



Using price policies to promote healthier diets



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ABSTRACT

This publication provides information on the use of price policies to promote healthy diets and explores policy developments from around the WHO European Region. It examines the economic theory underpinning the use of subsidies and taxation and explores the currently available evidence. The publication includes several case studies from WHO European Member States where price policies have been introduced. It concludes with some observations about the design of more effective price policies.

Keywords

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ABBREVIATIONS

BMI	body mass index
EU	European Union
GDP	gross domestic product
NCDs	noncommunicable diseases
VAT	value-added tax

FOREWORD

Today in Europe policy-makers increasingly recognize the urgency of promoting healthy diets, with a view to lowering the alarming rates of overweight, obesity and other diet-related noncommunicable diseases. Analysis of the latest data shows that unhealthy diets are the leading risk factors undermining health and well-being in the WHO European Region.

There are strong indications of the links between energy-dense diets, excess consumption of saturated fat, trans fats, sugar and salt, low consumption of fruit and vegetables and the increased burden of obesity, cardiovascular diseases, diabetes and some cancers. According to the WHO Childhood Obesity Surveillance Initiative, on average one in three children aged 6–9 years are overweight or obese in the countries studied. WHO data also show that more than 50% of adults are overweight or obese in 46 countries across Europe. More worryingly, the problem is disproportionately affecting the most vulnerable groups in society and is advancing more rapidly in the eastern part of the Region.

In this context, high-level policy-makers from across the Region – headed by many ministers – restated their commitment to the issue in the ground-breaking Vienna Declaration on Nutrition and Noncommunicable Diseases in the Context of Health 2020, which calls for decisive, concerted action for the prevention of obesity and diet-related noncommunicable diseases. This is why strategies to improve diets, such as the newly-adopted European Food and Nutrition Action Plan 2015–2020, remain a priority for the WHO Regional Office for Europe.

Evidence shows that the environments in which people develop their dietary behaviour and make their food choices have a significant influence on what they eat. One issue that Member States have repeatedly highlighted as a major concern is the affordability of healthy foods. For this reason, they have committed themselves to explore, according to national context, the use of economic measures and price incentives to promote healthy eating.

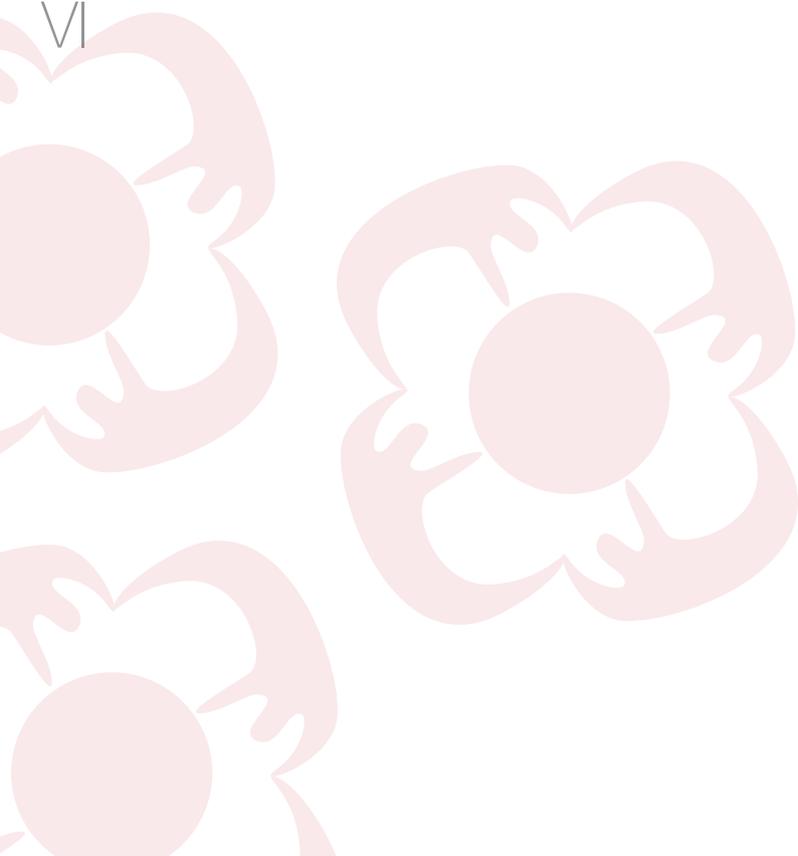
In order to support Member States in their work in this area, the Regional Office has prepared this report on the use of price policies. It examines the economic theory underpinning price policy as a tool to protect health, and explores in more depth the available evidence on the use of taxation and subsidies to influence the purchase and consumption of food. The Region is at the forefront in developing innovative policies in this area, and we

have capitalized on this to learn from countries' experiences. Based on this broad examination of the issue, the implications for policy development are discussed.

I believe this report can be of significant value to governments and can also inform the collective work of the Regional Office and Member States. This report is particularly timely as we move to implement the European Food and Nutrition Action Plan 2015–2020. While the report demonstrates enormous progress in terms of the available evidence for effective policies, it should also encourage us to build a healthier Europe through the wider implementation of price policies for healthy diets.

Zsuzsanna Jakab
WHO Regional Director for Europe

VI



INTRODUCTION

Of the six WHO regions, the European Region is the most severely affected by noncommunicable diseases (NCDs). Cardiovascular disease, diabetes, cancer and respiratory diseases together account for 77% of the burden of disease and almost 86% of premature mortality (1). Excess body weight (body mass index (BMI) >25) and excessive consumption of energy, saturated fats, *trans* fats, sugar and salt as well as low consumption of vegetables, fruits and whole grains are leading risk factors (2). These statistics drive the imperative to develop effective policies to promote healthy eating across the Region and beyond.

The 53 Member States of the Region have agreed on a common policy framework entitled Health 2020 with a goal to “significantly improve the health and well-being of populations, reduce health inequalities, strengthen public health and ensure people-centred health systems that are universal, equitable, sustainable and of high quality” (3). In line with this European health policy framework and the global WHO policy architecture on NCDs, a targeted European action plan has also been developed to address these diseases as the leading cause of death, disease and disability in the Region (4). Furthermore, Member States of the Region have committed themselves, in the Vienna Declaration and the European Food and Nutrition Action Plan 2015–2020 (5,6), to advancing food policy for the prevention of obesity and diet-related NCDs.

These documents recognize that tackling the burden of diet-related disease will require a series of food policy interventions. One policy area Member States have agreed to explore is economic measures to promote healthy eating, including price policies to influence the demand for foods high in saturated fat, *trans* fats, sugar or salt and to promote the consumption of fruit and vegetables.

Evidence shows that the environments in which people develop their dietary behaviour and make their food choices are a significant influence on what they purchase and, in turn, what they eat. This evidence indicates that food prices influence, to a certain degree, what and how much food people buy (7). Thus price policies that address affordability and purchasing incentives for different foods are seen as a key policy tool. Until recently, price policies for healthy eating had not been widely adopted by countries and new proposals often faced significant opposition from key stakeholders. In recent years, however, several countries within the Region have introduced price policies with the objective of influencing consumers’ purchases and dietary intake.

This briefing publication presents a summary of the available evidence to inform policy, and outlines six short country case studies from the Region. Given that the research evidence base is rapidly expanding and

lessons from countries are starting to emerge, policy-makers need to be well-informed of both the evidence and theory concerning the use of price policies for healthy eating. Based on the evidence and countries'

experiences, the report closes with a discussion of the implications for policy development and further research.

EVIDENCE TO INFORM POLICY DEVELOPMENT

2

Theoretical basis – a brief overview

Given the well-established role of price as a driver of food choice, interest in taxes and subsidies to improve diets and prevent NCDs remains high. Taxation specialists recognize that the tax system plays a role in supporting other policy objectives (8), and many economists and government policy-makers continue to explore the opportunities that price policies can offer for public health, including health gains and health care cost savings (9, 10).

Price is the cornerstone of traditional economic thinking. The most basic theoretical models of supply and demand stipulate that in a simplified, perfectly competitive world dealing with standard products, an increase in price will result in a decrease in the quantity of the product sold, and vice versa. The underlying rationale of taxing products for public health reasons (such as alcohol, tobacco and certain food products) is that consumption of some products

is associated with “negative externalities” that can result in costs to society that neither the producer nor consumer covers. In such cases a government may want to correct for the tendency of the market to encourage the consumption of products with a documented negative impact on health. A tax would work by changing the price for consumers, thereby reducing demand and shifting population-level consumption.

The example of unhealthy diets illustrates this concept. Frequent consumption of products high in energy, saturated fat, *trans* fatty acids, sugar or salt is associated with increased risk of overweight, obesity and some NCDs (11). The increased illness and disability associated with excessive consumption of such products is likely to result in increased health and social care costs in addition to lost economic productivity. For example, evidence suggests that lifetime costs may be higher for the obese population

compared to the non-obese, particularly when indirect costs such as lost work productivity, disability and quality of life are factored in alongside premature mortality and direct medical costs (10). As such, the costs to society of consuming these products (external costs) may be significant but not reflected in either the private costs of producing the product or the price that the consumer pays. This is an example of a “market failure”, which is an economic justification for government intervention. In such cases, governments may decide to increase the price of the product through taxation to reduce demand.

A corrective subsidy works in a similar manner to taxes, but the other way around. Here a drop in price at point of purchase should increase demand. A good example is fruit and vegetables. The low consumption of fruit and vegetables is a significant risk factor for global mortality. Their increased consumption has been shown to be protective against gastrointestinal cancer, ischaemic heart disease and stroke. Diets that are largely plant-based help the consumer to achieve and maintain a healthy weight (11), thus yielding significant benefits to society. Without government intervention, however, the prices of fruit and vegetables at point of purchase are likely to exceed the socially optimal price, and the quantity sold will be below the level needed for the maximum benefit to society.

Consumers can always substitute items in a range of food products for others among both core (those recommended by dietary guidelines) and non-core

foods (foods for which consumption should be limited as part of a healthy diet). It is this potential for substitution that provides the mechanism by which targeted price policies can be used to encourage shifts towards healthy diets (12). An increase in price will lead to a fall in demand and a shift by consumers to similar but untaxed substitutes. It seems reasonable to infer, therefore, that diets and diet-related health and well-being might be improved by changing the relative price of non-core foods high in energy, saturated fat, *trans* fatty acids, sugar or salt and/or by improving the affordability of core foods such as fruit and vegetables and whole grain products.

Types of evidence available

A significant amount of research has been published in this area, particularly in recent years. This growing body of evidence is diverse in terms of research methods, outcome of interest, type and level of taxation or subsidy, and target food or nutrients (12,13). Not only does this diversity present a challenge for interpreting the findings; it is also a challenge to link data on changes in consumption to the effects of a price policy. Individual-level surveys are often self-reported and do not generally collect price data; population-level consumption data are not disaggregated and sales data reveal little about individual behaviour change; and location-specific interventions provide limited insight into impact on overall consumption (12,13). Ideally, the relevant research should examine price interventions aimed at specific foods or targets (rather than alterations to general food taxes or subsidies), consider all food

consumed and assess the effect on overall diet or calorie intake.

However, despite these limitations, it is possible to make some judgements based on current evidence. When considered collectively, such evidence shows with comfortable levels of confidence that both individual consumers and population groups respond as predicted, and that targeted taxes and subsidies have the potential to influence the decisions that consumers make and can be used to incentivize healthy eating at the population level (7,8,12,14–21). The size and nature of the effect varies significantly, however, depending on the size and target of the price change (17,22–24). The most common proposal studied is for taxes on sugar-sweetened beverages as an easy-to-define category of products that are energy-dense and nutrient-poor but with close healthier substitutes. Proposals for taxes on nutrient content (such as saturated fat) and foods more broadly have also been analysed.

Data from *experimental choice studies* and *randomized controlled trials* demonstrate that consumers can be highly responsive to food prices and that taxation and subsidies are an effective means of influencing consumption of targeted foods (25–29). Manipulating prices of different foods in discrete environments (for example, supermarkets, cafeterias or vending machines) or laboratory settings has been shown to result in significant shifts in consumer responses towards healthier options at point of purchase (12,14,17,19,30–32). This evidence is

useful in demonstrating the direct effect of taxes and subsidies on consumer behaviour at given points in time, but it is limited by the setting in which the studies are conducted, does not provide an insight into impact on overall consumption, and cannot predict whether the effect would be sustained (14,17,19).

As concerns taxes, some *cross-sectional and longitudinal studies* have demonstrated that higher food prices are associated with lower consumption of affected foods, lower overall calorie consumption and lower population-level BMI, particularly among certain population groups (for example, people with high BMI, heavy consumers, people on low incomes and young people) (20). Reviews of the association between food prices and population weight using tax data and individual- and population-level data on weight have found that existing small taxes in the United States of America are not associated with sizeable differences or changes in consumption and weight outcomes, but non-trivial or larger price changes would be likely to have a greater impact (20,33–35).

Evidence from simulation studies or *modelling* is extensive and shows that price changes are likely to influence consumers' decision-making and the amount of food and drink they buy. In some instances, the predictive value of modelling is limited by the quality of available dietary, health and economic data (14,19). Nevertheless, modelling helps to bridge the gap from economic theory and experimental settings to forecast potential outcomes in real-world settings and can highlight key considerations for policy design.

Systematic reviews of the modelling evidence suggest that taxes on unhealthy foods or drinks are generally associated with beneficial dietary change at the population level, which has the potential to result in a positive health impact (8,15). Estimates of the size of the effect vary according to the price change scenario modelled (36). However, some suggest the size of the benefits could be significant (37). It is also noted that even where the changes in food purchasing/consumption are small, these could still lead to meaningful changes in important risk factors across the whole population and result in substantial health benefits and cost savings (19). Furthermore, modest average changes may hide more important changes among certain subpopulations: studies have found that younger consumers and frequent consumers change their consumption most in response to taxes (8,20,37–39).

The most recently published systematic review found that *all* modelling studies looking at taxes on sugar-sweetened beverages showed a reduction in consumption proportionate to the tax applied, and many showed a reduction in overall calorie intake (12). Taxes on a broad range of less healthy foods, as defined by a nutrient profile model, were also found to reduce the consumption of targeted foods with overall improvements to dietary quality, while taxes on specific nutrients were less effective at reducing consumption and had the potential to increase the intake of other unhealthy nutrients through substitution (12).

Until recently there has been very limited evidence from *real-world examples* of the implementation of health-related food taxes, reflecting the limited use of price policies as a food policy tool for healthier diets. One study from Ireland examined the consumers' response to a change in taxation on sugar-sweetened beverages over time, while adjusting for other potential confounding factors. Taking data on real consumption, the study demonstrated that the increase in price associated with the tax resulted in a decrease in consumption, whereas the subsequent decrease in price following the removal of the tax led to a significant increase in consumption (40). Further evidence now beginning to emerge from countries experimenting with price policies appears to be consistent with the main conclusions from experimental and modelling studies. This new evidence will be explored later in this publication.

As concerns food subsidies, there are limited examples of the implementation of population-wide subsidies with the express objective of increasing healthy food consumption, but there are some examples of targeted subsidies on fruit and vegetables for specific population groups. Recent evidence suggests that subsidies on healthier substitutes in retail settings are effective in influencing consumption, leading to a higher ratio of expenditure on healthy foods (41,42). The inclusion of healthier products in nutrition assistance programmes (that is, the scheme for the most deprived or food stamps programmes) can also encourage consumer shifts (43). The greatest shifts have been found to be towards close and

healthier substitutes (for example, from 2% fat to non-fat milk and from white to wholemeal bread), but increases in fruit and vegetable consumption have also been observed (42,44).

Simulation studies have also shown that subsidies can be effective in increasing the consumption of healthier options (8, 15). Findings from the most recent systematic review indicate that subsidies lead to an increase in the consumption of targeted foods of at least half the magnitude of the subsidy applied, although the effect of subsidies on overall calorie intake remains unclear (12).

6 Finally, there is evidence that the potential for positive effects might be amplified if a targeted food tax were combined with a subsidy on fruit and vegetables or other core foods. For example, Nordström & Thunström (45) predicted that a 50% subsidy for healthier products bearing the healthy food certification keyhole symbol (as judged by fat, sugar, fibre and calorie content) could increase average fibre intake to the recommended level (that is, by 38%). They proposed a 114% tax on bakery and ready-to-eat products, to be used to fund the subsidy and also to prevent unwanted increases in fat, salt and sugar consumption associated with the subsidy alone. Similarly, Nnoaham et al. (46) found that a combination of a targeted food tax and fruit and vegetable subsidy could reduce deaths from cardiovascular diseases and cancer.

Important considerations for the design of price policies

The body of evidence reviewed above shows that price policies have the potential to influence consumption patterns in the desired direction. Experimental studies are better to demonstrate the causal effects of price changes through random allocation to experimental treatment and elimination of most potential confounders. Observational studies are better to demonstrate the conditions of real life, whereas modelling studies provide insights into the potential effectiveness of different approaches and can identify and help avoid unintended consequences.

These combined findings are central to supporting the claimed effect of price changes and help to confirm the hypothesis that price changes will improve diets to a greater degree than each method alone. There are, however, a number of further considerations which should be taken into account in action to maximize the potential benefit to public health:

- price elasticity of demand;
- potential substitution effects;
- impact on health inequalities;
- passing on of the tax or subsidy to the consumer (pass-through);
- choice of mechanism.

Price elasticity of demand

The amount by which the change in price impacts upon the quantity sold is likely to be different for

different products. This is determined by the price elasticity of demand. Price elasticity of demand refers to the percentage by which a consumer will alter his/her consumption of a product if the price changes by 1%. For example, a product with high demand elasticity will see a high reduction in consumption if the price increases, and a product with low demand elasticity will only show a small reduction in consumption.

Price elasticities of demand for products can vary depending on people's preferences and habits and the number of alternatives that are available; they can also change over time. This may have implications for the level at which taxation must be set so as to shift consumers' behaviour. The demand for most foods is inelastic (the proportionate change in demand is smaller than the proportionate change in price), but price elasticity increases when substitutes are available. Thus, specific foods may have higher price elasticities of demand than others, since consumers are able to substitute different types of food (9).

Price elasticity of demand is a key consideration for policy design, as changes in food prices may need to be non-trivial (for example, in the range of 10–20%) in order to translate into meaningful changes to food purchases, food consumption and overall effect on health (14, 15, 17, 19, 47). Evidence does indicate proportionately larger effects for higher taxes (12). Currently, many examples of soft drink taxes around the world (in the United States, for example) are set

at levels too low (for example, 5%) to significantly influence consumer purchasing and only serve as a revenue-raising mechanism (20, 33–35).

Effects of substitution

Findings also suggest that the overall impact of the tax or subsidy is highly dependent on the design of the policy. The potential for unintended effects on consumption of other foods/nutrients (through substitution of untaxed or cheaper foods in the case of taxes) should be considered at the outset when a policy is being developed (9, 14, 15, 19, 46). Some studies (for example, Mytton (48)) have flagged that the gains from taxing one nutrient, such as saturated fat, may be offset by substitution of other nutrients, such as salt or refined starches, with potentially negative or no positive consequences for the overall diet.

This is why food products high in fats, sugar and/or salt for which there are close healthier substitutes are often recommended as the first target (for example, tap water and other non-caloric beverages are substitutes for sugar-sweetened beverages) (7, 12, 47). The alternative is broader taxes on a wider range of foods and non-alcoholic beverages high in saturated fat, *trans* fat, sugar or salt with the aim of improving the overall quality of the diet (48, 49). Soft drink taxes and targeted subsidies on fruit and vegetables appear to be most effective in inducing health-promoting changes in consumption (12). Taxes on single nutrients may apply to core foods as well as less healthy foods, so that there is the

potential for unintended consequences; this can be avoided through policy design and careful targeting but should be anticipated at the outset to ensure that the intake of untaxed unhealthy nutrients does not increase. Taxes using nutrient profile models or a broader range of nutrients are less likely to have unintended consequences or to apply to core foods, as the selection of targeted foods is based on consideration of the entire nutrient composition of the food.

Health inequalities

Regressivity is a central concern in the design of a taxation policy and should be a specific consideration when the introduction of consumption taxes – particularly flat taxes applied to specific food products – is explored (9). As the tax levied is the same regardless of an individual's income, if a rich person and a poor person both purchased the same amount of a product subject to the tax, the poorer individual would spend a relatively higher share of his/her income on the tax. The effect on poorer consumers is, therefore, an important consideration.

People in the lower socioeconomic groups typically spend more of their disposable income on food than those in high-income groups and are thus more affected by price increases. Studies of the effect of food taxes report varied levels of regressivity: the greatest potential for regressivity occurs when taxes target entire food groups containing core items (such as dairy products) rather than specific non-core food items (such as sugar-sweetened beverages) (12).

Approaches to measuring tax regressivity only, however, consider tax payments made. They do not consider the benefits to the same individuals as a result of a price policy. Given the poor diet-related health outcomes associated with low socioeconomic status, these groups may benefit disproportionately from improvements in diets resulting from a food tax, and the *health gains* from food taxes may be progressive and contribute to reducing health inequalities (19). Evidence does seem to indicate that higher price sensitivity among low socioeconomic groups means that they may be more responsive to the tax and more likely to reduce their consumption as a result (7, 12, 22, 50). This is particularly the case if the tax is highly targeted (for example, at sugar-sweetened beverages) and untaxed healthier substitutes are available (22, 36). In such situations, greater positive dietary effects are observed among consumers with low incomes (12).

Systematic reviews of the modelling evidence have found that there is overall improved food and nutrient consumption and health benefits for low socioeconomic groups, showing that taxes have the potential to reduce inequalities in health outcomes (8, 15). Such health improvements are, in principle, measurable and quantifiable and can be monetized.

Food taxes are also a potential source of additional revenue for governments that can be ring-fenced to support subsidies, health promotion policies, programmes and services or food assistance programmes targeted at vulnerable groups, thereby

alleviating some of the burden on low-income groups (37). Indeed, it has been found that fiscal measures are cost-saving in a range of income settings and can lead to socioeconomic gains (2,39).

While it is arguable that such taxes are inequitable as a *fiscal financing mechanism*, there is no strong evidence to suggest that corrective taxes that generate revenue for a government cannot also have a positive and progressive public health outcome at the same time. Such revenue generation alongside positive health outcomes could actually further increase societal benefits, as other approaches to generating the same revenue may be less efficient or subject to adverse effects with no progressive effects (51). The Organisation for Economic Co-operation and Development has concluded that, of all action to prevent obesity, fiscal measures were “the only intervention producing consistently larger health gains in the less well-off” across the countries studied (12).

Combining food taxes with subsidies could help to attenuate potential concerns as regards regressivity (46). Evidence suggests that subsidies should be highly targeted (for example, via nutrition and food assistance programmes) in order to reduce health inequalities between low- and high-income consumers. General subsidies have the potential to widen the gap as they may disproportionately benefit high-income consumers rather than low-income groups (12).

Pass-through

For taxes and subsidies to have an impact on consumption, they must increase prices at the point of purchase (9). Depending on how the price policy is administered, suppliers may choose not to alter their prices by the full tax or subsidy amount for commercial reasons. Decisions relating to pass-through may be linked with the competitive structure of the market as well as with the characteristics of the demand for the commodity in question. If firms are profit-maximizing and they believe that full pass-through of a tax would result in significant decreases in sales, they could make the choice only to pass on a proportion of the tax with a smaller profit on each unit sold to pay for the tax, as this may maximize their overall profit in certain circumstances. While the government may still generate the predicted revenues from the tax in these circumstances, the predicted changes in consumption may not be achieved, as consumers will only respond to the final price they pay.

Food and beverage manufacturers and retailers normally pass on the full price increase associated with the tax, and in many cases the price increase for consumers at point of purchase is greater than the tax increase alone (9). However, some differences in tax pass-through across different types of retailer were observed after the introduction of the saturated fat tax in Denmark and the soft-drink tax in France (52,53).

Choice of mechanism

Taxes aimed at promoting healthy eating could be administered in a variety of ways. This is a policy

consideration that is often overlooked when the use of price policies is explored, despite different approaches having greater potentials to minimize administrative costs (13,54). As the aim of public health nutrition interventions is to influence the consumption of food (quantity and quality), most recommendations have focused on consumption taxes. Although taxes can be levied at any point in the supply chain, generally speaking the closer the tax point is to the consumer, the more likely (other things being equal) it is that the tax will have a beneficial impact (9). The three most common approaches are outlined in Table 1.

It should be noted that these tax mechanisms are not mutually exclusive and can be combined in various ways. For example, in most countries where excise duties are applied to specific goods, VAT and import duties could also be payable (55). However, specific and ad-valorem excise taxes can also be combined to generate a minimum or “floor” taxation value that is still dynamic in nature, which is done more commonly in high-income countries (3).

While specific excise taxes are easy to administer and generate predictable revenues, they require regular evaluation and adjustment to keep up with inflation, and they can potentially incentivize manufacturers to alter the characteristics of a product (for example, increasing the size of chocolate bars if the tax is levied per chocolate bar sold) to undermine the tax (9). On the other hand, ad-valorem excise taxes automatically adjust for

inflation and have a larger impact on industry profits but they generate less predictable revenues, are harder to implement, incentivize manufacturers to cut their prices to maintain volume and can generate wide gaps between cheap and expensive products (which could, for example, encourage consumers to switch to cheaper products that could be just as harmful) (55).

If the administrative burden is to be minimized, consideration must also be given to the choice of target foods or nutrients. It may be, for example, that taxes on sugar-sweetened beverages and targeted subsidies on fruit and vegetables would be less burdensome to implement given that defining the targeted foods/products would be more straightforward. Conversely, nutrient- or ingredient-based taxes might be more burdensome to implement, given that significant resources may be required to assess the nutritional composition of a wide range of food products. Taxes applied to producers might help to achieve the desired price increase while minimizing the administrative burden (for example, a sugar tax on producers), although the potential for producers and retailers to absorb the price increase would need to be carefully considered.

Summary

- Collectively, the evidence suggests that price policies applied to food can influence what consumers buy and could contribute to improving health by shifting consumption in the desired direction and supporting healthier diets.

Table 1. Summary of tax mechanisms

Tax mechanism	Description	Strengths	Weaknesses	Source
Specific excise	A set amount of tax is charged on a given quantity of the product (for example, €1 per kg or €1 per unit) or per specific ingredients.	Potentially predictable revenue stream Increases all product prices by a fixed amount.	Inflation can reduce impact without regular adjustment. Changes in product characteristics (such as package size or composition) can reduce impact (more so for unit as opposed to tax per kg of the product or ingredient).	Yurekli, 2000 (55)
Ad-valorem excise	A tax levied on the sale of goods or services, determined as a percentage of the gross value or cost of the product at point of sale (for example, 30% of the price paid by consumers).	Automatically adjusts for inflation. Reduces industry profit margin on subsequent price increases.	Less predictable revenue stream. Generates large price differentials between cheap and expensive products.	Yurekli, 2000 (55)
Value-added tax	Tax on each stage of production that adds value to a product or process, with reimbursement of taxes paid to previous suppliers in the chain.	Efficient as it only taxes the value added and avoids cascade effects.	Generally applied at a fixed rate for all goods, therefore lacking opportunities to generate relative price changes between goods and change behaviour.	WHO, 2012 (3)

- The primary effect of price policies is to influence point-of-purchase decision-making by changing the price that the consumer pays. This affects both the purchase of the foods and or/nutrients targeted by the tax and close substitutes and other foods.
- The ultimate impact of the price policy will be affected by the extent to which the price increase or decrease is passed on to consumers.
- The effects of taxes and subsidies are also highly dependent on the way that they are designed and there is likely to be a knock-on effect for foods and/or nutrients beyond those that are targeted. Thus, economic analyses and evaluations of policies should consider the impact on purchases of targeted and non-targeted products and on diets as a whole. The potential for compensatory food purchasing should be considered in the design of a policy.
- Evidence suggests that taxes are more effective when applied to non-core foods for which there are close untaxed healthy alternatives (for example, sugar sugar-sweetened beverages versus diet sodas or water). Targeted subsidies on fruit and vegetables are effective at increasing consumption. Such targeted approaches are likely to be less administratively burdensome.
- Non-trivial taxes may be needed to have appreciable effects on purchase, diet and public health.
- The absolute impact of taxes on low socioeconomic groups is likely to favour health and the consumption of adequate food and nutrients and thus reduce the risk of NCDs. The relative impact may also be greater for these groups and thus contribute to reducing health inequalities.
- Funds raised from corrective taxes may be ring-fenced for targeted subsidies or other health promotion activities. Either way, corrective taxes can both raise revenue for governments and have positive health outcomes.

EXAMPLES OF POLICY ACTION IN EUROPE

Many countries apply taxes and subsidies to foods and at many different points in the food supply chain (for example, agricultural inputs) without necessarily

aiming to change consumers' purchasing or dietary behaviour or health outcomes. The primary objective is to raise revenue and many governments do not set

taxes at sufficiently high rates to change behaviour (8,35). On the basis of the evidence described above, however, several countries in the Region have introduced health-related taxes on specific foods and/or nutrients with the objective of influencing what people buy and their dietary intake. Others set specific taxes at a level high enough to acknowledge the potential for an impact on health and consumption even though the primary purpose is revenue-raising. Their experience is useful in informing further policy development by European Member States in this area. This section describes the approach taken in each of these countries and, where possible, the documented effects.

Denmark: tax on saturated fats

In October 2011, Denmark became the first country in the world to introduce a “fat tax” – a tax of DKr 16 (€2.15) per kg of saturated fat, with the taxable base including all foods containing saturated fat (for example, meat, dairy, edible oils and fats, margarine and blended spreads). Products with less than 2.3 g per 100 g (such as most types of milk) were excluded from the tax, as were foods for export and non-food items (such as medicines or animal food) (56). The tax received global attention when it was enacted, and generated controversy in some circles where it was claimed that the tax was inefficient, ineffective and would generate unintended negative consequences (57) (Table 2).

The tax originated from the government-appointed Prevention Commission, which in 2009 released a

set of 52 recommendations relating to improving life expectancy and health status in the later years of life. These included a recommendation to introduce a tax on saturated fat and other products such as tobacco, alcohol, sugar and sugar-sweetened beverages (56). This recommendation was subsequently revisited during a more comprehensive review of the Danish tax system beginning in the same year (58).

The aim of the reform to the tax system was to make various changes and cuts to different taxes so as to improve the labour supply and soften the impact of the global financial crisis. The idea behind the overall package was that marginal income tax rates could be reduced, with revenue supplemented through additional taxes in other areas that could also serve to achieve other market outcomes. The combination of cuts in some areas and new or increased taxes in others was modelled to be approximately revenue-neutral. In general, Denmark is a country with a relatively high level of taxation; the tax-to-gross domestic product (GDP) ratio has been relatively constant during the last 15 to 20 years, fluctuating around 48–50%, with more than half of the total tax revenue coming from personal income taxation (59).

Based on the recommendations of the Prevention Commission, the reform package proposed two increases to pre-existing health-related taxes and two new taxes (60):

- an increase in tobacco tax of DKr 3 (€0.40) per 20 cigarettes;

Table 2. Summary of tax on saturated fats, Denmark

Domain	Comment
Rationale	The aims were to raise additional revenue to reduce the income tax burden, and to reduce the consumption of saturated fats.
Mechanism	Excise tax of DKr 16 (€2.15) per kg of saturated fat in products with more than 2.3 g of saturated fat per 100 g.
Public/industry sentiment	Negative.
Current status	Abandoned.
Revenue collection	DKr 1 billion (€134 million) between November 2011 and August 2012.
Impact on consumption/ health	Econometric analysis suggests that in the short term consumption of some products subject to the tax dropped by 10–15%.
Unintended consequences	Speculated but unconfirmed cross-border shopping, job losses and negative profit impacts for producers.
Formal evaluation	As far as is known, no formal evaluation is planned.
Future plans	Unknown. Tax on sugar-sweetened beverages has also been abandoned as has the proposed sugar tax.

- an increase in tax on sweets, ice-cream and chocolate of 25%;
- a new tax on soft drinks proportionate to the sugar content (effectively an alteration to an existing tax – an increase for sugar-sweetened soft drinks and a decrease for artificially-sweetened soft drinks);
- a new tax on saturated fats (the “fat tax”).

The saturated fat tax underwent numerous revisions before the final amount and administrative details were finalized. The original proposal consisted of a tax of DKr 25 (€3.36) per kg on saturated fats in food, excluding meat and drinking milk. However, given the significant contribution of these two products to total saturated fat consumption in Denmark (18% and 16%, respectively) this was vigorously debated. In addition, the European Commission noted that the exclusion of meat was not consistent with state aid rules geared at protecting competition in the presence of market interventions such as this. This led to a revision of the amount to DKr 13.50 (€1.81) per kg with the inclusion of meat (56).

Smed (56) describes the further challenges posed by this revised tax that ultimately led to the final proposal which was passed by parliament. The new meat component of the fat tax was to be based on the predetermined values of saturated fat based on the animal type, rather than the specific cut of meat being sold. This was contentious as different cuts of meat from the same animal were not differentiated by the tax, and this eroded the incentive for consumers to select a healthier cut. In addition it was found that the

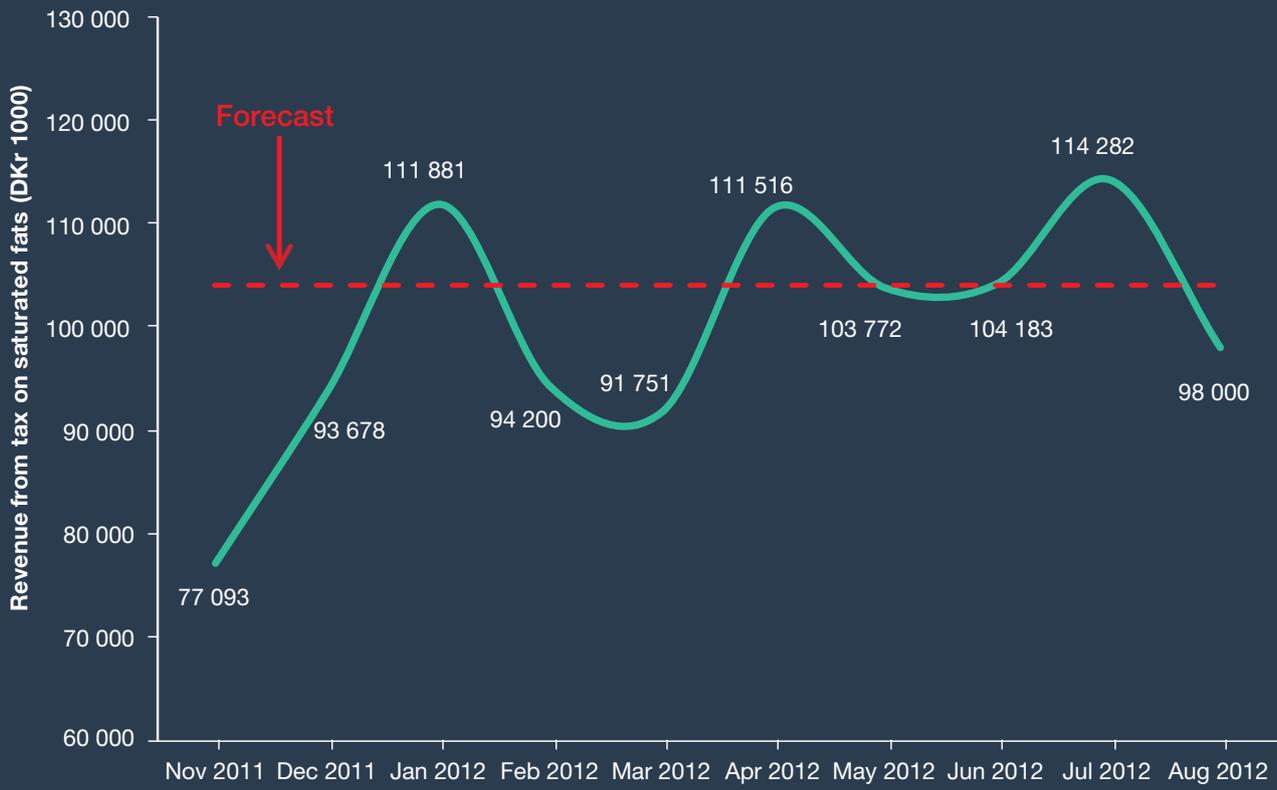
predetermined levels of saturated fat per animal were set at unusually high levels. These issues led to the final version of the fat tax as described above.

Between November 2011 and August 2012, the tax on saturated fats raised around DKr one billion (€134 million) in revenue (Fig. 1). This is close to the projected DKr 1.04 billion that the government forecast it would generate over this same period (the dashed line in Fig. 1). This represents the most recent revenue data available as of November 2012. The low revenue collection in the first period is probably due to a stockpiling effect in the months leading up to the introduction of the tax, which may also have had a slight impact on the intake estimates for the first few months (61).

Industry associations and unions called for the abandonment of the tax as it encouraged cross-border shopping, which they claimed was having a negative impact on the labour market and on the economy more broadly (62). In addition, the Danish Chamber of Commerce and the Agricultural & Food Council claimed, based on a random poll they carried out, that 80% of respondents felt that the tax had not caused them to alter their shopping habits and that there had been an increase in the proportion of people shopping internationally since the introduction of the tax. They claimed this had been fostered by German shops sending brochures to Danish households enticing them to shop internationally. In addition, they referred to their own analysis estimating that the tax had cost 1300 jobs since its introduction (63). No

Fig. 1. Revenue collected from the tax on saturated fat, Denmark

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Source: Ministry of Taxation (61).

methodology was, however, provided for either the survey or the labour market analysis referred to, and to date no academic evidence has been published to validate any of these points.

It has been reported that the tax was also very difficult to calculate correctly, control and ensure no discrimination between Danish and imported products.¹ In November 2012 it was announced that the tax would be abandoned, with the revenue gap being supplemented through increased income taxes and reduced personal tax deductions. This decision was made in the absence of any evidence as to the effectiveness of the tax, a move that was heavily criticized by the public health community (60). The proposed sugar tax has also been abandoned.

Subsequent to the abandonment of the tax, a data analysis has demonstrated that the consumption of fats decreased by between 10% and 15% as a result of the tax. This analysis focused on the consumption of butter, oils and fats, which are some of the products most heavily affected by the tax on saturated fat, but it should be kept in mind that the tax will also have influenced the price of a range of other food products, including processed foods (such as ready-meals, bread, pastries, processed foods and snacks) because they are based on ingredients subject to taxation. This may have amplified the effect of the tax. The tax was also associated with a shift from high-priced supermarkets towards discount stores, and this in turn was associated with discount stores

in some cases increasing the prices of butter and margarine by more than the pure tax increase (52). Given the short duration of the policy, it is not possible to determine whether such decreases would have been sustained in the longer term. An interesting additional effect of the tax on saturated fat was observed in relation to the packet size. For example, the packet or portion sizes for butter and chocolate decreased, which may have amplified the consumption effects of the tax itself.²

Finland: tax on sweets, ice cream and soft drinks

Finland has a long history of taxation on food products, with a tax on sweets and non-alcoholic beverages from 1926 to 1999 (64). In 2000, however, the sweets component was abolished, with the non-alcoholic beverage component remaining. Part of the reasoning for this was the exemption from the tax granted to xylitol (a sugar substitute). The European Food Safety Authority reported that the substitution of sugar with xylitol was associated with positive health impacts, but the European Commission held that the exemption of confectionery products containing xylitol from the tax unfairly discriminated against other non-sugar sweeteners. In late 2010, parliament approved a reinstatement of the “sweets tax” (64). The tax is currently levied on confectionery, chocolate and ice-cream, but excludes certain products such as biscuits, baked goods, yoghurt products, puddings, jellies, mousses and granulated sugar (65).

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¹ Correspondence with the Danish Veterinary and Food Administration.

² Correspondence with the Danish Veterinary and Food Administration.

The taxes are primarily levied to generate revenue for government finances, although the potential impacts on health and consumption are acknowledged (65). The tax rates were increased in 2012 and 2014 (Tables 3 and 4).

In 2013, a Sugar Tax Working Group explored three possible tax models, assessing their potential to expand central government revenues and promote healthy nutrition, as well as their suitability and impacts. The final report discussed a broad tax on total sugar content (for example, a given amount per kilo of sugar contained in certain products), an excise duty on specific products containing sugar (for example, a given amount per kg/litre of the specific product), and a tax model combining the two. The Working Group concluded that according to their estimates the combination model would be the optimal model in terms of health promotion, while the excise duty model would be the most straightforward in terms of practical implementation. The Group felt that both the sugar tax and the combination model would impose a significant administrative burden. A final decision was taken to expand the excise duty on beverages containing more than 0.5% sugar based on the recommendations of the Ministry of Finance Sugar Tax Working Group (66).

In 2010, while the tax was still only applied to non-alcoholic beverages, it generated €37 million (67). In 2011 this increased to €134 million with the addition of the tax on sweets and ice cream (€35 million from non-alcoholic beverages, plus

€100 million from sweets and ice-cream). In 2012 this increased to €197 million, exceeding Ministry of Finance revenue forecasts. The impact of the tax on purchase, consumption or health has not been formally evaluated, but there have been unofficial reports that it has led to decreased sales and consumption of non-alcoholic beverages and, since its re-introduction, sweets (68,69). At the same time, concerns have been raised by industry that by the tax targeting such specific products, it is unfairly discriminating against particular manufacturers in the food industry and therefore distorting competition (70).

Hungary: public health product tax

In 2011, motivated by the population's high salt consumption (among the highest per capita in the world), the fact that around two thirds of the adult population were obese, and the heavy consumption of food products high in fats, salt and sugars more generally, the government introduced a public health product tax (Table 5) (71).

The tax was introduced in 2011, aimed at products for which healthier alternatives were available. It has the specific health objectives of promoting both healthier food consumption by individuals and product reformulation by manufacturers. The revenue generated from the tax is hypothecated for the health care budget and is currently used to supplement the salaries of health care professionals. The categories of goods impacted by the tax are sugar-sweetened beverages, energy drinks, confectionery, salted snacks, condiments, flavoured alcohol and fruit jams.

Table 3. Summary of tax on sweets, ice cream and soft drinks, Finland

Domain	Comment
Rationale	Primary purpose: to provide revenue for the central government.
Mechanism	Excise tax on sweets and ice cream (€0.95 per kg), non-alcoholic beverages (€0.11 per litre) and beverages containing more than 0.5% sugar (€0.22 per litre).
Public/industry sentiment	Some negative sentiment from industry.
Current status	Active.
Revenue collection	€204 million in 2013. Forecast €250 million for 2014.
Impact on purchase, consumption or health	Reported decrease in consumption of sweets and soft drinks in 2011 and 2014, but no formal evaluation to infer causality.
Unintended consequences	Claims from industry that it distorts competition by discriminating against individual companies in the food industry.
Formal evaluation	No formal evaluation as of December 2012.
Future plans	Ongoing review of policy.

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Table 4. Tax rates on sweets, ice cream and beverages with and without sugar, Finland

Product	2011 tax rate	2012 tax rate	2014 tax rate	% increase
Sweets and ice cream (€/kg)	€0.750	€0.950	€0.950	27%
Beverages with sugar (€/litre)	€0.075	€0.110	€0.220	47%, then a further 50%
Sugar-free beverages (€/litre)	€0.075	€0.110	€0.110	47%

Table 5. Summary of public health product tax, Hungary

Domain	Comment
Rationale	The aims were to: promote healthier consumption and encourage product reformulation, and provide revenue for government finances, with the tax revenues to be used for the health care system.
Mechanism	Taxes applied to sugar-sweetened beverages, energy drinks containing methylxanthines or taurine, confectionery, salted snacks and condiments, alcohol with a high sugar content, fruit jams and ice creams.
Public/industry sentiment	Negative.
Current status	Active.
Revenue collection	Ft 18.9 billion (€61.5 million) between January 2013 and December 2013.
Impact on consumption/health	Reduction of consumption in concerned products documented. Product reformulation also observed. Population surveys and estimates indicate decrease in consumption of nutrients of public health concern.
Unintended consequences	Possible tax evasion. Reformulation of products with non-taxed but similarly unhealthy ingredients.
Formal evaluation	First formal evaluation in 2013.
Future plans	Continuation of scheme, with no significant changes currently announced. Second evaluation is underway with special focus on substitutes.

The tax was initially broader, including fast food, chips and bakery products, but the industry was able to argue successfully for exemptions in these areas (71). The tax mechanisms as of January 2012 are summarized in Table 6. It should be noted that the thresholds and amounts have changed since the tax was first implemented.

In 2013 the taxes generated Ft 18.9 billion (€61.5 million) (72). Manufacturers producing beverages and energy drinks reacted to the new policy by continually reformulating their products, particularly energy drinks, to avoid the tax. A significant proportion of the population believes that the tax is primarily a revenue-raising instrument rather than a public health instrument. As with other taxes of a similar nature, industry is critical of the tax, citing equity issues, product discrimination and possible job/income losses (71).

A health and financial impact assessment was conducted with the support of the WHO Regional Office for Europe in 2013. According to this impact assessment, sales of products subject to the public health tax have fallen by 27%, with a 20–35% decrease in consumption observed. An additional benefit observed has been the response of manufacturers in removing entirely, or substantially reducing, the taxed ingredient in their products through reformulation. Furthermore, the tax has been shown to influence consumer awareness and attitudes towards healthy and less healthy foods. Of those who do consume less of the taxed products, 80% cited the price increase as being a reason, with

20% of them noting that it made them more aware of the health implications of what they were consuming (71). The tax is estimated to have had an impact on the population-level consumption of salt and sugar, particularly among high consumers (such as young men, who are the largest consumers of sugar-sweetened beverages) (71).

France: tax on sugar- and artificially-sweetened beverages

In 2011, concerned about the high levels of sugar intake among the population, the French government adopted a tax on sodas. It was then decided to extend the tax to “light” sodas containing sweeteners, thus covering all non-alcoholic beverages with added sugar or sweeteners (Table 7). The tax was effective from January 2012 and is levied at €7.16 per hl on sugar-sweetened and diet sugar-sweetened beverages (equivalent to around €0.11 per 1.5 litre). It is levied on French manufacturers, importers and food outlets serving prepared drinks with added sugar or sweeteners. While primarily a revenue-raising tax, its alignment with the goals of reducing overweight and obesity have been noted, particularly with regard to childhood and adolescent obesity (53).

The tax generates revenues of almost €280 million per year. Within the first year, the price increase was passed on fully to consumers in the case of sodas but only partially for fruit drinks and flavoured waters, with some variation in pass-through among different retailers and brands (53). The impact of the tax is yet to be fully evaluated. Sugar-sweetened beverage sales

Table 6. Tax rates as of January 2012, Hungary

Category	Products	Threshold	Amount
Sugar-sweetened beverages	Syrups or concentrates for sugar-sweetened beverages	Drinks with >25% fruit content exempt	Ft 200/litre (€0.64/litre)
	Other sugar-sweetened beverages	Added sugar >8 g/100 ml	Ft 7/litre (€0.02/litre)
Energy drinks	Containing methyxanthines	>1 mg/100 ml	Ft 250/litre (€0.80/litre)
	Containing taurine	>100 mg/100 ml	Ft 250/litre (€0.80/litre)
Confectionery	Sweetened cocoa powder	None	Ft 70/kg (€0.22/litre)
	Chocolate	Added and total sugar >40 g/100 g and cocoa content <40 g/100 g	Ft 130/kg (€0.41/kg)
	Other products	Added and total sugar >25 g/100 g	Ft 130/kg (€0.41/kg)
Salted snacks	Containing salt	>1 g/100 g	Ft 250/kg (€0.80/kg)
Condiments	Containing salt	>5 g/100 g (mustard and ketchup exempt)	Ft 250/kg (€0.80/kg)
Flavoured alcohol	Alcohol containing added sugar	Total sugar content >5 g/100 ml	Ft 20/l (€0.06/litre)
Fruit jams	Fruit jams	Extra jam, extra jelly, marmalade and special quality jams exempt	Ft 500/kg (€1.59/kg)

Table 7. Tax on non-alcoholic beverages with added sugar or sweeteners, France

Domain	Comment
Rationale	Primarily revenue-raising, but alignment with addressing overweight and obesity among children and adolescents has been noted.
Mechanism	€7.16 per hl (equivalent to 100 litres) levied on French manufacturers, importers and food outlets that serve their own prepared drinks containing added sugar or added sweeteners, including sodas, fruit drinks, flavoured waters and “light” drinks.
Public/industry sentiment	Public sentiment is neutral. Industry strongly rejected any framing of the tax as a public health initiative, arguing that there was no strong evidence for it to be called a nutrition tax (73).
Current status	Active.
Revenue collection	Has generated about €300 million per year since 2012.
Impact on purchase, consumption or health	After years of increasing sales, an immediate drop in sales of these products was recorded following introduction of the tax. Econometric modelling had predicted a drop due to the tax.
Unintended consequences	No significant unintended consequences reported yet.
Formal evaluation	A formal evaluation is planned.
Future plans	Additional economic studies anticipated.

fell, however, by 3.3% between January 2012 and May 2012 following a 5% increase in prices, which is double the increase seen in other food prices more generally, meaning the tax is effective in increasing the price for consumers at point of purchase. While the reasons for this decrease cannot be ascertained, econometric modelling undertaken by the Toulouse School of Economics in advance of the tax being levied predicted significant decreases in consumption due to the tax. Further economic studies have been planned by the School, as well as a public perception and tax impact evaluation (74).

The general public have not expressed any significant opposition to the tax. Industry initially opposed it: after the government announced the tax, Coca-Cola issued a statement in which it threatened to cancel a significant investment in a factory in France before quickly retracting the statement. The government refers to it as primarily a revenue-generating mechanism (74).

European Union School Fruit Scheme

In November 2008, the European Union (EU) Council of Agriculture Ministers agreed to implement the School Fruit Scheme – a subsidy scheme to provide free fruit and vegetables to children in schools (Table 8). In return, schools must teach children about healthy eating and food production through appropriate programmes (known as accompanying measures). The scheme began in the 2009/2010 school year, and had an initial annual EU budget of €90 million with cofinancing (either 50% or 75%) by national or private

funds required in each country. The scheme now reaches over 8 million children in over 54 000 schools across the 25 participating member states (75).

The Scheme was first discussed in the white paper entitled *A Strategy for Europe on Nutrition, Overweight and Obesity related Health Issues* published by the European Commission (76). The paper notes the significant increase in overweight and obesity across Europe, particularly among children, and proposes a range of initiatives to tackle the problem. One suggestion was for a school fruit and vegetable scheme to ensure that access to healthy foods was not a problem in schools. The Scheme provides free fruit and vegetables to participating schoolchildren, and associated accompanying measures. The accompanying measures include knowledge transfer measures (for example, posters and educational classes on nutrition, health and agriculture) and action-oriented measures (for example, school gardening, farm visits and cookery classes). A recent evaluation found that the Scheme has increased children's overall consumption of fruit and vegetables in the short term (75). The key success factors of the scheme were deemed to be:

- the wide range of fruit and vegetables available to maintain children's interest;
- frequency of provision (more than once a week – ideally three times a week);
- continuity of provision;
- free distribution.

Table 8. Summary of the European School Fruit Scheme

Domain	Comment
Rationale	The scheme aims to address the rise of overweight and obesity among children in the EU by ensuring that healthy food options are available to them.
Mechanism	Provision of free fruit and vegetables in schools, paid for by a combination of EU, national, private and parental contributions. Accompanying measures used to teach children about nutrition, health and agriculture.
Public/industry sentiment	Positive.
Current status	Active.
Cost	In 2010/2011, the EU spent €55.4 million of the €90 million allocated to the Scheme, leaving approximately 39% of the earmarked budget unused. Additional public, parental and private cofinancing was €44.5 million, bringing the total spend to just below €100 million for 2010/2011.
Impact on consumption/ health	Increased consumption of fruit and vegetables in the short term. Long-term consumption and health impacts cannot yet be determined.
Unintended consequences	Administrative and organizational burdens, particularly with regard to contract negotiation, logistics and reporting.
Formal evaluation	Released in 2012 by the European Commission. Prepared by AFC Management Consulting AG and CO CONCEPT Marketing Consulting.
Future plans	Continuation of scheme. No significant changes announced.

Evidence from Norway (where a free school fruit programme had been operating before the introduction of the European School Fruit Scheme) has demonstrated that a free school fruit programme also resulted in a statistically significant decrease in the consumption of unhealthy snacks (77). In autumn 2014, the Norwegian programme providing free school fruit will be replaced by a subsidized scheme.

Within the European School Fruit Scheme, the development of the accompanying measures at school level is giving rise to a wide-ranging variety of measures, and it is unclear how important these are to the success of the overall Scheme. The evaluation notes that more work needs to be done on documenting and measuring the accompanying measures so that they can be separated from regular educational programmes for the purposes of evaluation (75). Schools could probably benefit from additional guidance with the structure and design of their additional measures.

Differences in accounting procedures, distribution costs and product costs between the participating countries imply that the efficiency of the Scheme in terms of output for money spent varies substantially across the region. The spread of spending per kilogram of fruit distributed is demonstrated in Fig. 2. The Scheme has generated an additional demand for fruit and vegetables of nearly 44 000 tonnes – equivalent to 0.06% of the total supply in 2010/2011 in the countries belonging to the EU since January 2007.

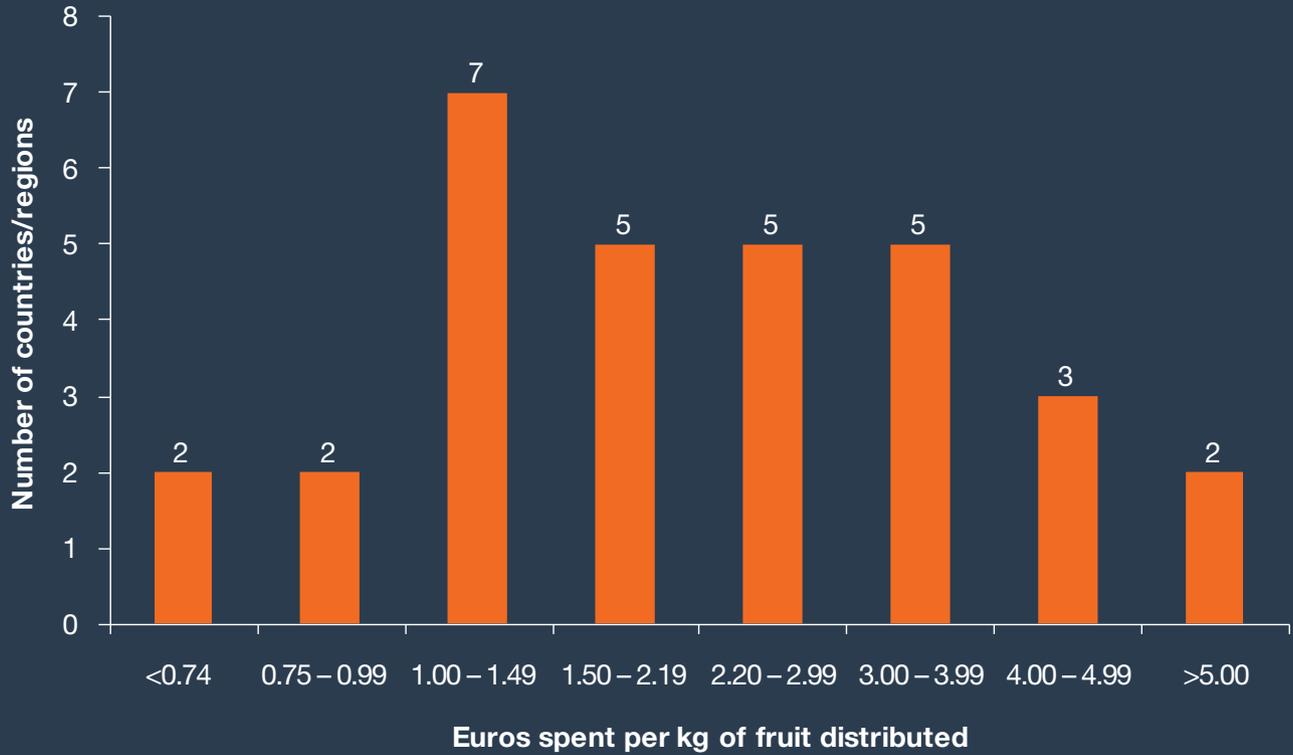
Administrative and organizational burdens were noted in the evaluation. These most often occurred during the selection procedure and contract negotiations, as dealings with suppliers are the responsibility of individual schools. Such burdens were greatest in smaller regional schools which had fewer resources to manage such contracts and at times had difficulty in sourcing local suppliers. Other burdens were related to the documentation and reporting of activities undertaken as part of the Scheme (75).

As the Scheme was designed in consultation with key stakeholders, public and industry sentiment towards the Scheme has been positive (78). Subsidies are, however, generally better received by the public than taxes (79), although they can cost significant amounts of money to implement, as opposed to taxes which generate revenue.

The Scheme is continuing, with the €90 million budget increased to €150 million for 2014/2015. The largest beneficiaries (in order) are Italy, Germany, Poland, France, Spain and Romania. The cofinancing rates range from 75% to 90%. In early 2014, the European Commission announced plans to merge the EU School Fruit Scheme with the EU School Milk Scheme as a joint framework, under the banner of “Eat Well: Feel Good”, with a combined budget of €230 million (€150 million for fruit and vegetables and €80 million for milk).

These findings from the EU School Fruit Scheme are consistent with the wider evidence which suggests

Fig. 2. Distribution of spending per kg of fruit distributed (in €)



that policies that increase the availability of fruit and vegetables in schools have a positive but modest impact on total daily intake, indicating an effect both inside and beyond the school gate (80–83).

Changes in value-added tax

In response to tough economic conditions across Europe, there have been calls for the 28 EU member states to increase their value added tax (VAT). Increases on VAT are a relatively popular option with governments as they have an impact on consumption rather than savings, are relatively cheap to administer and reduce corporate taxes which is seen to encourage global industry (with the benefits assumed to flow through to the economy). Over the past few years, major VAT increases have taken place in France, Germany, Greece, Italy, the Netherlands, Portugal, Spain and the United Kingdom.

While such VAT increases generally have an impact on all goods and services, they can also be levied on certain classes of product. One option would be to adjust the existing taxation regime. For example, VAT payable on non-core foods could be increased and/or VAT payable on fruit and vegetables could be removed (8). Portugal has done this through significantly increasing VAT on restaurants and on foodstuffs (for example, sugar-sweetened beverages, dairy desserts, canned fruit, jams, jellies, snacks, oil and margarine spreads) (84). However, differentiations in VAT rates are generally opposed by finance ministries due to the administrative costs and potentially distortive effects,

although many countries do differentiate rates in the pursuit of distributional goals

In cases such as these, VAT increases are purely revenue-raising mechanisms and there is limited (if any) discussion of the potential impacts on health. In addition, tax increases such as these are seldom evaluated for their health impact given that that is not a primary goal. Yet such increases (or decreases/concessions on fruit and vegetables) have the potential to generate significant shifts in consumption, as demonstrated throughout this publication, if levied at a sufficiently high rate to influence consumers' behaviour, with possible benefits to their health. More consideration, therefore, needs to be given to the role of VAT increases and concessions on associated health impacts or diet composition.

Supply chain interventions – a global perspective

A food systems approach that looks at policies influencing the production, manufacture and distribution of food also has significant – but largely untapped – potential to influence food prices at point of purchase. This potential exists because upstream food systems and agriculture policies affect what is grown, raised, processed, marketed, distributed, traded and sold, which in turn affects what is available and affordable to consumers (85). In the absence of examples from the European Region, international examples of interventions in supply chains to alter prices for public health reasons have been considered.

National and international policies affecting the fat supply chain, which are implemented largely for economic objectives, have led to the rising dominance of soybean oil and palm oil in world markets over the past decades and their increasing use in food production as low-cost oils (86,87). Soybean oil has a relatively healthy fatty-acid profile but is widely used

in partially hydrogenated vegetable oils which have high levels of *trans* fats. Similarly, palm oil contains high levels of saturated fats and can also be partially hydrogenated into *trans* fats. Box 1 gives an example from Singapore of how governments can address this issue.

IMPLICATIONS FOR POLICY DEVELOPMENT

The economic theory presented at the beginning of this publication demonstrates that in circumstances where the consumption (or inadequate consumption) of food products is associated with a negative externality, pricing policies may be effective and efficient mechanisms to alter patterns of consumption. The available research evidence largely supports the economic theory in showing that changing the price of food can alter consumption in the desired direction. The publication has explored how in recent times there have been several examples of pricing policies for healthy eating across the Region.

A continuing lack of robust data from monitoring and evaluation can make it difficult to determine the impact on food choice or identify shifts in consumption linked to positive health outcomes. In addition, price policies for food are susceptible to being widely opposed by both the public and industry, further limiting their

uptake and the strength of the policies. Nevertheless, where evidence is available from countries it does appear to be consistent with economic theory and the existing research evidence, with several examples of changes in purchasing and consumption patterns associated with price policies. It remains a priority to monitor and evaluate the policies currently in place across the Region.

Given the commitments made by the 53 WHO European Member States under the European Food and Nutrition Action Plan 2015–2020, it is vital that price policies for healthy eating are properly considered. This publication highlights several important areas to be borne in mind by policy-makers when considering fiscal measures, in particular the need to: (i) establish clear policy objectives, and (ii) target certain food(s) and/or nutrients and anticipate any broader effects.

Box 1. Intervention to reduce saturated fat in cooking oil in Singapore

In Singapore, the Health Promotion Board has been concerned about the high levels of saturated fat intake among the population. In the 2010 National Nutrition Survey, 57% of respondents reported that they usually eat at least one meal a day at a hawker centre (88). These hawker centres typically use high levels of palm oil in their food preparation. Individuals who eat at a hawker centre four or more times a week consume on average 36 g of saturated fats a day.

The Health Promotion Board worked with local manufacturing companies and the Singapore Food Manufacturers' Association to increase the availability of cooking oil with lower levels of saturated fats. However, such oil typically costs about 20% more than palm oil (SG\$ 50 more per month), which was identified as a barrier to its use by hawkers.

The Health Promotion Board therefore intervened to ensure that the prices of cooking oil with lower saturated fat content remained competitive with palm oil. Manufacturers of cooking oils with lower saturated fats were brought together with producers of other staple ingredients to share logistics services. Sharing storage and delivery resources and establishing a single point of contact for hawkers to order ingredients helped to improve productivity and generate cost savings. These manufacturers were also able to tap into a non-health-related government funding programme operated by the Standards, Productivity and Innovation Board. As a result, the price of oil with a healthier fat profile fell in line with palm oils and at least 30% of hawker stalls now buy this healthier oil.

Source: adapted from Hawkes et al. (85).

The pathway through which food prices can be expected to influence nutritional status and health outcomes can be illustrated as under (Fig. 3).

Based on the evidence, the most accurate and effective *objectives for price policies* will focus on their upstream potential to influence purchasing and consumption behaviour, rather than on downstream effects such as body weight or disease which are also influenced by a large number of other factors. In this way, price policies will contribute to the overall aim of reducing overweight and obesity and diet-related NCDs, rather than to the comprehensive achievement of the aim in isolation from other policy measures. The stated objectives of the policy, which are important to frame the policy and prepare for any potential legal challenge, might be to:

- increase (or reduce) the price at point of purchase of targeted foods or nutrients;
- reduce (or increase) the purchase of targeted foods or nutrients;
- reduce (or increase) the consumption of targeted foods or nutrients;
- stimulate food reformulation from food industry, retailers and other operators;
- generate revenue to be invested in health promotion programmes and policy action aimed at preventing obesity and other NCDs, including among vulnerable groups;
- create awareness among consumers and encourage greater intentions to choose healthier options.

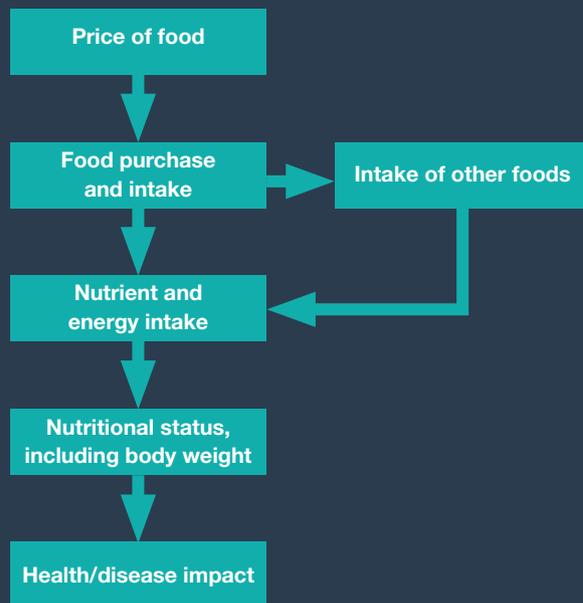
Longer-term objectives (recognizing that no single policy measure will affect all the factors that influence dietary behaviour) might be to:

- improve the overall quality of diet (nutrient and energy intake);
- contribute to a reduction in the prevalence of obesity and diet-related NCDs.

Policy-makers might also consider whether policies are designed to target whole populations or specific subpopulations through a more targeted approach. For example, taxation or subsidies applied at the national level have the potential to benefit the whole population and generate revenue for the government, while more narrowly focused food pricing strategies might also be effective at improving purchasing and dietary intake in specific settings or for specific target groups. Both present opportunities.

Careful consideration should be given to the process of *identifying the foods and/or nutrients* that will be subject to the tax or subsidy. Policy-makers may consider targeting specific foods or categories of food that have been shown to contribute to unhealthy diets and/or excess body weight: that is, foods that have little nutritional value, are high in fat, sugar and salt or energy-dense, nutrient-poor and for which there are close healthy substitutes (for example, sugar-sweetened beverages or a pre-defined list of “less healthy” foods, as in Hungary).

Fig. 3. Pathway from food price to health or disease impact



Source: adapted from Eyles (15).

Evidence suggests that the risk of unhealthy compensatory purchasing is reduced by targeting food(s) with close healthy substitutes. The potential for unintended consequences associated with a tax that targets a single nutrient has been discussed extensively in this publication.

An alternative approach is to use a nutrient profiling system that can identify items that are least likely to contribute to a healthy diet from within a given set of food products, allowing application to a broader range of products.

Fruit and vegetables are an obvious choice for targeted subsidies, which may be integrated in food and nutrition assistance programmes to have a maximum impact on health inequalities.

The supply-chain response also needs to be considered, namely, how food producers, manufacturers and retailers will be affected by fiscal measures and what their response will be at different points in the supply chain (for example, agricultural inputs, production):

- the type of tax selected (specific excise or ad valorem) may have an effect on the portion sizes on offer, and producers and retailers may choose to pass on none, some, all or more than the price increase indicated by the tax, which will affect the price at point of purchase (89);
- producers may also reformulate products to avoid the levy (thus potentially improving the

overall nutritional profile of the product, which may magnify the effect, but also potentially undermining the effect of any price increase on consumption).

A further effect of taxation might be that consumers become more aware of unhealthy products because of the price increase, thereby amplifying the effect of the price increase and enhancing the potential profitability of the market for healthy products. These effects need to be captured in order to evaluate the overall impact of the policy.

Monitoring of policy impact

The biggest gap in the evidence base for price policies for nutrition is not a lack of practical examples but a lack of formal evaluations of these examples (90). This is partly due to their recent introduction in many countries and the significant timeframes required to measure change. Preliminary work needs to be done when a tax is first implemented to ensure that the correct data are captured and reported for a meaningful evaluation to be undertaken in the future.

Monitoring and evaluation are critical to capture the following changes over time that may result from the policy:

- price of targeted products and close substitutes at point of purchase;
- purchasing patterns of targeted products and close substitutes;

- nutritional composition of targeted products and close substitutes;
- dietary intake and behaviour (both of foods/nutrients targeted by the tax or subsidy and of the whole diet);
- population-level rates of overweight and obesity and other diet-related NCDs.

Policy-makers should prioritize the collection of data at the baseline in order to map and contrast with trends over time and assess the extent to which policy objectives have been met. Wherever possible, data should be disaggregated by socioeconomic status, sex and age. In particular, specific consideration

needs to be given to the equity implications of price policies and how these will be evaluated. This information will help to identify the impact of the policy and will inform decisions about how to adjust or improve the policy, including whether or not the amount of tax levied has been adequate to influence purchasing and consumption.

The aim of the evaluation should be to assess the extent to which the policy has made a tangible contribution to broader strategies on nutrition and obesity prevention, where action along multiple policy axes works synergistically to address the multiple determinants of unhealthy diets.

CONCLUSION

This publication has briefly described the theoretical basis underpinning price policies for healthy diets, and has looked closely at the available evidence to inform policy development. The evidence is largely consistent with the theory, and suggests that price policies have the potential to influence consumer purchasing in the desired direction.

The publication has also looked at some of the important considerations to be borne in mind when price policies are being designed and implemented, notably the level at which the price increase or decrease would need to be set to

influence consumers and the potential for unintended consequences. Consideration was given to the potential for substitution that could undermine the overall impact on nutritional quality of diets, and the potential regressivity of taxation. Nevertheless, when considered as a whole and in the light of net health and societal benefits, price policies still figure as an important tool in tackling unhealthy diets and NCDs. From the evidence, taxes on sugar-sweetened beverages and targeted subsidies on fruit and vegetables emerge as the policy options with the greatest potential to induce positive changes in consumption, but the country case studies have also

demonstrated that other approaches can have a positive impact.

Experience with the implementation of such policies in the Region has shown that they are feasible and can influence consumption and purchasing patterns as intended, with a significant impact on important dietary and health-related behaviour. Furthermore, the revenue raised has, in some cases, been successfully ring-fenced for the health budget. The importance of continued monitoring and evaluation has been highlighted, particularly in terms of establishing

baseline data at the outset in order to monitor the effects of the policy.

There is significant scope for countries across Europe to advance the implementation of price policies for healthy diets in the coming years. Several valuable lessons for policy development have emerged from this publication, including the importance of identifying clear policy objectives, foreseeing unanticipated effects of the policy through smart policy design and investing in monitoring and surveillance.

REFERENCES

1. Global status report on noncommunicable diseases 2010. Geneva: World Health Organization; 2010 (http://www.who.int/nmh/publications/ncd_report_full_en.pdf, accessed 31 October 2014).
2. Cecchini M, Sassi F, Lauer JA, Lee YY, Guajardo-Barron V, Chisholm D. Tackling of unhealthy diets, physical inactivity, and obesity: health effects and cost-effectiveness. *Lancet* 2010;376(9754): 1775–84.
3. Health 2020: a European policy framework supporting action across government and society for health and well-being. Copenhagen: WHO Regional Office for Europe; 2012 (EUR/RC62/9; http://www.euro.who.int/__data/assets/pdf_file/0011/199532/Health2020-Long.pdf, accessed 31 October 2014).
4. Action plan for the implementation of the European strategy for the prevention and control of noncommunicable diseases 2012–2016. Copenhagen: WHO Regional Office for Europe; 2012 (http://www.euro.who.int/__data/assets/pdf_file/0019/170155/e96638.pdf, accessed 31 October 2014).
5. Vienna Declaration on Nutrition and Noncommunicable Diseases in the Context of Health 2020. Copenhagen: WHO Regional Office for Europe; 2013 (http://www.euro.who.int/__data/assets/pdf_file/0009/193878/Vienna-Declaration.pdf, accessed 31 October 2014).

6. European Food and Nutrition Action Plan. Copenhagen: WHO Regional Office for Europe; 2014 (document EUR/RC64/14; http://www.euro.who.int/__data/assets/pdf_file/0008/253727/64wd14e_FoodNutAP_140426.pdf, accessed 31 October 2014).
7. Andreyeva T, Long MW, Brownell KD. The impact of food prices on consumption: a systematic review of research on the price elasticity of demand for food. *Am J Public Health* 2010; 100(2):216–22.
8. Thow AM, Jan S, Leeder S, Swinburn B. The effect of fiscal policy on diet, obesity and chronic disease: a systematic review. *Bull World Health Organ.* 2010;88(8):609–14.
9. Sassi F, Belloni A, Capobianco C. The role of fiscal policies in health promotion. Paris: Organisation for Economic Co-operation and Development; 2013.
10. Obesity and the economics of prevention. Fit not fat. Paris: Organisation for Economic Co-operation and Development; 2010 (http://www.oecd-ilibrary.org/social-issues-migration-health/obesity-and-the-economics-of-prevention_9789264084865-en, accessed 27 October 2014).
11. Nishida C, Uauy R, Kumanyika S, Shetty P. Joint WHO/FAO expert consultation on diet, nutrition and the prevention of chronic diseases. *Public Health Nutr.* 2002;7(1A):245–50 (http://www.who.int/nutrition/publications/public_health_nut9.pdf, accessed 31 October 2014).
12. Thow AM, Downs S, Jan S. A systematic review of the effectiveness of food taxes and subsidies to improve diets: Understanding the recent evidence. *Nutr Rev.* 2014;72(9):551–65.
13. Sharma A, Hauck K, Hollingsworth B, Siciliani L. The effects of taxing sugar-sweetened beverages across different income groups. *Health Economics* 2014;23(9):1159–84.
14. Thow AM. Fiscal levers to improve diets and prevent obesity. Deakin (ACT): Deeble Research Institute; 2012 (Evidence brief No. 2; http://ahha.asn.au/sites/default/files/publication/15793/deeble_institute-evidence_brief_fiscal_policy_measures_for_obesity.pdf, accessed 31 October 2014).
15. Eyles H, Mhurchu CN, Nghiem N, Blakely T. Food pricing strategies, population diets, and non-communicable disease: a systematic review of simulation studies. *PLOS Medicine* 2012;9(12): e1001353.
16. Faulkner GE, Grootendorst P, Nguyen VH, Andreyeva T, Arbour-Nicitopoulos K, Auld MC et al. Economic instruments for obesity prevention: results of a scoping review and modified delphi survey. *Int J Behav Nutr Phys Act.* 2011;8:109.
17. Hawkes C. Food taxes: what type of evidence is available to inform policy development? *Nutr Bull.* 2012;37(1):51–6.
18. Kim, D, Kawachi I. Food taxation and pricing strategies to “thin out” the obesity epidemic. *Am J Prev Med.* 2006;30(5):430–7.
19. Mytton O, Clarke D, Rayner M. Taxing unhealthy food and drinks to improve health. *Brit Med J.* 2012;344, e2931.

20. Powell LM, Chaloupka FJ. Food prices and obesity: evidence and policy implications for taxes and subsidies. *Milbank Quarterly* 2009; 87(1):229–57.
21. Powell LM, Chriqui JF, Khan T, Wada R, Chaloupka FJ. Assessing the potential effectiveness of food and beverage taxes and subsidies for improving public health: a systematic review of prices, demand and body weight outcomes. *Obesity Reviews* 2013;14(2):110–28.
22. Claro RM, Levy RB, Popkin BM, Monteiro CA. Sugar-sweetened beverage taxes in Brazil. *Am J Public Health* 2012;102(1):178–83.
23. Dharmasena S, Capps O. Intended and unintended consequences of a proposed national tax on sugar-sweetened beverages to combat the U.S. obesity problem. *Health Econ.* 2011;29(10).
24. Duffey KJ, Gordon-Larsen P, Shikany JM, Guilkey D, Jacobs DR, Popkin BM. Food price and diet and health outcomes: 20 years of the CARDIA Study. *Arch Intern Med.* 2010;170(5):420–6.
25. Epstein LH, Dearing KK, Roba LG, Finkelstein E. The influence of taxes and subsidies on energy purchased in an experimental purchasing study. *Psychol Sci.* 2010;21(3):406–14.
26. Epstein LH, Jankowiak N, Nederkoorn C, Raynor HA, French SA, Finkelstein E. Experimental research on the relation between food price changes and food-purchasing patterns: a targeted review. *Am J Clin Nutr.* 2012;95(4):789–809.
27. Giesen JC, Havermans RC, Nederkoorn C, Jansen A. Impulsivity in the supermarket. Responses to calorie taxes and subsidies in healthy weight undergraduates. *Appetite* 2012; 58(1):6–10.
28. Giesen JC, Payne CR, Havermans RC, Jansen A. Exploring how calorie information and taxes on high-calorie foods influence lunch decisions. *Am J Clin Nutr.* 2011;93(4):689–94.
29. Nederkoorn C, Havermans RC, Giesen JC, Jansen A. High tax on high energy dense foods and its effects on the purchase of calories in a supermarket: an experiment. *Appetite* 2011; 56(3):760–5.
30. Block JP, Chandra A, McManus KD, Willett WC. Point-of-purchase price and education intervention to reduce consumption of sugary sugar-sweetened beverages. *Am J Public Health* 2010;100(8):1427–33.
31. Ni Mhurchu C, Blakely T, Jiang Y, Eyles HC, Rodgers A. Effects of price discounts and tailored nutrition education on supermarket purchases: a randomized controlled trial. *Am J Clin Nutr.* 2010; 91(3):736–47.
32. Waterlander WE, Steenhuis IH, de Boer MR, Schuit AJ, Seidell JC. Introducing taxes, subsidies or both: the effects of various food pricing strategies in a web-based supermarket randomized trial. *Prev Med.* 2012;54(5):323–30.
33. Chriqui JF, Chaloupka FJ, Powell LM, Eidson SS. A typology of beverage taxation: multiple approaches for obesity prevention and obesity prevention-related revenue generation. *J Public Health* 2013;34(3):403–23.

34. Sturm R, Datar A. Regional price differences and food consumption frequency among elementary school children. *Public Health* 2011;125(3):136–41.
35. Chaloupka FA, Powell LM. Price, availability, and youth obesity: evidence from bridging the gap. *Prev Chronic Dis*. 2009;6(3):A93 (http://www.ncbi.nlm.nih.gov/pmc/articles/PMC_2722398/, accessed 28 October 2014).
36. Finkelstein EA, Zhen C, Nonnemaker J, Todd JE. Impact of targeted beverage taxes on higher- and lower-income households. *Arch Intern Med*. 2010;170(22):2028–34.
37. Andreyeva T, Chaloupka FJ, Brownell KD. Estimating the potential of taxes on sugar-sweetened beverages to reduce consumption and generate revenue. *Prev Med*. 2011;52(6):413–6.
38. Sturm R, Powell LM, Chriqui JF, Chaloupka FJ. Soda taxes, sugar-sweetened beverage consumption, and children's body mass index. *Health Aff*. 2010;29(5):1052–8.
39. Jensen JD, Smed S. Cost-effective design of economic instruments in nutrition policy. *Int J Behav Nutr Phy*. 2007;4(1):10.
40. Bahl R, Bird R, Walker MB. The uneasy case against discriminatory excise taxation: sugar-sweetened beverage taxes in Ireland. *Public Finance Review* 2003;31(5):510–33.
41. An R, Patel D, Segal D, Sturm R. Eating better for less: a national discount program for healthy food purchases in South Africa. *Am J Health Behav*. 2013;37(1):56.
42. Sturm R, An R, Segal D, Patel D. A cash-back rebate program for healthy food purchases in South Africa: results from scanner data. *Amer J Prev Med*. 2013;44(6):567–72.
43. Andreyeva T, Luedicke J. Federal food package revisions: effects on purchases of whole-grain products. *Am J Prev Med*. 2013;45(4):422–9.
44. Healthy Incentives Pilot (HIP) Interim Report. Alexandria (VA): US Department of Agriculture; 2013 (http://www.fns.usda.gov/sites/default/files/HIP_Interim.pdf, accessed on 19 August 2014).
45. Nordström LJ, Thunström L. Can targeted food taxes and subsidies improve the diet? Distributional effects among income groups. *Food Policy* 2011;36(2):259–71.
46. Nnoaham KE, Sacks G, Rayner M, Mytton O, Gray A. Modelling income group differences in the health and economic impacts of targeted food taxes and subsidies. *Int J Epidemiol*. 2009;38(5):1324–33.
47. Schroeter C, Lusk J, Tyner W. Determining the impact of food price and income changes on body weight. *J Health Econ*. 2008;27(1):45–68.
48. Mytton O, Gray A, Rayner M, Rutter H. Could targeted food taxes improve health? *J Epidemiol Commun H*. 2007;61(8):689–94.
49. Sacks G, Veerman JL, Moodie M, Swinburn B. 'Traffic-light' nutrition labelling and 'junk-food' tax: a modelled comparison of cost-effectiveness for obesity prevention. *Int J Obes*. 2011;35(7):1001–9.
50. Smed S, Jensen JD, Denver S. Socio-economic characteristics and the effect of taxation as a

- health policy instrument. *Food Policy* 2007; 32(5–6):624–39.
51. Brownell KD, Frieden TR. Ounces of prevention – the public policy case for taxes on sugared beverages. *N Engl J Med.* 2009;360(18):1805–8.
 52. Jensen J, Smed S. Danish tax on saturated fat: short run effects on consumption and consumer prices of fats. Copenhagen: Institute of Food and Resource Economics; 2012 (FOI working paper 2012/14; http://okonomi.foi.dk/workingpapers/WPpdf/WP2012/WP_2012_14_Danish_fat_tax.pdf, accessed 31 October 2014).
 53. Berardi N, Sevestre P, Tepaut M, Vigneron A. The impact of a ‘soda tax’ on prices. Evidence from French micro data. Paris: Banque de France; 2012 (Banque de France Working Paper No. 415; http://papers.ssrn.com/sol3/papers.cfm?abstract_id=2192470, accessed 31 October 2014).
 54. Thow AM, Heywood P, Leeder S, Burns L. The global context for public health nutrition taxation. *Public Health Nutr.* 2011;14(1):176–86.
 55. Yurekli A. Tool 4: Design and administration. Design and administer tobacco taxes. In: Yurekli A, de Beyer J, editors. *World Bank Economics of tobacco toolkit*. Washington (DC): World Bank; 2000 (<http://siteresources.worldbank.org/INTETC/Resources/375990-1113490055569/Taxes.pdf>, accessed 31 October 2014).
 56. Smed S. Financial penalties on foods: the fat tax in Denmark. *Nutr Bull.* 2012;37:142–7.
 57. Craven BM, Marlow ML, Shiers AF. Fat taxes and other interventions won’t cure obesity. *Economic Affairs* 2012;32(2):36–40.
 58. Danish Tax Reform 2010. Copenhagen: Danish Ministry of Taxation; 2009 (http://www.skm.dk/media/139042/danish-tax-reform_2010.pdf, accessed 31 October 2014).
 59. Tax policy development in Denmark, Italy, the Slovak Republic and Turkey [website]. Paris: Organisation for Economic Co-operation and Development; 2014 (<http://www.oecd.org/denmark/taxpolicydevelopmentindenmark/italytheslovakrepublicandturkey.htm>, accessed 31 October 2014).
 60. Smed S, Robertson A. Are taxes on fatty foods having their desired effects on health? *Brit Med J.* 2012;345:e6885.
 61. Indtægtslister for 2012 [Tax revenue for 2012] [website]. Copenhagen: Ministry of Taxation; 2012 (<http://89.233.45.21/skatteomraadet/talogstatistik/menu/9571.html>, accessed 9 January 2015).
 62. Kraak V. Government policies and actions to protect citizen health [Commentary]. *World Nutrition* 2012;3(8):337–57.
 63. Gade S, Klarskov J. A tax everyone wants to see cut. *The Copenhagen Post.* 4 October 2012 (<http://cphpost.dk/news/opinion-a-tax-everyone-wants-to-see-cut.2935.html>, accessed 31 October 2014).
 64. Yle Uutiset [Yle News] [website]. Parliament approves new sweet tax. Helsinki: Yle Uutiset; 2010 (http://yle.fi/uutiset/parliament_approves_new_sweet_tax/5671240, accessed 31 October 2014).

65. Ministry of Finance [website]. Excise duty. Helsinki: Ministry of Finance; 2010 (http://www.vm.fi/vm/en/10_taxation/05_excise_duty/index.jsp, accessed 31 October 2014).
66. Ministry of Finance [website]. Final report of the Sugar Tax Working Group. Helsinki: Ministry of Finance; 2013 (http://www.vm.fi/vm/en/04_publications_and_documents/01_publications/075_taxation/20130131Sokeri/name.jsp, accessed 31 October 2014).
67. Taxation and Customs Union [website]. Excise duty – sweets, ice-cream and sugar-sweetened beverages. Brussels: European Commission; 2012 (http://ec.europa.eu/taxation_customs/tedb/taxDetail.html?id=2001/1334016000&taxType=Other+indirect+tax, accessed 31 October 2014).
68. Weston S. Tax increases affect drinks sales in Finland. In: FoodBev.com [website]. Bath: FoodBev Media Ltd; 2014 (<http://www.foodbev.com/news/tax-increases-affect-drinks-sales-in-fin#.VDKzbmeSyoN>, accessed 31 October 2014).
69. Cornelsen L, Green R, Dangour A, Smith R. Perspectives. Why fat taxes won't make us thin. *J Public Health* 2014;1–6. doi:10.1093/pubmed/dfu032.
70. Byrne J. Confectionery tax will distort competition, claims Finnish industry body. *Confectionery News*. 23 September 2010 (<http://www.confectionerynews.com/Regulation-Safety/Confectionery-tax-will-distort-competition-claims-Finnish-industry-body>, accessed 31 October 2014).
71. A népegészségügyi termékadó hatásvizsgálata [The public health impact assessment of taxes on products]. Budapest: Hungarian National Institute for Health and Development; 2013 (http://www.oefi.hu/NETA_hatasvizsgalat.pdf, accessed 31 October 2014).
72. Food taxes and their impact on competitiveness in the agri-food sector. Annexes to the main report. Rotterdam: ECSIP Consortium; 2014 (<https://www.google.be/url?sa=t&rct=j&q=&esrc=s&source=web&cd=1&cad=rja&uact=8&ved=0CCQQFjAA&url=http%3A%2F%2Fec.europa.eu%2FDocsRoom%2Fdocuments%2F6150%2Fattachments%2F1%2Ftranslations%2Fen%2Frenditions%2Fpdf&ei=YPFYVongGtPXavusgPgB&usg=AFQjCNFtbSkwB48p-3vszW4A4lsVJyrvWw&bvm=bv.78677474,d.d2s>, accessed 4 November 2014).
73. Flash. Lettre d'information de l'Association Nationale des Industries Alimentaires 2012;696.
74. Landon J, Graff H. What is the role of health-related food duties? A report of a National Heart Forum meeting held on 29 June 2012. London: National Heart Forum; 2012.
75. Evaluation of the School Fruit Scheme. In: Agriculture and Rural Development [website]. Brussels: European Commission; 2012 (http://ec.europa.eu/agriculture/evaluation/market-and-income-reports/school-fruit-scheme-2012_en.htm, accessed 31 October 2014).
76. White Paper on A Strategy for Europe on Nutrition, Overweight and Obesity related Health Issues. Brussels: European Commission; 2007

- (COM(2007) 279 final; <http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=COM:2007:0279:FIN:EN:PDF>, accessed 31 October 2014).
77. Øverby NC, Klepp K, Bere E. Introduction of a school fruit program is associated with reduced frequency of consumption of unhealthy snacks. *Am J Clin Nutr.* 2012;96:1100–3.
78. EPHA [website]. *Updated* School Fruit Scheme: Excellent Take-up by Member States. Brussels: European Public Health Alliance; 2009 (<http://www.ephpa.org/spip.php?article 3365>, accessed 31 October 2014).
79. Gonzalez-Zapata IL, Alvarez-Dardet C, Millstone E, Clemente-Gomez V, Holdsworth M, Ortiz-Moncada R et al. The potential role of taxes and subsidies on food in the prevention of obesity in Europe. *J Epidemiol Commun H.* 2010;64(8):696–704.
80. Mozaffarian D, Afshin A, Benowitz NL, Bittner V, Daniels SR, Franch HA et al. Population approaches to improve diet, physical activity, and smoking habits: a scientific statement from the American Heart Association. *Circulation* 2012; 126(12):1514–63.
81. de Sa J, Lock K. Will European agricultural policy for school fruit and vegetables improve public health? A review of school fruit and vegetable programmes. *Eur J Public Health* 2008;18(6):558–68.
82. Evans CE, Christian MS, Cleghorn CL, Greenwood DC, Cade JE. Systematic review and meta-analysis of school-based interventions to improve daily fruit and vegetable intake in children aged 5 to 12 y. *Am J Clin Nutr.* 2012;96(4):889–901.
83. Van Cauwenberghe E, Maes L, Spittaels H, van Lenthe FJ, Brug J, Opperet JM et al. Effectiveness of school-based interventions in Europe to promote healthy nutrition in children and adolescents: systematic review of published and ‘grey’ literature. *Br J Nutr.* 2010;103(6):781–97.
84. de Azevedo Pereira JA. Using VAT as a fiscal consolidation tool in Portugal. Lisbon: Autoridade Tributária e Aduaneira [Revenue and Customs Authority]; 2014 (http://ec.europa.eu/taxation_customs/resources/documents/taxation/gen_info/conferences/taxforum2013/pereira.pdf, accessed 4 November 2014).
85. Hawkes C, Thow AM, Downs S, Ling AL, Ghosh-Jerath S, Snowdon W et al. Identifying effective food systems solutions for nutrition and noncommunicable diseases: creating policy coherence in the fats supply chain. *SCN News* 2014;(40):39–47.
86. Hawkes C, Friel S, Lobstein T, Lang T. Linking agricultural policies with obesity and noncommunicable diseases: a new perspective for a globalizing world. *Food Policy* 2012;37(3):343–53.
87. World Bank/International Finance Corporation. World Bank Group Framework and IFC Strategy for Engagement in the Palm Oil Sector. Washington (DC): World Bank/IFC; 2011 (<http://www.ifc.org/wps/wcm/connect/159dce004ea3bd0fb359f71dc0e8434d/WBG+Framework+and+>

- IFC+Strategy_FINAL_FOR+WEB.pdf?MOD=AJPERES, accessed 31 October 2014).
88. Creating a Healthier Singapore. A message from Health Promotion Board [e-document]. Singapore: Health Promotion Board; 2013 (http://www.ciaprochef.com/wohfasia/pdf/CreatingaHealthier_Singapore_final.pdf, accessed 27 October 2014).
 89. Bonnet C, Réquillart V. Sugar policy reform, tax policy and price transmission in the soft drink industry [e-document]. 2012 (Transparency of food pricing. Working Paper No. 4; http://www.transfop.eu/media/universityofexeter/businessschool/documents/centres/transfop/wp_transfop_4.pdf, accessed 31 October 2014).
 90. Mytton OT, Eyles H, Ogilvie D. Evaluating the health impacts of food and beverage taxes. *Curr Obes Rep.* 2014;1–8.

The WHO Regional Office for Europe

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