthy beverages; food was not targeted.</li> <li>• It involved a host of interventions to reduce the intake of SSBs, some of which overlap with other Blueprint rapid reviews eg, vending machine interventions; labelling interventions. This paper's policy had the aim of reducing intake of SSBs in city-owned spaces, and procurement was one aspect of this.</li> <li>• The outcome measure in this paper is in terms of <b><u>calorie availability in the environment, not calorie intake at an individual level</u></b>. As such, during Nesta's modelling work, we would need to convert this effect size into a calorie reduction for people's energy intake, rather than availability.</li> <li>• When specifying how this Blueprint policy on applying standards to public procurement is enacted, it is worth bearing in mind this paper's broader scope. They had the</li> </ul>

	<p>aim/mandate of reducing intake of SSBs in public sector spaces, but the route or mechanism to achieving this was broad in scope. Our policy recommendation should perhaps allow similarly flexible implementation scope, rather than being overly prescriptive. That way, public sector organisations have a target to reach but can work out how to get there in an achievable way based on their context.</p>
<p><b>Authors' summary of results</b></p>	<p>“Average beverage sugar grams and calories at access points decreased (sugar, -13.1 g; calories, -48.6 kcal; <math>p &lt; .001</math>) following the implementation of the HBEO. The average proportion of high sugar (“red”) beverages available per access point declined (-27.8%, <math>p &lt; .001</math>). Beverage prices did not change over time. City agencies were significantly more likely to sell only low-sugar beverages after the HBEO was implemented (OR = 4.88; 95% CI, 1.49–16.0).”</p>
<p><b>Population (P)</b></p>	<p>People in Boston, Massachusetts, using city-owned spaces</p>
<p><b>Intervention (I)</b></p>	<p>A policy called the ‘Healthy Beverage Executive Order’ (HBEO), which was established by the former Boston mayor. The policy was designed to promote access to healthy beverages; the “executive order directed city departments to eliminate the sale of [sugar-sweetened beverages] SSBs on city property and to adhere to the City of Boston’s HBEO standards in vending machines and city-managed food or beverage services programs”.</p> <p>This policy was implemented through the following:</p> <ul style="list-style-type: none"> <li>● eliminating drinks classed as SSBs from city-funded events and vending machines, and from cafés or cafeterias on city property</li> <li>● restricting purchase of SSBs with city funds</li> <li>● prohibiting certain types of industry marketing on city property (eg, banners, vending machine graphics) that promoted products that did not qualify for sale under HBEO standards</li> <li>● educational materials at point of purchase and traffic light signage to categorise beverages (red = “drink rarely, if at</li> </ul>



	<p>all", yellow = "drink occasionally", and green = "drink plenty" or "healthy choice")</p> <ul style="list-style-type: none"> <li>• portion size guidelines for certain beverages</li> <li>• formation of the Healthy Options Coordinating Committee (HOCC), with representatives of relevant city departments;</li> <li>• creation of the healthy beverage toolkit, including communication and education materials.</li> </ul>
<b>Comparator (C)</b>	<ul style="list-style-type: none"> <li>• Baseline data from the area (before the policy was implemented), and</li> <li>• Data from local recreation sites not subject to the policy.</li> </ul>
<b>Outcomes (O)</b>	<ul style="list-style-type: none"> <li>• Beverage nutrient information (including total energy [kcal], sugar [grams] per serving and where applicable, noncaloric sweetener type (artificial or natural noncaloric))</li> <li>• Beverages (ie, brand, type, flavour, size, price) at access points on city properties, parks and recreational facilities.</li> </ul>
<b>Study design (S)</b>	<p>"This policy evaluation uses a pre–post natural experimental design (20) to evaluate the impact of the HBEO on changes in healthy beverage availability in Boston city agencies. Beverage access data were collected by trained data collectors before (March–September 2011) and after (March–November 2013) the HBEO was issued. Additional data were collected in local recreation sites not subject to the HBEO in July–August 2011 and June–July 2013."</p>

The EAG also shared two books by the Food and Agriculture Organization of the United Nations (2021) on 'Public food procurement for sustainable food systems and healthy diets' ([Volume 1](#) & [Volume 2](#)). Unfortunately, these books could not be used to answer our research question; the included outcome measures could not be used to model the impact of public sector food procurement on energy intake or body weight specifically. However, these documents do provide good rationales for the value of this policy on applying public sector procurement standards. They also provide valuable insights into barriers and facilitators to public sector procurement interventions, along with numerous case studies from countries around the world. For example, in Volume 2, see chapter 18 ('Sustainable and healthy sourcing of food for the public plate: lessons learned in Denmark') and chapter 25 ('Sustainable food procurement in British school catering').

## Appendices

### Appendix 1: PubMed search strategy

Effectiveness of applying standards to public sector food procurement on physical and/or behavioural outcomes relating to obesity: a rapid review protocol.

No.	Concept	PubMed Search Terms
1	Public sector or government settings (including schools, nurseries, hospitals, social care settings, publicly-managed prisons, armed forces)	"Public Sector"[Mesh] OR "Government"[Mesh] OR "Schools"[Mesh] OR "Nurseries, Infant"[Mesh] OR "Schools, Nursery"[Mesh] OR "Hospitals"[Mesh] OR "Prisons"[Mesh] OR "Social Welfare"[Mesh] OR "public sector"[tiab] OR "government"[tiab] OR "school*"[tiab] OR "nurs*"[tiab] OR "prison*"[tiab] OR "hospital*"[tiab] OR "social care"[tiab] OR "social service*"[tiab] OR "armed force*"[tiab]
2	Food procurement	"food procurement"[tiab:~5] OR "procurement"[tiab] OR "meal*"[tiab] OR "food sourcing"[tiab:~5] OR "Food" [Mesh] OR "Food and Beverages" [Mesh] OR "Diet, Food, and Nutrition" [Mesh] OR "Fast Foods" [Mesh] OR "Snacks" [Mesh] OR Food* [tiab] OR Foodstuff* [tiab] OR Snack* [tiab] OR Nutrition* [tiab] OR Diet [tiab] OR "Dietary Intake"[tiab]
3	Practices/intervention/strategies	"Health Policy"[Mesh] OR "Public Policy"[Mesh] OR "nutrition polic*"[tiab] OR "regulation*"[tiab] OR "practice*"[tiab] OR "standard*"[tiab] OR "policy"[tiab] OR "policies"[tiab] OR "strateg*"[tiab] OR "guideline*"[tiab]
4	Calorie intake or BMI or overweight	"Calorie consumption" [tiab] OR Calori* [tiab] OR "Calories consumed" [tiab] OR "Calorie intake" [tiab] OR "Caloric intake" [tiab] OR "Energy" [tiab] OR "Energy Intake" [tiab] OR "Food consumption" [tiab] OR "Food consumed" [tiab] OR "Weight" [tiab] OR BMI [tiab] OR "weight loss" [tiab] OR "obesity" [tiab] OR "overweight" [tiab] OR "over-weight" [tiab] OR "BMI" [tiab] OR "body weight" [tiab] OR "bodyweight" [tiab] OR "body mass index" [tiab] OR "Body Mass Index" [Mesh] OR "Obesity" [Mesh] OR "Overweight" [Mesh]

5	Systematic review	"systematic review"[tiab] OR "systematic*"[tiab] OR "meta-analys*"[tiab] OR "narrative synthes*"[tiab]
6	Full search	#1 AND #2 AND #3 AND #4 AND #5
7	Publication date limit	Filter to include publications from 2010 onwards

## Appendix 2: JBI Data Extraction Form for Review for Systematic Reviews and Research Syntheses

Study details
Author/year
Objectives
Participants (characteristics/total number)
Setting/context
Description of interventions/phenomena of interest
Search details
Sources searched
Range (years) of included studies
Number of studies included <i>I</i>
Types of studies included
Country of origin of included studies
Appraisal
Appraisal instruments used
Appraisal rating
Analysis
Method of analysis
Outcome assessed
Results/findings
Significance/direction
Heterogeneity
Comments

Appendix 3: Summary of four excluded studies found through our searches (in PICOS format)

<b>Paper reference and link</b>	<a href="#">Micha et al. (2018)</a>
<b>Authors' summary of results</b>	“Of 6,636 identified articles, 91 interventions met inclusion criteria, including 39 randomized and 52 nonrandomized studies evaluating 1 or more food environment policy strategy (Fig 1, Table 1). These included direct provision of healthful foods/beverages (N =40) [10,37–75], competitive food/beverage standards (N =29) [66–72,74–95], and school meal standards (N =39) [73–75,90–126]. Most studies were conducted in the US (N =55), followed by the UK (N =11), Netherlands (N =7), Norway (N =6), Canada (N =3), South Korea (N =2) and others (N =1 each). About half of interventions (N =49, 54%) were multi-component, with the relative contribution of the food environment policy component ranging from 30–100%.”
<b>Population (P)</b>	School students
<b>Intervention (I)</b>	'School food environment policies'. Of relevance for this review would be: <ul style="list-style-type: none"> <li>• school meal standards</li> <li>• competitive food and beverage standards</li> </ul> (Neither are explicitly about 'procurement standards')
<b>Comparator (C)</b>	Mixed
<b>Outcomes (O)</b>	Multiple, but of relevance for this review: <ul style="list-style-type: none"> <li>• total calories</li> <li>• adiposity and metabolic measures (inc. BMI)</li> </ul>
<b>Study design (S)</b>	Systematic review and meta-analysis
<b>Other comments</b>	<b><u>Not explicitly procurement standards.</u></b> Pages of most relevance were pages 12, 14, and 16 where there are sections on standards for school meals and competitive food and beverages, plus outcome measures of 'total calories' and 'adiposity and metabolic measures'. However, these are smaller sections of a wider review.

<b>Paper reference and link</b>	<a href="#">Niebylski et al. (2014)</a>
<b>Authors' summary of results</b>	“Where evaluated, healthy food procurement programs found in this review were nearly always effective at increasing availability of healthier food and decreasing that of less healthy food; contributing to the increased purchases of healthier foods and lower purchases of food high in fat, sodium and sugar. Further, some interventions that included a health parameter as an outcome, found that healthy food uptake led to improvements in health outcomes (blood pressure and BMI) [39,42].”
<b>Population (P)</b>	Populations in settings like schools, prisons, hospitals (plus worksites which aren't relevant to this 'public sector' review)
<b>Intervention (I)</b>	Healthy food procurement policies
<b>Comparator (C)</b>	Mixed
<b>Outcomes (O)</b>	Not relevant outcome measures for our purposes. Either irrelevant outcomes or often qualitative descriptions rather than outcomes we could use to model impact.
<b>Study design (S)</b>	Systematic review
<b>Other comments</b>	<p>It sounds like the perfect study - systematic review of healthy procurement in settings like schools, prisons, hospitals (plus worksites which aren't relevant to this 'public sector' review). However, <b>it is unclear that any of the outcome measures could be used for modelling.</b></p> <p>Only one reference included in the paper with possible outcome (BMI) which could be extracted – <a href="#">reference 42</a>. A small-scale trial of schools in the late 1990s (published in 2005); was small and changing food was part of a wider initiative so the impact of procurement standards can't be isolated.</p>

<b>Paper reference and link</b>	<a href="#">Osman et al. (2021)</a>
<b>Authors' summary of results</b>	<p>"A total of 2432 articles were identified by searching the databases, and 36 studies were included. The majority of the studies applied menu modifications and meal composition interventions (n = 12, 33.3%), or included the implementation of the new food service system (n = 8, 22.2%), protected mealtimes, mealtime assistance and environmental intervention (n = 7, 19.4%), and attractive meal presentation (n = 3, 8.3%). Previous studies that used multidisciplinary approaches reported a significant improvement in food intake, nutritional status, patient satisfaction and quality of life (n = 6, 16.7%). In conclusion, it is suggested that healthcare institutions consider applying one or more of the listed intervention strategies to enhance their foodservice operation in the future."</p>
<b>Population (P)</b>	Hospitalised people/inpatients
<b>Intervention (I)</b>	<p>A variety. Of most relevance here:</p> <ul style="list-style-type: none"> <li>• menu modifications.</li> </ul> <p>(Not explicitly about 'procurement standards')</p> <p>Due to the nature of hospitals and issues with malnutrition, the aims of the interventions are to increase energy/caloric intake. Thus, it may not be relevant for our research question.</p>
<b>Comparator (C)</b>	Mixed
<b>Outcomes (O)</b>	<p>Multiple (inc. protein intake, reducing food waste etc.), but of relevance for this review:</p> <ul style="list-style-type: none"> <li>• calorie intake</li> <li>• energy intake.</li> </ul>
<b>Study design (S)</b>	Systematic review
<b>Other comments</b>	<p><b><u>Unclear if it covers procurement per se (was menu changes) and aims are to increase energy/caloric intake (not decrease).</u></b> Pages of most relevance were page 13 (which covers outcomes and interventions in a table) and page 18 (which has sections on the interventions).</p>

<b>Paper reference and link</b>	<a href="#">Storcksdieck genannt Bonsmann (2014)</a>
<b>Authors' summary of results</b>	<p>"To understand what policy frameworks European countries have created to govern these practices, a systematic assessment of national school food policies across the European Union plus Norway and Switzerland (n = 30 countries) was carried out. The survey revealed that all 30 countries currently have a school food policy in place; a total of 34 relevant policies were identified, 18 of which were mandatory and the remaining 16 voluntary. Major policy objectives specified were those to improve child nutrition (97% of policies), to help children learn and adopt healthy diet and lifestyle habits (94%) and to reduce or prevent childhood obesity (88%). Most commonly (&gt;90%), the policies offered food-based standards for menu composition, and portion sizes were guided by age-appropriate energy requirements. Lunch and snacks were the most widely addressed mealtimes for almost 90% of all policies examined. Other important areas covered included food marketing to children; the availability of vending services; training requirements for catering staff; and whether nutrition education is a mandatory part of the national curriculum. Evaluation was mentioned in 59% of the school food policies reviewed. Future analyses should focus on evaluating the implementation of these policies and more importantly, their effectiveness in meeting the objectives defined therein."</p>
<b>Population (P)</b>	School students
<b>Intervention (I)</b>	Mixture of school food policies
<b>Comparator (C)</b>	n/a
<b>Outcomes (O)</b>	None relevant to this review
<b>Study design (S)</b>	Mapping exercise
<b>Other comments</b>	<p><b><u>Excluded because cannot calculate effect size from outcomes used</u></b>; also probably not correct study design for our purposes. Paper just shows that countries have food standards (many of which include procurement).</p>