



# Getting the Price Right: How Nutrition and Obesity Prevention Strategies Address Food and Beverage Pricing Within High-Income Countries

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## Abstract

**Purpose of Review** Food and beverage prices are major influences on dietary intakes. International health bodies recommend leveraging food prices to create healthier food environments. A policy review was conducted to understand the extent to which national nutrition and obesity prevention policy strategies within high-income countries (i) consider food price as a determinant of health and (ii) propose and implement policies to rebalance food pricing towards healthier options.

**Recent Findings** Policy strategies were inconsistent and fragmented in their inclusion of food prices as determinants of diet-related health. The equity benefits of pricing policies were often indicated. Fiscal measures and food subsidies in schools were the most commonly proposed and implemented pricing policies, predominantly used in Europe.

**Summary** Price is a pertinent but underutilized policy lever in nutrition policy. Comprehensive food and beverage pricing strategies need to be identified, adopted and implemented to improve population diets for everyone.

**Keywords** Food price · Food policy · Fiscal policy · NCD prevention · Obesity prevention

## Introduction

Dietary risk factors are currently driving global disease burdens [1], with cardiovascular disease being the main cause of diet-related death and disability [2]. The burden of disease associated with diet is unevenly distributed across populations, with those in more socioeconomically disadvantaged circumstances sharing disproportionately higher burdens [3–7]. Although the causes of diet-related disease and death are complex and multifaceted, the price and affordability of foods and diets have been found to be key determinants of food choices, particularly for populations in lower socioeconomic positions [8, 9, 10••]. Evidence supports the notion that people in lower socioeconomic positions may be more sensitive to food prices [10••], and when this is considered alongside the lower prices of unhealthy foods (per calorie) [9], the

plausible contribution of food prices to the observed socioeconomic inequalities in diet-related health becomes apparent.

With the perceived and actual price of food being an important determinant of diet, pricing tools and policies have the potential to promote healthy eating across populations. Indeed, economic theory of consumer choice and demand suggests that increasing the price of a product reduces demand, while price-lowering strategies can increase demand [11]. Therefore, taxing unhealthy foods and/or subsidizing healthier foods could shift population diets in healthier directions and reduce diet-related disease [12]. In accordance with theory, an entire body of empirical evidence has found that pricing interventions such as food taxes and subsidies have positive impacts in terms of promoting healthier diets [12, 13••, 14–22]. Furthermore, by addressing this broader structural determinant of dietary behaviours, pricing strategies may be as, if not more, effective among populations in lower socioeconomic positions [15–17, 23, 24].

In response to the evidence identifying food and beverage pricing as a key determinant of health and leverage point for improving population nutrition, leading health organizations, including the World Health Organization, have advocated for the inclusion of pricing policies as part of comprehensive policy strategies to address population nutrition, weight and non-

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communicable diseases [23, 25–28]. In recent years, a rising number of countries have implemented pricing policies, such as taxes on sugar-sweetened beverages (SSBs), and observed favourable health outcomes [29–38]. However, the extent to which food price and affordability (as a determinant or as a way to intervene) is being incorporated into national nutrition and obesity prevention policy strategies and actions is presently unclear. Thus, this review aims to elucidate the extent to which national nutrition and obesity prevention policy strategies include price as a determinant of diet-related health and pricing policies as proposed actions. Moreover, we aim to compare proposed policies with those that have been implemented by national governments and listed on globally recognized policy databases and government websites. Such evidence is required to hold governments accountable to their international commitments to reduce non-communicable diseases, particularly through evidence-based action on food prices, by ultimately identifying both exemplar strategies and gaps in the current international policy landscape.

## Methods

A review of international food, diet, nutrition or overweight and obesity prevention policy strategies was conducted.

### Search Strategy

Policy strategies were defined as ‘strategic documents outlining a health department’s principles, goals, objectives and strategies for population-level action specifically on dietary risk factors or overweight/obesity’, consistent with existing evidence [39]. A purposive sample of policy documents was obtained using the World Health Organization’s Global Database on the Implementation of Nutrition Action (GINA) [40]. Relevant documents were also identified by searching government websites and through existing knowledge of government strategies. Pricing policies proposed in strategic documents were cross-checked with the World Cancer Research Fund’s NOURISHING database [25] and government or regional websites for their implementation. Other national food pricing policy actions implemented during the time period of the strategy, but not described in strategic policy proposals, were also noted (Table 1).

### Eligibility Criteria

Policy strategies were deemed to be eligible for inclusion in this review if they were prepared by government departments to inform action by self-governing countries or regions. To this extent, regional policy strategies were included if they were developed by a council of national governments with the intention of informing country-level actions. Policies were

only included from high-income Organization for Economic Cooperation and Development (OECD) countries (World Bank definition [60]) to facilitate comparisons across contexts. Furthermore, only the most recent policy strategies put forwards by government departments were included in this review. By contrast, policy strategies were excluded from this review if they were not published in English, focused on individual policies or legislation (e.g. SSB taxes), published by non-governmental organizations or not publicly available.

### Data Extraction and Synthesis

Following multiple readings of the included policy strategies and familiarization with their overall content, each document was analysed using inductive content analysis [61]. This approach enabled synthesis of codes and clear comparisons to be made between countries in relation to how food prices are (i) considered as a determinant of diet-related health and (ii) proposed to be addressed by specific policy actions (which may not reflect real-world implementation). The initial data immersion process further indicated that the inclusion of price generally lacked depth (i.e. consisted of single words or short phrases rather than extensive descriptions of the logic for addressing food and beverage pricing), precluding the use of more in-depth analysis methods. All codes and the associated text were extracted into a standard Microsoft Excel™ template. Examples of the codes derived included but were not limited to: ‘price as a determinant of health’, ‘affordability as a determinant of health’, ‘food environments as determinants of health’, ‘economic drivers’, ‘evidence of pricing determinants recognized’, ‘fiscal measures’, ‘meal subsidies’, ‘food vouchers’, ‘price promotion restriction’ and ‘price monitoring’. Codes were aggregated into themes to address our overarching research questions. The key themes, drawing upon key examples from countries, are discussed in the results.

## Results

Eighteen policy strategies were deemed to be eligible for inclusion in this review. The policy strategies were published between 2003 and 2019, with 67% published over the last decade. Nine strategies were framed as policy plans to address nutrition, food, or diets, while six were framed in the context of overweight or obesity, and three spanned across both domains. Policy strategies were predominantly included from Europe (78%;  $n = 14$ ), with multiple strategies stemming from the self-governing regions in the UK ( $n = 4$ ). We additionally included one regional plan developed by the Nordic Council of Ministers, extending across Denmark, Finland, Iceland, Norway, Sweden, the Faroe Islands, Greenland and Aland. National policy strategies were also located from Australia, New Zealand, Canada and Israel. Table 1 summarizes how

**Table 1** A chronological summary of how price is included in national and regional nutrition and obesity prevention policies from high-income OECD countries

Country; policy strategy; publication year	Inclusion of food price as a determinant of health	Proposed actions to address food price in policy strategies (implemented actions in bold)
New Zealand; Healthy Eating – Healthy Action Oranga Kai – Oranga Pūmau: a strategic framework; 2003 [41]	<ul style="list-style-type: none"> <li>• Affordability and lack of money identified as determinants of food choice, particularly for those with low incomes</li> <li>• Food price/cost identified as a determinant of food choice, including the cost of fruits and vegetables</li> <li>• Food price not identified as a determinant of health</li> </ul>	<ul style="list-style-type: none"> <li>• Policy measures to promote healthy food purchases and access to healthy options among those on low incomes proposed, including increasing the availability of affordable, healthy food options (for lower socioeconomic groups)</li> <li>• No food pricing strategies proposed</li> <li>• <b>SSB tax implemented in 2017* (not included in policy strategy)</b></li> <li>• Subsidies for milk programmes in schools</li> </ul>
Portugal; National Programme Against Obesity; 2005 [42]	<ul style="list-style-type: none"> <li>• Food price not identified as a determinant of health</li> </ul>	<ul style="list-style-type: none"> <li>• Subsidies for milk programmes in schools</li> </ul>
Slovenia; Food and Nutrition Action Plan for Slovenia 2005–2010; 2005 [43]	<ul style="list-style-type: none"> <li>• Food price not identified as a determinant of health</li> </ul>	<ul style="list-style-type: none"> <li>• No food pricing strategies proposed</li> </ul>
Spain; Spanish Strategy for Nutrition, Physical Activity and Prevention of Obesity; 2005 [44]	<ul style="list-style-type: none"> <li>• Environmental and economic determinants broadly identified, with the identification of the money children are provided with as a determinant of their food choices</li> <li>• Identification of price as a determinant of food choice: high prices lower consumption, relative price differences influence food choice</li> </ul>	<ul style="list-style-type: none"> <li>• Government and parent subsidized school meal, fruit and vegetable and milk programmes proposed</li> <li>• Subsidized workplace meal and fruit programmes proposed</li> <li>• Additional research on food price as a determinant of unhealthy diets recommended</li> </ul>
Nordic region; Nordic Council of Ministers: A Better Life Through Diet and Physical Activity - Nordic Plan of Action on Better Health and Quality of Life Through Diet and Physical Activity; 2006 [45]	<ul style="list-style-type: none"> <li>• Environmental and economic determinants of food choice broadly identified; no identification of the specific mechanisms through which food prices influence health</li> </ul>	<ul style="list-style-type: none"> <li>• Action areas include a focus on creating healthy environments, with few specific pricing strategies described</li> <li>• Proposal to monitor the food environment and price of foods (Healthy Food Access Basket Surveys)</li> </ul>
Australia; Healthy Weight 2008: Healthy Weight 2008: The National Action Agenda for Children and Young People and their Families; 2008 [46]	<ul style="list-style-type: none"> <li>• Price, particularly the low price/cost of high-calorie foods, identified as a determinant of nutritional status and unhealthy diets</li> <li>• Aim to ensure access to healthy and affordable foods</li> </ul>	<ul style="list-style-type: none"> <li>• Propose to reduce the price/cost of healthy foods through removal of the value-added tax (VAT) on certain foods and the distribution of food stamps among those living in low socioeconomic circumstances</li> <li>• Propose to reduce or eliminate discounts on unhealthy foods</li> <li>• Propose to tax high-calorie foods</li> <li>• The use of coupons to reduce monetary expenditure on food proposed</li> </ul>
Israel; Health Behaviours: Promoting Physical Activity, Prevention and Treatment of Obesity, Healthful Nutrition; 2011 [47]	<ul style="list-style-type: none"> <li>• Price supervision proposed: revising maximum prices of core foods that are healthy, including wholemeal and enriched flour, low-fat dairy products, fruit and vegetables</li> <li>• Fruit and vegetable programmes in schools proposed</li> <li>• Propose to use tax rebates or subsidies to encourage manufacturers to produce healthy foods</li> </ul>	<ul style="list-style-type: none"> <li>• The redistribution of food aid proposed as one approach to improve food access (i.e. using food donations)</li> <li>• Research recommended to better understand how food prices influence health and the effectiveness of food vouchers targeting “households experiencing financial hardship”</li> <li>• <b>SSB tax implemented in 2012* (not included in policy strategy)</b></li> </ul>
France; French National Nutrition and Health Plan 2011–2015; 2012 [48]	<ul style="list-style-type: none"> <li>• Environmental (food supply, food access) and economic determinants of food choice broadly identified, along with some mention of the social prices of food. No identification of the specific mechanisms through which food prices influence health</li> </ul>	<ul style="list-style-type: none"> <li>• Price supervision proposed: revising maximum prices of core foods that are healthy, including wholemeal and enriched flour, low-fat dairy products, fruit and vegetables</li> <li>• Fruit and vegetable programmes in schools proposed</li> <li>• Propose to use tax rebates or subsidies to encourage manufacturers to produce healthy foods</li> <li>• The redistribution of food aid proposed as one approach to improve food access (i.e. using food donations)</li> <li>• Research recommended to better understand how food prices influence health and the effectiveness of food vouchers targeting “households experiencing financial hardship”</li> <li>• <b>SSB tax implemented in 2012* (not included in policy strategy)</b></li> </ul>

**Table 1** (continued)

Country; policy strategy; publication year	Inclusion of food price as a determinant of health	Proposed actions to address food price in policy strategies (implemented actions in bold)
North Ireland; A Fitter Future for All: Framework for Preventing and Addressing Overweight and Obesity in Northern Ireland 2012–2022; 2012 [49]	<ul style="list-style-type: none"> <li>• Identification of unhealthy food as cheap</li> <li>• Identification of healthy foods as unaffordable, especially for individuals from lower socioeconomic circumstances</li> </ul>	<ul style="list-style-type: none"> <li>• <b>Fruit and water must be available in schools since 2005* (not included in policy strategy)</b></li> <li>• No food pricing strategies proposed</li> <li>• Broadly propose to create healthy food environments and investigate the determinants of obesity (price not specified)</li> <li>• School meal vouchers proposed</li> <li>• VAT reduction on school meals proposed</li> </ul>
Germany; INFORM: German National Initiative to Promote Healthy Diets and Physical Activity - the National Action Plan for the Prevention of Poor Dietary Habits, Lack of Physical Activity, Overweight and Related Diseases; 2013 [50]	<ul style="list-style-type: none"> <li>• The food environment broadly identified as a determinant of food choice and health; limited identification of the specific mechanisms through which food prices influence health</li> <li>• Food price identified as a barrier to school meals among families with low incomes</li> </ul>	<ul style="list-style-type: none"> <li>• Improve the affordability of healthy foods and diets (no specific strategies identified)</li> </ul>
Czech Republic; Food Safety and Nutrition Strategy 2014–2020; 2014 [51]	<ul style="list-style-type: none"> <li>• Environmental and economic drivers broadly identified as determinants of nutrition; limited identification of the specific mechanisms through which food prices influence health</li> <li>• Affordability of healthy diets identified as an important aspect of prevention efforts</li> </ul>	<ul style="list-style-type: none"> <li>• Broadly propose to create healthy food environments with some pricing strategies described</li> <li>• Develop a proposal for and evidence review of fiscal measures on unhealthy products, including sugar-sweetened beverage (SSB) tax. <b>SSB tax implemented in 2018*</b></li> <li>• Broadly aim to monitor elements of the food environment (price not specified)</li> </ul>
Ireland; A Healthy Weight for Ireland: Obesity Policy and Action Plan 2016–2025; 2016 [52]	<ul style="list-style-type: none"> <li>• Food price and affordability identified as determinants of food choice and health</li> <li>• Environmental determinants identified. Fiscal policies, namely, taxes on foods high in sugar and fat, identified as evidence-based and cost-effective interventions to create healthy food environments. Discussion of the current implementation of fiscal policies and their endorsement by the United Nations</li> <li>• ‘Reasonably priced food’ identified as an important determinant of healthy and easy choices</li> </ul>	<ul style="list-style-type: none"> <li>• No food pricing strategies proposed</li> <li>• <b>SSB and sugar product tax implemented since 1981, free fruit and vegetables programmes for school children since 2007* (not included in policy strategy)</b></li> <li>• No food pricing strategies proposed</li> <li>• No food pricing strategies proposed</li> <li>• Broadly aim to monitor elements of the food environment (price not specified)</li> </ul>
Norway; Norwegian National Action Plan for a Healthier Diet - an Outline: Healthy Diet, meal Enjoyment and Good Health for Everyone.; 2017 [53]	<ul style="list-style-type: none"> <li>• Food price not identified as a determinant of health</li> <li>• Food price not identified as a determinant of health</li> </ul>	<ul style="list-style-type: none"> <li>• Subsidized school meal programmes proposed</li> <li>• Healthy Start food vouchers (targeting families with low incomes) proposed. <b>Healthy Start implemented in 2005*</b></li> <li>• Proposal to restrict price promotions on unhealthy foods and beverages</li> <li>• SSB levy and fiscal measures to create healthy food environments. <b>SSB tax implemented across the UK in 2018*</b></li> <li>• Proposal to improve access to affordable foods, including strengthening food aid to address food insecurity</li> </ul>
Switzerland; Eating Well and Staying Healthy: Swiss Nutrition Policy 2017–2024; 2017 [54]	<ul style="list-style-type: none"> <li>• Economic drivers and relative price differentials between foods identified as determinants of food choice</li> <li>• Food affordability identifies as a determinant of food choice</li> <li>• Price promotions identified as an influential element of the food environment</li> </ul>	<ul style="list-style-type: none"> <li>• No food pricing strategies proposed</li> <li>• No food pricing strategies proposed</li> <li>• Broadly aim to monitor elements of the food environment (price not specified)</li> </ul>
Denmark; Strategy for food, meals and health; 2018 [55]	<ul style="list-style-type: none"> <li>• Food price not identified as a determinant of health</li> </ul>	<ul style="list-style-type: none"> <li>• No food pricing strategies proposed</li> </ul>
Scotland; A Healthier Future: Scotland’s Diet and Healthy Weight Delivery Plan; 2018	<ul style="list-style-type: none"> <li>• Food price not identified as a determinant of health</li> </ul>	<ul style="list-style-type: none"> <li>• No food pricing strategies proposed</li> </ul>

**Table 1** (continued)

Country; policy strategy; publication year	Inclusion of food price as a determinant of health	Proposed actions to address food price in policy strategies (implemented actions in bold)
UK; Childhood Obesity: A Plan for Action, Chapter 2; 2018 [58••]	<ul style="list-style-type: none"> <li>The food environment broadly identified as a determinant of food choice and health, including price promotions as an influential element of this food environment. Some retailers commended for addressing the unhealthy influence of price promotions</li> </ul>	<ul style="list-style-type: none"> <li><b>UK Nursery Milk Scheme (subsidy/reimbursement) implemented in the 1940s [56, 57] (not included in policy strategy)</b></li> <li>Fiscal measures and SSB levy: monitor industry progress on reformulation, expand current levy to additional sugar-sweetened milk-based beverages, fund school breakfast programmes for families with low incomes (and school sports programmes). <b>SSB tax implemented in 2018*</b></li> <li>Proposal to restrict price promotions (buy-one-get-one-free and multibuy offers) on unhealthy foods and beverages.</li> <li>Healthy Start food vouchers for fruits, vegetables and milk (targeting families with low incomes). <b>Healthy start was implemented in 2006*</b></li> <li><b>School Fruit and Vegetable Scheme in state-funded schools since 2004* (not included in policy strategy)</b></li> <li><b>UK Nursery Milk Scheme (subsidy/reimbursement) implemented in the 1940s [56] (not included in policy strategy)</b></li> </ul>
Canada; Food Policy for Canada: Everyone at the table; 2019 [59]	<ul style="list-style-type: none"> <li>Environmental, economic and access drivers broadly identified as important elements of food systems; no identification of the specific mechanisms through which food prices influence health</li> </ul>	<ul style="list-style-type: none"> <li>Broadly propose to improve all elements of the food system, with no food pricing strategies proposed</li> <li><b>Nutrition North Canada food subsidy for remote communities implemented in 2011* (not included in policy strategy)</b></li> </ul>

N/A, not applicable; VAT, value-added tax; SSB, sugar-sweetened beverage

\***Bolded text** indicates food pricing strategies have been implemented and listed in the NOURISHING database [25] and/or within the national and regional government websites

food price is included in each national or region-level nutrition or obesity prevention policy strategy.

## Food Prices and Affordability as Determinants of Health

### (i) *Inadequate consideration of food price*

The majority of the policy strategies analysed recognized the broader environmental influences on food choices and population nutrition. Nevertheless, this recognition did not always include the influence of the *food* environment and the associated barriers to healthy eating, including price-related barriers. Similarly, the interrelated influences of the environment, food supply, food system, food security, food access and economic factors on food choices and diet-related health were not included in a consistent or in-depth manner, with a largely absent focus on the role of food prices across the food system.

Evidence was rarely cited when policy strategies did describe food price as a determinant of food choice or health. Ireland's *Obesity policy and action plan 2016–2025* [52] provided one exception to this whereby evidence on the effectiveness of taxes on unhealthy foods and beverages for improving population nutrition was included as justification for proposed action.

### (ii) *Fragmented inclusion of food price as a determinant of food choice*

While a few policy strategies identified food prices as determinants of health and provided some nuance in the way in which food prices elicit their influence on nutrition-related outcomes, this was typically fragmented with little comprehensive consideration within single-policy strategies. The following mechanisms for price as a driver of food choice were presented:

- The low price or cheapness of high calorie or unhealthy foods and beverages promotes their purchase and consumption [47, 49, 52].
- The price of fruits and vegetables influences their consumption (direction of influence unspecified) [41].
- Relative price differentials between (healthy and unhealthy) foods and beverages influence purchase decisions and consumption [45, 62••].
- Higher food prices lower the consumption of a product [45].
- Price promotions form an important element of the food environment, influencing food purchases and thus consumption [52, 58••, 62••].

### (iii) *Food affordability and income*

The affordability of food was frequently presented as a determinant of food choices. However, the nature of food affordability (i.e. what constitutes affordable and unaffordable diets) was rarely detailed. New Zealand's *Healthy Eating-Healthy Action 2008* [41] strategy exemplified how affordability can ultimately be described as a function of food price and income. To this extent, food affordability was often presented as a key determinant for individuals or households with low incomes: 'People on low incomes can struggle to afford high-quality food for a healthy diet (New Zealand Government, 2008 [41]).' The implications of food and diet affordability for the health of entire populations was less clear.

## Policy Actions on Food Pricing

Table 2 summarizes the different types of food pricing policy actions identified across the nutrition and obesity prevention policy strategies reviewed.

### (i) *Creating healthy food environments through retail pricing interventions*

A key action area identified across most policy proposals centred around the creation of healthy and supportive environments; yet few examples existed which included pricing policies as components of healthy and supportive food environments. Of exception, Scotland's *diet and healthy weight delivery plan 2018* [62••] outlined how the implementation of fiscal measures forms a component of creating healthy environments, proposing a SSB tax alongside multiple other pricing actions. The UK, Irish and Israeli obesity policy strategies also included fiscal measures to varying degrees [47, 52, 58••, 62••]. In particular, the Scottish and UK strategies proposed actions to extend the current taxes on SSBs to a broader range of beverages, such as sugar-sweetened milk-based beverages. Comparatively, the Irish and Israeli policy proposals described relatively formative stages of SSB taxes, focusing on developing proposals and conducting evidence reviews. To create healthy food environments more holistically, the UK, Scottish and Israeli obesity policy strategies further proposed to restrict or eliminate price promotions (i.e. multibuy deals, coupons and purchase rewards) on unhealthy foods and beverages. In addition, the Israeli policy proposals uniquely included 'price supervisions' (i.e. set maximum prices of commonly consumed foods), with the aim of shifting the foods that are currently price controlled towards healthier options. For example, if white bread is price controlled by setting a maximum legal price, this would be removed and replaced with price controls for whole wheat bread, ensuring the affordability of the healthier option.

Of the fiscal policies proposed in five strategies, SSB taxes were implemented in the UK, including in England, Scotland

**Table 2** Potential pricing policy targets to include in future research focusing on the development of comprehensive nutrition and obesity prevention policy strategies

Food policy actions	Exemplar strategies
Fiscal measures	<ul style="list-style-type: none"> <li>• Shift the relative price of foods and beverages</li> <li>• VAT reductions on healthy foods</li> <li>• SSB or unhealthy food taxes</li> </ul>
School and workplace subsidy programmes	<ul style="list-style-type: none"> <li>• Breakfast programmes</li> <li>• Meal programmes</li> <li>• Fruit and vegetable programmes</li> <li>• Milk programmes</li> </ul>
Food vouchers (targeting households with low incomes)	<ul style="list-style-type: none"> <li>• Vouchers are exchanged for foods and beverages (e.g. British Healthy Start, the US Special Supplemental Nutrition Programme for Women, Infants, and Children)</li> </ul>
Food aid or relief	<ul style="list-style-type: none"> <li>• Food donations offered at reduced prices</li> </ul>
Price promotions	<ul style="list-style-type: none"> <li>• Restrict price promotions (e.g. buy-one-get-one free and multibuy offers) on unhealthy foods and beverages</li> </ul>
Food pricing supervisions (i.e. set pricing)	<ul style="list-style-type: none"> <li>• Set maximum or minimum prices on unhealthy and healthy foods (e.g. floor prices on SSBs)</li> </ul>

VAT, value-added tax; SSB, sugar-sweetened beverage

and Ireland. SSB taxes were also implemented in France (2012) and Portugal (2017) despite not being proposed in national policy documents. With respect to recommendations to regulate price promotions on unhealthy products and set pricing supervisions for healthier foods and beverages in three policy strategies, no evidence of real-world implementation was identified.

#### (ii) *Food subsidies, food vouchers and food aid*

Across multiple European countries [43, 45, 50, 58••, 62••], it was proposed that food pricing as a determinant of food choice could be addressed through subsidized meal or food programmes, predominantly in school and workplace settings. Policy proposals indicated that subsidies would be provided by either governments or organizations; however some school programmes were proposed as parent-funded initiatives. Meal programmes extended to either breakfast or lunch, while food programmes typically encompassed free milk and/or fruit and vegetable schemes. These types of food subsidies typically targeted families and children in lower socioeconomic circumstances in policy proposals. For example, the UK childhood obesity policy strategy (2018) [58••] described using the revenue raised by the SSB tax to fund school breakfast programmes in communities of low socioeconomic position. Moreover, Germany's INFORM policy strategy (2013) [50] recognized that the value-added tax (VAT) reductions on school meals 'only affords minor relief to low-income families'. As such, the German policy strategy to improve population diets proposed to provide school meal vouchers for all children, with the concurrent intention of preventing the potentially stigmatizing effects of targeting only low-income children with meal vouchers. In Israel, proposals

included using food stamps through credit card-like payment systems to once again reduce the risk of stigma-related issues [47]. Consistent with this objective to mitigate the impact of food price on food choice, particularly among families and individuals in low socioeconomic circumstances, policy strategies in France and Scotland proposed actions relating to food aid or food relief (i.e. to provide low price food options). These actions were often accompanied with broader recommendations to redistribute food across the food system to improve food access and insecurity.

In accordance with the actions listed in the NOURISHING database, food subsidy programmes have been implemented in multiple European countries. The school fruit, vegetables and milk scheme was legislated in Europe in 2017, whereby countries receive funding if they lead the scheme's implementation along with educational health promotion programmes. However, despite the real-world implementation of such fruit and vegetable schemes in multiple countries, they were not included in most policy proposals (with the exception of Scotland). The food subsidy programme for remote communities in Canada and nursery milk schemes in the UK were also absent from nutrition and obesity prevention strategies even though they have been implemented. In comparison, the implementation of Healthy Start food vouchers was consistent with the rhetorical commitments expressed in policy proposals from the UK.

#### (iii) *Monitoring food prices and pricing actions*

Although monitoring food environments and determinants of diet-related health were commonly identified as key action areas within policy strategies, the importance of monitoring food prices and evaluating pricing interventions or actions was

scarcely articulated. Exceptions to this included proposed actions to monitor food prices with basket surveys (Australia, 2008 [46]), evaluate how price changes impact food-related behaviours (France, 2011 [48]), evaluate the use of food vouchers (France, 2011 [48]), review the evidence on taxation (Ireland 2016, UK 2018 [52, 58••]) and broadly research food price as a determinant of health (Nordic Council, 2006 [45]).

## Discussion

Our policy review of nutrition and obesity prevention policy strategies from high-income countries has revealed that food and beverage prices are sporadically included as determinants of diet-related health, despite the evidence and clear logic underpinning this influence [8, 63, 64]. Of further concern is the limited inclusion of food and beverage pricing policies as proposed actions in these documents and thus the relative absence of comprehensively implemented policies that seek to address a wide range of food and beverage pricing elements (i.e. the cheapness of unhealthy foods and beverages, price of fruits and vegetables, relative price differentials between healthy and unhealthy foods and beverages, and the unhealthy influence of price promotions) in a strategic way. This paucity of food and beverage pricing strategies within policy proposals is at odds with the literature and recommendations made by international health organizations [13, 65, 66]. Political rhetoric often outlines the scope of policies that governments are willing to debate on and implement [67]. The need to elevate food and beverage prices in policy discourse relating to the key determinants of diet-related health and health inequalities [68, 69] and the associated evidence-based policy interventions is apparent. Nevertheless, countries in the UK, namely, England and Scotland, are presently leading the way and demonstrating how we can begin to achieve this.

Fiscal measures that tax unhealthy food and beverage options (to reduce their cheapness, affordability and therefore consumption) have been shown to be effective in the real-world [13••, 14, 16]. Estimates indicate that a 10% tax on unhealthy foods and beverages is associated with a 6% reduction in the consumption of these products [13••]. However, in recent years, evidence has emerged of the potential for retailer pricing strategies (viz. price promotions and discounts) to undermine fiscal measures by increasing the affordability of unhealthy foods and beverages [70]. This evidence suggests that the average yearly discounts on unhealthy foods and beverages are approximately 30% of the original retail prices in Australia [71, 72], indicating that the current food pricing landscape is likely to present major issues for public health, even in the presence of 10–20% taxes on unhealthy foods and beverages. Although we await real-world evidence of the effectiveness of policy actions to restrict price promotions on unhealthy items in light of the current UK proposals, the

obesity prevention strategies in the UK make a move towards more comprehensive regulation of food and beverage pricing.

The effectiveness of healthy food subsidies in promoting healthy foods and beverages has also been substantiated in the literature [13••, 14, 16], with meta-analyses indicating that a decrease in healthy food and beverage prices by 10% correlates to a 12% increase in consumption [13••]. However, despite evidence of effectiveness [73], there has been limited uptake of policies that subsidize a wide array of healthy food options, including nuts and seeds and wholegrains, to ultimately address dietary risks more broadly. In addition to this, subsidies on healthy foods may have the unintended consequence of increasing expenditure on and consumption of unhealthy items [74, 75], once again illustrating the need for a comprehensive approach to food pricing policies. The targeted distribution of food vouchers to ameliorate the financial strain of purchasing foods and beverages, through subsidy programmes like British Head Start and the US Supplemental Nutrition Assistance Program, have been used for households meeting low-income criteria. While such programmes have been shown to decrease food insecurity by as much as 30% [76], their ability to reduce inequalities in diet- and weight-related health outcomes remain questionable [77–79]. Compared to targeted pricing policies such as food vouchers, structural economic changes to the food environment (for example, via population-level taxation) have been shown to produce greater health gains for individuals in lower socioeconomic circumstances [80]. Moreover, the UK childhood obesity prevention strategy exemplifies the multiple benefits of taxing SSBs and using the revenue raised to fund school breakfast programmes in low socioeconomic communities [58••]. The favourable equity outcomes associated with addressing the structural economic aspects of the food environment are further reported in a recent systematic review, which found that price was more likely to impact consumption among individuals in lower, compared to higher, socioeconomic positions [10••]. As the evidence continues to strengthen for using food and beverage pricing policies to improve public health and reduce diet-related health inequalities, the co-benefits of implementing multiple comprehensive pricing strategies should be further investigated.

Despite evidence and recommendations for the implementation of structural policies that can create healthy food environments for all (in which food and beverage pricing policies are a core component), the overall lack of political rhetoric and action on the structural influences of healthy eating and obesity has been previously recognized [81]. The concept of lifestyle drift has been used to describe the political emphasis on individual behaviour change approaches to public health problems, and it has been suggested that power imbalances in political processes can be partly attributed to this phenomenon [81, 82]. In the context of our review, political power in decision-making is often held by those in higher



socioeconomic positions, who are thought to be affected by the price and affordability of foods and beverages to a lesser extent than their lower socioeconomic counterparts. Diet-related health may therefore be perceived as a matter of individual responsibility among policymakers who have the socioeconomic means that enable healthy choices. Industry interference with nutrition policy has also been recognized as a challenge to decision-making, largely stemming from perceived profit losses to powerful corporations [83]. Such norms among policymakers may thus result in policies drifting towards those that are focused on lifestyle or behaviour change, concurrently silencing the consideration of structural food pricing policies. Additional political leadership, commitment and advocacy are essential to shift and reframe nutrition and obesity prevention discourse so that it better aligns with principles of equity and social justice. Prioritization of structural interventions in this vein will also deliver the greatest benefits to overall population health [84, 85]. Stronger discourse around the need to use pricing policies to create healthier food environments is beginning to emerge in policy strategies from the UK where the Government stated in 2018 that they ‘will not shy away from further action, including mandatory and fiscal levers if necessary.’

### Limitations

As with all policy document analyses, our analysis was dependent on the comprehensiveness of the included strategic documents and real-world policy processes. That is, published strategies do not always include policy actions that have previously been implemented in the real-world. For example, although no US nutrition or obesity prevention strategy was located, the Special Supplemental Nutrition Programme for Women, Infants, and Children (WIC) has been legislated since 1972 and the Fresh Fruit and Vegetable Programme offering free or lower price meals was implemented in 2008. Evidence is also emerging around the use of produce prescriptions in the US (i.e. where medical professionals prescribe produce vouchers to patients in lower socioeconomic positions or with diet-related diseases); although such initiatives are yet to be integrated into public policy [86]. The inclusion of only English-language documents also limited our analysis and despite an absence of Latvian, Hungarian and Chilean strategies in our review, each of these countries implemented taxes on SSBs and/or unhealthy products in 2004, 2011 and 2015, respectively. Nevertheless, these limitations were partially addressed by cross-checking the proposed food pricing policies that were strategically identified with those listed in the World Cancer Research Fund’s Nourishing database and on government or regional websites. This process ultimately indicated that single policies, especially SSB taxes and school meal programmes, are often legislated even if they are not included in strategic policy proposals to improve population nutrition

and weight; highlighting the critical nature of ongoing advocacy for specific, evidence-based policy actions. These actions may also be implemented at lower government levels, which were beyond the scope of this review, but further points towards the importance of such advocacy efforts.

Moreover, our policy review did not include low and middle-income countries due to the likely issues with the generalisability of pricing policies across contexts and differences in the socioeconomic patterning of diet-related health issues such as obesity. In low- and middle-income countries, increasing food and beverage prices have been positively associated with obesity, particularly among women in higher socioeconomic positions [87], and healthy diets have been found to be less affordable than unhealthy alternatives [88]. For these reasons, comprehensive food pricing policy strategies should be explored and developed in these settings.

### Implications for Policy and Research

Comprehensive policies that rebalance food and beverage pricing to better align with health imperatives are urgently required. Such strategies must be considered alongside other structural policies that collectively and holistically create healthy, equitable and sustainable food systems. Researchers should work towards developing and testing comprehensive frameworks for food pricing policies that best support healthy diets for all. This should include the prioritization of pricing policies by considering their individual and synergistic effects on population health and health equity (across a range of pricing and non-pricing policies) to provide a road map for countries and jurisdictions to take action. Furthermore, evidence is required to better understand how the overall affordability of healthy and unhealthy diets could be optimized through interventions that change the broader social determinants of health, particularly housing and income.

Importantly, with insufficient political commitment to addressing the global burdens of high body mass and non-communicable diseases [89], governments around the world must be held accountable for action, so that the price of foods and beverages enables, not constrains, healthy population diets.

### Conclusion

Our results suggest that no high-income OECD country is considering comprehensive actions to ensure that healthy foods and diets remain economically attractive and affordable. Such inaction on one of the most promising food policy levers warrants concern and ongoing attention. A change in political rhetoric that favours food pricing policies is critical to effectively and equitably improve population nutrition. This should be backed by government leadership and commitment.

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## Compliance with Ethical Standards

**Conflict of Interest** The authors declare that they have no conflict of interest.

**Human and Animal Rights and Informed Consent** This article does not contain any studies with human or animal subjects performed by any of the authors.

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