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Abbreviations

BMI	body mass index
CI	confidence interval
CIF	cost, insurance, freight
DALY	disability-adjusted life year
GIFNA	Global database on the Implementation of Food and Nutrition Action
GRADE	Grading of Recommendations Assessment, Development and Evaluation
HIC	high-income country
LMIC	low- and middle-income country
NCD	noncommunicable disease
NUGAG	Nutrition Guidance Expert Advisory Group
PICO	population, intervention, comparator and outcome
RCT	randomized controlled trial
SES	socioeconomic status
SSB	sugar-sweetened beverage
UNESCO	United Nations Educational, Scientific and Cultural Organization
USA	United States of America
VAT	value-added tax
WHO	World Health Organization

Glossary

Ad valorem excise tax: An excise tax applied as a percentage of the value of a product *(1)*. Ad valorem excise taxes can be based on different types of values, including the cost, insurance, freight (CIF) value (for imports), ex-factory price, wholesale price or retail price.

Consumption tax: A tax that is levied on the consumption of goods and services rather than their production. Consumption taxes are indirect taxes, and include excise taxes and sales taxes.

Excise tax: An indirect consumption tax applied to a specific product *(1)*. An excise tax may be applied as an ad valorem excise tax, a specific excise tax or a combination of the two *(2)*. Because they have a relatively narrow focus and lead to price increases for the targeted product relative to other products, excise taxes can have a powerful impact on consumer decision-making and are therefore commonly used as policy instruments to attain policy goals beyond revenue generation.

Foods that contribute to a healthy diet: Nutrient-dense foods rich in naturally occurring fibre and/or unsaturated fatty acids, low in saturated fatty acids, *trans*-fatty acids, free sugars and salt, free of non-sugar sweeteners, and/or the consumption of which is associated with positive health outcomes.

Foods that do not contribute to a healthy diet: Foods high in saturated fatty acids, *trans*-fatty acids, free sugars and/or salt and/or which contain non-sugar sweeteners, and which are usually highly processed, and/or the consumption of which is associated with negative health outcomes.

Indirect tax: A tax that is collected by an intermediary such as a manufacturer or retail store on behalf of the person who bears the ultimate economic burden of the tax, such as the consumer. These taxes are indirect in the sense that, unlike direct taxes, they are not levied directly on taxpayers' income or gains. Indirect taxes include excise taxes, sales taxes and tariffs.

Non-sugar sweeteners: All synthetic and naturally occurring or modified non-nutritive sweeteners that are not classified as sugars *(3)*. Sugar alcohols and low-calorie sugars are not considered to be non-sugar sweeteners *(3)*.

Nutrient profile model: A tool for classifying foods and beverages according to their nutritional composition for reasons relating to disease prevention and health promotion. In the context of fiscal policies to promote healthy diets, nutrient profile models provide one means of defining foods and beverages to be taxed or subsidized.

Own-price elasticity of demand: Measures the responsiveness of consumer demand to changes in price. For example, an own-price elasticity of demand of –0.5 means that a 10% increase in price would lead to a 5% reduction in demand *(2)*. In other words, it is the percentage change in purchasing or consumption of a given product resulting from a 1% increase in its price.

Pass-through rate: The proportion of a consumption tax that is transferred to the price paid by consumers *(4)*.

Progressive or regressive: Properties of a tax, or a tax system, that determine how the tax burden is distributed among people with different incomes. A progressive tax weighs more on people with higher incomes, in terms of the proportion of their disposable income or total consumption expenditure represented by the tax they pay. Conversely, a regressive tax weighs more on people with lower incomes. Typically, these properties are defined in relation to the financial burden of the tax – that is, the tax payments borne by taxpayers, without considering the distribution of the wider health and economic effects of the tax, including those caused by changes in behaviour triggered by the tax *(2)*.

Sales tax: Consumption taxes that are levied on almost all goods and services. Sales taxes are collected from consumers at the point of purchase *(4)*. Unlike excise taxes, sales taxes are usually applied at a uniform rate on all goods and services, leaving the relative prices of specific goods and services unaffected.

Specific excise tax: An excise tax applied as a specific monetary amount per unit volume or quantity (e.g. sugar content) *(1)*. Specific excise taxes are sometimes also referred to as volumetric, ad quantum or per unit taxes.

Substitution: An effect caused by a rise in price that induces a consumer to buy more of a relatively lower-priced good and less of a higher-priced one. Consumers may move to untaxed or less heavily taxed products (product substitution) or to cheaper alternatives of the taxed product (brand substitution).

Sugar-sweetened beverages: All types of non-alcoholic beverages containing free sugars, including carbonated and non-carbonated soft drinks, fruit and vegetable juices and drinks, nectars, liquid and powder concentrates, flavoured waters, vitamin waters, energy and sports drinks, ready-to-drink teas, ready-to-drink coffees, flavoured milks and milk-based drinks, and plant-based milk substitutes.

Taxable products: The set of products to which a tax is applied *(1)*.

Tax base: The value, quantity or volume of a taxable product on which a tax rate is applied. For example, for ad valorem excise taxes, the tax base is the value of the product, such as the CIF value (for imports), ex-factory price, wholesale price or retail price. For specific taxes, the tax base can be the fixed quantity or unit volume upon which the tax rate is applied *(5)*.

Tax structure: Refers to the way a tax is designed. Excise taxes can be applied at a uniform (the same) tax rate or at a differential (tiered) rate. They can be also specific in nature, ad valorem or a mix of the two.

Tiered tax: Used to describe a tax structure whereby rates vary within a taxed product category based on product characteristics (e.g. sugar content in sugar-sweetened beverages) *(1)*.

Value-added tax (VAT): A multistage tax on goods and services that is levied on the value-add generated at each stage of the supply chain. The tax is eventually borne by final consumers *(2)*. VAT is usually applied at a uniform rate on all goods and services, leaving the relative prices of specific goods and services unaffected.

Executive summary

Background

Unhealthy diets are a leading global public health risk, contributing to all forms of malnutrition (i.e. undernutrition; micronutrient-related malnutrition; and overweight, obesity and diet-related non-communicable diseases (NCDs)). Affordability of food and beverages (which is a function of food and beverage price and disposable income) is a key characteristic of the food environment and is well established as an important influence on food and beverage purchases and consumption. The inverse relationship between food and beverage prices and purchases and consumption indicates that taxes can reduce, and subsidies can increase, consumption of targeted products. Accordingly, implementing fiscal policies that discourage consumption of foods that do not contribute to a healthy diet and/or encourage consumption of foods that contribute to a healthy diet has been proposed in various documents adopted by the World Health Assembly, including the Global Strategy on Diet, Physical Activity and Health; the Comprehensive Implementation Plan on Maternal, Infant and Young Child Nutrition; and the Global Action Plan for the Prevention and Control of Noncommunicable Diseases 2013–2020.[1]

Objective, scope and methods

In response to Member State requests, the World Health Organization (WHO) developed this guideline to strengthen and streamline support for Member States in developing and implementing new, or strengthening existing, fiscal policies to promote healthy diets.

The guideline's objectives are to:

- provide evidence-based recommendations and implementation considerations on taxation of foods that do not contribute to a healthy diet and sugar-sweetened beverages (SSBs), and on a subset of subsidies on foods that contribute to a healthy diet (the subset including subsidies that have the primary intention to change consumer behaviour by lowering prices of targeted foods and beverages at retail level);
- enable evidence-informed advocacy to advance policy action;
- guide future research to further strengthen the evidence base for policy action; and
- contribute to the creation of food environments that enable healthy dietary practices among children and adults.

Recognizing the broad range of fiscal measures governments can use for health promotion, the scope of this guideline is limited to consumption taxes (e.g. excise taxes, sales taxes) on foods that do not contribute to a healthy diet and SSBs, and to a subset of subsidies on foods that contribute to a healthy diet (the subset including subsidies that have the primary intention to change consumer behaviour by lowering prices of targeted products at retail level; for example, food vouchers, discounts, reduction of value-added tax (VAT) and inclusion of food in public distribution systems). The guideline does not cover school meal or food subsidies. School food provision is reviewed in a forthcoming WHO guideline on school food and nutrition policies. The guideline also does not cover food production or agricultural subsidies (i.e. subsidies to manufacturers or farmers) or trade policy instruments (e.g. import tariffs). Food production or agricultural subsidies or trade policy instruments have complex global impacts on nutrition, health and equity, as well as on the agricultural sector and climate, and were considered outside the scope of this guideline.

[1] The Seventy-second World Health Assembly extended the period of the global action plan to 2030 to ensure its alignment with the 2030 Agenda for Sustainable Development.

Pricing policies were considered in scope. The pricing policies included for consideration were measures taken to restrict price promotions, or to implement minimum price policies (price floors) or maximum price policies (price ceilings), on foods and beverages. However, no recommendation was made for pricing policies because no eligible studies on the effectiveness of such policies were identified by the systematic review (see "The evidence").

This guideline was developed using the procedures outlined in the *WHO handbook for guideline development*. These procedures include a review of systematically gathered evidence by an international, multidisciplinary group of experts (the Nutrition Guidance Expert Advisory Group (NUGAG) Subgroup on Policy Actions); assessment of the certainty of that evidence via Grading of Recommendations Assessment, Development and Evaluation (GRADE); and consideration of additional decision criteria potentially relevant for the translation of the identified evidence into recommendations.

This guideline is not an implementation manual. It does not describe **how** countries can implement and monitor fiscal policies to promote healthy diets, but rather recommends **what** measures to take. Implementation guidance on SSB taxation policies can be found in the *WHO manual on sugar-sweetened beverage taxation policies to promote healthy diets*.

The evidence

Effectiveness of taxes on SSBs

The systematic review showed large and significant effects of SSB taxes on price change of taxed beverages and purchases of taxed beverages. This large effect allowed for upgrading the certainty of the observational evidence using the GRADE methodology (see section 2.1) to moderate. Meta-analyses showed a pass-through rate – that is, the proportion of a tax that is transferred to the price paid by consumers – of 82% and that SSB taxes significantly decreased purchases of taxed beverages, with an own-price elasticity of –1.59. The own-price elasticity of –1.59 indicates that a 10% tax-induced price increase would reduce purchases of SSBs by about 16%.

Effectiveness of taxes on foods or nutrients

The systematic review identified far fewer eligible studies that evaluated the effect of a tax on foods or nutrients. There was very low certainty evidence on the effect of taxes on foods on price change, purchases of taxed foods and purchases of untaxed foods. There was very low certainty evidence about the effect of taxes on saturated fats on the price of taxed foods, purchases of taxed foods and purchases of untaxed foods, based on studies of one tax, which was in place for a limited duration. Evidence from modelling studies considered by the NUGAG Subgroup on Policy Actions showed that food taxes can have a large desirable effect on health-related outcomes.

Effectiveness of subsidies on foods

The systematic review evidence on a subset of food subsidies (the subset including subsidies that have the primary intention to change consumer behaviour by lowering prices of targeted foods at retail level) included studies on food vouchers; subsidized fruit and vegetable programmes; discounted pulses and fortified wheat flour; and a reduction in VAT on fruits and vegetables. All except one subsidy policy (the VAT reduction) targeted low-income populations. The certainty of evidence for this subset of subsidies was very low for price change, purchases of subsidized and unsubsidized foods, consumption of subsidized and unsubsidized foods and diet. However, available studies consistently showed a significant increase in purchase of subsidized fruits and vegetables.

Contextual factors

Evidence from a review of contextual factors showed impacts on implementation of fiscal and pricing policies to promote healthy diets.

- Taxes on SSBs, taxes on foods that do not contribute to a healthy diet, subsidies or rewards for foods that contribute to a healthy diet, or combinations of subsidies and taxes would generally be cost-effective or cost-saving.

- Special Rapporteurs on the right of everyone to the enjoyment of the highest attainable standard of physical and mental health and on the right to food have called for healthy foods to be made economically accessible, and have recommended taxes on SSBs and on foods that do not contribute to a healthy diet.
- Taxes on foods that do not contribute to a healthy diet and subsidies for foods that contribute to a healthy diet appear to be among the interventions to promote healthy diets that are most likely to decrease health inequalities, because price interventions that create a healthier food environment circumvent voluntary behaviour change. In comparison, individual-based information and education interventions appear to be among the interventions most likely to widen inequalities.
- SSB taxes are supported by 39–66% of the public. Variation in acceptability is linked to tax framing and the intended use of the revenue – the use of tax revenue for health purposes is linked to greater public acceptability of taxes.
- Acceptability to industry of taxes on SSBs and foods that do not contribute to a healthy diet appears very low. There are multiple examples of lobbying against taxes and interference in policy processes.
- Some countries have successfully implemented fiscal policies, demonstrating that they are acceptable to government and policy-makers and are feasible to implement.

Recommendations

WHO recommendation on taxation of beverages

WHO recommends implementation of a policy to tax sugar-sweetened beverages (SSBs).

(Strong recommendation)

Recommendation remarks

These remarks provide context for the recommendation and are to facilitate interpretation and implementation.

- For this recommendation, 'SSBs' refers to all types of non-alcoholic beverages containing free sugars,[1] including carbonated and non-carbonated soft drinks, fruit and vegetable juices[2] and drinks, nectars, liquid and powder concentrates, flavoured waters, vitamin waters, energy and sports drinks, ready-to-drink teas, ready-to-drink coffees, flavoured milks and milk-based drinks, and plant-based milk substitutes.
- Free sugars are monosaccharides and disaccharides added to food and beverages by the manufacturer, cook or consumer, and sugars naturally present in honey, syrups, fruit juices and fruit juice concentrates *(6)*. The WHO guideline on sugars intake recommends reducing children's and adults' intake of free sugars to less than 10% of total energy intake, based on evidence regarding the relationship between free sugars intake and body weight and dental caries *(6)*.
- This recommendation covers SSBs purchased for either adults or children.
- The effectiveness of a policy depends on its design and administration. The current evidence from policy evaluations was insufficient to recommend policy design elements. However, the WHO manual on SSB taxation policies provides policy-makers with key considerations and strategies for SSB tax policy development, design, implementation and administration *(5)*. It includes discussion of types of taxes, taxable products and tax rates, as further outlined in this guideline's implementation considerations (**Chapter 5**).

[1] Taxation policies that contributed to the evidence included policies relating to both SSBs and beverages sweetened with non-sugar sweeteners (NSSBs). However, it was not possible to identify a difference in effectiveness between taxes that target SSBs only and those that target both SSBs and NSSBs.

[2] None of the policies in the evidence base for this recommendation included 100% fruit juices as a taxable product. However, reducing consumption of fruit juices could contribute to reducing overall sugars intake because of the sugars content of fruit juices.

- Depending on the country, SSB taxes may be implemented by subnational or national jurisdictions. Evidence from subnational studies suggests that the effect of subnational SSB taxes may be affected by cross-border shopping *(7)*. Regional and international cooperation offers opportunities to minimize cross-border shopping *(5)*.
- The regressivity of a tax on SSBs is a common argument used by opponents of such taxes *(5)*. However, this argument is based solely on the tax burden incurred by consumers *(5)*. It does not consider the health and economic harm caused by excessive SSB consumption, which often disproportionately affects people of lower socioeconomic status (SES), or the subsequent health benefit (and economic gains from this benefit) of a reduction in SSB consumption, which is likely to be greater among people of lower SES *(5)*. The WHO manual on SSB taxation policies proposes additional counter-arguments to the regressivity of a tax on SSBs *(5)*.
- A tax on SSBs can encourage reformulation of beverages and lead to beverages with reduced sugars content.

Recommendation rationale

The recommendation was formulated by the NUGAG Subgroup on Policy Actions based on several key considerations (below and **Table 2, pp. 21**).

- The group judged SSB taxes to have a large desirable effect on two outcomes critical for decision-making (price change and purchases of taxed beverages), and small undesirable effects, based on evidence from a systematic review that assessed the effectiveness of fiscal policies on non-alcoholic beverages *(7)*. As a result of the large desirable effect, the certainty of the observational evidence was deemed moderate. The overall balance between desirable and undesirable effects was judged by the group to probably favour the intervention.
- The recommendation is further based on the group's judgements that there are negligible costs of implementation of SSB taxes, that the cost-effectiveness of SSB taxes favours taxes, that SSB taxes are feasible to implement with varying acceptability among stakeholders, and that implementation of SSB taxes probably supports the realization of human rights and supports improved health equity.
- Implementing a tax on SSBs increases their prices *(7)*. Consumers respond to tax-induced price increases by reducing purchases of taxed beverages *(7)*.
- The effect of the tax on purchases is a function of the price increase triggered by the tax.
- Implementation of a tax on SSBs thereby has the potential to influence consumption of SSBs and free sugars *(6)*.
- Implementing a tax on SSBs may also encourage product changes and reformulation, and lead to a decrease in sugar content of taxed beverages *(7)*. For example, taxes levied at higher rates on products containing more sugar (e.g. tiered taxes) can provide incentives for manufacturers to reformulate their products and for consumers to switch to products containing less sugar.

WHO recommendation on taxation of foods

WHO suggests implementation of a policy to tax foods that do not contribute to a healthy diet.

(Conditional recommendation)

Recommendation remarks

These remarks provide context for the recommendation and are to facilitate interpretation and implementation.

- This recommendation should be considered in the context of other WHO guidelines on healthy diets, including those on total fat *(8)*, saturated fatty acids and *trans*-fatty acids *(9)*, polyunsaturated fatty

acids (forthcoming), sugars *(6)*, sodium *(10)*, potassium *(11)*, low-sodium salt substitutes (forthcoming), carbohydrates *(12)* and non-sugar sweeteners *(3)*.

- Foods that do not contribute to a healthy diet are those that are high in saturated fatty acids, *trans*-fatty acids, free sugars and/or salt and/or which contain non-sugar sweeteners, and which are usually highly processed, and/or the consumption of which is associated with negative health outcomes.
- Nutrient profile models – tools for classifying foods and beverages according to their nutritional composition for reasons relating to disease prevention and health promotion – provide one means of defining foods and beverages to be taxed or subsidized. Nutrient profile models used for this purpose should align with recognized and credible national or international dietary guidelines.
- This recommendation covers foods that do not contribute to a healthy diet purchased for either adults or children.
- The current evidence from policy evaluations was insufficient to recommend policy design elements. However, the effectiveness of a policy to tax foods that do not contribute to a healthy diet will depend on the country context, and the policy's design and administration. It remains important to learn from country experiences on policy implementation including on the type of tax, the tax rate, taxable products, and the nutrient profile model used to define taxable products, as well as possible substitution effects of the tax.
- A single nutrient tax (based on evidence from a tax on saturated fatty acids) may also increase prices and reduce purchases of taxed products. A single nutrient tax is likely to have a broad range of taxable products, which may or may not include foods that contribute to a healthy diet.
- The regressivity of a food tax is a common argument used by opponents of such taxes. However, this argument is based solely on the tax burden incurred by consumers and does not consider the health and economic harm caused by excessive consumption of foods that do not contribute to a healthy diet. While considering the financial impact on lower-income populations, policymakers should strive to design tax structures that target foods that do not contribute to a healthy diet, encouraging a shift towards healthier options. This approach aims to strike a balance between safeguarding affordability of foods that contribute to a healthy diet for all income groups, while discouraging foods the consumption of which is associated with negative health outcomes.

Recommendation rationale

The recommendation was formulated by the NUGAG Subgroup on Policy Actions based on several key considerations (below and **Table 3, pp. 25**).

- This conditional recommendation was formulated based on the very low certainty evidence from a limited number of real-world policy evaluations and evidence from modelling studies that food taxes can have a large desirable effect.
- The recommendation was further supported by evidence on probable acceptability and feasibility, probably favourable cost-effectiveness and the potential for the intervention to increase equity and support human rights.
- Price changes that affect the cost of foods can influence decisions on food purchases. Taxation of foods can raise their price and provide a disincentive to purchase.
- Although there are variations in policy designs, implementation of a policy to tax foods that do not contribute to a healthy diet may reduce purchases of the targeted foods as a consequence of price increases, and has the potential to affect their consumption.

WHO recommendation on a subset of targeted food subsidies

WHO suggests implementation of a policy to subsidize foods that contribute to a healthy diet.

(Conditional recommendation)

Recommendation remarks

These remarks provide context for the recommendation and are to facilitate interpretation and implementation.

- This recommendation is made based on evidence from a subset of targeted food subsidies (the subset including subsidies that provide price incentives to consumers at the retail level – including through rebates, discounts, monetary vouchers or coupons or reduction of VAT on the target food).
- This recommendation should be considered in the context of other WHO guidelines on healthy diets, including those on total fat *(8)*, saturated fatty acids and *trans*-fatty acids *(9)*, polyunsaturated fatty acids (forthcoming), sugars *(6)*, sodium *(10)*, potassium *(11)*, low-sodium salt substitutes (forthcoming), carbohydrates *(12)* and non-sugar sweeteners *(3)*.
- Foods that contribute to a healthy diet are those that are nutrient-dense, rich in naturally occurring fibre and/or unsaturated fatty acids, low in saturated fatty acids, *trans*-fatty acids, free sugars and/or salt, free of non-sugar sweeteners, and/or the consumption of which is associated with positive health outcomes.
- This recommendation covers foods that contribute to a healthy diet purchased for adults and children.
- Inequities exist in nutrition status and diet-related health status, with lower-income populations bearing a disproportionate burden of disease. Subsidies may reduce such inequities.
- The current evidence from policy evaluations was insufficient to recommend policy design elements. However, the effectiveness of a policy to subsidize foods that contribute to a healthy diet will depend on the country context, and the policy's design and administration. It remains important to learn from country experiences on policy implementation, including how subsidies are delivered, the geographical distribution of subsidies, to whom subsidies are delivered and which foods are subsidized.

Recommendation rationale

The recommendation was formulated by the NUGAG Subgroup on Policy Actions based on several key considerations (below and **Table 4, pp. 27**).

- This recommendation was formulated based on the very low certainty of evidence on a subset of targeted food subsidies, as the evidence appears to indicate desirable effects.
- The recommendation was further supported by evidence on probable acceptability and feasibility, probably favourable cost-effectiveness, and the potential for the intervention to increase equity and support human rights.
- Price changes that affect the cost of food can influence decisions on food purchases. A subsidy on foods that contribute to a healthy diet can reduce their price and provide an incentive to purchase.
- Although there are variations in policy designs, implementation of a policy to subsidize foods that contribute to a healthy diet may increase purchases of the subsidized food among the target population, suggesting a potential benefit.

Key considerations for implementation

The recommendations in this guideline should be adapted to the local contexts of WHO regions and Member States. Considerations about the local context include:

- available resources, including for policy implementation, enforcement and continued monitoring for compliance;
- institutional arrangements relevant to fiscal policies, such as designation of competent authorities for the implementation and enforcement of fiscal policies, including tax laws;
- structures and mechanisms, including mechanisms to protect against conflicts of interest and to safeguard public health policies and enforcement mechanisms;
- the policy context, including the country's legal system and potential regulatory pathways and the overall political economy; and
- the stakeholders to consult and/or engage with at different stages of the policy cycle.

Key policy design elements include the products subject to a tax or subsidy; the tax or subsidy rate; and the tax type, structure and base. Detailed guidance on implementing SSB taxation can be found in the WHO manual on SSB taxation policies. The manual provides finance and health ministry officials with national-level examples in the implementation of SSB excise taxes, along with key considerations and strategies for SSB tax policy development, design, implementation and administration. Additional global and regional implementation resources on fiscal policies to promote healthy diets, and on taxation in general, may serve as useful references to support implementation of the recommendations in this guideline and to ensure that general principles of tax design are considered. WHO also continues to provide technical support to countries developing and implementing fiscal policies to promote healthy diets.

Importantly, preparing for potential opposition to fiscal policies (such as that from industry) may increase policy strength and effectiveness. The WHO manual on SSB taxation policies gives guidance on anticipating opposition to policies, and summarizes common arguments against policies, as well as typical tactics used to counter the policy process, including sowing doubt by discrediting science and diverting attention or threatening court and legal challenges. The manual also proposes steps to strengthen the government's position against legal challenges, and strategies that policy-makers can employ to support the adoption of an SSB tax and counter industry opposition. These strategies include using strong scientific evidence, building a multisectoral coalition of support, developing a comprehensive advocacy strategy and strategically framing the tax.

Fiscal policies to promote healthy diets are best implemented as part of a comprehensive policy approach to create enabling and supportive food environments. The recommendations in this guideline should be considered alongside other relevant WHO guidance and recommendations, including the WHO guideline on policies to protect children from the harmful impact of food marketing, and forthcoming WHO guidelines on school food and nutrition policies and nutrition labelling policies.

1. Introduction

1.1 Background

Unhealthy diets are a leading global public health risk, contributing to all forms of malnutrition (i.e. undernutrition; micronutrient-related malnutrition; and overweight, obesity and diet-related noncommunicable diseases (NCDs)) *(13, 14)*. Globally, 38.9 million children under the age of 5 years were estimated to have overweight or obesity in 2020 – 41% of whom live in low- and lower-middle-income countries – while 45.4 million were estimated to be wasted, and 149.2 million to be stunted *(15)*. Among older children, 337 million children aged 5–19 years were estimated to have overweight or obesity in 2016 *(13)*. Virtually no progress has been made in reducing the spread of childhood overweight in two decades *(15)*. Worldwide, dietary risks[1] were responsible for 11.61% of all disability-adjusted life years (DALYs) lost to NCDs and nearly 8 million deaths from NCDs in 2019 *(16)*.

Every country in the world is affected by one or more forms of malnutrition, which threatens the survival, growth and development of children and adolescents, as well as economies and nations *(17)*. Combating malnutrition in all its forms is one of the greatest global health challenges *(18, 19)*. The causes of malnutrition are complex, and action is required on many fronts *(20–23)*. There is wide recognition that structural changes (i.e. changes to social, cultural, political and physical environments) are required to promote healthy diets *(24)*. In the absence of these structural changes, behaviour change interventions have had limited success in reducing disease risk factors *(25)*. In line with the work of the World Health Organization (WHO) on creating supportive environments for health *(26–28)*, key actions to improve diets include those that focus on the food environment – that is, the surroundings that influence and shape consumers' food behaviours, preferences and values, and prompt consumer decisions *(29, 30)*.

Governments play a leading role in addressing malnutrition in all its forms and reducing the burden of diet-related NCDs, including through public policies that create food environments conducive to healthy diets *(31–33)* and through effective regulation of private sector activities that influence health – that is, the commercial determinants of health *(28, 34)*. The private sector, however, continues to influence public health policy and regulation, including through actions such as lobbying *(34)*.

Affordability of food (which is a function of food price and disposable income) is a key element of the food environment and is well established as an important influence on food purchases *(35)*. There is consistent evidence that food purchases and consumption are inversely related to food price *(36)*, meaning that as the price of a food increases (i.e. affordability decreases), consumption of that food generally decreases. The actions of agribusinesses, manufacturers and retailers are increasingly influencing food prices and affordability – as well as availability, safety and desirability – and, in current food systems, it has become challenging for consumers "to make healthy and affordable food choices consistent with optimal nutrition outcomes" *(37)*. Although the cost of a healthy diet differs across major world regions and World Bank income groupings *(38)*, a healthy diet that reflects global guidance[2] is currently unaffordable for almost 3.1 billion people *(39)*. At the same time, unhealthier options, such as sugar-sweetened beverages (SSBs) *(40)*, have become increasingly affordable. The inverse relationship between food prices and food purchases and consumption indicates that taxes can reduce, and subsidies can increase, consumption of targeted foods *(36)*.

[1] "Dietary risks" includes diets that are low in whole grains, fruits, nuts and seeds, vegetables, fibre, legumes, polyunsaturated fatty acids, calcium or milk, and/or are high in sodium, *trans*-fatty acids, processed meat, red meat or sugary drinks (Global Burden of Disease risk factors).

[2] In this analysis, a "healthy diet" was based on average food group amounts recommended by food-based dietary guidelines from 10 countries.

Recognizing the impact of food prices and affordability, numerous global and regional calls to action have been made. Fiscal measures to promote health and prevent disease are broad ranging and have been proposed in various WHO documents adopted by the World Health Assembly, including the Global Strategy on Diet, Physical Activity and Health *(41)* in 2004; the Comprehensive Implementation Plan on Maternal, Infant and Young Child Nutrition *(42)* in 2012; and the Global Action Plan for the Prevention and Control of Noncommunicable Diseases 2013–2020[1] *(43)* in 2013. The Framework for Action to guide implementation of the commitments of the Rome Declaration on Nutrition adopted by the Second International Conference on Nutrition in 2014 also recommends that governments explore the use of economic incentives and disincentives to promote healthy diets *(33)*. In 2018, the Political Declaration of the Third High-level Meeting of the General Assembly on the Prevention and Control of Non-communicable Diseases (A/RES/73/2), endorsed by heads of state at the 73rd session of the United Nations General Assembly, reaffirmed political commitment to "promote and implement policy, legislative and regulatory measures, including fiscal measures as appropriate, aiming at minimizing the impact of the main risk factors for noncommunicable diseases, and promote healthy diets and lifestyles" *(44)*.

1.2 Scope and purpose

In recent years, an increasing number of countries have implemented fiscal policies to promote healthy diets *(45, 46)*. In particular, governments have imposed taxes on SSBs *(4, 45–48)*; as of February 2024, 115 Member States[2] have implemented SSB taxes at a national level, and three countries at a subnational or municipal level (**Fig. 1**), while 41 Member States[3] have implemented national-level taxes on a variety of food categories (**Fig. 2**). Fewer countries have implemented policies to subsidize healthier foods and beverages,[4] remove taxes on healthier food products[5] or remove subsidies on less healthy food products[6] as a means of encouraging healthier dietary patterns *(45)*. Despite some progress in implementing fiscal policies to promote healthy diets, governments continue to face challenges in their attempts to develop fiscal policies, often resulting in weakened, delayed or defeated policies. Existing fiscal policies also vary in their policy design. For example, some existing taxes on SSBs exclude 100% fruit juices and milk-based SSBs from the taxable products, while others are based only on added sugars content and not on free sugars[7] content *(45)*.

In response to Member State requests, and to strengthen and streamline support for Member States in developing and implementing new, or strengthening existing, fiscal policies to effectively promote healthy diets, WHO began developing this guideline.

Because no single intervention can ensure that all aspects of the food environment support healthy diets, a comprehensive package of policy actions is required. Therefore, guidelines are being developed for multiple policy actions in addition to fiscal policies, including policies to restrict food marketing *(49)*, nutrition labelling policies *(50)*, and school food and nutrition policies *(51)*. Prioritization of policies will depend on the country context.

Recognizing the broad range of fiscal and pricing measures governments can use for health promotion, the scope of this guideline is limited to taxation of SSBs and foods that do not contribute to a healthy diet, and to a subset of food subsidies (the subset including subsidies that have the primary intention to change consumer behaviour by lowering prices of targeted foods at retail level). The guideline does not cover food production or agricultural subsidies (i.e. subsidies to manufacturers or farmers) or trade policy instruments (e.g. import tariffs). Food production or agricultural subsidies or trade policy instruments have complex

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[1] The Seventy-second World Health Assembly extended the period of the global action plan to 2030 to ensure its alignment with the 2030 Agenda for Sustainable Development.

[2] Based on data from the WHO Global database on the Implementation of Food and Nutrition Action (GIFNA) and the WHO Noncommunicable Disease Document Repository.

[3] This number was collated by WHO from GIFNA and the WHO Noncommunicable Disease Document Repository.

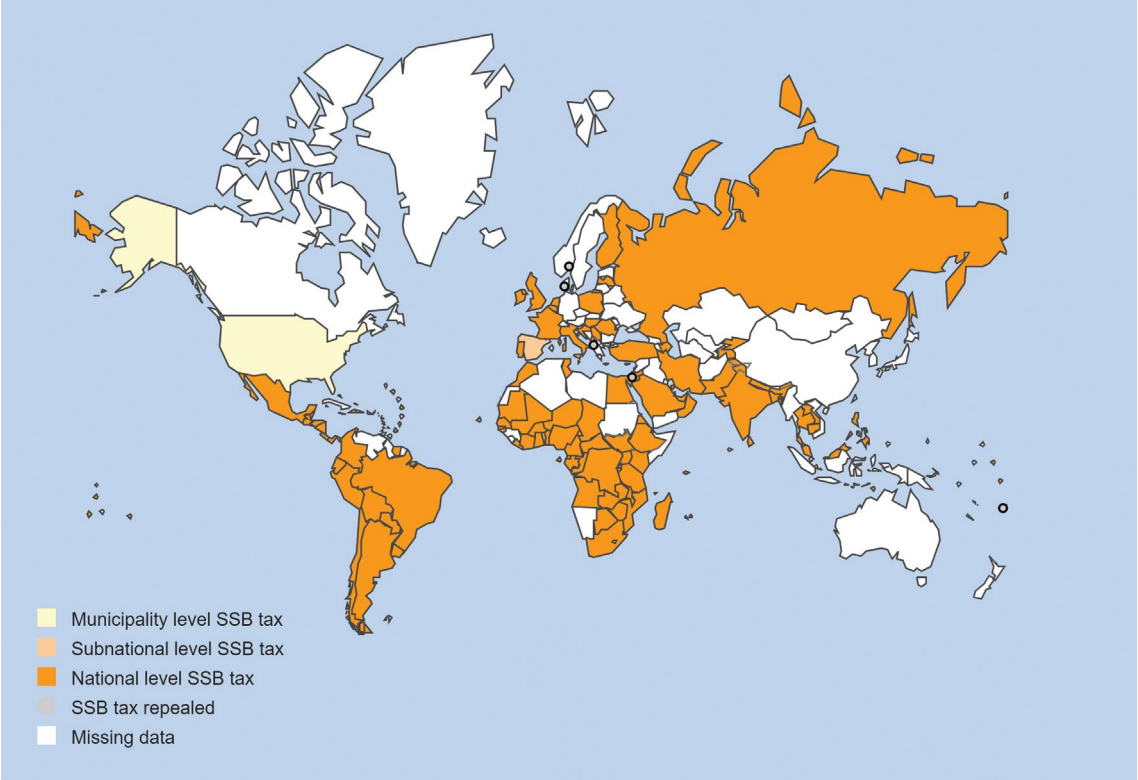
[4] Subsidies on healthier foods and beverages were reported by nine countries in the WHO global nutrition policy review 2016–2017, of which four provided details.

[5] Removing taxes from healthier foods and beverages was reported by six countries in the WHO global nutrition policy review 2016–2017, of which four provided details.

[6] Removing subsidies on foods and beverages that do not contribute to a healthy diet was reported by four countries in the WHO global nutrition policy review 2016–2017, all of which provided details.

[7] Free sugars include monosaccharides and disaccharides added to foods and beverages by the manufacturer, cook or consumer, and sugars naturally present in honey, syrups, fruit juices and fruit juice concentrates (WHO *Guideline: sugars intake for adults and children*, 2015; http://www.who.int/nutrition/publications/guidelines/sugars_intake/en/).

Fig. 1. Countries with taxes on SSBs as of February 2024



Note: “Missing data” means either there has been no action to implement food taxes or the status is unknown.’

Fig. 2. Countries with taxes on foods as of February 2024

Note: “Missing data” means either there has been no action to implement food taxes or the status is unknown.’

global impacts on nutrition, health and equity, as well as on the agricultural sector and climate, and were considered outside the scope of this guideline. School meal or food subsidies were not included. School food provision is reviewed in a forthcoming WHO guideline on school food and nutrition policies *(51)*. Pricing policies were considered in scope. The pricing policies included for consideration were measures taken to restrict price promotions, or to implement minimum price policies (price floors) or maximum price policies (price ceilings), on foods and beverages. The guideline is intended for the general population (children and adults). It does not cover fiscal policies on foods for special dietary purposes. Patient groups with special dietary needs are therefore not a relevant target group. Finally, this guideline is not an implementation manual. It does not describe **how** countries can implement and monitor fiscal policies to promote healthy diets, but rather recommends **what** measures to take. Implementation guidance on SSB taxation policies can be found in the *WHO manual on sugar-sweetened beverage taxation policies to promote healthy diets (5)*.

The WHO guidelines on policies to improve the food environment are in line with other WHO guidelines and recommendations – including guidelines on intake of sodium *(10)*, sugars *(6)*, total fat *(8)*, saturated fatty acids and *trans*-fatty acids *(9)*, polyunsaturated fatty acids (forthcoming) and carbohydrates *(12)*, and the use of non-sugar sweeteners *(3)* and low-sodium salt substitutes (forthcoming) – and the recommendations of the WHO Commission on Ending Childhood Obesity *(52)*. The guidelines on policies to improve the food environment can be used in conjunction with available manuals *(5)* and tools, including the nutrient profile models developed by the WHO regional offices for restricting food marketing to which children are exposed *(53–58)*.

1.3 Objectives

Complementing global and regional guidance on fiscal policies, and recognizing that there is a large body of evidence on the impacts of fiscal measures for health promotion, the objectives of this guideline are to:

- provide evidence-based recommendations and implementation considerations on taxation of foods that do not contribute to a healthy diet and SSBs, and on a subset of subsidies on foods that contribute to a healthy diet (the subset including subsidies that have the primary intention to change consumer behaviour by lowering prices of targeted foods and beverages at retail level);
- enable evidence-informed advocacy to advance policy action;
- guide future research to further strengthen the evidence base for policy action; and
- contribute to the creation of food environments that enable healthy dietary practices among children and adults.

As noted above, this guideline is one of several on policies to improve the food environment. The overarching objective of these guidelines is to contribute to the achievement of healthier populations, in line with the WHO Thirteenth General Programme of Work (2019–2023) *(59)*. The WHO guidelines on policies to improve the food environment will also contribute to implementation of additional calls to action relating to nutrition and health (**Annex 1**).

1.4 Target audience

The guideline is intended for a wide audience involved in the development, design, implementation, monitoring and evaluation of fiscal policies to promote healthy diets, as well as those involved in compliance with, and advocacy for, such policies. The end users for this guideline are thus:

- national and local policy-makers involved in developing, designing, implementing, monitoring or evaluating fiscal policies on foods and non-alcoholic beverages, including food regulators and policy-makers from health and finance/tax authorities;
- implementers and managers of national and local health and nutrition programmes;
- organizations (including nongovernmental organizations) and professional societies involved in advocating for, developing and evaluating fiscal policies;

- health professionals, including managers of health and nutrition programmes and public health policy-makers in all settings;
- scientists and other academic actors involved in relevant research (including policy evaluation); and
- representatives of the food industry and other agencies involved in implementing, or complying with, fiscal policies.

2. How this guideline was developed

This guideline was developed in accordance with the WHO process for development of evidence-informed guidelines outlined in the *WHO handbook for guideline development (60)*. This chapter describes the contributors to the guideline development process and the steps taken.

2.1 Contributors to guideline development

The guideline was developed by the WHO Department of Nutrition and Food Safety with support from the Department of Health Promotion and other members of the WHO Secretariat (**Annex 2**), together with the contributors described below.

WHO Steering Committee

An internal steering committee (**Annex 3**) provided input to development of the guideline. The WHO Steering Committee included representatives from relevant departments in WHO with an interest in the provision of advice on food environment policies, determinants of health, health promotion, and maternal and child health.

Guideline development group

A guideline development group (**Annex 4**) – the WHO Nutrition Guidance Expert Advisory Group (NUGAG) Subgroup on Policy Actions – was convened with the main functions of determining the scope and key questions of the guideline (including the target population, intervention, comparator and outcomes of interest), reviewing the evidence and formulating evidence-based recommendations. The NUGAG Subgroup on Policy Actions included experts identified through an open call for experts in 2018, and people who had participated in previous WHO expert consultations or were members of WHO expert advisory panels. In forming the group, the WHO Secretariat considered the need for expertise from multiple disciplinary areas, representation from all WHO regions and a balanced gender mix. Efforts were made to include experts in complex interventions; development and/or implementation of fiscal and pricing policies to promote healthy diets; and systematic review, programme evaluation and Grading of Recommendations Assessment, Development and Evaluation (GRADE) methodologies.

External resource people

Various external resource people, including methods experts and members of the systematic review teams, attended the meetings of the NUGAG Subgroup on Policy Actions (**Annex 5**). The systematic review team was led by Dr Tatiana Andreyeva, University of Connecticut. It undertook a systematic review to support development of the guideline; this was published as two peer-reviewed articles, on fiscal and pricing policies for non-alcoholic beverages *(7)* and for foods *(61)*.

The risk of bias assessment team was led by Dr Beverley Shea, Ottawa Hospital Research Institute. The team applied different tools, as appropriate for the study designs, which included interrupted time series, controlled before-and-after studies, cohort studies, mixed methods and randomized controlled trials (RCTs) (as detailed in section 2.2). This differed from the approach used in the two published articles, which used a tool developed by the systematic review team to capture validity of measures, sample selection and control for confounders.

External peer review group

Four external peer reviewers were identified in consultation with WHO regional nutrition advisers, representing academia and government (**Annex 6**). The external peer review took place between January and March 2023.

Public consultation

A public consultation on the draft guideline was held in December 2022 and January 2023. Stakeholders were invited to provide comments on the overall clarity of the guideline, considerations and implications for adaptation and implementation of the guideline, context- and setting-specific issues that may not have been captured, any errors of fact and missing data. The consultation was open to everyone. Declaration of interest forms were collected from all those submitting comments and assessed by the WHO Secretariat following procedures for management of conflicts of interest (see section 2.3). The comments were reviewed and considered in finalizing the guideline. A summary of the comments, together with WHO responses, was posted on the WHO website.[1] Comments were received from 67 individuals and organizations.

2.2 Guideline development process

Scoping of the guideline

A scoping review of existing evidence was prepared by Dr Tatiana Andreyeva, University of Connecticut. The scoping review included a review of current evidence on the impacts of food and beverage prices on consumer demand for targeted products, dietary intake and quality, and body weight and health outcomes.

Formulation of key questions and prioritization of outcomes

Fiscal and pricing policies are a priority policy option for creating food environments that contribute to healthy diets, and are implemented within complex systems (including the food system), that are country-specific, and influenced by political, legal, economic, cultural and ethical contexts. As proposed in the *WHO handbook for guideline development*, logic models can be used during guideline planning to show interventions of interest and elements of the system in which they are implemented to help formulate guideline questions *(60)*. **Fig. 3** shows a logic model depicting pathways from fiscal and pricing policies to promote healthy diets to behavioural, health and non-health outcomes. It shows country context policy inputs and considerations, including potential interactions with other, complementary food environment policies, which can amplify the policy of interest's impact.

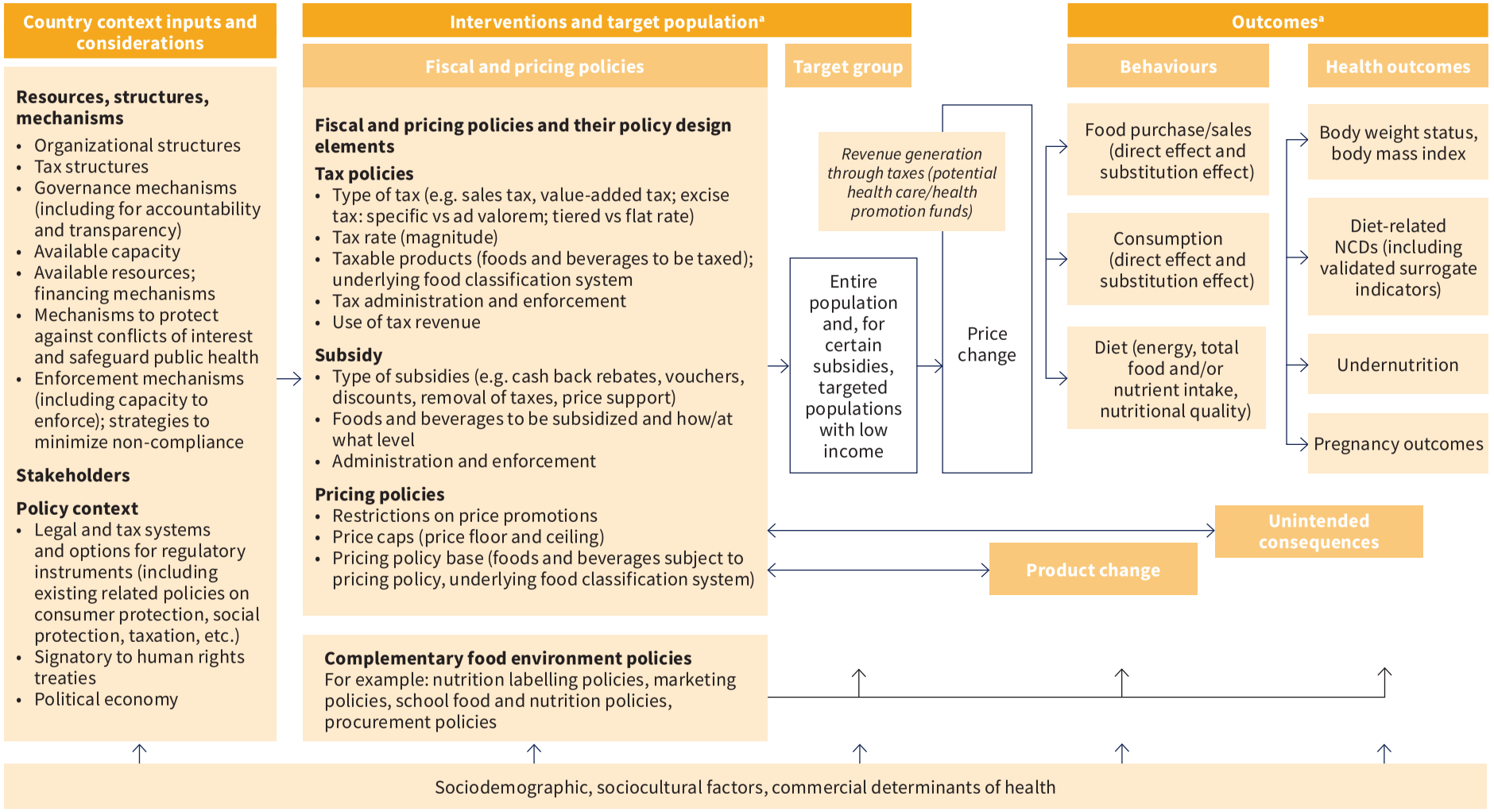
The research question was formulated using the population, intervention, comparator and outcome (PICO) format, based on the scoping review and taking the logic model into consideration. Policy design elements were identified for the intervention for possible subgroup analysis, data permitting. The draft PICO question was first discussed and reviewed by the WHO Secretariat, the WHO Steering Committee and the NUGAG Subgroup on Policy Actions. The final PICO question was determined by the NUGAG Subgroup on Policy Actions. All potentially important outcomes were identified and discussed by the group, followed by an anonymous online rating of outcomes on a scale from 1 to 9. Outcomes rated 7–9 were considered critical for decision-making, and those rated 4–6 were considered important. Those rated 1–3 were dropped from the PICO question.

The NUGAG Subgroup on Policy Actions noted several challenges to assessing longer-term health outcomes.

- The policies under consideration may have been recently introduced, whereas changes to outcomes such as body weight status/body mass index (BMI) and diet-related NCDs occur gradually.
- There are methodological challenges in disentangling the impact of fiscal and pricing policies from the complex array of factors that contribute to outcomes such as body weight status/BMI and diet-related NCDs.
- There is a need to be realistic about the extent to which any one intervention can be expected to impact outcomes such as body weight status/BMI and diet-related NCDs on its own. Instead, fiscal and pricing

[1] *Consolidated comments and responses: Public consultation on the draft WHO Guideline on fiscal policies to promote healthy diets*

Fig. 3. Logic model depicting pathways from fiscal and pricing policies to behavioural, health and non-health outcomes



[a] Interventions and outcomes shown in the figure are those prioritized by the members of the WHO Nutrition Guidance Expert Advisory Group (NUGAG) Subgroup on Policy Actions in formulating the research question for the evidence review to inform the guideline on fiscal policies.

policies are intended to contribute to such outcomes as part of a comprehensive package of policy actions.

Nonetheless, the group ranked several longer-term health outcomes and two non-health outcomes as important, to ensure that the breadth and depth of current evidence were captured and considered in the guideline, and to highlight potential research and knowledge gaps and data challenges to strengthen the evidence base for future updates to this guideline. The selection of outcomes of interest when defining research questions should not be based on outcomes for which evidence is known to be available, but rather should provide the opportunity to explore the unknown and highlight data gaps.

The PICO question was as follows.

- What is the effect in adults and children on the outcomes of interest of implementing a fiscal and/or pricing policy compared with not implementing the policy?

Table 1 provides details of the key question in PICO format.

Table 1. Population, intervention, comparator and outcomes for key question

Measure	Key question
Population	Children and adults Disaggregation by age, sex, gender, BMI, pregnancy status, SES, rurality, income group (HICs and LMICs)
Intervention	Measures taken by governments to tax specified foods and non-alcoholic beverages; subsidize targeted foods or non-alcoholic beverages to change consumer behaviour by lowering prices of targeted foods at retail level; restrict price promotions; and/or implement minimum price policies (price floors) or maximum price policies (price ceilings) Disaggregation by type of tax, subsidy or pricing policy; tax or subsidy rate; products to be subject to a tax, subsidy or pricing policy; tax or subsidy point, jurisdiction and duration; use of tax revenue; and degree and quality of implementation and enforcement
Comparator	No fiscal or pricing policy
Critical outcomes for decision-making	Price change Purchases of targeted foods or beverages Purchases of non-targeted foods or beverages (a measure of substitution effects) Consumption of targeted foods or beverages Consumption of non-targeted foods or beverages (a measure of substitution effects) Dietary intake
Important outcomes (longer-term health outcomes and non-health outcomes)	Body weight status/BMI Diet-related NCDs (or validated surrogate indicators) Undernutrition and pregnancy outcomes Product changes Unintended consequences to wider society (e.g. revenue, jobs)

BMI: body mass index; HIC: high-income country; LMIC: low- and middle-income country; NCD: noncommunicable disease; SES: socioeconomic status.

A systematic review to assess the evidence on the effectiveness of implemented fiscal and pricing policies, including to determine their potential desirable and undesirable effects, and explore policy design elements, was commissioned, because none of the reviews identified by the scoping review adequately answered the formulated research question.

The NUGAG Subgroup on Policy Actions requested an additional review to provide information on contextual factors that would be considered in the formulation of the recommendations, such as resource implications,

equity and human rights, acceptability and feasibility. The contextual factors in the review included those outlined in the *WHO handbook for guideline development* (Chapters 10 and 18) *(60)*. Extra questions were formulated to guide the review of contextual factors (**Annex 7**).

Pricing policies were considered in scope for both the systematic review and the review of contextual factors. However, no recommendations were formulated for pricing policies to promote healthy diets because the systematic review identified a lack of evidence relating to their effectiveness (or harms); the title of this guideline hence refers only to fiscal policies to promote healthy diets.

Evidence gathering and grading

Evidence gathered for this guideline included:

- a systematic review on the impacts of fiscal and pricing policies on non-alcoholic beverages *(7)* and foods *(61)*;
- a review of contextual factors (values, resource implications, equity and human rights, acceptability, and feasibility) *(62)*; and
- modelling studies on taxation of food.

The systematic review team conducted the systematic review to address the key question in PICO format (**Table 1**). The systematic review search included literature published up until June 2020. The review of contextual factors was conducted by WHO and involved literature searches for systematic reviews, primary studies and grey literature that provided information on values, resource implications, equity and human rights, acceptability and feasibility *(62)*. Detailed descriptions of the methods for each review are available in the review publications.

The risk of bias of each study included in the systematic review was assessed by the risk of bias assessment team using the following standardized tools:

- Cochrane Effective Practice and Organisation of Care review group data collection checklist for interrupted time series and controlled before-and-after studies
- Newcastle–Ottawa Quality Assessment Scale for cohort studies
- Mixed Methods Appraisal Tool
- Cochrane Risk of Bias 2 (RoB 2) tool for RCTs.

In line with the guideline development process, the certainty of the body of evidence for each outcome gathered through the systematic review was assessed using the GRADE approach. GRADE provides a transparent approach to grading the certainty of evidence for each outcome included in key questions. The certainty of evidence indicates the level of confidence that the effects of an intervention as observed in a body of evidence (i.e. a set of scientific studies) reflect the true effects that would occur in real-world settings.

Using the GRADE approach, there are four possible assessments for the overall certainty of the evidence for an outcome *(63)*:

- very low (very low level of confidence in the effect estimate – the true effect is likely to be substantially different from the effect estimate);
- low (low level of confidence in the effect estimate – the true effect may be substantially different from the effect estimate);
- moderate (moderate level of confidence in the effect estimate – the true effect is likely to be close to the effect estimate, but there is a possibility that it is substantially different); and
- high (high level of confidence in the effect estimate – the true effect is likely to be close to the effect estimate).

The starting point for assessing the overall certainty of the evidence for an outcome depends on the design of the studies that contribute to the evidence base: evidence from observational studies starts at low certainty, because of residual confounding, whereas evidence from RCTs starts at high certainty. Most studies that assess the effectiveness of a fiscal policy are observational. Although observational studies,

such as natural experiments, are likely most appropriate for evaluating policies such as SSB taxes *(64)*, the certainty of evidence for observational studies starts at low in GRADE. The overall certainty of evidence for each outcome in the systematic review was assessed by considering five factors for potentially downgrading the certainty (risk of bias, inconsistency, indirectness, imprecision and publication bias) as defined and used in the GRADE approach, and three factors for potentially upgrading the certainty (large effect size, all plausible confounding would reduce the demonstrated effect, and dose–response gradient).

For each GRADE factor, judgements were made in consultation with the methods expert, and further discussed with the systematic review authors and the NUGAG Subgroup on Policy Actions. The judgements and their rationale were recorded in GRADE evidence profile tables (see **Annex 8**).

The certainty of evidence was not assessed for the contextual factors review, nor for the modelling studies on taxation of food.

Formulation of the recommendations

The NUGAG Subgroup on Policy Actions discussed and assessed the evidence, drafted recommendations and reached consensus on the direction and strength of the recommendations using the GRADE approach.

After reviewing the ratings for the certainty of evidence for each critical and important outcome, the NUGAG Subgroup on Policy Actions made a judgement on the overall certainty of evidence by reflecting on the validity, precision, consistency and applicability of the measures of effect, taking into consideration the pathway of effect of the entire body of evidence. The GRADE approach explicitly separates the process of assessing the level of certainty of the evidence from the process for making recommendations. The latter process takes into consideration several additional contextual factors (resource implications, equity and human rights, acceptability and feasibility) *(63)*. The level of certainty of evidence does not imply a particular strength of recommendation; high certainty evidence does not necessarily mean that a strong recommendation will be made, and a strong recommendation can be made with low or very low certainty evidence, depending on additional considerations.

Evidence-to-decision tables were used to structure and document the discussion, and anonymous online voting was used to arrive at an initial judgement for each factor. Following the voting, initial judgements were discussed until the group reached consensus. Based on the evidence of effectiveness and additional contextual factors, the NUGAG Subgroup on Policy Actions developed the recommendations and associated remarks by consensus.

2.3 Management of conflicts of interest

According to the rules in the WHO *Basic documents (65)*, whenever an expert or an individual provides independent advice to WHO, including participating in WHO meetings, a declaration of interest form must be submitted, and all declarations must be analysed. In the case of guideline development, this includes all members of the guideline development group (for this guideline, the NUGAG Subgroup on Policy Actions), individuals who prepare systematic reviews and evidence profiles, and any other experts (including external peer reviewers) who participate in the process of guideline development in an individual capacity. Declaration of interest forms were reviewed by the WHO Secretariat in consultation with the WHO Office of Compliance, Risk Management and Ethics when finalizing the composition of the NUGAG Subgroup on Policy Actions. Before every meeting, the members of the NUGAG Subgroup on Policy Actions, the members of the systematic review team and other experts who would be participating in the meeting were asked to submit their updated declaration of interest forms. In addition to distributing the declaration of interest form, the WHO Secretariat described the declaration of interest process and provided an opportunity during meetings for guideline development group members to declare any interests not provided in written form. All declared interests were reviewed by the WHO Secretariat in consultation with the Office of Compliance, Risk Management and Ethics, as necessary. A summary of declared interests and the assessment of these interests is provided in **Annex 9**.

Similarly, declaration of interest forms from external peer reviewers were assessed by the WHO Secretariat, following the procedures for management of interests outlined in the *Guidelines for declaration of interests for WHO experts (66)*.

3. Summary of evidence

Evidence was gathered via a systematic review on the impacts of fiscal and pricing policies on non-alcoholic beverages *(7)* and foods *(61)* and a review of contextual factors *(62)*. The evidence gathered was specific to taxation and subsidies in relation to foods and non-alcoholic beverages, and does not include broader evidence on the effectiveness of policies to tax or subsidize other products. Policy-makers may draw upon such broader evidence to further support fiscal policies to promote healthy diets.

3.1 Evidence on effectiveness of fiscal policies to promote healthy diets

The evidence summarized in this section is from the systematic review on the impact of fiscal and pricing policies (which was published as two peer-reviewed articles – on fiscal and pricing policies for non-alcoholic beverages *(7)* and for foods *(61)*) and from the GRADE evidence profiles (**Annex 8**).

Table 1 outlines the population, intervention, comparator and outcomes that guided the review. Policies that could affect consumer prices but are not direct fiscal or pricing policies, such as import tariffs, agricultural subsidies, cash transfers and in-kind transfer programmes, were not included. Pilot interventions were included if the piloted intervention was later adopted into policy. The systematic review search included literature published up until June 2020.

The included studies were grouped as follows:

- taxation of SSBs[1] (*n* = 86 studies);
- taxation of foods or nutrients (*n* = 19[2]):
  - tax on food (*n* = 15);
  - tax on saturated fats (*n* = 5); and
- subsidies on foods that contribute to a healthy diet (*n* = 32[3]).

No studies were identified for pricing policies.

The following summaries note where studies did not report statistical testing. Without statistical testing, it is difficult to assess whether any observed difference reported by a study is most likely real or due to chance.

[1] The taxable products varied across evaluated tax policies. Beverages included both those sweetened with non-sugar sweeteners and SSBs (i.e. beverages containing free sugars – that is, monosaccharides and disaccharides added to foods and beverages by the manufacturer, cook or consumer, and sugars naturally present in honey, syrups, fruit juices and fruit juice concentrates). They include carbonated or non-carbonated soft drinks, fruit/vegetable juices and drinks, liquid and powder concentrates, flavoured water, energy and sports drinks, ready-to-drink tea, ready-to-drink coffee, and flavoured milk drinks. Evaluations were conducted on all taxed beverages combined; it was not possible to conduct separate analyses by type of beverage.

[2] The number of studies reporting on taxation of foods or nutrients (19 studies) is less than the sum of the number of studies reporting on taxation of foods (15 studies) and taxation of saturated fats (5 studies), as one study reported on both taxes on foods (in Denmark, Finland and Hungary) and a tax on saturated fat (in Denmark).

[3] The systematic review on the effect of fiscal and pricing policies for foods *(28)* included an additional three studies that evaluated a price incentive programme implemented by a private health insurance provider in South Africa. This programme was not included in the evidence base for this guideline. It was not considered a subsidy since the programme did not directly involve government funds.

3.1.1 Taxation of SSBs

A total of 86 studies, all observational,[1] on 11 national[2] and 14 subnational[3] taxes on SSBs were included in the systematic review.

The evaluated taxes on SSBs included in the review varied in their type (e.g. excise or sales, tiered or uniform), coverage (national or subnational), taxable products (beverages included or not included) and rate. The range of tax rates within the review was 5–50%, with most studies looking at tax rates within the range of 10–25%. However, price increases were often lower than the tax rates cited, due to incomplete pass-through of taxes, as explained below. Characteristics of the tax policies are summarized in **Annex 10**.

Pooled analyses were completed for five of the six critical outcomes – price change, purchases of taxed beverages, purchases of untaxed beverages (a measure of substitution effects), consumption of taxed beverages, and consumption of untaxed beverages (a measure of substitution effects) – and none of the six important outcomes. Where possible, sensitivity analyses assessed the possible impact of outliers, studies with high and low variance, and risk of bias[4] on the effect sizes. Studies that could not be included in pooled analyses (e.g. due to missing data or a lack of statistical testing) were synthesized narratively. For outcomes where pooled analyses were not completed, narrative synthesis was used for all studies.

Where possible, subgroup analyses compared findings based on socioeconomic status (SES) using narrative synthesis. It was not possible to complete subgroup analyses by age, sex, gender, body mass index (BMI), pregnancy status, rurality or income group (high-income countries (HICs) and low- and middle-income countries (LMICs)) or by any tax characteristics, as a result of lack of data.

Based on the included studies, observational evidence showed that taxes on SSBs increase prices of taxed beverages (**Annex 8**). As a result of the large effect size for price change of taxed beverages (measured using pass-through rate), the observational evidence was upgraded from low to moderate certainty. The effects of taxes on SSBs on prices of taxed beverages were reported as pass-through rates (i.e. the proportion of a consumption tax that is transferred from producers and/or distributors to consumers). Pooled analysis of 46 estimates from 41 studies for 18 policies[5] found a pass-through rate of 82% (95% confidence interval (CI): 66% to 98%; $P < 0.001$), indicating that a 1 dollar increase in tax would increase the price for the consumer by 0.82 dollars. This suggests tax under-shifting (i.e. less than 100% of the tax is borne by the consumer). There were no substantive differences in the magnitude or statistical significance of the effect size when outlier studies were excluded, and no significant differences in effect size between studies with low and high risk of bias. Of 12 estimates from eight studies for 10[6] policies that could not be included in the pooled analysis, 10 estimates (from seven studies) suggested increased prices of taxed beverages but did not provide statistical testing. The remaining two estimates were from a study of two state sales taxes in the United States of America (USA) – the study showed significantly increased prices of taxed beverages in one state and no significant change in the other.

Observational evidence showed that taxes on SSBs reduce purchases of taxed beverages (**Annex 8**). As a result of the large effect size for purchases of taxed beverages (measured using price elasticity), the observational evidence was upgraded from low to moderate certainty. Pooled analysis of 35 estimates from 33 studies for 16 policies[7] found an own-price elasticity of –1.59 (95% CI: –2.11 to –1.08; $P < 0.001$), indicating that a 10% tax-induced price increase would reduce purchases of taxed beverages by about 16%.

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[1] All included studies used non-experimental research designs, including interrupted time-series or controlled before-and-after designs (i.e. difference-in-difference analysis).

[2] National taxes: Barbados, Chile, Denmark, Finland, France, Hungary, Mexico, Portugal, Saudi Arabia, South Africa, United Kingdom.

[3] Subnational taxes: Catalonia (Spain), Sheffield (United Kingdom), restaurant chain (United Kingdom), Berkeley (USA), Boulder (USA), Cook County (USA), Maine (USA), Oakland (USA), Ohio (USA), Philadelphia (USA), San Francisco (USA), Seattle (USA), Washington (state) (USA), state sales taxes (USA).

[4] The sensitivity analysis by risk of bias included in this summary of evidence and the GRADE evidence profile tables (**Annex 8**) is based on the risk of bias assessed by the risk of bias assessment team.

[5] National: Barbados, Chile, Denmark, France, Mexico, Portugal, Saudi Arabia, South Africa, United Kingdom; subnational: Catalonia (Spain), Berkeley (USA), Boulder (USA), Cook County (USA), Oakland (USA), Philadelphia (USA), San Francisco (USA), Seattle (USA), Washington (state) (USA).

[6] National: Denmark, Finland, France, Hungary, Mexico, Portugal; subnational: Catalonia (Spain), Sheffield (United Kingdom), restaurant chain (United Kingdom), Maine (USA), Ohio (USA), Philadelphia (USA).

[7] National: Barbados, Chile, Denmark, France, Mexico, Portugal, Saudi Arabia; subnational: Catalonia (Spain), Berkeley (USA), Cook County (USA), Oakland (USA), Philadelphia (USA), Seattle (USA), Washington (state) (USA).

There were no substantive differences in the magnitude or statistical significance of the effect size when outlier studies or studies with extreme variance were excluded, and no significant differences in effect size between studies with low and high risk of bias. Of 14 estimates from 10 studies for 10[1] policies that could not be included in the pooled analysis, nine estimates (from six studies) suggested decreased purchases of taxed beverages but did not provide statistical testing, three estimates (from three studies) showed significantly decreased purchases of taxed beverages, and two estimates (from one study) showed no significant change. In a narrative subgroup analysis of purchases of taxed beverages by SES, six studies from Mexico consistently showed greater reductions in purchases of taxed beverages for low-income (compared with higher-income) or low-SES (compared with higher-SES) households. The results of studies from other countries were less consistent. Of two studies from Philadelphia, USA, one study showed no difference by SES or income, whereas the other study showed lower reductions in purchases of taxed beverages in low-income residential areas. Two studies from Chile and two studies from Catalonia, Spain, showed greater reductions in purchases of taxed beverages in higher-income groups or areas, and a United Kingdom of Great Britain and Northern Ireland study found that the reduction in sugar purchased per household in taxed beverages was smallest for the lowest SES group.

Observational evidence about the effect of taxes on SSBs on purchases of untaxed beverages (a measure of substitution effects) (**Annex 8**) was of very low certainty. Pooled analysis of 25 estimates from 24 studies for 14[2] policies found a cross-price elasticity of 0.42 (95% CI: −0.52 to 1.35; $P = 0.37$), indicating no significant substitution to untaxed beverages. There were no substantive differences in the magnitude or statistical significance of the effect size when outlier studies or studies with extreme variance were excluded, and no significant differences in effect size between studies with low and high risk of bias. Of eight studies for six[3] tax policies that could not be included in the pooled analysis, two studies showed no significant change in purchases of untaxed beverages, two studies suggested no change in purchases of untaxed beverages but did not provide statistical testing, two studies suggested increased purchases of untaxed beverages but did not provide statistical testing, one study showed significantly increased purchases of untaxed beverages, and one study suggested mixed results across retailers. In a narrative subgroup analysis of purchases of untaxed beverages by SES, findings were inconsistent.

Observational evidence about the effect of taxes on SSBs on self-reported consumption of taxed beverages was of very low certainty (**Annex 8**). Pooled analysis of 12 estimates from nine studies for five[4] policies found an own-price elasticity of −3.78 (95% CI: −8.86 to 1.30; $P = 0.13$), suggesting no significant effect of taxes on SSBs on self-reported consumption of taxed beverages. Of four studies for two[5] policies that could not be included in the pooled analysis, two studies assessing the impact of an excise tax showed significantly decreased self-reported consumption of taxed beverages, and two studies on a subnational sales tax in the USA showed no significant change. In a narrative subgroup analysis of self-reported consumption of taxed beverages by SES, a study from Philadelphia, USA, and a study from Mexico showed no difference by income.

Similarly, observational evidence about the effect of taxes on SSBs on self-reported consumption of untaxed beverages (a measure of substitution effects) was of very low certainty (**Annex 8**). Pooled analysis of 12 estimates from nine studies for five[6] policies found a cross-price elasticity of 0.54 (95% CI: −0.60 to 1.68; $P = 0.32$), indicating no significant substitution to untaxed beverages. There were no substantive differences in the magnitude or statistical significance of the effect size when outlier studies were excluded, and no significant differences in effect size between studies with low and high risk of bias. Of two studies for one[7] policy that could not be included in the pooled analysis, one study showed significantly increased self-reported consumption of untaxed beverages, and one study showed mixed results by type of beverage.

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[1] National: Denmark, Finland, France, Hungary, Mexico, Portugal, United Kingdom; subnational: Maine (USA), Ohio (USA), Philadelphia (USA).
[2] National: Barbados, Chile, Denmark, France, Mexico, United Kingdom; subnational: Catalonia (Spain), restaurant chain (United Kingdom), Berkeley (USA), Cook County (USA), Philadelphia (USA), Oakland (USA), Seattle (USA), Washington (state) (USA).
[3] National: Denmark, Mexico, Saudi Arabia, United Kingdom; subnational: Berkeley (USA), Philadelphia (USA).
[4] Catalonia (Spain), Berkeley (USA), Oakland (USA), Philadelphia (USA), Seattle (USA).
[5] Mexico, state sales taxes (USA).
[6] Catalonia (Spain), Berkeley (USA), Oakland (USA), Philadelphia (USA), Seattle (USA).
[7] State sales taxes (USA).

Observational evidence about the effect of taxes on SSBs on diet was of very low certainty (**Annex 8**). Pooled analysis was not possible. Of the two studies that reported on the diet outcome, both of which reported on state sales taxes in the USA, one study showed no change in total calorie intake, and the other showed significantly increased total calorie intake.

Observational evidence about the effect of taxes on SSBs on product changes was of low certainty (**Annex 8**). Pooled analysis was not possible. Of the six studies that reported on the outcome of product changes, which were related to three specific tiered excise taxes in Portugal, South Africa and the United Kingdom of Great Britain and Northern Ireland, five studies suggested decreased sugar content of taxed beverages but did not provide statistical testing. The remaining study, from the United Kingdom of Great Britain and Northern Ireland, did provide statistical testing and found a significant reduction in the percentage of beverages exceeding the lower levy threshold for sugar.

With regard to unintended consequences, the evidence about the effect of taxes on SSBs on unemployment was of very low certainty, and evidence on the effect on cross-border shopping and other unintended consequences was of low certainty (**Annex 8**). Pooled analyses were not possible. One study from Mexico showed no change in manufacturing jobs and a significant decrease in national unemployment rates, whereas a study from Philadelphia, USA, showed no significant effect on unemployment. Results for cross-border shopping after implementation of a tax in small jurisdictions showed mixed results. Of 10 studies for five excise tax policies in local jurisdictions, four studies showed significantly increased cross-border shopping or significantly decreased total grocery sales for retailers in taxed jurisdictions, three studies suggested effects but did not provide statistical testing, two studies suggested mixed results, and one study showed no significant effect. With regard to other unintended consequences, two United Kingdom of Great Britain and Northern Ireland studies showed no significant post-tax changes for market return and turnover for soft drink manufacturers. A study in Oakland, USA, showed no significant changes to store SSB advertising and price promotions after tax implementation.

The observational evidence about the effect of taxes on SSBs on body weight status was from studies that reported on state sales taxes in the USA and was of low certainty (**Annex 8**). Pooled analysis was not possible. Only one of the five studies that reported on this outcome showed significantly decreased BMI; the remaining four studies reported no significant difference. In a narrative subgroup analysis of body weight status by SES, one USA study reported larger effects among individuals with higher levels of education (compared with individuals with lower levels of education).

No eligible studies were identified for the outcomes of diet-related NCDs, undernutrition or pregnancy outcomes.

One limitation of the evidence is that it includes few or no studies on long-term outcomes such as body weight status and diet-related NCDs. This is explained, in part, by the fact that most taxes on SSBs are recently implemented. Given changes in body weight status and diet-related NCDs typically occur gradually, as illustrated in **Fig. 4** (in section 6.2), long-term studies are needed to assess any effect on these outcomes. Even so, there is a need to be realistic about the extent to which any one intervention can be expected to impact on outcomes such as body weight status/BMI and diet-related NCDs on its own; fiscal and pricing policies are intended to contribute to such outcomes as part of a comprehensive package of policy actions. A further limitation of the evidence arises because many studies reported aggregated results for the general population rather than results by SES, thereby limiting assessment of the impacts of taxes on equity.

3.1.2 Taxation of foods or nutrients

A total of 19 studies, all observational,[1] on four national taxes[2] and various state sales taxes in the USA[3] on foods or nutrients were included.

The evaluated taxes on food included in this review varied in their type (e.g. excise, sales), coverage (national or subnational), taxable products and rate. Details of the tax policies can be found in **Annex 10**. Because of

[1] All included studies used non-experimental research designs, including interrupted time series or a before-and-after controlled design (i.e. difference-in-difference analysis).
[2] Denmark, Finland, Hungary, Mexico.
[3] Colorado (USA), Maine (USA), state sales taxes (USA).

the variation in tax policy design, the effects of taxes on foods were analysed and summarized separately in the following categories:

- taxation of foods (10 studies on a national (ad valorem) excise tax in Mexico; one study on a national excise tax in Hungary; one study on national excise taxes in Denmark, Finland and Hungary; and three studies on state sales taxes in the USA); and
- taxation of saturated fats (five studies on a national excise tax in Denmark).

Pooled analysis could not be completed for any of the outcomes of interest, because of the low number of available studies or high heterogeneity across measures. Instead, all studies were synthesized narratively.

Tax on foods

Fifteen studies on four national taxes (Denmark, Finland, Hungary and Mexico) and three studies on subnational taxes (in Colorado (USA), Maine (USA) and multiple states in the USA) on foods were included.

Four of the six observational studies on the effect of taxes on foods on price change showed significantly increased prices of taxed foods. The remaining two studies (on taxes in Denmark, Finland and Hungary and on the Mexican tax) suggested increased prices of taxed foods, but did not provide statistical testing. The evidence for this outcome was of very low certainty (**Annex 8**).

Of nine observational studies that reported on the effect of taxes on foods on purchases of taxed foods, five studies (on the Hungarian and Mexican taxes) showed significantly decreased purchases of taxed foods, one study (on taxes in Denmark, Finland and Hungary) suggested decreased purchases of taxed foods but did not provide statistical testing, two studies (on a sales tax in Colorado, USA, and on the Mexican tax) reported no significant change, and one study (on the Mexican tax) found mixed results by food. The evidence for this outcome was of very low certainty (**Annex 8**). In a narrative subgroup analysis of purchases of taxed foods by SES, two studies on the Mexican tax suggested that purchases of taxed foods declined more for households of low SES (compared with households of higher SES).

Observational evidence about the effect of taxes on foods on purchases of untaxed foods (a measure of substitution effects) was of very low certainty (**Annex 8**). Of seven studies that reported on this outcome, two studies (one on a sales tax in Colorado, USA and one on the Mexican tax) showed significantly increased purchases of untaxed foods, two studies (on the Mexican tax) found mixed results, and three studies (on the Hungarian and Mexican taxes) showed no significant change.

With regard to unintended consequences, evidence about the effect of taxes on foods on unemployment was of very low certainty (**Annex 8**). Two studies, both on the Mexican tax, reported on unemployment. One case study reported an increase in unemployment but did not provide statistical testing. The other study showed a small but significant decrease in national unemployment following tax implementation.

Observational evidence about the effect of a food tax on BMI was from studies that reported on sales taxes in two states in the USA and was of low certainty (**Annex 8**). Pooled analysis was not possible. Of the two studies that reported on this outcome, neither study reported a significant impact. In a narrative subgroup analysis of body weight status by SES, one study found a negative association between taxes and BMI for high-school graduates only.

No studies were identified for the outcomes of consumption of taxed foods, consumption of untaxed foods (a measure of substitution effects), dietary intake, product changes, diet-related NCDs, undernutrition or pregnancy outcomes.

The systematic review included only real-world policy evaluations, of which there were a limited number. Evidence from modelling studies was therefore also considered by the NUGAG Subgroup on Policy Actions, which showed that food taxes – if well designed – are expected to have a large desirable effect on health outcomes *(67–70)*.

Tax on saturated fats

Five studies on a national tax on saturated fats in Denmark were included. The national tax had a very broad range of taxable products, including some foods that are considered "core" to a healthy diet. The available evidence was of very low certainty, and was mostly downgraded as a result of risk of bias and indirectness – evidence was from one setting, representing a single country context (**Annex 8**).

Of three studies reporting on the effect of a tax on saturated fats on the price of taxed foods, two studies showed significantly increased prices of taxed foods. The remaining study suggested increased prices of taxed foods but did not provide statistical testing.

Of five studies that reported on the effect of a tax on saturated fats on purchases of taxed foods, three studies suggested decreased purchases of taxed foods but did not provide statistical testing, and two studies showed significantly decreased purchases of taxed foods.

Only one study reported on the effect of taxes on purchases of untaxed foods, suggesting mixed results, but it did not provide statistical testing.

No studies were identified for the outcomes of consumption of taxed foods, consumption of untaxed foods (a measure of substitution effects), diet, product changes, unintended consequences, body weight status, diet-related NCDs, undernutrition or pregnancy outcomes.

3.1.3 Subsidies on foods that contribute to a healthy diet

A total of 32 studies, 10 of which were RCTs and 22 of which were observational studies, on a subset of subsidies on targeted foods that contribute to a healthy diet were included. More specifically, studies evaluated various vouchers for and discounts on fruits and vegetables for low-income households in the USA; food vouchers for low-income pregnant women and low-income households in the United Kingdom of Great Britain and Northern Ireland; a subsidized fruit and vegetable box programme targeting low-income Aboriginal families with young children in Australia; discounted pulses and fortified wheat flour for eligible households in India; and the reduction of value-added tax (VAT) on fruits and vegetables in Latvia. The subsidies varied in their coverage (national or subnational), in products to be subsidized and in target population. Details of the subsidy policies can be found in **Annex 10**.

Pooled analyses were completed for two of the six critical outcomes – purchases of subsidized fruits and vegetables and consumption of subsidized fruits and vegetables – and none of the six important outcomes. Studies that could not be included in pooled analyses (e.g. due to missing data or a lack of statistical testing) were synthesized narratively. For outcomes where pooled analyses were not completed, narrative synthesis was used for all studies. Evidence from both RCTs and observational studies was of very low certainty for all outcomes for which studies were identified; details are provided in **Annex 8**.

Three observational studies reported on the effect of subsidies on foods that contribute to a healthy diet on price change. One of these (from Latvia, which assessed a VAT rate reduction) showed significantly decreased price indices for some fruits and vegetables in Latvia compared with controls. The two remaining studies, from the USA, had mixed results across measures.

Pooled analysis of eight estimates on purchases of subsidized fruits and vegetables from six RCTs found a price elasticity of −0.79 (95% CI: −1.60 to 0.02; P = 0.05), indicating that a 10% subsidy-induced price decrease would increase purchases significantly by about 7.9%. Pooled analysis of six estimates from four observational studies found a price elasticity of −0.34 (95% CI: −0.74 to 0.05; P = 0.08). All four studies (one RCT and three observational studies) that could not be included in the pooled analyses showed significantly increased purchases of subsidized fruits and vegetables.

Of the three studies (two RCTs and one observational study) that reported on purchases of unsubsidized foods, two studies showed no significant change, and one study found mixed results.

Pooled analysis of four estimates on consumption of subsidized fruits and vegetables from three RCTs found a price elasticity of −0.45 (95% CI: −1.50 to 0.59; P = 0.26), indicating no significant effect, and pooled analysis of five estimates from four observational studies found a price elasticity of −0.02 (95% CI: −0.20 to 0.15; P = 0.72), also indicating no significant effect. Of the 10 studies (two RCTs and eight observational studies)

that could not be included in the pooled analyses, six studies showed significantly increased consumption of subsidized fruits and vegetables, and four studies showed no significant change.

Of the four studies (three RCTs and one observational study) that reported on effects on consumption of unsubsidized foods, three studies found mixed results, and one showed significantly decreased consumption of unsubsidized foods.

Of the five studies (three RCTs and two observational studies) that reported on effects on diet, an observational study from India showed significantly increased intake of protein from pulses, and an RCT from the USA showed a significantly increased Healthy Eating Index–2010 score. Of the remaining studies, two studies showed no significant effect, and one study found mixed results.

The two studies (one RCT and one observational study) that reported on effects on body weight status showed no significant change.

An observational study from India showed no significant effect of subsidies on foods that contribute to a healthy diet on undernutrition, two observational studies from Australia found mixed results, and one observational study from Australia reported a significant improvement in mean red blood cell folate z-score among children.

No studies were identified for the outcomes of product changes, unintended consequences, diet-related NCDs or pregnancy outcomes.

3.2 Evidence on contextual factors

A total of 301 publications were included in the review of contextual factors relevant to fiscal and pricing policies to promote healthy diets *(62)*. The overall aim of the review was to search for, identify, summarize and present information on the impact of contextual factors on implementation of fiscal and pricing policies to promote healthy diets.

Forty-one publications provided evidence relating to values. Study populations varied in their values about body weight status. In HICs, overweight and obesity were generally perceived as a serious health problem. Women were more likely than men to perceive overweight and obesity (especially childhood obesity) as a serious health problem, as were people of lower SES compared with their higher-SES counterparts. In contrast, in many studies from LMICs, overweight and obesity were perceived as indicating good health or interpreted as "healthy weight". However, in some countries that have perceived overweight and obesity as indicating good health, values are changing, and normal-weight BMI is increasingly considered healthy. In contrast to values about body weight status, there was no variability in values about diet-related NCDs, which were perceived negatively in all identified studies. No studies were identified on values and food prices.

Fifty-six publications provided evidence relating to resource implications. Evidence was identified in modelling studies, from both LMICs and HICs. All studies that presented cost-effectiveness analyses of modelled taxes on SSBs found modelled taxes to be cost-effective or cost-saving. Studies that did not present cost-effectiveness analyses generally found that the intervention resulted in health care cost savings. Studies that modelled taxes on foods that do not contribute to a healthy diet, or a combination of subsidies and taxes, found the interventions to be cost-effective or cost-saving. Of the studies that presented cost-effectiveness analyses of modelled subsidies or rewards, all but two found the modelled scenarios to be cost-effective or cost-saving. Cost–benefit analyses of policy options to restrict volume promotions for products high in fats, sugars and/or salt estimated that all options analysed would have net benefits. In some instances, the revenue from SSB taxes has been used to finance health care programmes and salaries of health care professionals, or for healthier food incentives, school food programmes or community development.

Seventy publications provided evidence relating to human rights and equity. Special Rapporteurs on the right of everyone to the enjoyment of the highest attainable standard of physical and mental health and on the right to food have called for healthy foods to be made economically accessible, and have recommended taxes on SSBs and on foods that do not contribute to a healthy diet; the revenue from these taxes can be used to subsidize access to fruits and vegetables, and for educational campaigns on healthy diets. Some studies,

however, report that taxes on foods and non-alcoholic beverages are perceived to be inappropriately intrusive. Taxes on foods that do not contribute to a healthy diet and subsidies for healthier foods appear to be among the interventions to promote healthy eating that are most likely to reduce health inequalities. (Interventions such as nutrition labelling, mass media public information campaigns or community-based health education rely more on individuals having the resources (e.g. time, finance) to make and sustain behaviour changes and may therefore be more effective among people of higher SES. Conversely, the effects of taxes and subsidies rely less on individual resources.) Although taxes on foods and non-alcoholic beverages are generally considered to be financially regressive, many studies found taxes to be equitable because of their progressive health benefits. Subsidies can also have an explicit focus on health equity, such as when they are targeted at people of lower SES. Three studies that examined employment changes associated with implementation of taxes found no negative impacts on employment.

A total of 153 publications provided evidence relating to acceptability. The evidence showed that acceptability of fiscal and pricing policies to promote healthy diets varied greatly by stakeholder. The existence of such policies, or national action plans that recommend implementation of such policies, indicates acceptability to governments and policy-makers; the increasing number of countries implementing SSB taxes suggests that these taxes may be more acceptable than other fiscal and pricing policies. Evidence from a systematic review and meta-analysis showed that 39–66% of the public supported an SSB tax; studies reported variation in acceptability according to age, sex, parental status, education, SES, political beliefs and ethnicity. Variation in acceptability was also linked to tax framing and the intended use of the revenue. For example, the use of tax revenue for health purposes is linked to greater public acceptability of taxes. Acceptability to industry of taxes on food and non-alcoholic beverages appeared very low, with multiple examples of lobbying against taxes and interference in policy processes. Limited evidence was found relating to environmental acceptability.

Seventy-eight publications provided evidence relating to feasibility. The existence of fiscal policies (particularly SSB taxes) in some countries points to their feasibility. Evidence identified on feasibility showed that facilitators of the development and implementation of policies include strong political leadership, intersectoral collaboration, supporting evidence, community support, and the use of existing government infrastructure and taxation mechanisms. Barriers to development and implementation include complexity of the development process, conflicting interests, industry interference and pressure, a weak evidence base and the (perceived) administrative burden. Facilitators of monitoring, evaluation and enforcement include establishment of independent advisory committees, support from academia or health institutions, and collaborative efforts between stakeholders. Barriers to monitoring, evaluation and enforcement include a lack of plans or programmes for monitoring, evaluation and enforcement; and actual or perceived costs of monitoring, evaluation and enforcement.

4. Recommendations

WHO recommendation on taxation of beverages

WHO recommends implementation of a policy to tax sugar-sweetened beverages (SSBs).

(Strong recommendation)

Recommendation remarks

These remarks provide context for the recommendation and are to facilitate interpretation and implementation.

- For this recommendation, 'SSBs' refers to all types of non-alcoholic beverages containing free sugars,[1] including carbonated and non-carbonated soft drinks, fruit and vegetable juices[2] and drinks, nectars, liquid and powder concentrates, flavoured waters, vitamin waters, energy and sports drinks, ready-to-drink teas, ready-to-drink coffees, flavoured milks and milk-based drinks, and plant-based milk substitutes.
- Free sugars are monosaccharides and disaccharides added to food and beverages by the manufacturer, cook or consumer, and sugars naturally present in honey, syrups, fruit juices and fruit juice concentrates *(6)*. The WHO guideline on sugars intake recommends reducing children's and adults' intake of free sugars to less than 10% of total energy intake, based on evidence regarding the relationship between free sugars intake and body weight and dental caries *(6)*.
- This recommendation covers SSBs purchased for either adults or children.
- The effectiveness of a policy depends on its design and administration. The current evidence from policy evaluations was insufficient to recommend policy design elements. However, the WHO manual on SSB taxation policies provides policy-makers with key considerations and strategies for SSB tax policy development, design, implementation and administration *(5)*. It includes discussion of types of taxes, taxable products and tax rates, as further outlined in this guideline's implementation considerations (**Chapter 5**).
- Depending on the country, SSB taxes may be implemented by subnational or national jurisdictions. Evidence from subnational studies suggests that the effect of subnational SSB taxes may be affected by cross-border shopping *(7)*. Regional and international cooperation offers opportunities to minimize cross-border shopping *(5)*.
- The regressivity of a tax on SSBs is a common argument used by opponents of such taxes *(5)*. However, this argument is based solely on the tax burden incurred by consumers *(5)*. It does not consider the health and economic harm caused by excessive SSB consumption, which often disproportionately affects people of lower SES, or the subsequent health benefit (and economic gains from this benefit) of

[1] Taxation policies that contributed to the evidence included policies relating to both SSBs and beverages sweetened with non-sugar sweeteners (NSSBs). However, it was not possible to identify a difference in effectiveness between taxes that target SSBs only and those that target both SSBs and NSSBs.

[2] None of the policies in the evidence base for this recommendation included 100% fruit juices as a taxable product. However, reducing consumption of fruit juices could contribute to reducing overall sugars intake because of the sugars content of fruit juices.

a reduction in SSB consumption, which is likely to be greater among people of lower SES *(5)*. The WHO manual on SSB taxation policies proposes additional counter-arguments to the regressivity of a tax on SSBs *(5)*.

- A tax on SSBs can encourage reformulation of beverages and lead to beverages with reduced sugars content.

Recommendation rationale

The recommendation was formulated by the NUGAG Subgroup on Policy Actions based on several key considerations (below and **Table 2**).

- The group judged SSB taxes to have a large desirable effect on two outcomes critical for decision-making (price change and purchases of taxed beverages), and small undesirable effects, based on evidence from a systematic review that assessed the effectiveness of fiscal policies on non-alcoholic beverages *(7)*. As a result of the large desirable effect, the certainty of the observational evidence was deemed moderate. The overall balance between desirable and undesirable effects was judged by the group to probably favour the intervention.
- The recommendation is further based on the group's judgements that there are negligible costs of implementation of SSB taxes, that the cost-effectiveness of SSB taxes favours taxes, that SSB taxes are feasible to implement with varying acceptability among stakeholders, and that implementation of SSB taxes probably supports the realization of human rights and supports improved health equity.
- Implementing a tax on SSBs increases their prices *(7)*. Consumers respond to tax-induced price increases by reducing purchases of taxed beverages *(7)*.
- The effect of the tax on purchases is a function of the price increase triggered by the tax.
- Implementation of a tax on SSBs thereby has the potential to influence consumption of SSBs and free sugars *(6)*.
- Implementing a tax on SSBs may also encourage product changes and reformulation, and lead to a decrease in sugar content of taxed beverages *(7)*. For example, taxes levied at higher rates on products containing more sugar (e.g. tiered taxes) can provide incentives for manufacturers to reformulate their products and for consumers to switch to products containing less sugar.

Table 2. Additional considerations by the NUGAG Subgroup on Policy Actions to determine the direction and strength of the recommendation on taxation of beverages

Decision criteria and judgement	Additional considerations
Magnitude of desirable effects of implementing a policy: large	The size of the desirable effects of the intervention depends on policy design elements, particularly the tax rate. A tax with a higher tax rate will produce larger effects. As food environments are complex and myriad factors influence the outcomes of interest, there is a need to be realistic about the extent to which any one intervention can be expected to affect the long-term outcomes of interest on its own. Although real-world policy evaluations are limited in their study design, the methods used in some of the studies included in the systematic review are among the most robust that can be used to infer causation from observational data. Importantly, the evidence is not based on a set of independent outcomes but on a hierarchy of outcomes. If a tax increases the price of taxed beverages, it can influence purchases of taxed beverages, and, in turn, consumption of taxed beverages and overall diet.

Decision criteria and judgement	Additional considerations
	The data for purchases of taxed beverages (sourced mainly from scanner data from stores) were considered more reliable than the data for consumption of taxed beverages (for which there were methodological limitations). Given this, and the hierarchy of outcomes noted above, the outcomes of price change and purchases of taxed beverages were considered acceptable proxies for consumption of taxed beverages.
Magnitude of undesirable effects of implementing a policy: small	The evidence did not show undesirable health effects. The undesirable effects on cross-border shopping – which were based on studies of subnational SSB taxes – were considered small.
Balance of desirable and undesirable effects: favours the intervention	Based on the large desirable and small undesirable effects, moderate certainty of the evidence, and probably no important uncertainty or variability in values, the balance of desirable and undesirable effects was judged to favour the intervention. The effect of a tax is highly dependent on tax design. If poorly designed (including a trivially small tax rate), a tax may bring no or only marginal health benefits. However, no SSB tax was identified that led to undesirable health effects.
Overall certainty of evidence: moderate	Typically, the judgement on the overall certainty of the evidence across all the critical outcomes for a recommendation is based on the certainty of the evidence of the critical outcome with the lowest rating *(60)*. However, considering the justifications provided under "Magnitude of desirable effects of implementing a policy", the judgement on the overall certainty of the evidence was based on evidence for the outcomes of price change and purchases of taxed beverages, which were considered critical for a decision about the size of the desired effect and certainty of the evidence.
Cost-effectiveness: favours the intervention	The judgement that cost-effectiveness favours the intervention was based on modelling studies, which found modelled taxes to be cost-effective or cost-saving.
Resources required: negligible costs	The costs considered should be those to the government and not to other actors (e.g. industry). Many of the costs of a tax are one-off costs incurred when setting up the tax, and the ongoing costs are likely to be minimal. Compared with other policy measures to promote healthy diets, the resources required for implementing an SSB tax were judged to be negligible. Tax administration costs are typically measured as a proportion of revenue generated. As evidence indicates that SSB taxes do not have higher administration costs than other taxes, and given evidence of the revenue generated by such taxes, the tax administration costs are likely to be minimal. Taxes can generate revenue that can be earmarked for other health purposes.
Impact of policy implementation on equity: increased	Equity impacts of an SSB tax are a potential concern for governments. Expenditures due to increased prices are perceived to weigh most heavily on incomes of people of low SES, although these people are likely to benefit more from the intervention than others in terms of health benefits. The judgement on the impact of SSB taxes on equity was therefore based on the progressivity of health benefits rather than financial regressivity (which is further discussed under "Acceptability of the policy"). Studies identified for the review of contextual factors pointed to a favourable impact on equity. Quantitative subgroup analyses by SES were not possible in the systematic review because of insufficient disaggregated data. Narrative analysis of primary studies included in the systematic review showed mixed findings on the impact of an SSB tax on equity.

Decision criteria and judgement	Additional considerations
Impact of policy implementation on human rights: probably increased	Although a tax on SSBs may restrict the choice of some people, it improves public health in a more equitable way. Information on the impact on human rights was taken from human rights texts, including reports by Special Rapporteurs on the right of everyone to the enjoyment of the highest attainable standard of physical and mental health, who recommend that, to respect, protect and fulfil the right to health, governments "increase availability and accessibility of healthier food alternatives through fiscal…policies that discourage production of unhealthy foods" *(71)*.
People's values related to the outcomes of policy implementation: probably no important uncertainty or variability	The judgement was made on values relating to diet-related health outcomes, such as overweight/obesity and diet-related NCDs, rather than values relating to price of foods. Values relating to the intervention of interest are discussed under "Acceptability of the policy to key actors".
Acceptability of the policy to key actors: varies	Country experience has shown overwhelming public support for a tax. Revenue, particularly its use, influences acceptability, especially to the public. Acceptability can be influenced by the media. Based on country experience, acceptability varies over time and may increase once a tax is implemented; this was seen in opinion polls conducted after implementation of the SSB tax in the United Kingdom of Great Britain and Northern Ireland. Industry, as a key stakeholder for SSB tax implementation, shows low levels of acceptability, increasing the risk of opposition in the development phase. The judgement "varies" reflects the variability between and within stakeholder groups.
Feasibility of implementing the policy: yes	Feasibility depends on country context (including existing tax infrastructure). Implemented SSB taxes, including in LMICs, indicate that the intervention is feasible. Poor policy framing may limit feasibility of the policy and leave it vulnerable to criticism. The intent behind the tax needs to be clearly defined. It is important to be prepared for opposition to ensure that this does not limit feasibility.

LMIC: low- and middle-income country; NCD: noncommunicable disease; SES: socioeconomic status; SSB: sugar-sweetened beverage.

WHO recommendation on taxation of foods

WHO suggests implementation of a policy to tax foods that do not contribute to a healthy diet.

(Conditional recommendation)

Recommendation remarks

These remarks provide context for the recommendation and are to facilitate interpretation and implementation.

- This recommendation should be considered in the context of other WHO guidelines on healthy diets, including those on total fat *(8)*, saturated fatty acids and *trans*-fatty acids *(9)*, polyunsaturated fatty acids (forthcoming), sugars *(6)*, sodium *(10)*, potassium *(11)*, low-sodium salt substitutes (forthcoming), carbohydrates *(12)* and non-sugar sweeteners *(3)*.

- Foods that do not contribute to a healthy diet are those that are high in saturated fatty acids, *trans*-fatty acids, free sugars and/or salt and/or which contain non-sugar sweeteners, and which are usually highly processed, and/or the consumption of which is associated with negative health outcomes.
- Nutrient profile models – a tool for classifying foods and beverages according to their nutritional composition for reasons relating to disease prevention and health promotion – provide one means of defining foods and beverages to be taxed or subsidized. Nutrient profile models used for this purpose should align with recognized and credible national or international dietary guidelines.
- This recommendation covers foods that do not contribute to a healthy diet purchased for either adults or children.
- The current evidence from policy evaluations was insufficient to recommend policy design elements. However, the effectiveness of a policy to tax foods that do not contribute to a healthy diet will depend on the country context, and the policy's design and administration. It remains important to learn from country experiences on policy implementation including on the type of tax, the tax rate, taxable products, and the nutrient profile model used to define taxable products, as well as possible substitution effects of the tax.
- A single nutrient tax (based on evidence from a tax on saturated fatty acids) may also increase prices and reduce purchases of taxed products. A single nutrient tax is likely to have a broad range of taxable products, which may or may not include foods that contribute to a healthy diet.
- The regressivity of a food tax is a common argument used by opponents of such taxes. However, this argument is based solely on the tax burden incurred by consumers and does not consider the health and economic harm caused by excessive consumption of foods that do not contribute to a healthy diet. While considering the financial impact on lower-income populations, policymakers should strive to design tax structures that target foods that do not contribute to a healthy diet, encouraging a shift towards healthier options. This approach aims to strike a balance between safeguarding affordability of foods that contribute to a healthy diet for all income groups, while discouraging foods the consumption of which is associated with negative health outcomes.

Recommendation rationale

The recommendation was formulated by the NUGAG Subgroup on Policy Actions based on several key considerations (below and **Table 3**).

- This conditional recommendation was formulated based on the very low certainty evidence from a limited number of real-world policy evaluations and evidence from modelling studies that food taxes can have a large desirable effect.
- The recommendation was further supported by evidence on probable acceptability and feasibility, probably favourable cost-effectiveness and the potential for the intervention to increase equity and support human rights.
- Price changes that affect the cost of foods can influence decisions on food purchases. Taxation of foods can raise their price and provide a disincentive to purchase.
- Although there are variations in policy designs, implementation of a policy to tax foods that do not contribute to a healthy diet may reduce purchases of the targeted foods as a consequence of price increases, and has the potential to affect their consumption.

Table 3. Additional considerations by the NUGAG Subgroup on Policy Actions to determine the direction and strength of the recommendation on taxation of foods

Decision criteria and judgement	Additional considerations
Magnitude of desirable effects of implementing a policy: don't know	There is potential for taxes to have a desirable public health effect, but the evidence base from real-world policy evaluations is limited, reflected in the judgement "don't know". The evidence from the systematic review does not allow a judgement on desirable effects. However, based on evidence from modelling studies, taxes – if well designed – would be expected to have a large desirable effect *(67–70)*. Substitution of taxed foods was considered more complex than that of taxed beverages, making it more difficult to estimate the effect of food taxes on health.
Magnitude of undesirable effects of implementing a policy: don't know	There is insufficient evidence to judge whether a food tax would have undesirable effects.
Balance of desirable and undesirable effects: probably favours the intervention	Although the systematic review provided limited evidence on desirable and undesirable effects, the judgement reflects the indirect evidence, including from modelling studies. Based on expert judgement, the balance of effects of a food tax policy, if well designed, is likely to favour the intervention.
Overall certainty of evidence: very low	Evidence is limited for all outcomes. Consistent with the remarks in relation to the recommendation for taxation of beverages, the judgement on the overall certainty of the evidence was based on evidence for the critical outcomes of price change and purchases of taxed foods.
Cost-effectiveness: probably favours the intervention	The judgement that cost-effectiveness probably favours the intervention was based on modelling studies, which found modelled taxes to be cost-effective or cost-saving.
Resources required: negligible costs	The costs considered should be those to the government and not to other actors (e.g. industry). Many of the costs of a tax are one-off costs incurred when setting up a tax, and the ongoing costs are likely to be minimal. Compared with other policy measures to promote healthy diets, the resources required for implementing a food tax were judged to be negligible. Compliance costs to industry may be higher for more complex tax structures. Tax administration costs are typically measured as a proportion of revenue generated. As evidence indicates that food taxes do not have higher administration costs than other taxes, and given the potential revenue generated by such taxes, the tax administration costs are likely to be minimal. Taxes can generate revenue that can be earmarked for other health purposes.
Impact of policy implementation on equity: probably increased	Equity impacts of a food tax, similar to those of an SSB tax, are a potential concern for governments. Expenditures due to increased prices are perceived to weigh most heavily on incomes of people of low SES, although these people are likely to benefit more from the intervention than others in terms of health benefits. The judgement on the impact of food taxes on equity was based on evidence from modelling studies.
Impact of policy implementation on human rights: probably increased	Although a food tax may restrict the choice of some people, it improves public health in a more equitable way. Information on the impact on human rights was taken from human rights texts, including reports by Special Rapporteurs on the right of everyone to the enjoyment of the highest attainable standard of physical and mental health, who recommend that, to respect, protect and fulfil the right to health, governments "increase availability and accessibility of healthier food alternatives through fiscal…policies that discourage production of unhealthy foods" *(71)*.

Decision criteria and judgement	Additional considerations
People's values related to the outcomes of policy implementation: probably no important uncertainty or variability	The judgement was made on values relating to diet-related health outcomes, such as overweight/obesity and diet-related NCDs, rather than values relating to prices of foods.
Acceptability of the policy to key actors: varies	Evidence is limited on acceptability of food taxes. The judgement "varies" reflects the variability between and within stakeholder groups.
Feasibility of implementing the policy: probably yes	Compared with a tax on SSBs, a tax on foods may be more difficult to implement with regard to controlling potential substitution and defining the taxable products, and there are likely to be more ways to manipulate products to avoid taxation. Nutrient profile models could help to overcome the difficulties in applying taxes. There are broader cultural considerations for food taxes, which may impact feasibility. Governments already implement very complex tax systems and are competent in defining products that will be taxed.

NCD: noncommunicable disease; SES: socioeconomic status; SSB: sugar-sweetened beverage.

WHO recommendation on a subset of targeted food subsidies

WHO suggests implementation of a policy to subsidize foods that contribute to a healthy diet.

(Conditional recommendation)

Recommendation remarks

These remarks provide context for the recommendation and are to facilitate interpretation and implementation.

- This recommendation is made based on evidence a subset of targeted food subsidies (the subset including subsidies that provide price incentives to consumers at the retail level – including through rebates, discounts, monetary vouchers or coupons or reduction of VAT on the target food).
- This recommendation should be considered in the context of other WHO guidelines on healthy diets, including those on total fat *(8)*, saturated fatty acids and *trans*-fatty acids *(9)*, polyunsaturated fatty acids (forthcoming), sugars *(6)*, sodium *(10)*, potassium *(11)*, low-sodium salt substitutes (forthcoming), carbohydrates *(12)* and non-sugar sweeteners *(3)*.
- Foods that contribute to a healthy diet are those that are nutrient-dense, rich in naturally occurring fibre and/or unsaturated fatty acids, low in saturated fatty acids, *trans*-fatty acids, free sugars and/or salt, free of non-sugar sweeteners, and/or the consumption of which is associated with positive health outcomes.
- This recommendation covers foods that contribute to a healthy diet purchased for adults and children.
- Inequities exist in nutrition status and diet-related health status, with lower-income populations bearing a disproportionate burden of disease. Subsidies may reduce such inequities.
- The current evidence from policy evaluations was insufficient to recommend policy design elements. However, the effectiveness of a policy to subsidize foods that contribute to a healthy diet will depend on the country context, and the policy's design and administration. It remains important to learn from country experiences on policy implementation, including how subsidies are delivered, the geographical distribution of subsidies, to whom subsidies are delivered and which foods are subsidized.

Recommendation rationale

The recommendation was formulated by the NUGAG Subgroup on Policy Actions based on several key considerations (below and **Table 4**).

- This recommendation was formulated based on the very low certainty of evidence on a subset of targeted food subsidies, as the evidence appears to indicate desirable effects.
- The recommendation was further supported by evidence on probable acceptability and feasibility, probably favourable cost-effectiveness, and the potential for the intervention to increase equity and support human rights.
- Price changes that affect the cost of food can influence decisions on food purchases. A subsidy on foods that contribute to a healthy diet can reduce their price and provide an incentive to purchase.
- Although there are variations in policy designs, implementation of a policy to subsidize foods that contribute to a healthy diet may increase purchases of the subsidized food among the target population, suggesting a potential benefit.

Table 4. Additional considerations by the NUGAG Subgroup on Policy Actions to determine the direction and strength of the recommendation on a subset of targeted food subsidies

Decision criteria and judgement	Additional considerations
Magnitude of desirable effects of implementing a policy: varies	The evidence appears to indicate desirable effects, but the size of these effects is not clear. Unlike taxes, the target population for subsidies varied substantially in the included studies, and it is possible that the size of the desirable effects varies depending on the target population. There may be additional desirable non-health effects of subsidies, including increased retail revenue for farmers, particularly if a subsidy programme also has the goal of improving the income of local farmers.
Magnitude of undesirable effects of implementing a policy: don't know	Evidence from the systematic review was insufficient to make a judgement. Some modelling studies suggest that the prices of subsidized products may be increased for those not eligible for subsidies and the prices of unsubsidized, less healthy foods may be reduced. Experience from a lunch programme in the United Kingdom of Great Britain and Northern Ireland showed that money saved on subsidized products may be used to purchase less healthy products.
Balance of desirable and undesirable effects: probably favours the intervention	The desirable effects are likely to outweigh the undesirable effects, although desirable effects may vary.
Overall certainty of evidence: very low	Evidence was limited for all outcomes. Consistent with the remarks in relation to the recommendations on taxation of SSBs and taxation of foods, the judgement on the overall certainty of the evidence was made based on evidence for the critical outcomes of price change and purchases of subsidized products.
Cost-effectiveness: probably favours the intervention	Much of the evidence was based on modelling studies, which estimated subsidies to be cost-effective.
Resources required: moderate costs	The resources required are likely to be moderate, compared with those for implementing a tax (which were considered negligible). The resources required will vary, depending on the context and the size of the target population.

Decision criteria and judgement	Additional considerations
	Although there was consensus on judging the costs as being moderate, four NUGAG Subgroup on Policy Actions members selected "varies" as the judgement. Subsidies can have a high administrative burden, and the resources required will be ongoing.
Impact of policy implementation on equity: probably increased	Because most of the included subsidies had an explicit focus on health equity, as they targeted people of lower SES, the intervention probably increases health equity.
Impact of policy implementation on human rights: probably increased	Information on the impact on human rights was taken from human rights texts, including reports by Special Rapporteurs on the right of everyone to the enjoyment of the highest attainable standard of physical and mental health, who recommend that, to respect, protect and fulfil the right to health, governments "increase availability and accessibility of healthier food alternatives through fiscal … policies that discourage production of unhealthy foods" *(71)*.
People's values related to the outcomes of policy implementation: probably no important uncertainty or variability	The judgement was made on values relating to diet-related health outcomes, such as overweight/obesity and diet-related NCDs, rather than values relating to prices of foods.
Acceptability of the policy to key actors: probably yes	Although subsidies were generally perceived to be acceptable, acceptability, especially among policy-makers, may vary depending on the political context and the design of the subsidy.
Feasibility of implementing the policy: probably yes	Linked to acceptability, feasibility may vary depending on the political context and the design of the subsidy. Feasibility may vary depending on the available fiscal space in a country, which may be lower in low-income countries.

5. Implementation considerations

Key implementation considerations were identified through the review of contextual factors and deliberations of the NUGAG Subgroup on Policy Actions during the evidence-to-decision discussions (see **Tables 2–4** for evidence-to-decision tables). The considerations discussed in this section are not exhaustive.

For SSB taxation, detailed implementation guidance can be found in the WHO manual on SSB taxation policies *(5)*. Numerous other global and regional implementation resources on fiscal policies to promote healthy diets *(1, 5, 72)* and on taxation in general *(2)* may serve as useful references to support implementation of the recommendations on SSB and food taxes in this guideline and to ensure that general principles of tax design are taken into account. For subsidies, implementation guidance is more limited. Existing subsidy programmes, including those that informed the formulation of the recommendation in this guideline, can be a resource to support the development of implementation and evaluation mechanisms.

WHO also continues to provide technical support to countries developing and implementing fiscal policies to promote healthy diets.

5.1 Overarching considerations

A comprehensive policy approach is needed to create enabling and supportive food environments, and actions should be considered in the context of the myriad other individual, social and environmental influences on nutrition. The recommendations in this guideline should therefore be considered together with those in other WHO guidelines on policies to improve the food environment, including guidelines on policies to protect children from the harmful impact of food marketing *(49)*, school food and nutrition policies *(51)*, and nutrition labelling policies *(50)*. Also relevant for improving the food environment are the WHO guideline on school health services *(73)*; the WHO and United Nations Educational, Scientific and Cultural Organization (UNESCO) global standards for health-promoting schools *(74)*; the recommendations of the WHO Commission on Ending Childhood Obesity *(52)*; and WHO dietary guidelines, including on intake of sodium *(10)*, sugars *(6)*, total fat *(8)*, saturated fatty acids and *trans*-fatty acids *(9)* and carbohydrates *(12)*, and use of non-sugar sweeteners *(3)*.

The recommendations on taxes and subsidies in this guideline may require adaptation to the local context of WHO regions and Member States, including the country's nutritional situation, cultural context, locally available foods, dietary customs, available resources and capacities, and existing policies and governance structures. Also important are the country's institutional arrangements relevant to fiscal policies – for example, designation of competent authorities for the implementation and enforcement of fiscal policies, including tax laws, and the existence of governance mechanisms to protect fiscal policies to promote healthy diets from conflicts of interest.

While not within the scope of this guideline, governments may wish to review any existing food-related fiscal policies to ensure they are coherent with the policies recommended in this guideline and promote a healthy diet (e.g. some governments subsidize foods that do not contribute to a healthy diet) *(5)*.

5.2 Policy design considerations

To ensure their effectiveness, fiscal policies to promote healthy diets should be well designed. Consideration should be given to policy design elements such as the products subject to a tax or subsidy; the tax or subsidy rate; and the tax type, structure and base. Policy design elements specific to SSB taxation are described in detail in the WHO manual on SSB taxation policies *(5)*. Importantly, policy design elements must be in line with country-specific legal frameworks for fiscal policies and with a country's dietary guidance.

Nutrient profile models can help define the products to be taxed or subsidized. A nutrient profile model provides a means of differentiating between foods that are more likely to be part of a healthy diet (and therefore could be subsidized) and those that are less likely to be part of a healthy diet, notably foods that may contribute to excess consumption of energy, saturated fatty acids, *trans*-fatty acids, free sugars and/or salt (and therefore could be taxed). Some nutrient profile models are intended for application to only processed or highly processed foods and not to unprocessed or minimally processed foods *(56)*.

In view of the recent WHO guideline on the use of non-sugar sweeteners, which suggests that non-sugar sweeteners not be used as a means of achieving weight control or reducing the risk of NCDs *(3)*, countries may consider including foods and beverages sweetened with non-sugar sweeteners within the range of taxable products.

When determining which products will be subject to a tax or subsidy, the country context, including the local food culture, should also be considered.

Taxable products can also be defined through a single nutrient – for example, saturated fatty acids. Although a single nutrient tax on food may increase prices and reduce purchases of taxed products, evidence on the desirable or undesirable effects of such taxes is still limited. A single nutrient-based food tax is likely to have a broad range of taxable products and could therefore include both foods that contribute to a healthy diet and foods that do not.

The impact a tax will have on purchases and consumption is affected by substitution. The consumer response to a tax-induced price increase is greater if close substitutes are available. These close substitutes should be healthier to minimize substitution with other less healthy (and untaxed) foods.

The tax rate should be sufficiently high to deter consumption. The effect of a tax is likely to be larger if the tax rate is higher. Based on current evidence, the estimated reduction in consumer purchases of SSBs in response to a price increase is about 1.6 times the price increase. A recent review of the implementation of SSB taxation globally shows that effective tax rates are very low *(75)*. The excise tax share of the population weighted average price of 330 ml of an internationally comparable brand of sugar-sweetened carbonated beverage amounted to 6.6% only *(75)*.

Country-specific modelling exercises can simulate the potential impact of a tax on prices, purchases, tax revenues and health outcomes under various scenarios – for example, the impact of a tax that translates to a 20% increase in the retail price of the target product. Technical support to conduct modelling studies is provided by WHO and partner organizations and such studies are an important starting point in the design of an effective tax.

Countries can structure a tax in different ways. It is beyond the scope of this guideline to describe different tax types in detail, but information is available elsewhere *(2, 5)*. In summary, specific excise taxes are most likely to lead to higher prices and therefore discourage consumption *(2, 76)*. Such taxes also increase the price of all taxed foods and beverages by the same amount, reducing the incentive for consumers to substitute one taxed product with a cheaper taxed product *(47, 76)*. In contrast, ad valorem excise taxes may increase (absolute) price differences between taxed products, potentially incentivizing consumers to substitute taxed products with cheaper taxed products rather than with healthier untaxed products *(2)*. Compared with uniform tax structures, tiered structures based on nutrient content levels may be more likely to encourage consumers to substitute taxed foods and beverages with foods and beverages containing lower levels of the targeted nutrient, as well as encourage industry to reformulate foods and beverages *(72, 77–84)*.

Specific excise taxes on SSBs or foods should be regularly adjusted for inflation and income growth to ensure these (i.e. inflation and income growth) do not reduce the effectiveness of the taxes in reducing consumption.[1]

[1] This applies to specific excise taxes (a tax per unit, rather than as a percentage of value) and builds on evidence from tobacco taxation. To ensure that taxes maintain their "real value", they should be adjusted regularly. See also Chapter 5: Design and administration of taxes on tobacco products, in National Cancer Institute monograph 21: *The economics of tobacco and tobacco control*.

Greater attention should be paid to monitoring any cross-border shopping in smaller jurisdictions, given that the extent to which cross-border shopping may occur is likely to depend on the geographical jurisdiction *(64)*. Regional and international cooperation offers opportunities to minimize cross-border shopping *(5)*.

The existence of a monitoring system and government or independent third-party monitoring may increase the effectiveness of food environment policies *(85)*. Baseline data should be collected to allow evaluation of the policy and inform decision-making about any possible adjustments *(48)*. Potential indicators for evaluation include prices, purchases, consumption and dietary intake. For further evaluation considerations, see Chapter 6.

5.3 Resource considerations

Taxes on simply defined foods (e.g. SSBs) may be easier to implement than taxes targeting multiple nutrients, especially in countries with limited resources *(76)*. Taxes targeting an individual nutrient can be administratively burdensome to implement because they apply to a wide range of foods *(86)*. Although specific excise taxes based on nutrient content (e.g. SSB taxes based on sugars content) are likely to have a larger impact, other taxes (e.g. volume-based SSB taxes) may be more feasible in countries with weaker tax administration systems. In general, and reflecting on the policies included in the evidence base, the resources required are likely to be greater for subsidies than for taxation policies, as subsidies can have a high administrative burden, and the resources required will be ongoing.

5.4 Equity considerations

Countries may be concerned about the possible financial regressivity of a tax on SSBs or foods that do not contribute to a healthy diet, but this must be weighed against the health benefits of a tax, which most studies have shown to be greatest for lower-income groups *(5)*. Furthermore, there are potential benefits from using the tax revenue, while not being dependent on it. For example, the revenue can be used for social protection interventions and interventions targeting vulnerable populations (including targeted subsidies on foods that contribute to a healthy diet).

Whereas taxes appear likely to improve health equity *(62)*, some studies suggest that general (i.e. non-targeted) subsidies on foods that contribute to a healthy diet may disproportionately benefit people of higher SES *(86)*. Targeting subsidies – for example, at people of lower SES – ensures an explicit focus on health equity.

5.5 Acceptability considerations

Different actors vary greatly in their acceptance of fiscal policies *(62)*, with tax policy design elements having different implications for their interests and goals *(2)*. Public acceptability of taxes on SSBs or foods that do not contribute to a healthy diet is influenced by how the revenue from such taxes is used – public acceptability may be increased if the revenue is used for health programmes *(62)*. The WHO manual on SSB taxation policies discusses the political economy of SSB taxation *(5)*. Policy-makers should be prepared for lobbying against taxes on SSBs or foods that do not contribute to a healthy diet, including arguments that taxes would be ineffective and unfair, and would lead to job losses *(62)*, which can be refuted with empirical evidence. Typical industry tactics to oppose such policies include sowing doubt by discrediting science, diverting attention and threatening court and legal challenges *(5)*. The WHO manual on SSB taxation policies proposes steps to strengthen the government's position against legal challenges and describes strategies that policy-makers can employ to increase acceptability among government stakeholders, increase support for the adoption of an SSB tax and counter industry opposition *(5)*. These strategies include using strong scientific evidence, building a multisectoral coalition of supporters (e.g. community leaders, health organizations, grass-roots organizations), developing a comprehensive advocacy strategy and strategically framing the tax *(5, 47, 72, 87)*.

5.6 Feasibility considerations

The feasibility of implementation of fiscal policies to promote healthy diets is likely to depend on existing government infrastructure, taxation mechanisms and administrative capacity *(62)*, the ability to establish a strong legal and administrative architecture, and support across government.

Factors such as strong political leadership, intersectoral collaboration, supporting evidence, community support, and the use of existing government infrastructure and taxation mechanisms may facilitate the development and implementation of fiscal policies to promote healthy diets. Feasibility may increase if strategies are employed by policy-makers to support the adoption of a tax or subsidy and industry opposition is countered, as discussed in section 5.5.

In contrast, based on the findings of the review of contextual factors, the complexity of the development process, conflicting interests, industry interference and pressure, a weak evidence base, the (perceived) administrative burden, and a lack of financial and human resources may hinder development and implementation *(62)*.

The feasibility of subsidies on foods that contribute to a healthy diet is also likely to depend on available fiscal space and existing benefit programmes, such as social protection programmes. Taxes on foods that do not contribute to a healthy diet require capacity to define the taxable products and control possible substitution effects; these are more complex than taxes on SSBs.

5.7 Additional resources

As noted, the considerations discussed in this section are not exhaustive, and existing global and regional implementation resources (**Box 1**) may be used and consulted when translating the recommendations in this guideline to actions.

Box 1. Additional resources for development and implementation of fiscal policies to promote healthy diets

Global

- Building momentum: lessons on implementing a robust sugar sweetened beverage tax *(4)*
- Fiscal policies to promote healthy diets: policy brief *(88)*
- Global report on the use of sugar-sweetened beverage taxes, 2023 *(75)*
- Implementing fiscal and pricing policies to promote healthy diets: a review of contextual factors *(62)*
- Manual on sugar-sweetened beverage taxation policies to promote healthy diets *(5)*

Regional

- Potential for sugar-sweetened beverage taxes in Ukraine: estimated impacts of a sugar-sweetened beverage excise tax on price, consumption and tax revenue *(89)*
- Reducing the consumption of sugar-sweetened beverages and their negative health impact in Estonia *(90)*
- Sugar-sweetened beverage taxation in the Region of the Americas *(1)*
- Sugar-sweetened beverage taxes in the WHO European Region: success through lessons learned and challenges faced *(72)*
- Taxes on sugar-sweetened beverages as a public health strategy: the experience of Mexico *(87)*
- Technical report on: taxation for sugar-sweetened beverages in Sri Lanka *(91)*
- Using price policies to promote healthy diets *(48)*

Nutrient profile models[a]

- Nutrient profile model for the marketing of food and non-alcoholic beverages to children in the WHO Eastern Mediterranean Region *(54)*
- Nutrient profile model for the WHO African Region: a tool for implementing WHO recommendations on the marketing of foods and non-alcoholic beverages to children *(53)*
- Pan American Health Organization nutrient profile model *(56)*
- WHO nutrient profile model for South-East Asia Region *(55)*
- WHO nutrient profile model for the Western Pacific Region: a tool to protect children from food marketing *(57)*
- WHO Regional Office for Europe nutrient profile model *(58)*

[a] The nutrient profile models developed by the WHO regional offices should be consulted for their intended uses, as these vary.

6. Research gaps

Based on the results of the systematic review, the review of contextual factors, the discussions of the NUGAG Subgroup on Policy Actions and input received during peer review and public consultation, a number of research gaps and considerations were identified. These will be important when updating this guideline, and for further advocacy and action on fiscal policies to promote healthy diets.

6.1 Overarching research gaps

Overall, there is a lack of evidence from policy evaluations, particularly from LMICs, assessing their process and impact, which would provide valuable insights into contextual factors affecting the implementation of fiscal policies, in particular of food taxes and subsidies.

Effectiveness of policies

Much of the research identified in the systematic review focused on immediate outcomes (e.g. price change, purchases, consumption); few or no suitable studies were available for longer-term outcomes (e.g. body weight status, diet-related NCDs, undernutrition, pregnancy outcomes) *(7, 61)*. This is likely because most fiscal policies have been recently implemented, and any changes in long-term outcomes are expected to occur gradually over time. Studies on longer-term outcomes would be valuable when updating this guideline, but these are associated with substantial methodological challenges – for example, disentangling the impact of food prices from the complex array of factors that contribute to long-term outcomes such as body weight status and diet-related NCDs. There is also a need to be realistic about the extent to which any one intervention can be expected to impact outcomes such as body weight status/BMI and diet-related NCDs on its own. High-quality studies on intermediate outcomes (e.g. price change, purchases, consumption) will therefore remain valuable. However, recent evaluations of the national SSB tax in Mexico *(92)* and the national SSB tax in the United Kingdom of Great Britain and Northern Ireland *(93)* – which were published after the systematic review was completed – illustrate that studies focused on long-term outcomes are possible. The evaluation of the Mexican tax showed a 1.3 percentage point (or 3%) decrease in overweight and obesity prevalence among adolescent girls following implementation of the tax, and no significant change for boys *(92)*. The evaluation of the United Kingdom of Great Britain and Northern Ireland tax showed a decrease in obesity prevalence among year 6 girls (aged about 10–11 years), and no significant change for year 6 boys or for boys or girls in reception (aged about 4–5 years) *(93)*.

Based on the systematic review and GRADE assessment, there was very low certainty evidence on the effect of taxes and subsidies on purchases and consumption of untaxed foods and beverages, which provide measures of substitution effects. If consumption of foods or beverages that do not contribute to a healthy diet remains the same or increases in response to a tax or subsidy, the fiscal policy may not have the desired outcome. To ensure the effectiveness of policies and mitigate any such unintended consequences, there is a need for further studies investigating substitution effects.

Based on the systematic review, no evidence was identified on the effectiveness of pricing policies to promote healthy diets. Studies on such policies would be valuable to enable formulation of recommendations on such policies when updating this guideline.

Taxes affect demand and supply of products, which will result in a shift in the market equilibrium. Information on longer-term shifts in market equilibrium associated with fiscal policies would improve understanding of the effects of taxes on food systems.

Effectiveness of specific policy design elements

In this guideline, recommendations on specific policy design elements were not possible due to the limited evidence from policy evaluations. With increasing policy evaluations becoming available, more insights will be obtained on the effectiveness of specific policy design elements. Experience from tobacco taxation has shown that excise taxes are preferred from a public health perspective because they raise the relative price of the targeted products compared to other products and services, making the targeted products less affordable *(5)*.

Evidence of an association between intake of highly processed foods – typically high in saturated fatty acids, *trans*-fatty acids, free sugars and/or salt and/or which contain non-sugar sweeteners (described by some as "ultra-processed") – and risk of NCDs is accumulating *(94)*. However, in the systematic review on the effectiveness of fiscal policies to promote healthy diets, no eligible studies were identified in which the taxable products were explicitly defined based on the level of processing. From 1 November 2023, Colombia will tax ultra-processed foods and SSBs *(95)*. The taxable products are defined by the use of specified ingredients in the manufacturing process of specified categories of products in combination with thresholds for sodium, free sugars and saturated fat content *(95)*. Provided they are eligible, evaluations of this tax could be considered when updating this guideline.

Contextual factors

Although the review of contextual factors found substantial evidence relating to the acceptability of taxes, there was far less evidence relating to the acceptability of subsidies *(62)*.

For pricing policies, there was little evidence with regard to contextual factors, including resource implications, acceptability and health equity *(62)*. The little evidence that was found for health equity provided mixed evidence on the uptake of pricing promotions by SES *(62)*; further research may provide more clarity.

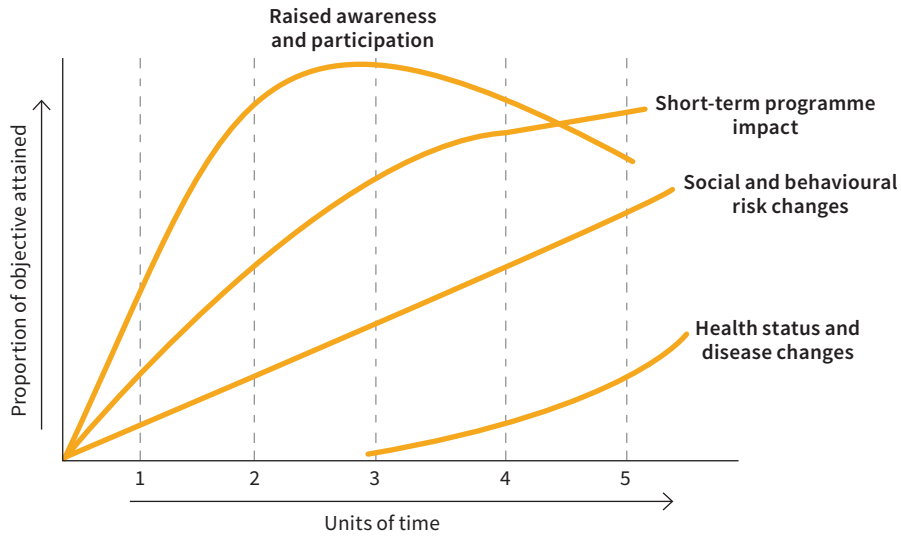
6.2 Considerations for the design of future evaluations

Although RCTs are often considered the gold standard study design in research, natural experiments (e.g. using difference-in-difference or interrupted time-series methods) are likely to be the most appropriate for evaluating the impact of fiscal policies *(64, 96)*. A recent review of worldwide experience evaluating SSB taxes provides several considerations that should be taken into account to ensure that evaluations of such taxes are useful and rigorous, including the advantages and challenges of different methods, the outcomes that are likely to be of interest to different actors, and the strengths and limitations of different data sources *(64)*. As discussed in the WHO manual on SSB taxation policies *(5)*, an evaluation could seek to assess changes in the price of the targeted products, purchases of targeted and untargeted products, and reported intake of total energy and free sugars (which should ideally be reduced to less than 5% of total daily energy intake, as recommended by WHO *(6)*). Similarly, in relation to taxation of food, assessing how consumers change their consumption in response to taxation of a specific product, including their consumption of non-taxed or less heavily taxed products (i.e. substitution), remains important. Changes in health-related outcomes as a result of a fiscal policy are likely to only occur in the long term (**Fig. 4**) and should therefore be evaluated over a longer term than outcomes such as purchasing and consumption of foods and beverages *(64)*.

Process evaluations of fiscal policies are also important *(64)*, and can provide important contextual information about factors that support or hinder policy implementation, for example.

The certainty of the evidence from included policy evaluation studies, most of which were observational, was either low or very low for all but two outcomes (**Annex 8**). The certainty of the evidence was often downgraded as a result of serious risk of bias, serious inconsistency, serious indirectness (because evidence came from a single setting representing a single country context) or serious imprecision. The inconsistency of effect could result from variations in policy design; however, the current evidence base did not allow quantitative subgroup analysis of policy design. Emerging evidence may enable future systematic reviews to further explore reasons for inconsistency of effect.

Fig. 4. Distribution of outcomes and impact over time



Source: Bauman *(97)*.

Several studies in the systematic review lacked statistical testing and, as such, were excluded from pooled analysis. Future studies should include statistical testing to ensure that they can be included in pooled analysis.

Analyses by SES, sex, gender and geographical location were not possible in the systematic review, with only a small subset of studies reporting data for subpopulations. Where possible, future studies should include data disaggregated by these characteristics to enable analysis of the impact on health equity of fiscal policies to promote healthy diets.

7. Uptake, monitoring and updating of the guideline

This guideline will be disseminated to Member States through the networks of WHO regional offices and country offices, WHO collaborating centres, United Nations partner agencies and civil society agencies, relevant nutrition webpages on the WHO website[1] and the electronic mailing lists of the WHO Department of Nutrition and Food Safety, among others. The guideline will also be disseminated at relevant global, regional and national meetings. Specifically, it will be used to support policy dialogues being held as part of the WHO's work to accelerate action to stop obesity. The guideline is an important part of the technical package to support implementation of the recommendations for the prevention and management of obesity over the life course, and related targets adopted by the Seventy-fifth World Health Assembly.[2]

The impact of this guideline can be evaluated by assessing its adoption and adaptation across countries. Evaluation at the global level will be through the periodically conducted Global Nutrition Policy Review and the WHO NCD Country Capacity Survey, published through the WHO Global database on the Implementation of Food and Nutrition Action (GIFNA)[3] and will also consider independent researcher input. GIFNA is a centralized platform developed by the WHO Department of Nutrition and Food Safety for sharing information on nutrition actions in public health practice implemented around the world. GIFNA currently contains information on thousands of policies (including legislation), nutrition actions and programmes in all WHO Member States. It includes data and information from many sources, including the first and second WHO global nutrition policy reviews conducted in 2009–2010 and 2016–2017, respectively *(45, 46)*. By providing programmatic implementation details, specific country adaptations and lessons learned, GIFNA serves as a platform for monitoring and evaluating how policy guidelines are being translated and adapted in various countries. The WHO NCD Country Capacity Survey is a global survey of all Member States that provides a periodic assessment of national capacity for NCD prevention and control, including in several nutrition-related areas.

In line with the *WHO handbook for guideline development (60)*, the recommendations in this guideline will be regularly updated, based on new data and information. The WHO Department of Nutrition and Food Safety and the Department of Health Promotion will be responsible for coordinating updates of the guideline, following the formal procedure described in the *WHO handbook for guideline development (60)*. When the guideline is due for review, WHO will welcome suggestions for additional questions that could be addressed in the guideline.

If there are concerns that one or more of the guideline's recommendations may no longer be valid, the Department of Nutrition and Food Safety will communicate this information, together with plans to update the guideline, to relevant actors via announcements on the Department of Nutrition and Food Safety website and electronic mailing lists, as well as communicating directly with actors, as necessary.

[1] http://www.who.int/nutrition/en/
[2] https://apps.who.int/gb/ebwha/pdf_files/WHA75/A75_10Add6-en.pdf
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Annex 1.

Global calls to action and commitments related to food environment policies

The WHO guidelines on policies to improve the food environment will contribute to implementation of calls to action relating to nutrition and health, including:

- the Comprehensive Implementation Plan on Maternal, Infant and Young Child Nutrition;
- the Global Action Plan for the Prevention and Control of Noncommunicable Diseases 2013–2030;
- the Political Declaration of the High-level Meeting of the General Assembly on the Prevention and Control of Non-Communicable Diseases held in New York in September 2011 and the outcome document (A/RES/68/300) of the High-level Meeting of the General Assembly on the Comprehensive Review and Assessment of the Progress Achieved in the Prevention and Control of Non-communicable Diseases held in New York in July 2014;
- the recommendations of the Commission on Ending Childhood Obesity established by the WHO Director-General in May 2014;
- the commitments of the Rome Declaration on Nutrition and recommended actions in the Framework for Action, which recommends a set of policy options and strategies to promote diversified, safe and healthy diets at all stages of life; these were adopted by the Second International Conference on Nutrition in 2014 and endorsed by the 136th session of the WHO Executive Board (in January 2015) and the Sixty-eighth World Health Assembly (in May 2015), which called on Member States to implement the commitment of the Rome Declaration on Nutrition across multiple sectors;
- the goals of the United Nations Decade of Action on Nutrition (2016–2025), declared by the United Nations General Assembly in April 2016, which include increased action at the national, regional and global levels to achieve the commitments of the Rome Declaration on Nutrition by implementing policy options included in the Framework for Action and evidence-informed programme actions;
- the acceleration plan to stop obesity adopted at the Seventy-fifth World Health Assembly in May 2022, together with the intermediate outcome and process targets; and
- the 2030 Agenda on Sustainable Development and the Sustainable Development Goals, particularly Goal 2 (“zero hunger”) and Goal 3, Target 4 (“reduce by one third premature mortality from non-communicable diseases through prevention and treatment”).

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[2] Professor Elie Akl served as methods expert from the second meeting of the WHO NUGAG Subgroup on Policy Actions in December 2019.

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Annex 7.
Guidance questions for the review of contextual factors

Factor	Guidance questions
Values	• What are the values people affected by the intervention assign to the intervention health outcomes?
Resource implications	• What is the value for money of the intervention in terms of cost–benefit ratio/ cost-effectiveness/cost utility, including the impact on national/global health care costs in the short term and long term, and the impact on government revenue (including the use of additional revenue; and issues of non-compliance, inflation, black market or cross-border trade)?
Equity	• What is the impact of the intervention on (health) (in)equality and/or (health) (in)equity, including food and nutrition security (unequal and/or unfair access to food)? • Is the intervention sensitive to sex, gender, age, ethnicity, religion, culture, language, sexual orientation/gender identity, disability status, education, socioeconomic status, place of residence (including issues of social stigma, household expenditure, financial regressivity, and jobs/employment)?
Human rights	• Is the intervention in accordance with human rights standards, and what is the impact of the intervention on human rights (including the ability to make a competent, informed and voluntary decision)?
Acceptability	• Is the intervention acceptable to governments and policy-makers, the public and consumers, and industry? • Is the intervention acceptable to, and in agreement with, existing cultural and religious norms and beliefs? • Is the intervention aligned with environmental goals and considerations?
Feasibility	• What is the feasibility of developing and implementing the intervention (including barriers and facilitators)? • What is the feasibility of monitoring and enforcement of the intervention (including barriers and facilitators)? • Does the intervention have an impact on change within existing health or food systems (including resulting in additional interventions to improve the nutrition and health of populations)?

Annex 8.
GRADE evidence profiles

GRADE evidence profile 1

PICO: What is the effect in adults and children on the outcomes of interest of implementing a tax on sugar-sweetened beverages compared with not implementing the policy?
Population: Children and adults
Intervention: Tax on sugar-sweetened beverages
Comparison: No tax
Outcomes: Table 1 in section 2.2 categorizes outcomes as critical or important

Quality assessment							Impact	Certainty
No. of studies	Study design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other considerations		
Price change: measured using pass-through rates								
49	Non-RCTs	Not serious[1]	Not serious[2]	Not serious[3]	Not serious[4]	Large effect (pass-through rate: 82%)	*Meta-analysis* of 46 estimates from 41 studies for 18 tax policies: significant increase in prices of taxed beverages; overall pass-through rate 82% (95% CI: 66% to 98%); I^2 = 99%. Additional information: subgroup analysis for RoB 3 studies (with 3 estimates) that had an unclear RoB were excluded from the subgroup analysis. High RoB (17 estimates from 15 studies): pass-through rate 81.8% (95% CI: 53% to 110%; $P < 0.001$); I^2 = 96%. Low RoB (26 estimates from 23 studies): pass-through rate 83.7% (95% CI: 63% to 105%; $P < 0.001$); I^2 = 99%. Between-group difference: $P = 0.91$. *Narrative analysis* of 12 estimates from 8 studies *(1–8)* for 10 tax policies: 10 estimates (from 7 studies *(1–7)*) suggested increased prices, but did not provide statistical testing; 1 study *(8)* of 2 USA state sales taxes showed significant increase in prices for 1 state, but no significant change in another state.	⨁⨁⨁◯ Moderate

Quality assessment							Impact	Certainty
No. of studies	Study design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other considerations		
Purchases (direct effects): measured using PE								
43	Non-RCTs	Not serious[5]	Not serious[6]	Not serious[7]	Not serious[8]	Large effect (PE: –1.59)	*Meta-analysis* of 35 estimates from 33 studies for 16 tax policies: significant reduction in purchases of taxed beverages; PE: –1.59 (95% CI: –2.11 to –1.08); I^2 = 100%. Additional information: subgroup analysis for RoB 3 studies (with 3 estimates) that had an unclear RoB were excluded from the subgroup analysis. High RoB (16 estimates from 16 studies): PE: –1.91 (95% CI: –2.96 to –0.86; P = 0.0015); I^2 = 99.7%. Low RoB (16 estimates from 14 studies): PE: –1.59 (95% CI: –2.29 to –0.88; P < 0.001); I^2 = 99.7%. Between-group difference: P = 0.59. Additional information: average % change in purchases (reduction in demand) for taxed beverages was –15% (95% CI: –20% to –9%); I^2 = 100%. Additional information: subgroup analysis for RoB 3 studies (with 3 estimates) that had an unclear RoB were excluded from the subgroup analysis. High RoB (16 estimates from 16 studies): % demand reduction –10% (95% CI: –14% to –6%; P < 0.001); I^2 = 99.9%. Low RoB (16 estimates from 14 studies): % demand reduction –18% (95% CI: –28% to –8%; P = 0.001); I^2 = 99.8%. Between-group difference: P = 0.11. *Narrative analysis* of 14 estimates from 10 studies *(1–3, 5, 6, 8–12)* for 10 tax policies: 3 estimates (from 3 studies *(6, 9, 10)*) showed significant decrease in purchases of taxed beverages; 9 estimates (from 6 studies *(1–3, 5, 11, 12)*) reported decrease, but did not provide statistical testing; 2 estimates (from 1 study *(8)*) found no significant change (for USA sales taxes).	⨁⨁⨁◯ Moderate

Quality assessment							Impact	Certainty
No. of studies	Study design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other considerations		
Purchases (substitution effects): measured using PE								
32	Non-RCTs	Not serious[9]	Serious[10]	Not serious[11]	Serious[12]	Publication bias suspected[13]	*Meta-analysis* of 25 estimates from 24 studies for 14 tax policies: no significant change in purchases of untaxed beverages; PE: 0.42 (95% CI: −0.52 to 1.35); I^2 = 98%. Additional information: subgroup analysis for RoB 1 study (with 1 estimate) that had an unclear RoB was excluded from the subgroup analysis. High RoB (14 estimates from 14 studies): PE: 0.14 (95% CI: −0.86 to 1.13; *P* = 0.77); I^2 = 98%. Low RoB (10 estimates from 9 studies): PE: 0.47 (95% CI: −2.76 to 3.71; *P* = 0.75); I^2 = 92%. Between-group difference: *P* = 0.82. *Narrative analysis* of 8 studies *(5, 9–15)* for 6 tax policies: studies showed a large mix of results – 4 studies *(5, 9, 13, 14)* showed no change (2 studies provided statistical testing); 3 studies *(11, 12, 15)* showed increase in purchases (1 study provided statistical testing); 1 study *(10)* showed mixed results across retailers.	⨁◯◯◯ Very low
Consumption (direct effects): measured using PE								
13	Non-RCTs	Very serious[14]	Serious[15]	Not serious[16]	Serious[17]	None	*Meta-analysis* of 12 estimates from 9 studies for 5 tax policies (all subnational): reduction in consumption of taxed beverages for children and adults with pooled effect PE: −3.78 (95% CI: −8.86 to 1.30); I^2 = 82%. Additional information: subgroup analysis for RoB No studies were excluded from the subgroup analysis. High RoB (6 estimates from 6 studies): PE: −6.46 (95% CI: −14.34 to 1.41; *P* = 0.09); I^2 = 88%. Low RoB (6 estimates from 3 studies): PE: −0.24 (95% CI: −1.26 to 0.77; *P* = 0.56); I^2 = 0%. Between-group difference: *P* = 0.04. Additional information: average % change in consumption (demand for taxed beverages) for children and adults was −18% (95% CI: −38% to 1%); I^2 = 53%.	⨁◯◯◯ Very low

Quality assessment							Impact	Certainty
No. of studies	Study design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other considerations		
							Additional information: subgroup analysis for RoB No studies were excluded from the subgroup analysis. High RoB (6 estimates from 6 studies): % demand reduction –33% (95% CI: –46% to –21%; $P < 0.001$); $I^2 = 0\%$. Low RoB (6 estimates from 3 studies): % demand reduction –3% (95% CI: –21% to 14%; $P = 0.63$), $I^2 = 0\%$. Between-group difference: $P < 0.001$. Additional information: analyses separately for children and adults No studies were excluded from the subgroup analysis. Adults (9 estimates from 9 studies): PE: –4.64 (95% CI: –10.0 to 0.72); $I^2 = 86\%$. % change –24% (95% CI: –43% to –4%); $I^2 = 46\%$. Children (3 estimates from 3 studies): PE –0.17 (95% CI: –2.18 to 1.84); $I^2 = 0\%$. % change 0.1% (95% CI: –32% to 33%); $I^2 = 0\%$. *Narrative analysis* of 4 studies *(16–19)* for 2 tax policies (Mexico and USA sales taxes): 2 studies *(16, 17)* showed a significant decrease in consumption of taxed beverages; 2 studies *(18, 19)* (for USA sales taxes) showed no significant change.	

Quality assessment							Impact	Certainty
No. of studies	Study design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other considerations		
Consumption (substitution effects): measured using PE								
11	Non-RCTs	Very serious[18]	Not serious[19]	Not serious[20]	Not serious[21]	None	*Meta-analysis* of 12 estimates from 9 studies for 5 tax policies (all subnational): no change in consumption of untaxed beverages; PE: 0.54 (95% CI: −0.60 to 1.68); I^2 = 48%. Additional information: subgroup analysis for RoB No studies were excluded from the subgroup analysis. High RoB (6 estimates from 6 studies): PE: 1.73 (95% CI: −3.62 to 7.07; P = 0.44); I^2 = 71%. Low RoB (6 estimates from 3 studies): 0.06 (95% CI: −0.12 to 0.25; P = 0.42); I^2 = 0%. Between-group difference: P = 0.42. Additional information: analyses separately for children and adults No studies were excluded from the subgroup analysis. Adults (9 estimates from 9 studies): PE: 0.71 (95% CI: −0.58 to 2.00); I^2 = 57%. Children (3 estimates from 3 studies): PE: 0.02 (95% CI: −0.22 to 0.26); I^2 = 0%. *Narrative analysis* of 2 studies *(16, 19)* for 1 tax policy: 1 study *(19)* showed significant increase in consumption of untaxed beverages; 1 study *(16)* showed mixed results by type of beverage.	⨁◯◯◯ Very low
Diet (energy, total food and/or nutrient intake, nutritional quality)								
2	Non-RCTs	Serious[22]	Serious[23]	Serious[24]	Not serious[25]	None	Unclear effects (insufficient evidence). *Narrative analysis* only of 2 studies *(16, 19)* on USA sales taxes on soft drinks: 1 study *(16)* reported no statistically significant change in total daily caloric intake (–7.840 kcal; SE = 12.353), or nutrient intake of vitamin C (blood serum measure 0.008 mg/dL; SE = 0.011; and dietary recall measure 1.634 mg; SE = 2.019) or vitamin D (blood serum measure 0.072 ng/mL; SE = 0.372). The other study *(19)* found a statistically significant positive association between soft drink taxes and total daily caloric intake in adults (27.683 kcal; SE = 12.555; P = 0.034).	⨁◯◯◯ Very low

Quality assessment							Impact	Certainty
No. of studies	Study design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other considerations		
Product changes (portion size, food reformulation, portfolio mix)								
6	Non-RCTs	Not serious[26]	Not serious[27]	Not serious[28]	Not serious[29]	None	*Narrative analysis* only of 6 studies *(6, 12, 20–23)* for 3 tax policies (all tiered taxes; only 1 study provided statistical testing): all studies showed decrease in sugar content or calories of beverages. 1 study from the United Kingdom *(22)* found a statistically significant difference in percentage of drinks over lower levy sugar threshold compared with extrapolation of pre-announcement trend (–33.8 percentage points; 95% CI: –34.4 to –33.3; $P < 0.001$). Another study from the United Kingdom *(20)* found that the sugar content of 4 of 7 juice drinks eligible for taxation was reformulated to <5 g/100 mL (the other 3 were not reformulated); no statistical testing was reported. Another study from the United Kingdom *(21)* showed a 23 kcal/100 mL decrease in energy content of supermarket own-label manufacturers and a 15 kcal/100 mL decrease in energy content of brand manufacturers; no statistical testing was reported. Another study from the United Kingdom *(12)* showed a 28.8% decrease in the sales-weighted average total sugar content from 3.9 g/100 mL in 2015 to 2.8 g/100 mL in 2018; no statistical testing was reported. A study from South Africa *(23)* showed many brands reformulated to decrease sugar content; no statistical testing was reported. A study from Portugal *(6)* showed a 0.04 percentage point decrease in dietary energy density from SSBs due to product reformulation; no statistical testing was reported.	⨁⨁◯◯ Low

Quality assessment							Impact	Certainty
No. of studies	Study design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other considerations		
Unintended consequences (cross-border shopping)								
10	Non-RCTs	Not serious[30]	Not serious[31]	Not serious[32]	Not serious[33]	None	*Narrative analysis* only of cross-border shopping/retail revenue change assessed in 10 studies *(1, 9, 11, 24–30)* for 5 excise tax policies in local jurisdictions: 4 studies *(9, 24–26)* reported significant increase in cross-border shopping and/or reduced purchases for retailers in taxed jurisdictions; 3 studies *(1, 11, 27)* reported changes with no statistical testing provided; 2 studies *(28, 29)* had mixed results (supermarkets affected but not mass merchandise stores or pharmacies, and only 1 measure significant in another study); 1 USA study *(30)* reported no significant effect on cross-border shopping (RIRR 1.00; 95% CI: 0.97 to 1.03). No evidence was available that assessed effects of national taxes on cross-border shopping.	⨁⨁◯◯ Low
Unintended consequences (unemployment)								
2	Non-RCTs	Serious[34]	Not serious[35]	Not serious[36]	Not serious[37]	None	*Narrative analysis* only of employment effects assessed in 2 studies *(31, 32)*: a USA-based study *(31)* (Philadelphia) found no significant change in unemployment claims compared with neighbouring counties for supermarkets (–9.45; SE = 45.24; *P* = 0.084), soft drink manufacturing (–0.13; SE = 4.59; *P* = 0.98), all potentially affected industries (9.16; SE = 253.80; *P* = 0.97) or total unemployment (–445.85; SE = 1952.35; *P* = 0.97). A study in Mexico *(32)* found a small, but significant, decreasing trend in national unemployment (–0.0201; 95% CI: –0.0292 to –0.0111; *P* = 0.000).	⨁◯◯◯ Very low

Quality assessment							Impact	Certainty
No. of studies	Study design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other considerations		
Unintended consequences (other)								
3	Non-RCTs	Not serious[38]	Not serious[39]	Not serious[40]	Not serious[41]	None	*Narrative analysis* only of 3 studies *(33–35)* (6 estimates): a United Kingdom study *(34)* reported significant decreased cumulative abnormal returns for 3 of 4 soft drink firms on the day of announcement of the tax, but no significant cumulative abnormal returns for the 4 firms when the tax was implemented. Another United Kingdom study *(33)* reported a significant negative association between the announcement and soft drink manufacturer turnover (–0.058; SE = 0.034), but no significant association between the implementation and turnover (0.029; SE = 0.035). A USA-based study *(35)* (Oakland) reported no significant difference in exterior advertising at 12 months post-tax (OR 0.90; 95% CI: 0.63 to 1.30), interior advertising at 12 months post-tax (OR 1.04; 95% CI: 0.72 to 1.53) or price promotions at 12 months post-tax (OR 0.72; 95% CI: 0.51 to 1.00).	⨁⨁◯◯ Low

Quality assessment							Impact	Certainty
No. of studies	Study design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other considerations		
Body weight status, BMI								
5	Non-RCTs	Not serious[42]	Not serious[43]	Serious[44]	Not serious[45]	None	*Narrative analysis* only of 5 studies *(16, 18, 19, 36, 37)* (6 estimates) of USA sales taxes: 1 study *(36)* found small but statistically significant decreases in BMI (0.0029 points; SE = 0.0004), overweight (0.0002; SE = 0.0001) and obesity (0.0001; SE = 0.0000) among adults. 4 studies suggested no statistically significant effect on BMI. Of these: • 1 study *(19)* found no significant impact on BMI (0.007; SE = 0.093) and, in Ohio, no significant impact on BMI, overweight or obesity; • 1 study *(37)* found no significant impact on BMI among adults (fixed effect regression coefficient 0.0090; SE = 0.0122); • 1 study *(16)* found no significant impact on BMI z-score (0.015; SE = 0.016), obesity (0.009; SE = 0.006), overweight (0.002; SE = 0.011) or underweight (–0.002; SE = 0.003) among children and adolescents; • 1 study *(18)* found no significant difference in mean BMI z-score, obesity prevalence, or overweight or obesity prevalence among children and adolescents in states that have ever had a soft drink tax and states without a soft drink tax.	⨁◯◯◯ Very low
Diet-related NCDs (including validated surrogate indicators)								
0								
Undernutrition								
0								
Pregnancy outcomes								
0								

BMI: body mass index; CI: confidence interval; kcal: kilocalories; NCD: noncommunicable disease; OR: odds ratio; PE: price elasticity; RCT: randomized controlled trial; RIRR: ratio of incidence rate ratios; RoB: risk of bias; SE: standard error; SSB: sugar-sweetened beverage; United Kingdom: United Kingdom of Great Britain and Northern Ireland; USA: United States of America.

1. Across the outcomes, the following rules were followed for judging the RoB: If 60% or more of studies contributing to the evidence of an outcome had a high RoB, the RoB rating for that outcome was "very serious". If 41–59% of studies had a high RoB, the rating was "serious". If 40% or less of studies had a high RoB, the rating was "not serious". For assessing the RoB for outcomes with a smaller number of studies (i.e. less than 5), additional details of the RoB assessment were considered for making the final judgement. For all outcomes for which meta-analyses were conducted, the overall RoB was assessed for only those studies included in the meta-analysis. For this outcome (price change), a total of 41 studies were included in the meta-analysis. The RoB was rated as not serious, because 40% or less of all studies contributing to the evidence for this outcome had a high RoB. Low RoB or good quality: 23; high RoB: 15 (36%); unclear RoB: 3. Not downgraded for RoB.
2. All results were around the effect of an increase in prices; with high heterogeneity (I^2 = 99%). Not downgraded for inconsistency.
3. Most included studies were conducted at subnational level, but the certainty was not downgraded for that reason, as one would expect the observed effects in these studies to be even larger for policies implemented at a national level, because the tax pass-through rate is likely to be higher in national-level policies (given that industry can control prices more within smaller, subnational markets, and price increases are typically lower at subnational than at national levels). Although studies were conducted in HICs, no difference in effect is expected in LMICs. Not downgraded for indirectness.
4. The 95% CI of the tax pass-through rate included values that are consistent with an effect (95% CI: 66 to 98%). Not downgraded for imprecision.
5. Not downgraded for RoB, although 16 of 33 (48%) studies included in the meta-analysis were at high RoB, because the sensitivity analysis (excluding the high RoB studies) provided consistent results.
6. Not downgraded for the high level of inconsistency (I^2 = 100%) because it seemed to be driven by a number of studies (e.g. those related to the Philadelphia policy) that show a higher effect than the remaining studies, where the effect would still be considered significant.
7. Most included studies were conducted at subnational level, but the certainty was not downgraded for that reason, as one would expect the observed effects in these studies to be even larger for policies implemented at a national level, because the tax pass-through rate is likely to be higher in national-level policies (given that industry can control prices more within smaller, subnational markets, and price increases are typically lower at subnational than at national levels). Purchases are not expected to change as much with smaller price increases as with larger price increases. Cross-border shopping is less likely to impact the effect of national taxes. Although studies were conducted in HICs, no difference in effect is expected in LMICs. Not downgraded for indirectness.
8. The 95% CI of the PE included values that are consistent with an effect (95% CI: –2.11 to –1.08). Not downgraded for imprecision.
9. Not downgraded for RoB, although 14 of 24 (58%) studies included in the meta-analysis were at high RoB, because the sensitivity analysis (excluding the high RoB studies) provided consistent results.
10. Results were inconsistent, suggesting benefits favouring the intervention and the control, with some statistically significant and some not statistically significant, with high heterogeneity (I^2 = 98%). Downgraded for inconsistency.
11. Most included studies were conducted at subnational level, but the certainty was not downgraded for that reason, as one would expect the observed effects in these studies to be even larger for policies implemented at a national level, because the tax pass-through rate is likely to be higher in national-level policies (given that industry can control prices more within smaller, subnational markets, and price increases are typically lower at subnational than at national levels). Purchases are not expected to change as much with smaller price increases as with larger price increases. Although studies were conducted in HICs, no difference in effect is expected in LMICs. Not downgraded for indirectness. (Note: availability of tap water may influence outcome.)
12. Serious imprecision because the 95% CI of the PE included values suggesting benefits favouring the intervention and the control (95% CI: –0.52 to 1.35). Downgraded for serious imprecision.

13. The Egger test was conducted to test for publication bias in meta-analysed studies. The result of the Egger test was significant ($P < 0.001$), suggesting publication bias.
14. Downgraded for RoB because more than 60% of studies (6 out of 9 studies included in the meta-analysis) had a high RoB. The sensitivity analysis excluding the high RoB studies did not provide consistent results.
15. Downgraded for inconsistency, because results showed a high level of heterogeneity (I^2 = 82% for PE), and no subgroup effects were identified.
16. Most included studies were conducted at subnational level, but the certainty was not downgraded for that reason, as one would expect the observed effects in these studies to be even larger for policies implemented at a national level, because the tax pass-through rate is likely to be higher in national-level policies (given that industry can control prices more within smaller, subnational markets, and price increases are typically lower at subnational than at national levels). Consumption is not expected to change as much with smaller price increases as with larger price increases. Although studies were conducted in HICs, no difference in effect is expected in LMICs. Not downgraded for indirectness.
17. Serious imprecision because the 95% CI of the PE included both values suggesting benefits and values suggesting no effect (95% CI: −8.86 to 1.30).
18. Downgraded for RoB because more than 60% of studies (6 out of 9 studies included in the meta-analysis) had a high RoB. The sensitivity analysis excluding the high RoB studies did not provide consistent results.
19. All results were around the effect of no change in consumption (I^2 = 48%). Not downgraded for inconsistency.
20. Most included studies were conducted at subnational level, but the certainty was not downgraded for that reason, as one would expect the observed effects in these studies to be even larger for policies implemented at a national level, because the tax pass-through rate is likely to be higher in national-level policies (given that industry can control prices more within smaller, subnational markets, and price increases are typically lower at subnational than at national levels). Consumption is not expected to change as much with smaller price increases as with larger price increases. Although studies were conducted in HICs, no difference in effect is expected in LMICs. Not downgraded for indirectness.
21. Not downgraded for imprecision because the 95% CI of the PE included values that are consistent with no effect or trivial effect (95% CI: −0.60 to 1.68).
22. Overall RoB for this outcome was rated as serious: for one of the studies, the intervention was assessed as having a high RoB because the intervention was likely to affect data collection, completeness of the dataset was unclear, and it was unclear whether the intervention was independent of other changes over time. (The two included studies are from the same author, using the same data, but for a different target population.) The paper targeting adults was rated as high RoB *(19)*; the paper targeting children and adolescents was rated as low RoB *(16)*. Both studies were assessed using the Cochrane Effective Practice and Organisation of Care (EPOC) tool. Downgraded for RoB.
23. Downgraded for inconsistency because of variations in results: one study showed no significant reduction in caloric intake, whereas the other showed a significant positive association between soft drink tax and caloric intake.
24. Indirectness was related to the timing of outcome assessment, because any effect of the policy on diet would be expected beyond the study time frame. Downgraded for indirectness.
25. Included studies had very large sample sizes but small effects, and no CI was reported. Not downgraded for imprecision.
26. No serious RoB, because 40% or less of studies had a high RoB. One interrupted time-series study *(20)* was rated as having an unclear RoB using the EPOC tool, because it was unclear whether the intervention was unlikely to affect data collection. Low RoB: 3; high RoB: 2 (33%); unclear RoB: 1. Not downgraded for RoB.
27. All estimates pointed in the same direction (i.e. reduction in sugar content or calories of beverages); the available CI was narrow; only 1 of 6 studies provided statistical testing. Not downgraded for inconsistency.
28. Although most studies were conducted in HICs, no difference in effect is expected in LMICs. Not downgraded for indirectness.

29. Included studies had large sample sizes, with consistent results. One study reported a narrow CI. Not downgraded for imprecision.
30. No serious RoB, because 40% or less of studies had a high RoB. Low RoB: 5; high RoB: 4 (40%); unclear RoB: 1. Not downgraded for RoB.
31. Seven out of 10 studies showed an increase in cross-border shopping/retail revenue, although only 4 provided statistical testing. One study showed no significant effect. Not downgraded for inconsistency.
32. Included studies were conducted at subnational level, but the certainty was not downgraded for that reason. Cross-border shopping is less likely to impact the effect of national taxes. Not downgraded for indirectness.
33. Included studies had large sample sizes. Small effects reported. Narrow CI was reported for one study, consistent with a small effect. Not downgraded for imprecision.
34. Two interrupted time series were included for this outcome, and their RoB was assessed using the EPOC tool. One study *(31)* was assessed as having low RoB, and the other study *(32)* a high RoB, because the intervention was judged not to be independent of other changes. High RoB: 1; low RoB: 1. Downgraded for RoB.
35. Estimates showed either no effect or beneficial effects (i.e. increases in employment or decreases in unemployment). No estimates pointed to an increase in unemployment. Not downgraded for inconsistency.
36. There was no suspicion of indirectness. Not downgraded for indirectness.
37. Included studies had large sample sizes but small effects, where reported. One study reported a narrow CI, consistent with a small effect. Not downgraded for imprecision.
38. The two interrupted time series *(33, 34)* were assessed as having low RoB using the EPOC tool. The controlled before-and-after study *(35)* was assessed as having an unclear RoB using the EPOC tool, because the criterion "protection against contamination (studies using second site as control)" was unclear. Low RoB: 2; unclear RoB: 1. Not downgraded for RoB.
39. All results showed no statistically significant changes for tax effects, after policy implementation. Not downgraded for inconsistency.
40. There was no suspicion of indirectness. Not downgraded for indirectness.
41. Included studies had large sample sizes. Estimates showed either small effects or no effects. Not downgraded for imprecision.
42. No serious RoB, because 40% or less of studies had a high RoB. The interrupted time-series study *(37)* was assessed as having an unclear RoB using the EPOC tool, because the completeness of data was unclear in the study. Low RoB: 2; high RoB: 2 (40%); unclear RoB: 1. Not downgraded for RoB.
43. Estimates showed either no effect or a small reduction in BMI; no estimates pointed to an increase in BMI. Not downgraded for inconsistency.
44. Indirectness related to the timing of outcome assessment, because any effect of the policy on BMI would be expected beyond the study time frame. All studies were conducted on USA sales taxes. There is no evidence on the effect of excise taxes. Downgraded for indirectness.
45. Included studies had large sample sizes; no CI reported; only small magnitudes of effects reported, pointing in the same direction. Not downgraded for imprecision.

GRADE evidence profile 2

PICO: What is the effect in adults and children on the outcomes of interest of implementing a tax on food, compared with not implementing the policy?
Population: Children and adults
Intervention: Tax on food
Comparison: No tax
Outcomes: Table 1 in section 2.2 categorizes outcomes as critical or important
Included taxes: Tax on non-essential energy-dense food (implemented in Mexico) and other "non-core" food taxes (implemented in Denmark, Finland, Hungary and USA)

Quality assessment							Impact	Certainty
No. of studies	Study design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other considerations		
Price change								
6	Non-RCTs	Very serious[1]	Not serious[2]	Not serious[3]	Not serious[4]	None	*Narrative analysis* only of 5 studies *(3, 13, 38–40)* assessing the impact of the Mexican food tax: 4 studies showed significant increases in prices of taxed products; 1 study reported an increase, but did not provide statistical testing. Of these: • 1 study *(13)* found a significant impact on price index of taxed food (6.020; SE = 0.0805); • 1 study *(38)* found a significant increase in price of snacks (7.048%; SE = 0.030; *P* = 0.000); • 1 study *(39)* reported significant increases in price – for example, in DICONSA (state-owned stores) (2.90%; SE = 0.94), mini markets (1.90%; SE = 0.43), and grocery and convenience stores (2.16%; SE = 0.16); • 1 study *(40)* found significant increases in price of cookies (0.098; SE = 0.002), ready-to-eat cereals (0.051; SE = 0.004), salty snacks and peanuts (0.066; SE = 0.002), and pre-packaged sweet bread (0.05; SE = 0.004); • 1 study *(3)* reported increased prices of selected taxed foods, with all increases greater than the combined tax increase and expected inflation, except for cornflakes with sugar and handcrafted sweet bread – no significance testing was reported.	⨁◯◯◯ Very low

Quality assessment							Impact	Certainty
No. of studies	Study design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other considerations		
							A study *(5)* on 3 food tax policies in Denmark, Finland and Hungary reported increased prices of taxed products (e.g. +2.0% price change for confectionery in Denmark, +2.9% price change for confectionery in Finland, +3.9% price change for confectionery in Hungary), but did not provide statistical testing.	
Purchases (direct effects)								
9	Non-RCTs	Very serious[5]	Not serious[6]	Not serious[7]	Not serious[8]	None	*Narrative analysis* only of 6 studies *(3, 10, 13, 41–43)* (and 6 estimates) for the Mexican tax: 4 studies showed a significant decrease in purchases of taxed products. Of these: • 1 study *(41)* found a significant decrease in volume of taxed food purchases per capita per month (–25 g; 95% CI: –38 to –12; $P < 0.05$); • 1 study *(10)* found a significant 18% (1 g per capita per day) decrease in purchases of taxed foods from supermarkets ($P < 0.001$); • 1 study *(42)* found a significant 6.0% decrease (95% CI: –8.2% to –3.8%; $P < 0.05$) in the purchases of taxed foods beyond what would have been expected; • 1 study *(13)* found a significant 3% decrease in calories purchased from taxed food per week per household (–84.69 kcal; SE = 24.44). One study *(43)* found mixed results by product (reduction for sweet bread but no change for white bread). Another study *(3)* found no change in purchases of taxed products. Of the 3 other studies *(5, 44, 45)* (with 5 estimates) assessing the impact of food taxes in Denmark, Finland and Hungary, and the state tax in Colorado, USA, 2 studies *(5, 44)* (with 4 estimates) suggested decreased sales of taxed products (including 3 estimates on the percentage change in sales of sweets, with no statistical testing provided); and 1 study *(45)* found no significant change (0.0060; SE = 0.0591).	⊕◯◯◯ Very low

Quality assessment							Impact	Certainty
No. of studies	Study design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other considerations		
Purchases (substitution effects)								
7	Non-RCTs	Very serious[9]	Serious[10]	Not serious[11]	Serious[12]	None	*Narrative analysis* only of 5 studies *(3, 10, 13, 41, 42)* for 1 tax policy in Mexico: studies showed different conclusions across studies. 1 study reported a significant increase in purchases of untaxed products *(13)*; 2 studies reported mixed results across measures *(10)*; 2 studies reported no statistically significant change in purchases of untaxed products *(41, 42)*. 1 study *(45)* from Colorado, USA, reported a significant increase in monthly purchases of tax-exempt products (i.e. candy prepared with flour; increase in purchases 12.15%; SE = 3.96), whereas another study *(44)*, from Hungary, found no change in untaxed products purchased.	⨁◯◯◯ Very low
Consumption (direct effects)								
0								
Consumption (substitution effects)								
0								
Diet (energy, total food and/or nutrient intake, nutritional quality)								
0								
Product change (portion size, food reformulation, portfolio mix)								
0								
Unintended consequences (cross-border shopping)								
0								

Quality assessment							Impact	Certainty
No. of studies	Study design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other considerations		
Unintended consequences (unemployment)								
2	Non-RCTs	Serious[13]	Not serious[14]	Serious[15]	Not serious[16]	None	*Narrative analysis* only of 2 studies: 1 study *(32)* from Mexico reported a small, but significant, decreasing trend in national unemployment (–0.0201; 95% CI: –0.0292 to –0.0111; *P* = 0.000). Another (case) study *(43)* from Mexico reported on the change in the number of bakery employees (8 of 10 bakeries studied reduced staff; a total of 10 people stopped working), but did not provide statistical testing.	⨁◯◯◯ Very low
Unintended consequences (other)								
0								
Body weight status, BMI								
2	Non-RCTs	Very serious[17]	Not serious[18]	Serious[19]	Not serious[20]	None	*Narrative analysis* only of 2 studies for sales taxes: a USA study *(46)* found no significant impact of state snack taxes on BMI (–0.04; SE = 0.04). Another USA study *(47)* found no significant impact of a snack tax in Maine on BMI (0.001; SE = 0.002). No evidence was available that assessed effects of excise taxes on BMI.	⨁◯◯◯ Very low
Diet-related NCDs (including validated surrogate indicators)								
0								
Undernutrition								
0								
Pregnancy outcomes								
0								

BMI: body mass index; CI: confidence interval; NCD: noncommunicable disease; RCT: randomized controlled trial; SE: standard error; USA: United States of America.

1. Across the outcomes, the following rules were followed for judging the RoB: If 60% or more of studies contributing to the evidence of an outcome had a high RoB, the RoB rating for that outcome was "very serious". If 41–59% of studies had a high RoB, the rating was "serious". If 40% or less of studies had a high RoB, the rating was "not serious". For assessing the RoB for outcomes with a smaller number of studies (i.e. less than 5), additional details of the RoB assessment were considered for making the final judgement. For this outcome (price change), 6 studies were included in the narrative analysis. The RoB was rated as very serious, because more than 60% of studies had a high RoB. High RoB: 6 (100%). Downgraded for RoB.
2. Not downgraded for inconsistency, because all results were around the effect of an increase in price.
3. There was no suspicion of indirectness. Not downgraded for indirectness.
4. Included studies had sufficiently large sample sizes (i.e. $n > 500$ individuals per site/time period, or $n > 50$ store audits per site/time period). Estimates showed small effects. Not downgraded for imprecision.
5. Very serious RoB, because more than 60% of studies had a high RoB. Low RoB: 1; high RoB: 7 (78%); unclear RoB: 1. Downgraded for RoB.
6. Not downgraded for inconsistency, because results from 6 out of 9 studies were around the effect of a decrease in purchases of taxed products, with 2 studies showing no effect, and 1 showing mixed results.
7. There was no suspicion of indirectness. Not downgraded for indirectness.
8. All but one of the included studies had sufficiently large sample sizes (i.e. $n > 500$ individuals per site/time period, or $n > 50$ store audits per site/time period), and the reported CIs included values that are consistent with a small effect. Not downgraded for imprecision.
9. Very serious RoB, because more than 60% of studies had a high RoB. Low RoB: 1; high RoB: 5 (83%). Downgraded for RoB.
10. Results were inconsistent, suggesting benefits favouring the intervention and the control. Downgraded for inconsistency.
11. There was no suspicion of indirectness. Not downgraded for indirectness.
12. Included studies had sufficiently large sample sizes (i.e. $n > 500$ individuals per site/time period, or $n > 50$ store audits per site/time period), but with varying effects or no effect. One study reported a CI that included values suggesting benefits favouring the intervention and the control. Downgraded for imprecision.
13. Two interrupted time-series studies were included for this outcome, and their RoB was assessed using the Cochrane Effective Practice and Organisation of Care (EPOC) tool. One study *(43)* was assessed as having unclear RoB due to unclear reliable primary outcome measure(s). The other study *(32)* was assessed as having high RoB because the intervention was not assessed as being independent of other changes. High RoB: 1; unclear RoB: 1. Downgraded for RoB.
14. One study with a large sample size reported a small but significant decreasing trend in national unemployment, and no change in employment of the manufacturing industry for targeted foods, although one very small study with only 10 bakeries reported a reduction in staff. Not downgraded for inconsistency.
15. Evidence is from one setting, representing a single country context. Downgraded for indirectness.
16. One study had sufficiently large sample sizes (i.e. $n > 500$ individuals per site/time period, or $n > 50$ store audits per site/time period), and estimates showed either small effects or no effects. The other study did not provide statistical testing and had a very small sample size with only 10 bakeries included. Not downgraded for imprecision.

17. Two interrupted time-series studies were included for this outcome, and their RoB was assessed using the EPOC tool. One study *(46)* was assessed as having high RoB because the intervention was not assessed as being independent of other changes, and data were not analysed appropriately or there were insufficient data points to enable reliable statistical inference. The other study *(47)* was assessed as having high RoB because data were not analysed appropriately or there were insufficient data points to enable reliable statistical inference. High RoB: 2. Downgraded for RoB.
18. Estimates showed no effect of the tax on BMI. Not downgraded for inconsistency.
19. Indirectness was related to the timing of outcome assessment because any effect of the policy on BMI would be expected beyond the study time frame. All studies were conducted on USA sales taxes. There is no evidence on the effect of excise taxes on BMI. Downgraded for indirectness.
20. Included studies had sufficiently large sample sizes (i.e. $n > 500$ individuals per site/time period, or $n > 50$ store audits per site/time period). Estimates showed no impact of the assessed tax policy on BMI. Not downgraded for imprecision.

GRADE evidence profile 3

PICO: What is the effect in adults and children on the outcomes of interest of implementing a tax on saturated fats, compared with not implementing the policy?
Population: Children and adults
Intervention: Tax on saturated fats
Comparison: No tax
Outcomes: Table 1 in section 2.2 categorizes outcomes as critical or important
Included taxes: Saturated fats tax in Denmark

Quality assessment							Impact	Certainty
No. of studies	Study design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other considerations		
Price change								
3	Non-RCTs	Very serious[1]	Not serious[2]	Serious[3]	Not serious[4]	None	*Narrative analysis* only: 3 studies *(5, 48, 49)* reported increase in prices of targeted products (1 study without statistical testing). 1 study *(5)* reported a 13.1% increase in the price of butter; significance testing was not reported. 1 study *(48)* reported statistically significant increases in the price of butter (+11.38 kr/kg in discount stores; +8.17 kr/kg in supermarkets) and margarine (+6.18 kr/kg in discount stores; +4.57 kr/kg in supermarkets). 1 study *(49)* reported statistically significant increases ($P < 0.001$) in the price of high-fat varieties of minced beef (16%), regular cream (14%) and sour cream (13%).	⨁◯◯◯ Very low

Quality assessment							Impact	Certainty
No. of studies	Study design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other considerations		
Purchases (direct effects)								
5	Non-RCTs	Very serious[5]	Not serious[6]	Serious[7]	Not serious[8]	None	*Narrative analysis* only: 3 studies *(5, 50, 51)* suggested a decrease in purchases of targeted products, but no statistical testing was reported. Of these, 1 study *(50)* reported a 0.9% decrease in the total volume purchased of 12 foods targeted by the tax; 1 study *(5)* reported a 5.5% decrease in butter purchases; and 1 study *(51)* reported a 4% decrease in purchasing of saturated fat. 1 study *(49)* reported statistically significant decreases in purchases of minced beef and cream products. 1 study *(48)* showed a statistically significant decrease in total weekly purchasing of fat products per individual (41.772 g; $P = 0.000$).	⊕◯◯◯ Very low
Purchases (substitution effects)								
1	Non-RCT	Very serious[9]	Serious[10]	Serious[11]	Not serious[12]	None	*Narrative analysis* only: mixed results for purchases of untaxed substitutes; results not statistically tested. A study *(51)* reported a 7.9% increase in purchasing of vegetables and a 3.7% increase in purchasing of fibre, but also an increase in purchasing of salt for some age and sex groups and a decrease in purchasing of fruit for some age and sex groups; significance testing was not reported.	⊕◯◯◯ Very low
Consumption (direct effects)								
0								
Consumption (substitution effects)								
0								
Diet (energy, total food and/or nutrient intake, nutritional quality)								
0								
Product change (portion size, food reformulation, portfolio mix)								
0								

Quality assessment							Impact	Certainty
No. of studies	Study design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other considerations		
Unintended consequences (cross-border shopping)								
0								
Unintended consequences (unemployment)								
0								
Unintended consequences (other)								
0								
Body weight status, BMI								
0								
Diet-related NCDs (including validated surrogate indicators)								
0								
Undernutrition								
0								
Pregnancy outcomes								
0								

CI: confidence interval; kr: Danish krone; NCD: noncommunicable disease; RCT: randomized controlled trial.

1. Across the outcomes, the following rules were followed for judging the RoB: If 60% or more of studies contributing to the evidence of an outcome had a high RoB, the RoB rating for that outcome was "very serious". If 41–59% of studies had a high RoB, the rating was "serious". If 40% or less of studies had a high RoB, the rating was "not serious". For assessing the RoB for outcomes with a smaller number of studies (i.e. less than 5), additional details of the RoB assessment were considered for making the final judgement. For this outcome (price change), a total of 3 studies were included in the narrative analysis. Two interrupted time-series studies were included, and their RoB was assessed using the Cochrane Effective Practice and Organisation of Care (EPOC) tool. One study *(48)* was assessed as having high RoB because the intervention was not assessed as being independent of other changes. The other study *(49)* was assessed as having low RoB. One before-and-after study was included, and its RoB was assessed using the EPOC tool. The study *(5)* was assessed as having high RoB because there was no baseline measurement, characteristics for studies using second site as control, protection against contamination, or follow-up. Low RoB: 1; high RoB: 2. Downgraded for RoB.
2. Not downgraded for inconsistency, as there were no variations in results. All results pointed to an increase in prices of taxed products assessed in the studies.
3. Evidence was from one setting, representing a single country context. Studies had poor alignment of products included in the assessment compared with target products of the tax. Products affected most by the tax were mainly assessed in the studies. Downgraded for indirectness.
4. Included studies had sufficiently large sample sizes (i.e. n > 500 individuals per site/time period, or n > 50 store audits per site/time period). Estimates showed either small effects or no effects. Not downgraded for imprecision.

5. Very serious RoB, because more than 60% of studies had a high RoB. Low RoB: 1; high RoB: 4 (80%). Downgraded for RoB.
6. Not downgraded for inconsistency, because effects of all but one study pointed to a decrease in purchases of taxed products assessed in the studies. One study showed mixed results.
7. Evidence was from one setting, representing a single country context. Downgraded for indirectness.
8. Included studies had sufficiently large sample sizes (i.e. n > 500 individuals per site/time period, or n > 50 store audits per site/time period). Estimates showed either small effects or no effects. Not downgraded for imprecision.
9. One interrupted time series was included for this outcome, and its RoB was assessed using the EPOC tool. The study *(51)* was assessed as having high RoB because the intervention was not assessed as being independent of other changes. High RoB: 1. Downgraded for RoB.
10. Results were inconsistent, suggesting benefits favouring the intervention and the control, with no significance tests done or CIs provided. Downgraded for inconsistency.
11. Evidence was from one setting, representing a single country context. Downgraded for indirectness.
12. The included study had a sufficiently large sample size (i.e. n > 500 individuals per site/time period, or n > 50 store audits per site/time period). Estimates showed either small effects or no effects. No suspicion of imprecision.

GRADE evidence profile 4

PICO: What is the effect in adults and children on the outcomes of interest of implementing a subsidy on food, compared with not implementing the policy?
Population: Children and adults
Intervention: Subsidy on food that contributes to a healthy diet
Comparison: No subsidy
Outcomes: Table 1 in section 2.2 categorizes outcomes as critical or important
Included evaluated interventions: Various vouchers for and discounts on fruits and vegetables for low-income households in the USA; food vouchers for low-income pregnant women and low-income households in the United Kingdom; a subsidized fruit and vegetable box programme targeting low-income Aboriginal families with young children in Australia; discounted pulses and fortified wheat flour for eligible households in India; and the reduction of VAT on fruits and vegetables in Latvia

Quality assessment							Impact	Certainty
No. of studies	Study design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other considerations		
Price change								
3	Non-RCTs	Very serious[1]	Not serious[2]	Not serious[3]	Serious[4]	None	*Narrative analysis* only: 2 studies *(52, 53)* with mixed results across measures, most finding no statistically significant effects and 1 study *(54)* reporting a decrease in prices. 1 study *(54)* of reduced VAT rate for some fresh fruits and vegetables in Latvia reported significantly lower price indices for Latvia than controls. 1 USA study *(52)* providing matching financial vouchers for the amount of SNAP benefits spent on fresh local produce reported a significant increase in price of yellow squash ($0.02) and a significant decrease in price of russet potatoes (–$1.51), but no significant change in price of tomatoes ($0.35), peaches (–$0.32), cantaloupes (–$0.12), cucumbers ($0.10), green bell peppers ($0.03), zucchinis (–$0.18), green cabbage (–$0.01), cauliflower (–$0.43), Roma tomatoes (–$0.28), sweet potatoes ($0.00), turnip greens (–$0.03), jalapeno peppers (–$0.12) or red potatoes ($0.19).	⨁◯◯◯ Very low

Quality assessment							Impact	Certainty
No. of studies	Study design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other considerations		
							1 USA study *(53)* of fruit and vegetable prices at WIC vendors before and after introduction of a fruit and vegetable voucher to WIC food packages found significantly decreased prices of canned vegetables (–0.15; SE = 0.04; $P < 0.001$) and frozen vegetables (–0.64; SE = 0.11; $P < 0.001$), but no significant change in price of fresh vegetables (0.10; SE = 0.08; $P = 0.23$), fresh fruit (–0.02; SE = 0.07; $P = 0.77$), canned fruit (–0.15; SE = 0.11; $P = 0.18$) or frozen fruit (–0.03; SE = 0.10; $P = 0.78$).	
Purchases (direct effects)								
14	7 RCTs	Very serious[5]	Not serious[6]	Serious[7]	Serious[8]	None	*Meta-analysis* of 8 estimates from 6 studies: significant increase in purchases of subsidized fruits and vegetables; PE: –0.79 (95% CI: –1.60 to 0.02); $I^2 = 85\%$. *Narrative analysis*: 1 USA study *(55)* reported that receiving a 30% rebate for purchasing targeted fruits and vegetables was associated with increased SNAP households' monthly spending on targeted fruits and vegetables by US$ 1.10 (SE = 0.18; $P < 0.01$).	⨁◯◯◯ Very low
	7 non-RCTs	Not serious[9]	Serious[10]	Not serious[11]	Serious[12]	None	*Meta-analysis* of 6 estimates from 4 studies: marginally significant increase in purchases of subsidized fruits and vegetables; PE –0.34 (95% CI: –0.74 to 0.05); $I^2 = 95\%$. Additional information (narrative analysis): a total of 3 studies *(52, 56, 57)* were included in the narrative analysis. 2 studies reported significant increases in purchases of fruits and vegetables. 1 United Kingdom study *(56)* reported that receiving vouchers for fresh fruits, vegetables and milk was associated with increased quantity of fruits and vegetables purchased by eligible households by 1.789 kg per month (SE = 0.647; $P < 0.01$) and increased expenditure on fruits and vegetables by eligible households by £2.425 per month (SE = 0.643; $P < 0.01$).	⨁◯◯◯ Very low

Quality assessment							Impact	Certainty
No. of studies	Study design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other considerations		
							1 USA study *(52)* reported that a programme providing vouchers to match SNAP benefits that recipients spend on fresh local produce was associated with a marginally significant increase in produce purchases at participating grocery stores by 12.4% or US$ 843/week (SE not reported; $P < 0.10$) and quantities purchased by 16.3% or 632.14 units (SE not reported; $P < 0.10$). 1 study found statistically significant increases in purchases of other subsidized products. 1 study *(57)* of subsidies on pulses in selected Indian states reported a significant increase in total household purchases of all pulses per year (2.984 kg; SE = 0.99).	
Purchases (substitution effects)								
3	2 RCTs	Very serious[13]	Not serious[14]	Serious[15]	Serious[16]	None	*Narrative analysis* only: mixed results across measures in one study, and no effect in another study. 1 USA study *(58)* of financial incentives in a food benefit programme for low-income people found a significant difference in change in purchasing of SSBs between the incentive and control groups ($P < 0.05$), but no significant differences in other measures. 1 USA study *(59)* of a discount on qualifying fruits and vegetables reported no evidence of significant differences in purchasing of unhealthy food categories between the intervention and control groups.	⨁◯◯◯ Very low
	1 non-RCT	Serious[17]	Not serious[18]	Not serious[19]	Not serious[20]	None	*Narrative analysis* only: 1 USA study *(60)* providing SNAP participants with a subsidy on fresh produce purchases reported no significant effect of the programme on spending on SSBs among SNAP participants.	⨁◯◯◯ Very low

Quality assessment							Impact	Certainty
No. of studies	Study design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other considerations		
Consumption (direct effects)								
17	5 RCTs	Very serious[21]	Serious[22]	Serious[23]	Serious[24]	Publication bias suspected[25]	*Meta-analysis* of 4 estimates from 3 studies: no significant change in consumption of subsidized fruits and vegetables; PE: –0.45 (95% CI: –1.50 to 0.59); I^2 = 86%. *Narrative analysis*: 2 studies for the same US-based intervention showed significantly higher consumption of targeted foods. 1 USA study *(61)* reported that a 30% incentive for purchases of targeted fruits and vegetables was associated with increased daily consumption of targeted fruits and vegetables by 24% or 0.22 cup-equivalents (SE = 0.06; P < 0.01) 4–6 months after implementation. 1 USA study *(62)* reported that an incentive of 30 cents for every dollar of SNAP benefits spent on targeted fruits and vegetables was associated with increased daily consumption of targeted fruits and vegetables by 0.238 cup-equivalents (SE = 0.054; P < 0.01).	⨁◯◯◯ Very low
	12 non-RCTs	Not serious[26]	Serious[27]	Not serious[28]	Not serious[29]	None	*Meta-analysis* of 5 estimates from 4 studies: no significant change in consumption of subsidized fruits and vegetables; PE: –0.02 (95% CI: –0.20 to 0.15; P = 0.72); I^2 = 57%. Additional information (narrative analysis): 7 USA studies *(63–69)* assessed the impact of fruit and vegetable subsidies. 3 of these studies showed increased consumption of targeted products, and 4 studies reported no change. 1 USA study *(63)* reported that a subsidy for fresh fruits and vegetables for WIC participants was associated with increased servings of fruits and vegetables by 1.4 serves per 1000 kcal (SE = 0.33; P < 0.001) for farmers market participants and by 0.81 serves per 1000 kcal (SE = 0.34; P = 0.02) for supermarket participants.	⨁◯◯◯ Very low

Quality assessment							Impact	Certainty
No. of studies	Study design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other considerations		
							1 USA study *(64)* reported that an incentive for government nutrition assistance recipients to purchase fresh produce at farmers markets was associated with an increased percentage of respondents who reported eating 5 or more daily serves of fruits and vegetables, from 19.4% at baseline to 24.2% at 12 months ($P < 0.001$). 1 USA study *(65)* reported that a dollar-for-dollar match of SNAP dollars spent at farmers markets was associated with increased median frequency of fruit and vegetable consumption by 0.47 times per day (SE not reported). 1 USA study *(66)* reported that a dollar-for-dollar farmers market match incentive was associated with no significant change in total fruit and vegetable consumption. 1 USA study *(67)* reported that farmers market coupons for WIC participants were associated with no significant change in overall consumption of fresh produce. 1 USA study *(68)* reported that cash value vouchers for fruits and vegetables for WIC participants were associated with no significant change in fruit and vegetable consumption. 1 USA study *(69)* reported that a farmers market incentive programme was associated with no significant change in fruit and vegetable consumption. 1 study *(57)* reported statistically significant increases in consumption of other subsidized products. 1 study *(57)* of subsidies on pulses in selected Indian states reported a significant increase in consumption of all pulses per household per month (0.296 kg; SE = 0.11; $P < 0.05$).	

Quality assessment							Impact	Certainty
No. of studies	Study design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other considerations		
Consumption (substitution effects)								
4	3 RCTs	Very serious[30]	Serious[31]	Serious[32]	Not serious[33]	None	*Narrative analysis* only: 3 studies *(62, 70, 71)* showed mixed results. A USA study *(62)* of an incentive to make fruits and vegetables more affordable for SNAP participants found significantly decreased consumption of refined grains (–0.429 oz-eq; SE = 0.135; *P* = 0.002) and solid fats (–1.69 g-eq; SE = 0.68; *P* = 0.097) and increased consumption of alcohol (0.077; SE = 0.035; *P* = 0.027), but no significant difference in consumption of whole grains (–0.016 oz-eq; SE = 0.039; *P* = 0.688), total dairy (0.020 cup-eq; SE = 0.060; *P* = 0.740), total protein foods (–0.028 oz-eq; SE = 0.155; *P* = 0.857), oil (–0.96 g-eq; SE = 0.68; *P* = 0.160) or added sugars (–0.63 tsp; SE = 0.64; *P* = 0.324). A USA study *(70)* incentivizing the purchase of fruits and vegetables in a food benefit programme found a significant difference in change in SSB consumption between the incentive and control arms (*P* < 0.05), but no significant difference in other measures. A USA study *(71)* of an incentive that offered rebates to SNAP participants for purchasing targeted fruits and vegetables found a statistically significant decrease in consumption of refined grains (–0.43 oz-eq/day; 95% CI: –0.69 to –0.16; *P* = 0.002) and increase in consumption of alcoholic beverages (0.08 drinks/day; 95% CI: 0.01 to 0.15; *P* = 0.027), but no significant difference in consumption of whole grains (–0.02 oz-eq/day; 95% CI: –0.09 to 0.06; *P* = 0.688), total dairy (0.02 cup-eq/day; 95% CI: –0.10 to 0.14; *P* = 0.740), total protein foods (–0.03 oz-eq/day; 95% CI: –0.33 to 0.28; *P* = 0.857), oils (–1.0 g-eq/day; 95% CI: –2.3 to 0.4; *P* = 0.160), solid fats (–1.7 g-eq/day; 95% CI: –3.7 to 0.3; *P* = 0.097) or added sugars (–0.6 tsp/day; 95% CI: –1.9 to 0.6; *P* = 0.324).	⨁◯◯◯ Very low

Quality assessment							Impact	Certainty
No. of studies	Study design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other considerations		
	1 non-RCT	Not serious[34]	Not serious[35]	Serious[36]	Not serious[37]	None	*Narrative analysis*: A USA study *(72)* of a fruit and vegetable exposure/incentive targeting families receiving USA federal food assistance found a significant 24.6% decrease (SE = 10.5; *P* = 0.005) in times per day consuming soda.	⨁◯◯◯ Very low
Diet (energy, total food and/or nutrient intake, nutritional quality)								
5	3 RCTs	Very serious[38]	Not serious[39]	Serious[40]	Not serious[41]	None	*Narrative analysis*: 1 study, published as 2 papers *(62, 71)*: 1 *(71)* found a statistically significant increase in dietary quality and the other *(62)* mixed results. 1 study *(70)* found no change in diet quality. The USA study (with 2 papers) of an incentive to make fruits and vegetables more affordable for SNAP participants found a significant increase in Healthy Eating Index–2010 score (4.7; 95% CI: 2.4 to 7.1; *P* < 0.001), and a significant increase in vitamin C intake (14 mg; SE = 4; *P* = 0.001), but no significant difference in intake of total energy (–49 kcal; SE = 38; *P* = 0.201), fibre (0.38 g; SE = 0.33; *P* = 0.258), beta carotene (193 µg; SE = 121; *P* = 0.112) or vitamin A (15 µg retinol activity equivalents; SE = 24; *P* = 0.528). 1 USA study *(70)* incentivizing the purchase of fruits and vegetables in a food benefit programme found no significant difference in change in Healthy Eating Index–2010 score between the incentive and the control arm.	⨁◯◯◯ Very low

Quality assessment							Impact	Certainty
No. of studies	Study design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other considerations		
	2 non-RCTs	Not serious[42]	Not serious[43]	Serious[44]	Serious[45]	None	*Narrative analysis* only: 1 study *(73)* of a fruit and vegetable subsidy for disadvantaged Australian Aboriginal children reported no significant differences in adjusted intake of macronutrients per MJ/day for protein (0.1 g; 95% CI: –0.6 to 0.9), total fat (0.5 g; 95% CI: 0.1 to 0.9), saturated fat (0.2 g; 95% CI: –0.1 to 0.4), carbohydrate (–1.2 g; 95% CI: –2.5 to 0.1), total sugar (–1.0 g; 95% CI: –2.4 to 0.4), added sugar (0.03 g; 95% CI: –1.4 to 1.5) or starch (–0.2 g; 95% CI: –1.6 to 1.2). 1 study *(57)* of subsidies on pulses in selected Indian states reported a significant increase in pulse protein intake per day per household (1.383 g; SE = 0.67; $P < 0.05$).	⨁◯◯◯ Very low
Product changes (portion size, food reformulation, portfolio mix)								
0								
Unintended consequences (cross-border shopping)								
0								
Unintended consequences (unemployment)								
0								
Unintended consequences (other)								
0								
Body weight status, BMI								
2	1 RCT	Very serious[46]	Not serious[47]	Serious[48]	Serious[49]	None	*Narrative analysis* only: no significant change in BMI measures. 1 USA study *(70)* incentivizing the purchase of fruits and vegetables reported no significant difference in change in BMI between the incentive group and the control group.	⨁◯◯◯ Very low

Quality assessment							Impact	Certainty
No. of studies	Study design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other considerations		
	1 non-RCT	Not serious[50]	Not serious[51]	Serious[52]	Serious[53]	None	*Narrative analysis* only: no significant change in BMI measures. 1 before-and-after study *(74)* of a subsidized fruit and vegetable programme for Aboriginal children in northern New South Wales, Australia, reported no significant change in the percentage of children in each weight category (underweight, normal weight, overweight, obese) ($P = 0.721$).	⨁◯◯◯ Very low
Diet-related NCDs (including validated surrogate indicators)								
0								
Undernutrition								
4	Non-RCTs	Not serious[54]	Not serious[55]	Not serious[56]	Serious[57]	None	*Narrative analysis* only: 1 study *(74)* of a subsidized fruit and vegetable programme for Aboriginal children in northern New South Wales, Australia, reported a significant difference in adjusted mean haemoglobin (3.1 g/L; 95% CI: 1.4 to 4.8; $P < 0.05$) but no significant differences in adjusted mean ferritin (1.7 mg/L; 95% CI: –2.5 to 6.0) or adjusted mean iron (0.8 mmol/L; 95% CI: –0.5 to 2.0). 1 study *(73)* of a subsidized fruit and vegetable programme for Aboriginal children in northern New South Wales, Australia, reported on biomarkers for fruit and vegetable intake, and found significant increases in 3 out of 9 examined biomarkers (β-cryptoxanthin (28.9 nmol/L; 18%), vitamin C (10.1 mmol/L; 21%) and lutein–zeaxanthin (39.3 nmol/L; 11%)) at 12-month follow-up. 1 study *(75)* of a subsidized fruit and vegetable programme for Aboriginal children in northern New South Wales, Australia, reported a significant increase in the mean red blood cell folate z-score (0.55; 95% CI: 0.36 to 0.74) for children.	⨁◯◯◯ Very low

Quality assessment							Impact	Certainty
No. of studies	Study design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other considerations		
							1 study *(76)* of a food-based safety net programme involving the provision of fortified wheat flour in India found no significant impact on haemoglobin (–0.184; $P = 0.793$) or anaemia (–0.01; $P = 0.859$) in Punjab, and no significant impact on haemoglobin (–0.001; $P = 0.998$) and a significant impact on anaemia (–0.08: $P = 0.042$) in Tamil Nadu.	
Pregnancy outcomes								
0								

BMI: body mass index; CI: confidence interval; eq: equivalent; kcal: kilocalories; NCD: noncommunicable disease; oz: ounce; PE: price elasticity; RCT: randomized controlled trial; SE: standard error; SNAP: Supplemental Nutrition Assistance Program; SSB: sugar-sweetened beverage; tsp: teaspoon; United Kingdom: United Kingdom of Great Britain and Northern Ireland; USA: United States of America; VAT: value-added tax; WIC: Special Supplemental Nutrition Program for Women, Infants, and Children.

1. Across the outcomes, the following rules were followed for judging the RoB: If 60% or more of studies contributing to the evidence of an outcome had a high RoB, the RoB rating for that outcome was "very serious". If 41–59% of studies had a high RoB, the rating was "serious". If 40% or less of studies had a high RoB, the rating was "not serious". For assessing the RoB for outcomes with a smaller number of studies (i.e. less than 5), additional details of the RoB assessment were considered for making the final judgement. For all outcomes for which meta-analyses were conducted, the overall RoB was assessed for only those studies included in the meta-analysis. For this outcome (price change), a total of 3 studies were included in the narrative analysis. Of the 3 included studies, 2 were assessed with a high RoB and 1 with an unclear RoB using the Cochrane Effective Practice and Organisation of Care (EPOC) tool. The interrupted time-series study *(53)* was assessed as having high RoB because the intervention was not assessed as being independent of other changes. Two controlled before-and-after studies were included for this outcome, and their RoB was assessed using the EPOC tool. One study *(54)* was assessed as having high RoB because there was not blinded assessment of primary outcome(s). The other study *(52)* was assessed as having unclear RoB because it was unclear whether the study protected against detection bias. Downgraded twice for RoB.
2. Estimates showed either no effect or beneficial effects (i.e. a decrease in prices for fruits and vegetables). Only 1 estimate for 1 vegetable showed an increase in price. Not downgraded for inconsistency.
3. There was no suspicion of indirectness. Not downgraded for indirectness.
4. In 2 of 3 studies, sample sizes appeared insufficient (e.g. $n < 500$ individuals per site/time period, or $n < 50$ store audits per site/time period). No CIs provided. Downgraded for imprecision.
5. Very serious RoB, because more than 60% of studies had a high RoB. Low RoB: 1; high RoB: 5 (71%); unclear RoB: 1. Downgraded twice for RoB.
6. Not downgraded for inconsistency. Results showed a high level of heterogeneity ($I^2 = 85\%$ for PE), which was introduced by 1 study with 2 very large effect estimates *(58)*. All other studies showed small to large beneficial effects.
7. Evidence on the impact of a fruit and vegetable subsidy was from one setting, representing a single country context. Downgraded for indirectness.

8. Downgraded for imprecision because the 95% CI of the PE included values from a large effect to no effect (95% CI: –1.60 to 0.02).
9. No serious RoB because 40% or less of studies had a high RoB. Low RoB: 2; fair quality: 1; high RoB: 2 (28%); unclear RoB: 2. Not downgraded for RoB.
10. Downgraded for inconsistency, because results showed a high level of heterogeneity (I^2 = 95% for PE), and no subgroup effects explained the heterogeneity.
11. There was no suspicion of indirectness. Not downgraded for indirectness.
12. Downgraded for imprecision because the 95% CI of the PE included values that showed a large effect, no effect or trivial effects (95% CI: –0.74 to 0.05).
13. Two RCTs were included for this outcome, and their RoB was assessed using the RoB 2 tool. One study *(58)* was assessed as having high RoB due to lack of allocation concealment and blinding of participants. The other study *(59)* was assessed as having high RoB due to lack of random sequence generation and allocation concealment, and incomplete outcome data. Downgraded twice for RoB.
14. One study with 2 estimates reported inconsistent results, favouring the intervention and the control. One study showed no effect. Not downgraded for inconsistency.
15. Evidence on the impact of a fruit and vegetable subsidy was from one setting, representing a single country context. Downgraded for indirectness.
16. Two included studies appeared to have insufficient sample sizes (i.e. $n < 500$ individuals per site/time period, or $n < 50$ store audits per site/time period). No CIs provided. Downgraded for imprecision.
17. One controlled before-and-after study was included for this outcome, and its RoB was assessed using the EPOC tool. The study *(60)* was assessed as having high RoB because there was no protection against contamination. Downgraded for RoB.
18. Results of 1 study suggested no effect. Not downgraded for inconsistency.
19. There was no suspicion of indirectness. Not downgraded for indirectness.
20. The included study appeared to have a sufficiently large sample size (i.e. $n > 500$ individuals per site/time period, or $n > 50$ store audits per site/time period). CIs provided included values suggesting beneficial effects. Not downgraded for imprecision.
21. Very serious RoB, because more than 60% of studies had a high RoB. High RoB: 5 (100%). Downgraded twice for RoB.
22. Downgraded for inconsistency, because results showed a high level of heterogeneity (I^2 = 86% for PE), and no subgroup effects were identified.
23. Evidence on the impact of a fruit and vegetable subsidy was from one setting, representing a single country context. Downgraded for indirectness.
24. Downgraded for imprecision because the 95% CI of the PE included values from a large effect to a trivial effect (95% CI: –1.50 to 0.59).
25. The Egger test was conducted to test for publication bias in meta-analysed studies. The result of the Egger test was significant ($P = 0.047$), suggesting publication bias.
26. No serious RoB, because 40% or less of studies had a high RoB. Low RoB: 2; high RoB: 4 (33%); unclear RoB: 2; fair quality: 4. Not downgraded for RoB.
27. Downgraded for inconsistency, because results showed a high level of heterogeneity (I^2 = 57% for PE), and no subgroup effects were identified.
28. Not downgraded for indirectness.
29. Not downgraded for imprecision because the 95% CI of the PE included values that were consistent with no effect or a trivial effect (95% CI: –0.20 to 0.15).

30. Three RCTs were included for this outcome, and their RoB was assessed using the RoB 2 tool. One study *(70)* was assessed as having high RoB due to lack of allocation concealment and binding of participants. One study *(71)* was assessed as having high RoB due to incomplete outcome data. Another study *(62)* was assessed as having high RoB due to incomplete outcome data. High RoB: 3. Downgraded twice for RoB.
31. Results were inconsistent, suggesting benefits favouring the intervention and the control. Downgraded for inconsistency.
32. Evidence on the impact of a fruit and vegetable subsidy was from one setting, representing a single country context. Downgraded for indirectness.
33. Three of the 4 studies appeared to have sufficient sample sizes (i.e. $n > 500$ individuals per site/time period, or $n > 50$ store audits per site/time period). CIs provided included values suggesting no effect or small effects. Not downgraded for imprecision.
34. One cohort study was included for this outcome, and its RoB was assessed using the Newcastle–Ottawa Quality Assessment Scale for cohort studies (NOS tool). The study *(72)* was assessed as having fair quality. Not downgraded for RoB.
35. Results of study suggested a small beneficial effect favouring the intervention. Not downgraded for inconsistency.
36. One study assessing the impact of a fruit and vegetable subsidy was from one setting, representing a single country context. Downgraded for indirectness.
37. The included study appeared to have sufficient sample sizes (i.e. $n > 500$ individuals per site/time period, or $n > 50$ store audits per site/time period). No CIs provided. Not downgraded for imprecision.
38. Three RCTs were included for this outcome, and their RoB was assessed using the RoB 2 tool. One study *(70)* was assessed as having high RoB due to lack of allocation concealment and blinding of participants. One study *(71)* was assessed as having high RoB due to incomplete outcome data. Another study *(62)* was assessed as having high RoB due to incomplete outcome data. High RoB: 3. Downgraded twice for RoB.
39. Estimates showed either no effect or beneficial effects (i.e. a statistically significant increase in dietary quality, measured using the Healthy Eating Index–2010). Not downgraded for inconsistency.
40. Evidence on the impact of a fruit and vegetable subsidy was from one setting, representing a single country context. Downgraded for indirectness.
41. The 2 included studies appeared to have sufficient sample sizes (i.e. $n > 500$ individuals per site/time period, or $n > 50$ store audits per site/time period). One provided CI suggested benefits favouring the intervention (i.e. a significant increase in Healthy Eating Index–2010 score; 95% CI: 2.4 to 7.1). Not downgraded for imprecision.
42. Two non-RCTs were included for this outcome. One controlled before-and-after study was included, and its RoB was assessed using the EPOC tool. The study *(57)* was assessed as having unclear RoB because it was not clear whether the study protected against contamination. The cohort study included for this outcome was assessed using the NOS tool. The study *(73)* was assessed as being of fair quality. Not downgraded for RoB.
43. One study showed no effect. The other study reported a positive effect on dietary intake (increase in pulse protein intake per day per household). Not downgraded for inconsistency.
44. One of the 2 studies *(57)* used assumptions to rescale coefficient estimates. Downgraded for indirectness.
45. One of the 2 included studies appeared to have sufficiently large sample sizes (i.e. $n > 500$ individuals per site/time period, or $n > 50$ store audits per site/time period). No CIs provided. The other study appeared to have insufficient sample sizes (i.e. $n < 500$ individuals per site/time period, or $n < 50$ store audits per site/time period). The CIs provided in that study included values suggesting benefits favouring the intervention and the control (e.g. adjusted intake of added sugars; 95% CI: –1.4 to 1.5). Downgraded for imprecision.

46. One RCT was included for this outcome, and its RoB was assessed using the RoB 2 tool. The study *(70)* was assessed as having high RoB due to lack of allocation concealment and blinding of participants. High RoB: 1. Downgraded twice for RoB.
47. One study showed no effect. Not downgraded for inconsistency.
48. Evidence on the impact of a fruit and vegetable subsidy was from one setting, representing a single country context. Downgraded for indirectness.
49. The included study appeared to have insufficient sample sizes (i.e. $n < 500$ individuals per site/time period, or $n < 50$ store audits per site/time period). No CIs provided. Downgraded for imprecision.
50. One cohort study was included for this outcome, and its RoB was assessed using the NOS tool. The study *(74)* was assessed as having fair quality. Not downgraded for RoB.
51. The included study showed no effect. Not downgraded for inconsistency.
52. One study assessing the impact of a fruit and vegetable subsidy was from one setting, representing a single country context. Downgraded for indirectness.
53. The included study appeared to have insufficient sample sizes (i.e. $n < 500$ individuals per site/time period, or $n < 50$ store audits per site/time period). No CIs provided. Downgraded for imprecision.
54. Three cohort studies were included for this outcome, and their RoB was assessed using the NOS tool. The studies *(73–75)* were assessed as having fair quality. The other study *(76)* – a controlled before-and-after study – was assessed using the EPOC tool as having low RoB. Not downgraded for RoB.
55. Estimates showed either no effect or a small beneficial effect (i.e. significant increase in mean haemoglobin). Not downgraded for inconsistency.
56. There was no suspicion of indirectness. Not downgraded for indirectness.
57. One of the two included studies appeared to have insufficient sample sizes (i.e. $n < 500$ individuals per site/time period, or $n < 50$ store audits per site/time period). Only one study reported a CI (for adjusted mean ferritin; 95% CI: –2.5 to 6.0), which includes values suggesting benefits favouring the intervention and the control. Downgraded for imprecision.

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Annex 9.

Summary of declarations of interests of contributors to the guideline development process

NUGAG Subgroup on Policy Actions member	Interests declared/identified	Assessment
Nawal Al Hamad	No interests declared	Not applicable
Carukshi Arambepola	No interests declared	Not applicable
Gastón Ares	Declared receiving funding from Conaprole (a Uruguayan dairy company) for a joint research project (2015–2017) with the university for the development of guidelines to reduce the sugar content of dairy products targeted at children	Declarations were not deemed to constitute a risk to the guideline development process given the topic covered by the research (i.e. the development of guidelines to reduce the sugar content of dairy products targeted at children) was not related to the topic of the guideline
Sharon Friel	Declared receiving a research grant from the National Health and Medical Research Council of Australia (NHMRC) to fund the Centre of Research Excellence on Social Determinants of Health Equity (CRE), which ran from 2015 until 2020. The goal of the CRE was to provide evidence on how to navigate the political and policy processes more effectively to operationalize the social determinants of health and health inequity. Also declared receiving a grant from NHMRC for the Australian Prevention Partnership Centre Food Project on systems approaches to healthy and equitable eating	Declarations were not deemed to constitute any conflict of interest for her role in the NUGAG Subgroup on Policy Actions given the topics covered by the funding
Cho-il Kim	No interests declared	Not applicable
Knut-Inge Klepp	Declared that his institution (National Institute of Public Health, Norway) paid for his participation in the first meeting of the NUGAG Subgroup on Policy Actions	Declarations were not deemed to constitute any conflict of interest for his role in the NUGAG Subgroup on Policy Actions given the source of the funding
Joerg Meerpohl	No interests declared	Not applicable
Musonda Mofu	No interests declared	Not applicable
Ladda Mo-suwan	Declared presenting at the Pre-Congress of the 20th Annual meeting of the Pediatric Association in January 2019, on “Nutritional status and dietary intake of young children in Thailand”. Further declared participating in annual meetings of Wyeth and Abbott on infant and young child nutrition in 2016, 2017 and 2018, but no income nor honorariums were paid. The meeting invitations were extended through her university (Prince of Songkla University, Medical Faculty, Thailand) by Wyeth and Abbott, which covered expenses to participate in these annual meetings	Participation in annual meetings of Wyeth and Abbott on infant and young child nutrition and their coverage of her expenses to participate, which was made to her university, were not deemed to constitute a risk to the guideline development process given the focus of the meetings

NUGAG Subgroup on Policy Actions member	Interests declared/identified	Assessment
Monica Muti	No interests declared	Not applicable
Celeste Naude	No interests declared	Not applicable
Lisa Powell	Lisa Powell was a coauthor of the systematic review of evidence that informed the guideline. She declared receiving funds from WHO to travel and speak at a WHO/Pan American Health Organization meeting in 2016; for participation at a meeting on fiscal policies held in Bridgetown, Barbados; for participation at the expert consultation in 2017; and for a country visit to support analysis for the Maldives. Also declared that the University of Illinois Chicago, where she is employed, received an academic research grant from Bloomberg Philanthropies	Although her declared interests were not deemed to constitute any conflict of interest for her role in the NUGAG Subgroup on Policy Actions given the source of the funding, due to her coauthorship on the systematic review, she recused herself from providing judgements on the considerations and formulation of the recommendations
Mike Rayner	No interests declared	Not applicable
Eva Rehfuess	No interests declared	Not applicable
Lorena Rodríguez Osiac	No interests declared	Not applicable
Franco Sassi	No interests declared	Not applicable
Barbara Schneeman	Declared that: • until the end of 2012 (retired in January 2013), she was employed by the United States Food and Drug Administration (FDA), which is interested in scientific input for the development of nutrition recommendations; • as the head of the USA delegate to the Codex committees on food labelling and on nutrition and foods for special dietary uses (CCNFSDU), she presented the USA positions in these Codex forums (up to 2012); • she was employed by the United States Agency for International Development (USAID) as higher education coordinator from 2015 to 2016, where she worked with the higher education community to increase engagement with USAID; • she was a member of advisory committee at Monsanto discussing the role of agriculture in addressing climate change and improving food and nutrition security (2014 to 2017), and at the McCormick Science Institute reviewing research proposals on spices and herbs (2014 to 2021); • she was a temporary adviser for Ocean Spray on health claim petitions that are submitted to FDA related to cranberries (2014 to 2015); for General Mills on USA labelling requirements for nutrition declarations (2014 to 2016, and 2018); for DSM on Codex Alimentarius processes (2014 to 2015); for Hampton Creek on labelling standards for mayonnaise (2014 to 2015); and for a Washington, DC law firm on labelling of genetically modified foods (2014 to 2015);	Each engagement was assessed in the context of the topic of this guideline. Declared interests – i.e. engagements whether as consultant, presenter, speaker, member of science advisory group with indicated companies – have been on topics related to regulatory issues in the United States of America, and included providing information advice on FDA's labelling regulations including on updates to the Nutrition Facts panel, on health claims and on other FDA requirements for labelling purposes to industry. Other engagements have not involved the topic of this guideline and were not considered to pose a risk for the guideline development. Engagement on the science advisory committee for Monsanto was on issues related to agriculture's role in addressing climate change and food security. Engagement on the advisory committee for the McCormick Science Institute included tasks to review research proposals submitted for funding by the institute. Studies include evaluation of the use of spices and herbs to support consumers to adjust to, e.g. recommendations

	• she was a member of the National Academies of Sciences, Engineering, and Medicine (NASEM) and member/chair of the Dietary Guidelines Advisory Committee, involved in reviewing the evidence in developing the national dietary guidelines for the USA, Dietary Guidelines for Americans; as such, she: — was nominated to the Dietary Guidelines Advisory Committee of the USA by representatives from the North American Branch of the International Life Sciences Institute; the American Beverage Association; American Bakers Association, Grain Chain; Grocery Manufacturers Association; USA Dry Pea & Lentil Council, American Pulse Association; and — received honorariums for presentations on the process to develop the Dietary Guidelines for Americans and policies for food labelling in the US at various scientific meetings organized by PMK Assoc. (IFT & AOCS), McCormick Institute, Fiber Assoc-Japan, and Mushroom Council; • she was a Member of the Board of Trustees of the International Food Information Council (IFIC), which ensures that IFIC upholds its responsibilities as a 501(c)(3) non-profit (2021); • she was a government liaison for the International Life Science Institute North America, and evaluated research and organized webinars on the microbiome (2018); • she presented a webinar – for which she received no remuneration – to the International Dairy Foods Association on the work of the 2020 Dietary Guidelines Advisory Committee (2020)	on reducing intake of added sodium and sugars. The focus of these engagements was not considered to pose a risk for the guideline development. Regarding her membership on the US Dietary Guidelines Advisory Committee, the work was done for a national authority and therefore was not considered a conflict of interest. Regarding her nomination to the US Dietary Guidelines Advisory Committee by industry groups, there is no relationship or affiliation between nominator and nominee. It was therefore considered that these declared interests do not constitute any conflict of interest for the work being undertaken by the NUGAG Subgroup on Policy Actions
Reema Tayyem	No interests declared	Not applicable
Alison Tedstone	No interests declared	Not applicable
Anne Marie Thow	Declared receiving funding from WHO for consultancies to analyse trade, fiscal and nutrition policies, and to support nutrition policies in Pacific Island countries in 2015 and 2017. Further declared receiving funding from the Food and Agriculture Organization of the United Nations and the Asian Development Bank, through her university (University of Sydney) for consulting	Declarations were not deemed to constitute any conflict of interest for her role in the NUGAG Subgroup on Policy Actions given the source of the funding
Edelweiss Wentzel-Viljoen	Declared receiving funding from the South African Medical Research Council during 2014–2016 for research on salt reduction and hypertension. Further declared being a Board member of the Heart and Stroke Foundation of South Africa	Declarations were not deemed to constitute any conflict of interest for her role in the NUGAG Subgroup on Policy Actions given the source of and topic covered by the funding

Methods expert	Interests declared	Action taken
Elie Akl	No interests declared	Not applicable
Damian Francis	No interests declared	Not applicable

Systematic review team	Interests declared	Action taken
Tatiana Andreyeva	Declared serving on an advisory board for tax evaluation of the University of Illinois at Chicago, with the role to provide expert opinion on the ongoing sugary drink tax evaluation in several USA locations. She further declared serving on the advisory board for modelling childhood obesity prevention policies for the Harvard School of Public Health. She received research grants to study obesity prevention policies, conduct reviews on fiscal policies and predict tax revenue from three entities: American Heart Association, Healthy Food America and WHO	Declarations were not deemed to constitute any conflict of interest for her role in the guideline development process given the topic covered and source of funding
Samantha Marinello	No interests declared	Not applicable
Keith Marple	No interests declared	Not applicable
Timothy Moore	No interests declared	Not applicable
Lisa Powell	Lisa Powell was a coauthor of the systematic review of evidence that informed the guideline. She declared receiving funds from WHO to travel and speak at a WHO/Pan American Health Organization meeting in 2016; for participation at a meeting on fiscal policies held in Bridgetown, Barbados; for participation at the expert consultation in 2017; and for a country visit to support analysis for the Maldives. Also declared that the University of Illinois Chicago, where she is employed, received an academic research grant from Bloomberg Philanthropies	Although her declared interests were not deemed to constitute any conflict of interest for her role in the NUGAG Subgroup on Policy Actions given the source of the funding, due to her coauthorship on the systematic review, she recused herself from providing judgements on the considerations and formulation of the recommendations

Risk of bias assessment team	Interests declared	Action taken
Florence Awimbo	No interests declared	Not applicable
Beverley Shea	No interests declared	Not applicable
Micere Thuku	No interests declared	Not applicable

External peer reviewers	Interests declared	Action taken
Arantxa Colchero	Declared receiving funds from Bloomberg Philanthropies to conduct research on fiscal policies	Declarations were not deemed to constitute any conflict of interest for her role in the guideline development process given the source of the funding
Ma. Teresa Habitan	Declared having held the position of Assistant Secretary at the Domestic Finance Group of the Department of Finance, Philippines until 2021, and in that role provided advice on various aspects related to excise taxes	Declarations were not deemed to constitute any conflict of interest for her role in the guideline development process
Febri Pangestu	No interests declared	Not applicable
Sirpa Sarlio	Declared working at the Ministry of Finance, Finland and advising his government on development of excise taxes on sugar-sweetened beverages	Declarations were not deemed to constitute any conflict of interest for his role in the guideline development process

Declared interests were discussed with the Office of Compliance, Risk Management and Ethics (CRE)/WHO.

Annex 10.

Key characteristics of policies evaluated by studies included in the systematic review on the effectiveness of fiscal policies to promote healthy diets

The following tables provide the key characteristics of the policies evaluated by studies included in the systematic review of fiscal policies to promote healthy diets *(1, 2)*. The policy details were sourced from the included studies. Some of the policies and/or their characteristics may no longer be current.

Sugar-sweetened beverage taxes

Jurisdiction	Type of tax	Tiered tax?	Tax rate	Taxable products[a]
National taxes				
Barbados	Excise: ad valorem	No	10%	SSBs, including sodas, sugar-sweetened juices, and sugar-sweetened sports and energy drinks Exemptions: 100% juices, sugar-free (diet) sodas and sugar-free flavoured waters
Chile	Excise: ad valorem	Yes	≤6.25 g sugar/L: 10% >6.25 g sugar/L: 18%	SSBs, including sodas; industrialized juice drinks; powdered and concentrated beverages with added sugar; and beverages containing artificial sweeteners, flavours or dyes Exemptions: plain milk, flavoured sweetened milk-based drinks, 100% fruit juices and unflavoured water
Denmark	Excise: specific (volumetric)	Yes	January 1998: 1.00 kr/L January 2001: 1.65 kr/L October 2003: 1.15 kr/L January 2012: ≤0.5 g added sugar/100 mL: 0.57 kr/L >0.5 g added sugar/100 mL: 1.58 kr/L July 2013: ≤0.5 g added sugar/100 mL: 0.30 kr/L >0.5 g added sugar/100 mL: 0.82 kr/L January 2014: Tax removed	Soft drinks

Jurisdiction	Type of tax	Tiered tax?	Tax rate	Taxable products[a]
Finland	Excise: specific (volumetric)	Yes	2011: €0.075/L 2012: €0.11/L 2014: Sugar-sweetened beverages and juices: €0.220/L Sweetener-based soft drinks and waters: €0.11/L	Soft drinks, including sugar-sweetened and sweetener-based soft drinks, juices and waters
France	Excise: specific (volumetric)	No	2012: €7.16/100 L 2013: €7.31/100 L 2014: €7.45/100 L	All non-alcoholic beverages containing added sugar (e.g. sodas, fruit juice) or sweeteners (e.g. diet drinks)
Hungary	Excise: specific (volumetric)	No	7 ft/L	Soft drinks with added sugar >8 g/100 mL Exemptions: drinks with >25% fruit or vegetable content, and products prepared with the use of ≥50% milk
			200 ft/L	Syrups or concentrates for soft drinks Exemptions: syrups with >25% fruit or vegetable content
Mexico	Excise: specific (volumetric)	No	1 peso/L	Sugary drinks, including sodas, some nectars, concentrates with added sugar and powdered drink mixes Exemptions: alcoholic beverages, dairy products, drinks sweetened with non-caloric sugar substitutes
Portugal	Excise: specific (volumetric)	Yes	≥80 g sugar/L: €16.69/100 L <80 g sugar/L: €8.22/100 L	Non-alcoholic drinks with added sugar or sweeteners, including liquid or powder concentrates Exemptions: milk-, soy- or rice-based drinks; fruit-, algae- or veggie-based juice and nectar; cereal- and nut-based drinks; and drinks considered essential for special dietary needs
Saudi Arabia	Excise: ad valorem	No	50%	Carbonated beverages, including diet drinks and flavoured sparkling water Exemptions: many fruit drinks
			100%	Energy drinks
South Africa	Excise: specific (sugar content)	Yes	0.021 R/g sugar/100 mL over a threshold of 4 g/100 mL	Carbonates (sugar-sweetened and artificially sweetened), concentrates, fruit nectars, sports and energy drinks, and ready-to-drink teas Exemptions: non-flavoured bottled waters and 100% fruit juices
United Kingdom	Excise: specific (volumetric)	Yes	>8 g sugar/100 mL: £0.24/L 5–8 g sugar/100 mL: £0.18/L	Drinks that contain added sugar and have total sugar levels of 5 g per 100 mL and over Exemptions: soft drinks that are 100% fruit juice, are at least 75% milk (or a milk replacement), contain greater than 1.2% alcohol (or are an alcoholic beverage replacement), or are produced or distributed by manufacturers and importers with United Kingdom sales of less than 1 million litres per year

Jurisdiction	Type of tax	Tiered tax?	Tax rate	Taxable products[a]
Subnational taxes				
Catalonia, Spain	Excise: specific (volumetric)	Yes	>8 g sugar/100 mL: €0.12/L 5–8 g sugar/100 mL: €0.08/L	Beverages that include caloric sweeteners such as sugar, honey, fructose, sucrose, syrups or nectar (corn, maple, agave and rice) Exemptions: beverages made from natural, concentrated or reconstructed fruit or vegetable juices; milks or milk derivatives that do not contain additional caloric sweeteners; yeast yoghurts; drinkable fermented milk; medical products; and alcoholic beverages
Sheffield, United Kingdom	Excise: specific (per unit)	No	£0.20/drink	All drinks containing 5 mg of sugar/100 mL or more
Restaurant chain, United Kingdom	Excise: specific (per unit)	No	£0.10/drink	Non-alcoholic SSBs Exemptions: juices, bottled waters, diet cola and fruit spritzers (fruit juice mixed with water)
Berkeley, USA	Excise: specific (volumetric)	No	US$ 0.01/oz	Beverages with added sugar (equivalent to ≥2 kcal/oz) Exemptions: milks, beverages for medical use, alcoholic beverages, 100% fruit juices, water, and diet beverages without added sugar
Boulder, USA	Excise: specific (volumetric)	No	US$ 0.02/oz	SSBs with at least 5 g of caloric sweetener per 12 fluid ounces Exemptions: diet soda, products in which milk is the primary ingredient, alcoholic mixers and coffee drinks
Cook County, Illinois, USA	Excise: specific (volumetric)	No	US$ 0.01/oz	SSBs and artificially sweetened beverages
Maine, USA	Sales	No	5.50%	Soft drinks, including carbonated water
Oakland, USA	Excise: specific (volumetric)	No	US$ 0.01/oz	SSBs (e.g. soda; sports, energy and fruit-flavoured drinks; sweetened coffee and tea) containing ≥25 kcal/12 oz Exemptions: milk products, infant or baby formula, beverages for medical use, 100% juice, and beverages sweetened only with artificial sweeteners (e.g. diet soda)
Ohio, USA	Sales	No	5%	Any sweetened non-alcoholic beverage, whether sweetened naturally or artificially (unless it contains milk products or a milk substitute, or >50% fruit or vegetable juice by volume)
Philadelphia, USA	Excise: specific (volumetric)	No	US$ 0.015/oz	Any sweetened beverage, including those that contain artificial sweeteners (e.g. diet sodas)
San Francisco, USA	Excise: specific (volumetric)	No	US$ 0.01/oz	SSBs (e.g. soda; sports, energy and fruit-flavoured drinks; sweetened coffee and tea) containing ≥25 kcal/12 oz Exemptions: milk products, infant or baby formula, beverages for medical use, 100% juice, and beverages sweetened only with artificial sweeteners (e.g. diet soda)

Jurisdiction	Type of tax	Tiered tax?	Tax rate	Taxable products[a]
Seattle, USA	Excise: specific (volumetric)	No	US$ 0.0175/oz	SSBs with at least 40 kcal/12 fluid oz
Washington (state), USA	Sales	No	1/6 c/oz	Carbonated beverages, including diet and regular versions
State sales taxes, USA	Sales	No	Varies	Varies

c: US cent; fr: Hungarian forint; cal: kilocalorie; kr: Danish krone; oz: ounce; R: South African rand; SSB: sugar-sweetened beverage; United Kingdom: United Kingdom of Great Britain and Northern Ireland; USA: United States of America; US$: US dollars

[a] Large variations are seen in the included beverages. None of the evaluated taxes included 100% fruit juices.

Food taxes

Jurisdiction	Type of tax	Tiered tax?	Tax rate	Taxable products[a]
National taxes				
Denmark	Excise: specific (weight based)	No	16 kr/kg saturated fatty acids	Meat, dairy products, animal fats and vegetable oils that contain >2.3 g saturated fatty acids/100 g
			6.61 kr/L	Ice cream or ice cream mix that contains >0.5 g sugar/100 mL
			5.29 kr/L	Ice cream or ice cream mix that contains <0.5 g sugar/100 mL
			24.61 kr/kg	Chocolate and chocolate products; liquorice products; marzipan; sweets; effervescent products; chewing gum; and cakes with a certain sugar, cacao or chocolate content
			20.93 kr/kg	Chocolate and chocolate products, liquorice products, marzipan, sweets, effervescent products, chewing gum, and cakes that contain <5 g sugar/kg
Finland	Excise: specific (weight based)	No	2011: €0.75/kg 2012: €0.95/kg	Sweets, including confectionery, chocolate and ice cream
Hungary	Excise: specific (weight based)	No	2011: 100 ft/kg 2012: 130 ft/kg	Pre-packed sweets without cocoa that contain >25 g sugar/100 g; pre-packed sweets with cocoa that contain >40 g sugar/100 g and <40 g cocoa/100 g
			2011: 100 ft/kg 2012: 70 ft/kg	Sugared cocoa powder that contains >40 g sugar/100 g and <40 g cocoa/100 g
			2011: 200 ft/kg 2012: 250 ft/kg	Salty snacks that contain >1 g salt/100 g; condiments and instant soup that contain >5 g salt/100 g Exemptions: bakery products that contain <2 g salt/100 g (since 2012), ketchup, mustard, ready-to-eat soup and infant formula
			2011: 0 ft/kg 2012: 500 ft/kg	Jams that contain >35 g sugar/100 g

Jurisdiction	Type of tax	Tiered tax?	Tax rate	Taxable products[a]
Mexico	Excise: ad valorem	No	8%	Products with a caloric content ≥275 kcal/100 g, including snacks, candies, chocolate, pudding, marmalade, peanut butter and cereals Exemptions: products considered part of the "canasta básica" (basic consumption basket), including oil, milk and bread
Subnational taxes				
Colorado, USA	Sales	No	2.90%	Candy (defined as "a preparation of sugar, honey, or other natural or artificial sweeteners in combination with chocolate, fruit, nuts, or other ingredients or flavorings in the form of bars, drops, or pieces. 'Candy' shall not include any preparation containing flour and shall require no refrigeration" *(3)*)
Maine, USA	Sales	No	5.50%	Snack foods such as crackers, bread sticks, ice cream, frozen yoghurt, muffins, pies, cookies, cakes, gelatin, puddings, hot cocoa mix, marshmallows, breakfast bars and roasted nuts
State sales taxes, USA	Sales	No	Varies	Varies

fr: Hungarian forint; kcal: kilocalorie; kr: Danish krone; USA: United States of America

Food subsidies

Jurisdiction	Type of subsidy	Details of the subsidy
National subsidies		
India	Public distribution system	A public distribution system providing pulses and fortified wheat flour
Latvia	VAT rate reduction	Reduction of the VAT on fruits and vegetables (from the standard rate of 21% to 5%)
United Kingdom	Food vouchers	A government voucher scheme targeting low-income pregnant women and low-income households with children aged 3 years or younger. Families receive weekly vouchers to spend on plain fresh fruits and vegetables, and milk
United States	Food vouchers	Various programmes providing food vouchers and other incentives for low-income households to purchase fruits and vegetables, as part of the SNAP
Subnational subsidies		
New South Wales, Australia	Food voucher	A fruit and vegetable subsidy programme targeting low-income Aboriginal families with one or more young children organized by three Aboriginal medical services. Families receive a weekly box of subsidized seasonal fruits and vegetables, worth A$ 40–60 (depending on family size), with a co-payment of A$ 5

SNAP: Supplemental Nutrition Assistance Program; United Kingdom: United Kingdom of Great Britain and Northern Ireland; United States: United States of America; VAT: value-added tax.

Annex 10 references

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