

Health-related taxes on foods and beverages

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- Over-consumption of foods and beverages high in fat, sugar and salt content, associated with heightened risk for obesity and diet-related non-communicable diseases (NCDs), is one of the biggest public health problems facing the UK.
- It is not only a worry for people who suffer from limiting conditions such as diabetes, types of cancers, cardiovascular and coronary heart disease, but it is also worrying for all tax payers whose revenues go towards covering the costs of obesity and related NCDs to the NHS and the welfare system.
- Increasing the price of unhealthy foods and beverages through taxes is a potential policy measure to discourage over-consumption.
- This type of health-related food and beverage tax is already applied in Finland, France, Hungary, and Mexico.
- Preliminary evidence from existing taxes on food and beverages suggests that these have been effective in reducing purchases, but the long-run impact on consumption and population health is yet to be evaluated.
- The debate on such taxes in the UK is ongoing. Several organisations have called for a 20% or 20p per litre tax on sugar-sweetened beverages (SSB) while both Conservative and Labour party representatives stated in 2014 no intentions of introducing a tax on SSBs or sugar.
- The food industry remains firm that taxes are unnecessary and numerous companies have pledged to compromise with voluntary agreements such as restricting food marketing to children, reformulating products, modifying food labels and promoting healthy eating guidelines.
- The effectiveness of the tax in reducing consumption of unhealthy foods and beverages depends on its design. If tax rates are low, the tax base narrowly specified and taxes are levied upon products that are relatively cheap, the impact will be small.
- A higher tax rate, combined with gradual increases, and a broader tax base will result in a larger impact on consumption and has thus greater potential to influence health. However, proposals for such taxes are also likely to face even greater opposition from the food and beverage industry.
- Taxes on unhealthy foods and beverages alone will not solve nutrition-related health problems. However, if well designed and communicated, in combination with other relevant policy measures, taxes can contribute to improved population health.
- If taxes are to be pursued to fight obesity and non-communicable diseases, it is necessary that other regulatory measures and novel voluntary actions by food producers and food retailers continue to be developed and implemented.

1. Why are food and beverage taxes of interest to civil society?

The main reason talks have emerged on introducing specific food and beverage taxes is because of **public health concerns**. Over-consumption of energy dense foods high in fat and sugar, and sugar-sweetened beverages (SSB), is related to obesity and increased prevalence of type 2 diabetes, coronary heart disease (CHD), other cardiovascular diseases (CVD), several cancers and other NCDs (3-8). Furthermore, consumption of sugary foods and drinks is the primary cause of tooth decay. Taxes can be used to make unhealthy food more expensive relative to healthy foods and thereby incentivise healthier food consumption behaviour.

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Secondly, food taxes affect food prices, which matter for **consumers**, particularly low-income earners who spend a greater share of their disposable income on foods. Policies that lower the price of foods are understandably popular while food taxes, to the contrary, are unpopular because of their regressive nature. Food taxes are considered to be regressive because low-income earners pay relatively larger share of their disposable income on such taxes. However, those in lower socio-economic groups purchase a greater share of energy from less healthy foods and beverages than those in higher socio-economic groups (9) which places them at a greater risk of obesity and ill-health. This is at least partly due to the higher relative price of foods such as fruits and vegetables and lower relative price of unhealthy foods such as confectionery, soft drinks, snacks, fast food, breakfast cereals and convenience foods (10, 11).

Thirdly, taxes are a common measure to internalise the cost of **negative externalities**. Negative externalities are, by definition, private actions that impose costs on society. Food is associated with two types of externalities. First, obesity, if triggered by over-consumption of foods, imposes costs on society through higher medical costs, loss of productivity, absenteeism and subsequently, welfare payments. Second, unsustainable food production, focusing on quantity of food production, has a significant negative impact on the environment (12).

Raising government revenue through taxes on unhealthy foods and beverages can provide means to reduce the additional cost imposed on the society from its consumption, and to address the regressive nature of the tax by providing subsidies on healthy foods. While taxes on very specific food or beverage products are not expected to yield large tax contributions relative to other sources of tax revenue, the potential of the taxes to raise additional revenue has been used alongside the public health argument in the debates on the implementation of the majority of existing food and beverage taxes (e.g. Finland, Hungary, Denmark and France).

2. Background

2.1 Nutrition related health in the UK

In 2011, 62% of the UK population was obese or overweight³. A quarter of men (24%) and women (26%) were obese, and a further 42% of men and 32% of women were overweight. Obesity prevalence is highest among 45-74 year olds, both men and women. Among children aged 2-15, 17% of boys and 26% of girls were obese with a further 31% of boys and 28% of girls overweight. While the rate of growth in obesity prevalence among adults has slowed down, the levels in 2011 were still the highest recorded. For children there was a decline in obesity levels in the mid-2000's but since then the trend has mostly flattened out with only a small reduction continuing in the prevalence of overweight girls (13). The most recent projections by the WHO show that by 2030, 74% of men and 64% of women in the UK will be overweight, including 33% of women and 36% of men who will be obese (14).

Among women and children, overweight, and particularly obesity prevalence, varies by income group with the highest prevalence rates reported among the population of the lowest income quintile (13). Furthermore, a strong relationship exists between levels of deprivation and obesity among women and children⁴. Those in the lower deprivation quintiles are more likely to be obese and overweight in comparison to those in higher quintiles (13). For men, the difference in the prevalence of obesity among highest and lowest income earners is small, while the prevalence of overweight is higher among high income earners (13).

³ Obese defined as Body Mass Index (BMI) higher than 30 and overweight defined as BMI greater than 25

⁴ Quintiles of the Index of Multiple Deprivation (income deprivation; employment deprivation; health deprivation and disability; education, skills and training deprivation; barriers to housing and services; crime; living environment deprivation).
https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/6320/1870718.pdf

Being overweight or obese is the main risk factor for developing type 2 diabetes. According to Public Health England, obese adults are five times more likely to be diagnosed with diabetes in comparison to adults at a healthy weight (15). People with type 2 diabetes have an increased risk of developing other associated comorbidities such as cardiovascular diseases (CVD), kidney failure, and blindness (16-18). Recent estimates from the US show that persons with obesity die up to 8 years earlier than non-obese persons, mainly caused by associated diseases such as type 2 diabetes, dyslipidaemias and hypertension causing strokes and other coronary heart diseases (CHD) and cardiac events (19).

High consumption of saturated fat is associated with raised blood cholesterol which together with low consumption of fruits and vegetables and high consumption of salt are among the main risk factors for CHD (6). In the UK, CHD is the leading cause of death with 1 in 6 men and 1 in 10 women dying of the disease (20). High consumption of salt is further related to high blood pressure (hypertension) and stroke (6). High blood pressure affects approximately 1 in 3 adults in the UK and is one of the leading causes of CVD (13). High consumption of SSBs is associated with increased body mass index and with diabetes mellitus (6, 21) and together with sugary food consumption is linked to tooth decay, affecting 31% of adults and 28% of five year old children in England (22). Furthermore, dental extraction is the major cause of general anaesthesia in young children, affecting particularly children from deprived households and certain ethnic minority groups (22). At an extreme it can cause malnutrition for both children and adults and significantly reduce quality of life due to pain and discomfort. (22)

2.2 Estimated costs of obesity and nutrition related health in the UK

Health problems associated with being overweight or obese cost the NHS more than £5 billion every year (23, 24). Medical costs of an obese person are estimated to be 50-80% higher in comparison to an individual in normal weight (25, 26).

In addition to direct medical cost, society faces costs from absenteeism associated with obesity which in 2002 was estimated at 15.5-16 million days per year (24). It has also been estimated that obese people are up to 25% less likely to be in employment in comparison to people in healthy weight, with this effect being larger for women (27). Estimates of such indirect costs over the period 1998 to 2007 ranged between £2.6 billion (28) and £15.8 billion (29). Modelled projections suggest that indirect costs could be as much as £27 billion in 2015 (29).

According to most recent estimates, the total cost of obesity in the UK was £47 billion in 2012 - a figure second only to smoking. This estimate of the total societal cost includes the cost of health care, lost productivity due to disability and premature death, and direct investment in mitigation strategies (26).

By disease categories, the total cost (direct care and indirect costs) associated with diabetes in the UK was £23.7 billion in 2012 and is predicted to rise to £39.8 billion by 2035 (30). Combined costs of care, mortality and morbidity from CVD was £13.4bn in 2014, estimated to rise to £24 billion by 2020 (31). Dental treatment is equally costly. The NHS spends around £3.4 billion on dental treatment every year (32).

3. Food consumption and food price trends

There are many argued causes for the rising levels of obesity. Among these, some environmental conditions have contributed, such as modified food consumption patterns, increase sedentary life-styles, increase of availability of processed and high energy foods, physical access to these foods and changes in food prices.

Analysis of consumer food expenditure data since the 1980's, by the Institute of Fiscal Studies (IFS), showed a reduction in the amount of calories eaten at home and an increase in the calories eaten outside the home, from snacks, soft drinks and

confectionery (33). The price per calorie consumed has fallen, indicating a substitution towards cheaper sources of calories, particularly following the financial crisis of 2008 (34). Other sources similarly suggest that foods have become more calorie dense but cheaper, and that portion size of packaged foods and meals in restaurants has also increased (35).

Another change that has occurred in the past couple of decades affecting diets is a decrease in the time spent on preparing foods. This has fallen from 60 minutes as the average time to prepare a meal in 1980 to 34 minutes in 2014 (36, 37). This also suggests greater reliance on pre-prepared foods, ready to eat meals and eating out of the home.

While the food expenditure data show that health consciousness in food consumption decisions has increased (36) it is not always clear to consumers what foods are healthy or unhealthy and how much should be consumed or in fact is consumed. Based on a panel of nearly 30,000 British households, 36% believe they consume five portions of fruit and vegetables per day as recommended by the Government for a healthy diet but in reality only 11% of households achieve this (36). The National Diet and Nutrition Survey reports higher figures than the food expenditure data, with 31% of adults and 37% of children eating five portions of fruit and vegetables in a day, but even at this level, still significantly less than half of the population achieve the five a day target (38). IFS analyses also report that population buying practices have had a substantial shift away from fruit and vegetable consumption towards purchases of processed foods (34).

Awareness of the harmfulness of saturated fats has dominated the food sector and reformulation efforts in the past decade. Sugar has been used to replace fats meaning that many foods labelled as “healthy” due to their low-fat content now contain higher levels of sugar and contribute to rising obesity prevalence (39).

3.1 Food prices

Food prices act as signals for consumers and have an important role in purchasing decisions. A recent policy brief by the Food Research Collaboration on food prices in the UK shows the trend of Consumer Price Indices (CPI) (40). Since 2005 the price of foods bought for consumption at home has on average grown by 30%. The category of ‘other food’ which encompasses ready cooked meals has seen the smallest increase in price (22%) while the price of fruits and vegetables, for example, grew considerably more (31%). In comparison, the price of food bought for consumption outside the home (restaurants, cafes, catering), including alcoholic beverages, grew also at a slower rate of 23% (41). The CPI of unprocessed foods grew by 31% whereas the CPI of processed foods (including non-alcoholic beverages) grew at the slightly lower rate of 29%.

Recent academic research focusing on the price of unhealthy foods and cost of diets also shows that the healthiest diets cost double the price of the least healthy diet (42). The price of unhealthy foods has been shown to be decreasing over time and, importantly, the gap between the price of healthy and unhealthy foods is widening (10, 11).

Price promotions are also becoming more common at supermarkets. Kantar data on consumer expenditure shows that foods bought on price promotion account for 37% calories, 34% of sugar and 39% of saturated fats (37). Academic research shows that, contrary to common belief, overall healthy and non-healthy foods (high in salt, sugar and fat) are promoted similarly, regardless of their attributes regarding health. Nonetheless, the increase in sales due to price promotions is larger in the less healthy food categories than in healthier food categories (43).

3.2 Food purchasing trends across socio-economic groups

Table 1 shows the average annual expenditure share (%) of foods purchased by socio-economic groups in the UK in 2013. The largest differences between the highest two (A&B) and lowest two (D&E) groups illustrate the inequalities that exist in food purchasing patterns. Groups A&B spend more on fruits and vegetables while

groups D&E spend relatively more on both sweets, soft drinks, and ‘other’ category, which largely consists of convenience, pre-prepared frozen and canned foods.

Table 1: Average annual expenditure share of foods and beverages, 2013

Average annual expenditure share (%)			
	A&B	C	D&E
Bread, pasta, rice, breakfast cereal	11.0	11.1	11.5
Meat and fish	15.3	15.2	14.5
Dairy	13.9	13.5	13.4
Fruits and vegetables	15.9	14.2	12.4
Juice, juice drinks, flavoured milk	1.5	1.2	1.0
Soft drinks	4.6	4.9	5.3
Sweets (confectionery, biscuits)	8.4	9.2	10.3
Other*	29.4	30.8	31.6

Source: Kantar Worldpanel UK, author calculations

*Other: convenience foods, frozen prepared foods, canned goods, savoury home cooking (e.g. oils, sauces, meal kits, curry paste), crisps, pop-corn, slimming products, hot beverages, pickles, table sauces, condiments.

Other research on food consumption by socio economic groups has also shown that lower socio-economic groups generally purchase a greater proportion of energy from less healthy foods and beverages while higher socio-economic groups purchase a greater proportion of energy from healthier foods and beverages (9).

Analysing food expenditure data by different family compositions, IFS analyses reported that since the economic recession in 2008, couples with young children, lone parent households and pensioner households have seen the largest declines in the nutritional quality of their purchases, mostly driven by a switch to processed foods compared with other household types. As a result, the average saturated fat and sugar content of food purchases in these groups has increased over this period (34).

4. Food taxes in the UK

There are three types of taxes that can affect the price of food and beverages: the value added tax, import tariffs and excise duties. Value Added Tax (VAT) is paid as a % of the value of all food or beverages sold; import tariffs apply to foods or beverages that are imported from outside the European Union (EU); and excise duties may be levied upon goods that in a health context carry negative externalities such as tobacco or alcohol. Currently there are no excise duties on foods in the UK.

4.1 Value added tax

Most foods and non-alcoholic beverages in the UK are taxed either at reduced 0% or standard rate (20%) VAT. The 0% VAT applies to raw meat and fish, fruits and vegetables, cereals, nuts and pulses, herbs, bread and bread products and cold take-away foods. The 20% rate applies to hot take-away foods, ice cream, confectionery, juice and juice drinks, carbonated drinks, potato crisps and savoury snack products, cereal and muesli bars, fruit bars, flavoured rice cakes and savoury popcorn. While the standard rate applies to less healthy foods, there are still plenty of products that are high in sugar, fat and/or salt that are taxed at a reduced rate, such as cakes, flapjacks, chocolate for home-baking, sugary breakfast cereals or processed meat and cold take-away foods.

4.2 Trade tariffs and restrictions

Import tariffs on foods from non-EU countries are set via the Common Agricultural Policy (CAP) of the EU and vary according to foods and country of origin. The rate of

the tariffs depends on trade agreements between the EU and individual countries or groups of countries. The purpose of these tariffs is to ensure that EU produce is competitive in the EU market. Overall, tariffs range from 5% to 20% of the value of the food (44, 45).

The fruit and vegetable market within the EU is further protected by an entry price system. If the price of the imported produce falls below a set reference price it is subject to both tariff and an ad valorem duty while if it is at or above the reference price, it is subject to ad valorem duty only (45, 46). This system protects local fruit and vegetable producers but at the same time keeps the price of fruit and vegetables at potentially higher levels in comparison to world market prices.

Trade statistics, collected by DEFRA, show that the quantity of imports subject to potential tariffs varies significantly by food groups. For example, 33% of fruit and vegetable products are imported to the UK from outside the EU while only 0.7% of dairy and egg products, and 18% of meat and meat preparations, are imported from outside the EU(47). The overall impact of such trade restrictions on the prices of healthy and unhealthy foods (or health) has not been evaluated, but these figures do imply that the price of fruit and vegetables could be lower if such restrictions and tariffs were not in place.

In addition, sugar sector reforms proposed in the CAP may have significant effects on the price of sugar in the near future. DEFRA estimates that changes to sugar policy regarding sugar imports from non-EU countries are likely to reduce the price of sugar by 20-35% (48). Even though these reforms will not be implemented until 2017 it is clear it would undermine any tax on sugar or sugary beverages. While the aim of the sugar policy is to make the agricultural sector more competitive, a consequence of reducing the price of sugar is contrary to the recommendations of global nutrition and health policies (49).

5. Health related food taxes

5.1 Design of health related food tax

The main consideration when designing health related food taxes is the scope (base) of tax. Distinction can be made between taxes on individual products and taxes on ingredients. For example, the tax could be imposed on drinks with added sugars or it could be imposed on sugar as an ingredient. Between the two options there is a trade-off between the ease of implementation, administration, and its effectiveness. Imposing a tax on specific products (e.g. SSB) is easier to determine and administer but, because there will be alternatives that are not taxed but still high in sugar content, substitution to untaxed products will be likely (e.g. natural juices or sweets in general). Conversely, taxing added sugar as an ingredient will have a significant administrative burden as it affects a large range of products, but its effect will be larger as substitutions are less likely to occur because the price of all products containing sugar increases (50).

The next consideration is the type of tax to be imposed. In this context the discussion is generally between increasing the rate of an existing VAT and introducing an excise duty that can be in addition to an existing VAT on the product. VAT is proportional to the price of the product meaning that the value of the tax is smaller if the price of the product is lower. Excise duty is typically a 'per unit' tax, costing a specific amount per volume or unit of the item purchased. This type of tax is commonly used to raise government revenue and is levied upon goods for which demand is relatively less responsive to price changes and for which few substitutes exist. For example, tobacco, fuel and alcohol are all taxed via excise duty in addition to VAT. Excise duty is also argued to correct negative externalities (i.e. harm caused by consumption on third parties).

Excise duty is by definition likely to have a larger impact on consumption as it is imposed on a unit of product (e.g. per litre of SSB) and at the same rate regardless

of its price (e.g. branded and non-branded drinks would be taxed equally). As the VAT is levied based on the product price, it incentivises purchases of larger quantities (e.g. price per litre is lower for 1L bottle in comparison to 0.33L bottle). Both types of taxes are regressive but taxes based on volume of consumption, rather than value, have been shown to have a lower tax burden (51).

Finally, it has to be considered whether the tax rate will change over time. The advantage of the VAT based tax is that it is already linked to inflation. Excise duty, linked to unit of consumption, has to be indexed to inflation as otherwise it will become less significant as prices rise. Furthermore, excise duty can be introduced gradually, meaning that the tax rate is set to increase by increments for a number of years, a policy that has been applied to tobacco and alcohol products. Gradual implementation of the duty allows time for consumers to change their habits and soften the impact on households and businesses.

5.2 Health related food taxes introduced in other countries

Table 2 summarises health related food taxes introduced in a number of countries. The arguments for implementation for each of these taxes has been a combination of addressing rising obesity and NCD prevalence and increasing revenue for government (1).^{5,6} Finland is the only country where revenue collection is reported as the primary objective (1).

All taxes implemented are excise duties with the exception of Mexico where the VAT rate was raised for unhealthy foods. Hungary and Mexico have taxes on foods high in salt, sugar or fat content and sugary drinks/soft drinks/drinks with added sugar. Finland has a tax on sweets, ice-cream and soft drinks, and France and Berkley (California, USA) have taxed only soft drinks.

In a few examples the opposition to already implemented taxes has been successful in removing or limiting the taxes. Denmark introduced a tax on saturated fats in 2011 but due to its unpopularity among many actors, little political support, and alleged negative effects on the industry, the tax was repealed shortly before its first anniversary (52). The Finnish government rescinded a planned tax increment for 2015 in the sweets tax due to a complaint filed with the European Commission by the Finnish Food and Drinks Industries Federation calling into question the lawfulness of the tax⁷, which has reportedly hindered the government in expanding the scope of the tax (53).

Rates of the implemented taxes vary across countries. Hungary has the lowest tax rate on soft drinks and Finland has the highest (and progressive) tax rates. Tax revenues therefore vary but are also affected by the scope of the tax base (e.g. in France the tax also covers SSBs with artificial sweeteners) and consumption and price levels in each of the countries. In absolute levels, the tax in Mexico has yielded the highest revenue which also exceeded expectations by 116% (54).

⁵ Taxes on food and beverages, implemented for health reasons, can also be found in Mauritius, French Polynesia, Tonga and Samoa. For more details on these taxes see <http://www.wcrf.org/int/policy/nourishing-framework/use-economic-tools>

⁶ Few excise taxes on foods have existed before. Denmark, for example, has taxed ice cream since 1946, soft drink and juice since the 1930s and sweets (since 1968). Finland had an excise duty on sweets from 1926 to 2010.

⁷ Case refers to the unfair tax base as cookies and other bakery products are exempt from the tax while often referred as similar products to sweets and confectionery (http://www.etl.fi/www/fi/lausunnot/kannanotot/State_Aid_Complaint_Excise_Duty_in_Finland.pdf)

Table 2. Health related food taxes implemented

Country	Year	What are taxed	Rate of tax	Type of tax and reasoning	Revenues raised
Hungary	2011	Foods high in sugar, fat or salt and sugary drinks	Soft drinks: ~£0.02per/L Syrups or concentrates: ~£0.5 per/L Energy drinks: ~£0.64 per/L Pre-packaged sugary products: ~£0.33 per/kg Salty snacks (salt > 1g/100g):~£0.64 per/kg Jam: ~£1.28 per/kg	Excise; public health/revenue for health services	2011:~£8m 2012: ~£47m 2013: ~£46m
Denmark	2011 (abolished in Jan 2013)	Products with more than 2.3% of saturated fat (meat, dairy, animal fats and oils)	Saturated fat: ~£1.76 per/kg	Excise; public health/finance tax cuts elsewhere	~£115m; Estimated administrative cost ~£5-19m
France	2012	Drinks containing added sugar or sweetener	Sugared and non-sweetened drinks: 2012: ~£0.057 per/L 2013: ~£0.058 per/L 2014: ~£0.059 per/L Energy drinks: ~£0.79 per/L	Excise, adjusted annually to inflation; public health and revenue	£268m
Finland	2011	Sweets, ice cream and soft drinks	Soft drinks; sweets and ice-cream 2011: ~£0.06 per/L; ~£0.6 per/kg 2012: ~£0.09 per/L; ~£0.75 per kg 2014: ~£0.17 per/L, ~£0.75 per/kg	Excise with gradual increase; revenue collection /public health	2011: £95m 2012: £129m 2013: £144m
Mexico	2014	Sugary drinks and high-calorie foods (e.g. chips, sweets, breakfast cereals)	Sugary drinks: £0.04 per/L High-calorie foods: 8% increase in VAT	Excise/VAT; health (55)	2014: ~£1,252m (58% tax from sodas and 42% from high caloric foods).(54)
US, California, Berkley	2014	Sugar-sweetened beverages	~£0.24 per/L (56)	Excise; health	No data yet

Source: (1, 2) unless stated otherwise. Ecorys report analysis based on Euromonitor Passport Database

5.3 Policy debate in the UK on health related food taxes

Position of NGO's and medical associations in the UK

Over the past two years several NGO's and medical associations have actively advocated the introduction of a tax on SSBs to curb their consumption as they contribute towards higher bodyweight and oral health problems while providing no nutritional value. Support for a 20p per litre tax on SSBs and subsequent earmarking of revenues for programs to improve (children's) health and food environments have been publicly announced via statements and reports by:

- Children's Food Campaign in December 2014
- The Faculty of Public Health in November 2013
- Academy of Medical Royal Colleges in February 2013
- Sustain, including support from 61 organisations in January 2013

Calls for a tax on SSB in a form of an excise duty have also been made by:

- Action on Sugar in their manifesto for 2015 (published October 2014)
- UK Health Forum (previously National Heart Forum) in June 2012

Politicians' response

Thus far, the response from politicians to calls to introduce a tax on SSBs has not been positive. Although in March 2014 the Government Chief Medical Officer, Dame Sally Davies, told a committee of MPs that a tax on sugar may be necessary as it was unlikely the industry will voluntarily reformulate products to contain less sugar, Health Secretary, Jeremy Hunt, announced in June 2014 that the government did not have any plans to introduce taxes on sugar or sugary drinks (57). This statement was echoed by Labour Shadow Health Minister, Luciana Berger, a month later, in

July 2014 (58). The government Scientific Advisory Committee on Nutrition (SACN) did however at the same time issue draft recommendations to the public to reduce sugar intake to account for 5% of daily calories, reduced from 10% in previous recommendations, in the light of similar recommendation made by the WHO in March 2014 (21, 59, 60).

Industry position and the Responsibility Deal

The food and beverage industry does not support taxes and insists on the effectiveness of voluntary actions (61). This is largely done under the umbrella of the Responsibility Deal, launched in 2011 and led by the Department of Health (62). Companies sign up to voluntary pledges, focusing on different areas but not all of these have specific targets. For example, the 'calorie reduction pledge' aims to reduce the number of calories in the UK daily food supply by 5 billion through changes in formulation, package size, new low-calorie alternatives and consumer education. The pledge currently has 43 signatories listed⁸. In comparison, the pledge on 'saturated fat reduction' and the pledge to increase 'fruit and vegetable intake' have less specific targets and so far have 18 and 48 signatories, respectively.

Once signed up to the pledge, companies have to provide a delivery plan that sets out how they will meet the pledge objectives and annually report back on progress. Recently published analysis of these reports concludes that some of the actions undertaken could be effective in improving population health (e.g. reformulation to remove saturated fats) but the majority favoured information provision, awareness raising and communication with consumers, which has been shown to have a limited effect on health(63). No specific objectives were found regarding reduction in sugar consumption and pricing policies were only mentioned under the fruit and vegetable pledge. Furthermore, the evaluation found that most interventions were clearly or possibly already underway regardless of the Responsibility Deal (63). Elsewhere, concerns have also been expressed on whether the Responsibility Deal could achieve a reduction in sugar consumption and continue the progress made in reducing salt consumption due to a lack of clear targets (64, 65).

Even though voluntary reformulation has led to successes in reducing the amount of salt in foods in the past decade (66, 67) it is unclear whether this can be repeated for calories or, more specifically, sugar in pre-prepared foods and beverages because of more complicated needs in reformulation processes. Sugar not only provides sweetness but also is an important factor in volume, texture, viscosity and preservation of foods (68). Also, it remains to be seen whether the voluntary steps taken have and will be significant enough to impact health outcomes.

Public opinion

Another important factor is public support to taxing unhealthy foods and beverages. This aspect has received relatively little attention from academics. Timpson and Lavin (2014) analysed attitudes towards a tax on sugary drinks among 293 respondents from Cheshire, Cumbria, Greater Manchester, Lancashire and Merseyside (69). Of the respondents 76.2% reported drinking sugary drinks and most of the adult participants of the study described doing so as 'out of habit'. Many participants viewed sugary drinks as a source of energy but few linked it to weight gain or a high amount of calories. The majority however were aware of the negative effect of drinking sugary drinks on dental health. Adults reported that price affects their decisions to consume sugary drinks and reported buying sugary drinks on offer, or when it is part of a meal deal. Children and young people, on the other hand, bought a sugary drink if they wanted one, provided they had money for it, regardless of the price. Generally, the respondents found tax on sugary drinks acceptable but thought 20% would not be enough to impact consumption.

Although a small study, it brings up relevant points: a) sugary drink consumption is more likely to be habitual rather than a rational choice; b) children and young people might be less responsive to price changes (provided they have the money to buy the drink) as they buy small quantities at a time and do not think about budgets

⁸ As of 29.04.2015

or providing a meal when making decisions⁹, and c) adults buy sugary drinks in larger quantities at a time for the family, together with other food items, and do so often due to offers or deals and hence are likely to be more responsive to changes in prices.

Mazzocchi et al. (2014) looked at attitudes towards healthy eating policies more broadly in five European countries, including in the UK (sample n=603) (70). The British population considered a price subsidy for healthy foods (72% agree or strongly agree to the policy statement), followed by VAT reflecting healthiness of foods (67%) and subsidies for low-income families (62%) as the most popular among policies that affect the price of food. The least popular was a 'fat tax' to fund healthy eating policies (47%).

The study also measured willingness to pay (WTP) for healthy eating policies. When asked to allocate €150 of a tax increase between healthy eating policies, other policy actions to promote health, housing, security, transportation and the environment, the UK sample on average allocated €17 to healthy eating policies. However when asked how much they would be willing to pay in more taxes, the total net WTP amounted to €-11 signalling that while the public would support the healthy eating policies they are not individually willing to pay for these through higher taxes and to the contrary would prefer to see a tax reduction. Of the five countries studied, Denmark was the only country where the total WTP for healthy eating policies was positive (€14).

Authors also reported that fiscal policies were more likely to be supported by those who believe obesity is attributed to food supply factors¹⁰, and whose political views are more to the left, relative to centre. Those who consume fast-food and pre-packaged meals are predictably less likely to support fiscal policies. Those who thought obesity is attributed to individual failure, economic constraints or genetics were found to not have higher levels of support towards any of the policy options.

Emm et al. (2013) surveyed 188 respondents from South England and found greater support shown towards redistributive policies (e.g. funding fruit and vegetables at schools, subsidising exercise and education programs) in comparison to policies that raise the price of foods¹¹(71). Similarly to other findings, a comparison of public acceptability of increased taxation and education campaigns to choice architecture (i.e. nudging) interventions¹², found that the UK population accepted education campaigns the most (~80% of the sample). Choice architecture interventions were found acceptable by more than half of the sample (~50-65%) and increasing taxes was the least accepted (~40% of the sample) intervention (72).

6. Impact of health related food taxes

To evaluate the effectiveness of the taxes, the targeted outcome against which it is evaluated against needs to be made clear. Immediate response is generally measured by the reduction of consumption or the reduction in expenditure on taxed products and the tax revenue collected. Reports and studies on the impact of existing food and beverage taxes is mounting. However, to measure any resulting changes in health outcomes (e.g. BMI, obesity prevalence, NCD prevalence, life

⁹ The study cites research showing that habitual patterns develop at an early age suggesting that young people and children should be the target group for the policy to prevent consumption in adulthood.

¹⁰ This group supported all policies towards healthy eating with strongest support shown towards access and content of foods, followed by fiscal measures and advertising bans.

¹¹ Mean score of 4.79 (95%CI 4.63, 4.94) (scale 1 to 7) was attributed to redistributive policies versus 3.81 (95%CI 3.58, 4.04) to price raising policies.

¹² Limiting the size of products sold, changing the shape of products sold, and changing the location of foods in shops.

years gained) that allow for inferring causality between taxes and changes in health, longer-run evaluations with appropriate study designs are needed.

As the tax is generally levied upon the producer or the seller, the impact depends also on whether or not the tax is passed through to consumers. Taxes can be passed on fully, be over-shifted or under-shifted. Over-shifting is likely to occur when the demand for taxed foods or beverages is inelastic (i.e. less price responsive) and has been, for example, observed in the case of alcohol taxes. It has also been found that under-shifting is likely to occur for cheaper products and over-shifting for more expensive products as the price responsiveness varies depending on the price of the product (73). Prospective modelling studies generally assume that the tax is fully passed on to the consumers.

6.1 International evidence on the effectiveness of taxes

The most comprehensive study of the impact of the existing taxes in Europe, based on data from Euromonitor Passport Database, found an expected reduction in consumption (purchases) resulting from price increases due to the taxes (see tables 3 and 4). For soft drinks/SSB, the tax has resulted in an increase in the price by 3-10% and a reduction in consumption by 4-10% in all four countries. Evidence indicated over-shifting of the tax mostly in Finland but also to a small extent in France and Hungary (2). In the European countries no evidence was found of a significant impact on other competitiveness indicators investigated (retail margin, retail share, employment, productivity, economic value added, investment and trade).

Table 3 Impact of taxes on price and consumption of soft drinks

Country	Impact
Finland (soft drinks)	<ul style="list-style-type: none"> • Price increased by 7.3% in 2011, by 7.3% in 2012, and by 2.7% in 2013, while the tax was expected to increase the price by 1.5% and 0.9% in 2011 and 2012, respectively. • Price increases led to a reduction in demand by 0.7% in 2011, by 3.1% in 2012 and by 0.9% in 2013. • Almost no change in the trends in competitiveness indicators. Some effects on labour productivity and employment in the industry linked to reduction in demand. Difficult to separate the impact of taxes on alcoholic and non-alcoholic drinks.
France (regular Cola)	<ul style="list-style-type: none"> • Price increased by 5% in 2012 and by 3.1% in 2013 while the tax itself was expected to increase price by 4.5% in 2012. Increase in the price in 2013 was very large given tax rate was only adjusted to inflation. • Demand reduced by 3.3% in 2012 and 3.4% in 2013. • Retail margins increase for diet cola, no change for regular cola. • Based on available data no changes in the indicators for competitiveness were noted.
Hungary (Cola)	<ul style="list-style-type: none"> • Price increased by 3.4% in 2011, 1.2% in 2012 and 0.7% in 2013 while tax alone was expected to raise price by 3.1% in 2011. • Demand reduced by 2.7% in 2011, by 7.5% in 2012 and by 6% in 2013. • Some evidence of substitution towards non-branded products. • Increases in competitiveness indicators but unclear how much, if any, can be contributed to the tax. • Retailer margins increased.
Mexico	<ul style="list-style-type: none"> • Tax on sugary drinks reduced consumption by 10% and increased the consumption of untaxed alternatives (milk and bottled water) by 7%. Consumer survey of 1,500 Mexicans reported that more than half of the sample reduced the consumption of sugary drinks since the tax was introduced (74). • In the first half of 2014, the biggest soft-drink bottler reported 6.4% reduction in sales while in the second half of 2014 the reduction slowed down to 0.3% (75). • Soft drink bottlers have registered a general fall in the volume of sales in North America, ranging from 0.1% to 3% across different companies (76). • The value of the soda market in Mexico is estimated to increase by 9.6% by 2019 from its current value of \$15,935m (76).

Source:(1, 2) unless stated otherwise. Ecorys report analysis based on Euromonitor Passport Database.

The impact of taxes on foods appears to be less pronounced. In Denmark the increase in the price of fats, butter, margarine and oils due to the tax led to a reduction in consumption, albeit relatively small (table 4). Over-shifting of the tax

was observed in discount stores and under-shifting in supermarkets (77). In Hungary, the consumption of salty snacks also decreased even though the tax was notably under-shifted and prices increased by less than expected. However, for confectionery, no changes in demand were observed, even though prices increased due to the tax. In Finland, the tax was over-shifted for confectionery and ice-cream but the larger than expected price increase led to only a small reduction in consumption (1, 2). Reports of the effect of the Mexican tax, most recently, suggest reduction in the demand for confectionery and snacks.

Some important substitution effects have been also reported. In Finland, the demand for untaxed products such as frozen desserts, breakfast bars, dairy-based desserts and yoghurts increased by 2-10% (1, 2). In Denmark, the demand for less taxed fats and oils (i.e. products with lower fat content) increased, but at a more broader level an increase in fibre intake was found, which resulted in an overall increase in energy intake and also a small increase in salt intake (77).

Table 4 Impact of taxes on price and consumption of foods

Country	Impact
Finland (confectionery and ice-cream)	<ul style="list-style-type: none"> • The price of confectionery increased by 14.8% in 2011, 6% in 2012 and 3% in 2013. • The price of ice-cream increased by 15.7% in 2011, 4.9% in 2012 and by 2.9% in 2013. • Prices increased twice as much as can be attributed to the tax. • Demand for confectionery fell by 2.6% in 2011, 1.4% in 2012 and by 0.1% in 2013. • Demand for ice cream fell by 1.6% in 2011, 0.9% in 2012 and increased by 1.4% in 2013. • Demand increased for untaxed products (e.g. frozen desserts, breakfast bars) by 2-10%. • No visible impact on market shares of premium and non-premium brands. • Small increase in employment in confectionery production but decrease in productivity around the time of tax; decrease in value added of manufacturers directly after the tax; continuing increase in investments; no changes in margins.
Denmark (butter, margarine, oils)	<ul style="list-style-type: none"> • Prices increased by 12-17% for butter, margarine and cooking fats and 4-9% for less-taxed oils (e.g. olive and vegetable oils). • Demand for butter, margarine and cooking fats decreased by 5-8% and increased by 3-6% for less-taxed oils. • Increase of market share of non-branded less-taxed oils. • Research suggests hoarding effects as purchases of saturated fats increased by 34% just before the tax and there was a total reduction in consumption by 5% just after the tax. Increase in total energy intake was observed due to higher intake of fibre. Small increase in salt intake. Supermarkets were found to under-shift the tax while discount stores over-shifted the tax. (77)
Hungary (confectionery and salty snacks)	<p>Confectionery:</p> <ul style="list-style-type: none"> • Price of sugar confectionery and chocolates increased by 9.9% and 10.6%, respectively in 2010-2012. • Tax was expected to raise the price by 5.4% and 4.9%, respectively. • No changes in demand for confectionery were observed; demand for chocolates increased after tax but at a slower rate than in pre-tax period studied. • No changes in retail margins. • Tax coincided with slight decrease in employment in the industry. <p>Salty snacks:</p> <ul style="list-style-type: none"> • Prices increased by 6.3% in 2011, by 5.4% in 2012 and by 3.3% in 2013. • Tax was expected to rise the price by 18% (2011 and 2012 combined). • Demand decreased by 7.6% in 2011, 6.2% in 2012 and 0.6% in 2013. • Increase in the market share of non-premium brands both pre- and post-tax periods.
Mexico (salty and sugary snacks/high-caloric foods)	<ul style="list-style-type: none"> • Initial reports showed no effect on sales (78). • Demand for confectionery has been estimated to have reduced by 5% as a response to 12% increase in its price (79). • Revenues of one of the largest bread and snack producers in Mexico fell by 1.5% in 2014 while the more affected companies were the medium-sized producers, with an average fall in sales of 17%.(79)

Source: (1, 2) unless stated otherwise. Ecorys report analysis based on Euromonitor Passport data.

6.2 Modelling studies in the UK

Table 5 summarises the modelling studies using data from the UK to measure the impact of taxes on consumption and health. Earlier studies (rows 1-4) look at the impact of taxing saturated fats while the latest studies (rows 5-6) have shifted the focus on to SSBs. Research looking at the impact of broader taxes on sugar as a nutrient is yet to emerge.

Table 5 Summary of the modelling studies of health related food and beverage taxes in the UK

Study (year and data used)	Intervention	Impact on consumption	Impact on revenue	Impact on health
1. Marshall (2000) (The Dietary and Nutritional Survey of British adults)(80)	Extending VAT (17.5%) to principal sources of dietary saturated fats; exempting cholesterol neutral foods that are currently taxed (e.g. low fat frozen yoghurt)	0.67% reduction in dietary calories from saturated fats. Includes hypothesised substitutions; all price elasticities hypothesised.	Neutral (no estimates provided)	Reduction in ischaemic heart disease by 1.8-2.6%, preventing 1,800-2,500 deaths per year
2. Mytton et al. (2007) (National Food Survey 2000; epidemiological data from meta-analyses)(81)	a. Taxing principal sources of dietary fat; b. Taxing unhealthy foods (SSCg3d model); c. Taxing foods in order to obtain the best health outcome.	a. 3.2% increase in food expenditure and 2.2% increase in calories consumed b. 4%; -4.3% c. 4.6%; -6.4% observed increase in salt intake when saturated fat consumption fell	Not estimated	a. increase in CVD deaths by up to 3,500 b. decrease in CVD deaths by up to 2,500 c. decrease in CVD deaths by up to 3,200
3. Nnoaham et al. (2009) (Expenditure and Food Survey 1988-2000; epidemiological data from meta-analyses)(82)	a. Taxing principal sources of dietary fat; b. Taxing "less healthy foods" (WXYfm model); c. b + subsidising fruits and vegetables by 17.5%; d. b + using all tax revenue to subsidise fruit and vegetables.	a. 5-8% increase in weekly food expenditure; 0.55% reduction in calorie intake b. +5%; -2 to -3% c. +5%; -0.6 to -1.5% d. +5 to 6%; -0.2 to +0.7% increase in salt intake only in first scenario	a. £5bn b. £18.3bn c. £10.6bn d. 0	a. increase in total deaths (CHD, stroke, cancer) by up to 2,300 b. Increase in total deaths by up to 1,300 c. reduction in total deaths by up to 2,800 d. reduction in total deaths by up to 6,400
4. Tiffin and Arnoult (2011) (Expenditure and Food Survey 2005-06; four different sources providing risk ratio of disease associated with food intake)(83)	Tax on saturated fats (1% increase for every 1% of saturated fat content with max 15%) in combination with subsidy on fruits and vegetables to offset tax	Small reduction in total fat (SFA, MUFA) consumption; increase in fruit and veg intake (in line with recommended levels). Small increase in sugar and fibre intake; small reduction in sodium intake.	Taxes and subsidies designed to yield revenue neutral outcome	Small reduction in the odds ratio of being affected by CHD, gastric cancer, lung cancer, CVD, chronic disease, ischemic stroke. Odds ratios range from 1.02 to 1.78 and the change from pre- to post-tax ranges from 2 to 6.
5. Briggs et al. (2013) (Living Cost and Food Survey 2010, National Diet Nutrition Survey 2008-10), Health Survey England and Scottish Health Survey 2010)(84)	A 20% tax on SSB	Reduction in SSB consumption by 15-16%. Increase in milk (4%), juice (3%), diet drink (4-8%), tea and coffee (4%), and water (4%) consumption. Reduction in daily energy intake by 16.7 kJ	£276m	Number of obese people reduce by 1.3% (n=180 000); overweight by 0.9% (n=285 000);
6. Tiffin et al. (2014) (Living Costs and Food Survey 2010, Kantar Worldpanel UK 2010-11)(85)	a. £0.06/L tax on regular and diet soft drinks and juice drinks with sweeteners (as in France); b. £0.02/L tax on the above listed drinks; c. £0.06/L tax on regular soft drinks and juice drinks with fruit content lower than 25%; d. £0.02/L on regular soft drinks and juice drinks with sweeteners (as in Hungary).	a. 6.1% reduction in consumption of regular soft drinks and cola; 0.02% reduction in energy intake b. 2.3%, 0.008% c. 4.3%, 0.014% d. 1.4%, 0.005% Importance of substitution effects between beverages is noted.	Not estimated	Not estimated



It is evident that all proposed scenarios, regardless of the subject of the tax, yield relatively small changes in consumption behaviour and thus health. Nonetheless:

- a) Changes in the consumption of taxed products take place in the desired direction;
- b) The impact on overall energy intake varies because of substitution effects (see section 6.3)
- c) Taxes alone will result in an increase in government revenue, the level of which depends on the level of taxation, price of the taxed product, level of consumption and responsiveness of the consumption to changes in prices;
- d) Estimated health impact is relatively small where the impact on consumption is small and/or substitution effects undermine the impact of the tax on the overall energy intake;
- e) No study has attempted to measure the impact of gradual taxes, such as implemented in Finland, which are likely to lead to a more significant response from consumers, yielding also a higher health impact.

6.3 What are the counter arguments to taxes?

The ongoing debate has brought up various questions about the effectiveness of the taxes because of potential unintended effects. These often coincide with the arguments industry presents against food and beverage taxes (see also Box 1).

Regressiveness of the tax

Regressiveness of the tax on foods or beverages is one of the most frequent counter-arguments (86). If a tax is levied upon goods that low-income groups purchase and on which they therefore spend a greater share of their disposable income in comparison to higher-income groups, then the tax is regressive. However, this argument applies to all main consumer items that are taxed and that all population groups consume as low-income groups will always spend a relatively higher share of their income on taxes in comparison to high-income groups¹³. For example, the tariff on fruit and vegetables imported from outside the EU is also regressive. Thus, this is a bigger and a more fundamental issue across the whole taxation system. The government's objective of wealth redistribution has to look at the tax and benefit system as a whole, rather than focus on a single tax (87). If a tax is regressive, government can use other sections of the system to compensate low-income households (87), for example via income tax rates, tax credits or subsidies.

The evidence from modelling studies in the UK demonstrates that a tax on its own (i.e. with no corresponding subsidies on healthy foods) will be regressive. The lowest income earners would have to increase expenditure the most if SSBs were taxed by 20% (84). However, the differences between income thirds are relatively small (2.1%, 1.7% and 0.8%). The simulated impact of a tax on fats showed a small regressive effect. Rich and poor households were found to eat roughly similar amounts of fat but the poorest 2% of population were found to spend 0.7% of their income on the hypothesised tax while the richest were found to pay only 0.1% (88).

Another important aspect in the debate on the regressive nature of the tax is the already existing unfair distribution of health which is partly driven by low-income earners eating an unhealthier diet (9) in comparison to wealthier counterparts, as healthier diets are generally more expensive (42). Thus, larger health benefits might be seen among low-income groups as they are generally more responsive to price increases and have higher health risks associated due to greater consumption of unhealthy foods¹⁴. However, this is more likely to happen if healthy foods become more affordable than they have been (10, 11). If markets fail to reduce the price of fresh and healthy foods, then revenue collected from unhealthy foods taxes could

¹³ With the exception of luxury goods

¹⁴ Nnoaham et al. (2009) showed that in three of the four modelled scenarios, the health impact of taxes on fats and unhealthy foods is largest in the bottom income quintile. Briggs et al. (2013) showed an opposite effect where the impact of 20% SSB tax on energy intake and levels of obesity and overweight are highest in the highest income third.

be redistributed through subsidising fresh and healthy food to low-income groups. Existing programs, such as the Healthy Start program, which has been shown to be effective in increasing fruit and vegetable consumption among the voucher recipients, could be expanded (89).

Substitution effects

Substitution effects take place as the relative price of taxed and untaxed foods change. Some substitution effects are expected to enforce the tax (e.g. from regular to diet drinks), some may undermine it (e.g. from fats to carbohydrates or salt). Studies of hypothetical taxes provide some estimates of these effects but as consumers have different tastes and varying levels of access to available and affordable alternatives, the estimates based on retrospective expenditure data will always provide an average effect and thus only a crude approximation of real consumer behaviour patterns.

Cross-price elasticities are either negative or positive. Negative cross-price elasticity indicates that a tax would reduce consumption of a substitute product, while a positive cross-price elasticity would indicate that a tax on the unhealthy product would trigger an increase in the consumption of the substitute product. As the measured cross-price elasticities are relatively small and close to zero in value, a difference in the estimation methods or other bias can potentially cause a switch in the sign of the estimate from positive to negative which has a different interpretation (90). This is one of the explanations why different studies may find contradictive results regarding substitution effects in the same population (e.g. whether taxing soft drinks would reduce or increase consumption of snacks) (91, 92) and also it is a reason why prospective modelling studies are not able to provide robust estimates of the substitution effects.

Uncertainty on whether tax will be fully passed through to consumers

A tax on unhealthy foods and beverages can only be effective if it is passed on to consumers (i.e. the price increases by the amount of the tax). Whether or not this happens is dependent on various factors regarding how retailers expect consumers to react to taxes and profit margins. Taxes might be under-shifted if consumers are very price sensitive and it is less costly for the seller to reduce its own margins. However, if consumers are not as responsive to price changes or profit margins are tight, tax might be fully shifted to the consumers or even over-shifted by adding an increment to prices above the amount of the tax. Over-shifting is done to recover some of the lost revenue due to some decrease in demand.

Bargaining power between retailers and manufacturers is also a factor that will affect shifting of the tax (1). In the UK, the food market is dominated by a small number of large companies and the response to a tax is likely to be a re-optimisation of prices, resulting in higher prices for some products and lower prices for others (87).

This issue also refers to one of the weaknesses of the modelling studies as all of the studies assume a pass-through rate of 100%. Deviations from this have an impact on the predicted consumption and health outcomes. Over-shifting would reinforce the impact of the tax as price rises by more than tax alone while under-shifting would undermine the impact as price rises by less than intended.

Reformulation

Industry suggestions on how to tackle the crisis in diet-related health are mostly to improve consumer information (e.g. via labelling, education) and reformulation of products to contain less of specific ingredients or calories in more general. Introduction of taxes could further encourage or discourage product reformulation, depending on the type of tax imposed. Ingredient based taxes are more likely to lead to product reformulation than taxes based on products. For example, if a tax is imposed on SSBs regardless of whether it has 50% or 100% sugar, there is no incentive to reformulate the drink to include only 50% of sugars. If foods above certain level of sugar content are taxed, reformulation would be motivated provided

that the thresholds for the taxed ingredient are not tight (i.e. it is impossible to reduce the content of sugar to below a certain level).

Political will

Lack of support from current UK government towards a tax on SSBs or sugar is likely to reflect partially the failed attempt in 2012 to raise the VAT from 0% rate to a standard (20%) rate for cold take-away foods - the so called 'pasty tax'¹⁵. Those against the tax argued that the increase would negatively affect a large number of regular consumers and the industry, resulting in numerous job losses: such are the arguments recently used by the industry in opposition to raising taxes on SSBs (86, 93). At the same time the Prime Minister and the Chancellor were both negatively portrayed in the press as being "out of touch with the ordinary people" (93) and eventually, the proposed tax increase was rejected in what was labelled as a 'political U-turn'. These events demonstrate that increasing taxes on foods or beverages is very difficult and requires careful preparation, design and communication.

In Denmark, an analysis of the policy process surrounding the introduction and repeal of the tax on saturated fats concluded that politicians who initially supported the tax on saturated fats very quickly changed their minds as a reaction to criticisms by farmers, producers and retailers, without waiting for evidence of impact on demand and health. The repeal decision focused on revenue and economic effects and lacked a discussion on public health effects, while the introduction of the tax was heavily based on the health argument (52). It has also been noted that the tax had very few "wholehearted" supporters and many opponents, including among them nutrition experts (52). The analysis concluded that such taxes need to be politically supported for health rather than fiscal reasons and to be supported or at least accepted by prominent actors, including academic researchers (52).

Box 1: Main arguments used against taxes by the soft drinks industry

Tax is regressive and unfair*

Most taxes on consumption are regressive because low-earning households pay a relatively higher proportion of their incomes on taxes. This applies to food and beverages as well. This should be addressed in the broader taxation system but could specifically be addressed also, for example, by redistributing the revenue from unhealthy food taxes through targeted voucher schemes for healthy foods.

Tax destroys jobs and economic value*

Claims regarding job losses are generally done from a narrow and specific industry perspective, rather than from the point of view of the whole economy. If taxes reduce the demand for certain foods, the money saved is likely to be spent on other foods, products, or services, creating more demand and thus more jobs and economic value. To date, no scientific and peer-reviewed analysis has been published documenting negative impacts on jobs and economic value associated with taxes on unhealthy foods and beverages. To the contrary, an analysis of the effect of existing taxes in the EU did not discover any significant or sustained impact on the competitiveness of the food and beverage industry from these taxes (1, 2).

Tax is unlikely to increase government revenue and taxation is ineffective*

Effect on the consumption of taxed products (and health) and government revenue is in a reverse relation. If the effect on consumption is large (i.e. demand is elastic to price increase), the effect on revenue can be expected to be relatively smaller. If consumers do not respond to the price increase due to the tax, and have not reduced consumption considerably (i.e. demand is inelastic to price increase), it can be expected that revenues will be relatively larger. Hence, smaller revenues might mean that the health impact is larger. If the effect on consumption is small but yields larger tax revenues, it can provide additional funds for other programs targeting diet-related health.

Tax is paternalistic/imposes a nanny-state

There is a long history of taxing commodities, the consumption of which creates negative externalities, such as alcohol and tobacco.

**Arguments are from [foodrinktax.eu](http://fooddrinktax.eu) which is a website dedicated to presenting facts on why food and drink taxes will not work, sponsored by UNESDA, representing the non-alcoholic beverage industry in Europe.*

¹⁵ Hot take-away food is subject to 20% VAT; the aim of the tax was not related to health but to simplify the tax treatment of take away foods as hot take-away food is currently subject to 20% VAT while cold take away food is taxed at 0% VAT.

7. Implications

Evidence on the effectiveness of taxes to reduce consumption has been shown, particularly for SSBs. Arguably, the impact is small, but SSBs are relatively cheap products and the tax rates have been relatively small. So far, taxes on foods high in sugar, fat and salt content have resulted in price increases, but change in demand for these foods has been more variable, reflecting perhaps a more complex market. The impact on consumption has so far only been analysed at a population level. It is possible that effects have been greater across different sub-populations such as high and low demand consumers.

The impact of existing taxes on health has not yet been established but it is likely to be small because the impact on consumption has been small. The potential of these taxes to collect revenue for the government has also been shown. One effect that has not been measured for any of the existing taxes is their ability to convey a health message that in the long-run contributes to a reduction in the consumption of taxed products.

It is beyond doubt that the food environment in the UK needs to change to support healthier diets to improve diet-related health. This means that healthy foods and beverages have to become cheaper relative to unhealthy foods and beverages. There are a number of different policies that can help in achieving this and taxing unhealthy products is one of these. However, in order for the tax to be effective it needs to be sufficiently large and incentivise a switch to healthier alternatives. Crucially, it needs to have support from key actors and convey the message that it is introduced on grounds of improving the health of the population.

Introducing taxes in conjunction with other relevant policies and measures (e.g. consumer education, subsidy programs, improved labelling, reformulation and restrictions on marketing and promotion practices) is equally crucial. Otherwise taxes can become a “silver bullet” solution slowing industry and the Government from taking further steps and measures that are needed to address diet-related health in the UK.

If taxes are to be pursued to achieve changes in consumer behaviour, tax rates have to be sufficiently high as food products individually are relatively cheap. Furthermore, the tax base needs to be well thought through to avoid substitution towards untaxed but equally unhealthy alternatives. To reduce regressiveness of the tax, targeted subsidies for low-income households for healthy and fresh foods could be introduced. Health effects are also likely to be higher if collected tax revenue is allocated to nutrition related health programs and policies.

While the current evidence is mounting, there are still considerable gaps in the knowledge and uncertainty surrounding the impact of such taxes. Thus, current taxes in Europe and elsewhere need to be evaluated in the longer run for sustained effects on consumption and resulting changes in health outcomes. Importantly, more work needs to be done in order to establish opinion and support from the public. At a broader level, efforts should continue to better understand our relationship with food – why we consume what we consume and how we consume it - to provide future policy solutions.



Taxes on unhealthy foods or beverages

- ⇒ A well designed tax is likely to increase the price of the product tax is levied upon
- ⇒ Price increase on unhealthy food or beverages will reduce its consumption: the degree of change depends on consumer responsiveness to modifications in prices of taxed food and beverages.
- ⇒ Taxes will raise revenue: the amount will depend on the tax base, the rate and consumer responsiveness to changes in prices.
- ⇒ If well communicated, taxes can help convey a message on the harmfulness of overconsumption of the taxed foods/beverages.
- ⇒ Taxes on unhealthy foods or beverages alone will not improve health significantly, but they are a complementary measure to a wider food policy strategy aimed at improving the food environment, encouraging healthy lifestyles, and thereby impacting on the obesity epidemic.
- ⇒ Taxing unhealthy food and beverages is not an easy measure to adopt, as it has been, and will continue to be, strongly opposed by the food industry.

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References:

1. Ecorys. Food taxes and their impact on competitiveness in the agri-food sector. Final report for DG Enterprise and Industry. 2014.
2. Ecorys. Food taxes and their impact on competitiveness in the agri-food sector. Final report for DG Enterprise and Industry. Annex - Case Studies in Member States. 2014.
3. Rexrode K, Hanson J, Hennekens C. Obesity and cardiovascular disease. *Current Opinion in Cardiology*. 1996;11:490-5.
4. Steinberger J, Daniels S. Obesity, insulin resistance, diabetes and cardiovascular risk in children. An American Heart Association Scientific Statement from the Atherosclerosis, Hypertension and Obesity in the Young Committee and the Diabetes Committee. *Circulation*. 2003;107:1448-53.
5. Mokdad A, Ford E, Bowman B, Hietz W, Vinicor F, Bales V, et al. Prevalence of obesity, diabetes and obesity related risk factors. *JAMA*. 2001;289(1):76-9.
6. DGAC. Scientific report of the 2015 dietary guidelines advisory committee USDA, 2015.
7. Lavie C, Milani R, Ventura H. Obesity and cardiovascular disease: risk factor, paradox and impact of weight loss. *J Am Coll Cardiol*. 2009;53(21):1925-32.
8. Te Morenga L, Mallard S, Mann J. Dietary sugars and body weight: systematic review and meta-analyses of randomised controlled trials and cohort studies. *BMJ*. 2012;345:e7492.
9. Pechey R, Jebb SA, Kelly MP, Almiron-Roig E, Conde S, Nakamura R, et al. Socioeconomic differences in purchases of more vs. less healthy foods and beverages: analysis of over 25,000 British households in 2010. *Social Science and Medicine*. 2013;92:22-6.
10. Jones R, Conklin A, Suhrcke M, Monsivais P. The growing price gap between more and less healthy foods: analysis of a novel longitudinal UK dataset. *Plos One*. 2014;9(10):1-7.
11. Capacci S, Mazzocchi M, Shankar B. The regional price of junk foods relative to healthy foods in the UK: indirect estimation of a time series, 1997-2009. 86th Annual Conference of the Agricultural Economics Society; 16-18 April; University of Warwick, UK2012.
12. Tukker A, Huppel G, Guinee J, Heijungs R, de Koning A, van Oers L, et al. Environmental Impact of Products (EIPRO) Analysis of the life cycle environmental impacts related to the final consumption of the EU-25. European Commission Directorate-General Joint Research Centre, European Science and Technology Observatory, Institute for Prospective Technological Studies, 2006.
13. The Health and Social Care Information Centre. Health Survey for England 2011. 2012.
14. Press release: Promotion of overweight and obese males and females to increase in most countries by 2030, say latest projections by WHO [press release]. 2015.
15. Gatineau M, Hancock C, Holman N, Outhwaite H, Oldridge L, Christie A, et al. Adult obesity and type 2 diabetes London: Public Health England, 2014.
16. Collaboration. ERF. Diabetes mellitus, fasting blood glucose concentration and risk of vascular disease: a collaborative meta-analysis of 102 prospective studies. *Lancet*. 2010;375(9733):2215-22.
17. Jeerakathil T, Johnson J, Simpson S, Majumdar S. Short-term risk for stroke is doubled in persons with newly treated type 2 diabetes compared with persons without diabetes: a population-based cohort study. *Stroke*. 2007;38(6):1739-43.
18. Diabetes UK. Diabetes: facts and stats. 2014.
19. Grover S, Kaouache M, Rempel P, Joseph L, Dawes M, Lau D, et al. Years of life lost and healthy life-years lost from diabetes and cardiovascular disease in overweight and obese people: a modelling study. *The Lancet Diabetes & Endocrinology*. 2014; doi:10.1016/S2213-8587(14)70229-3.
20. British Heart Foundation. BHF headline statistics. 2015.
21. SACN. Draft Carbohydrates and Health report. 2014.
22. Watt R, Rouxel P. Dental caries, sugars and food policy. *Arch Dis Child*. 2012;97(9):769-72.
23. Scarborough P, Bhatnagar P, Wickramasinghe KK, Allender S, Foster C, Rayner MT. The economic burden of ill health due to diet, physical inactivity, smoking, alcohol and obesity in the UK: an update to 2006-07 NHS costs. *Journal of Public Health*. 2011;33(4):L527-55.
24. House of Commons Health Committee. Obesity, Third Report of Session 2003-04, HC 23-I. 2004.
25. Tigbe W, Briggs A, Lean M. A patient-centered approach to estimate total annual healthcare cost by body mass index in the UK Counterweight programme. *International Journal of Obesity*. 2013;37:1135-39.

26. Dobbs R, Sawers C, Thompson F, Manyika J, Woetzel J, Child P, et al. Overcoming obesity: An initial economic analysis. McKinsey Global Institute, 2014.
27. McCormick B, Stone I. Economic costs of obesity and the case for government intervention. *Obesity Reviews*. 2007; 8(S1):161-64.
28. National Audit Office. Tackling Obesity in England. London: 2001.
29. Butland B, Jebb S, Kopelman P, McPhearson K, Thomas S, Mardell J. Tackling obesities: future choices – project report. 2nd Ed. London: Foresight Programme of the Government Office for Science; 2007
30. Hex N. Estimate the current and future costs of Type 1 and Type 2 diabetes in the United Kingdom, including direct health costs and indirect societal and productivity costs. *Diabetic Medicine*. 2012;29(7):855-62.
31. CEBR. The economic cost of cardiovascular disease from 2014-2020 in six European economies. AstraZeneca, 2014.
32. NHS England. Improving dental care and oral health. A call to action. 2014.
33. Griffith R, Lluberas R, Lührmann M. Gluttony in England? Long-term change in diet. Institute of Fiscal Studies 2013.
34. Griffith R, O'Connell M, Smith K. Food expenditure and nutritional quality over the Great Recession. Institute of Fiscal Studies 2013.
35. British Heart Foundation. Portion distortion. How much are we really eating. 2013.
36. Kantar Worldpanel UK. Appetite for change? Nutrition and the nation's obesity crisis. 2013.
37. UK KW. Salt, sugar, fat. A consumer's eye view. 2014.
38. Department of Health. National Diet and Nutrition Survey Headline results from Years 1, 2 and 3 (combined) of the Rolling Programme (2008/2009 – 2010/11). 2012.
39. Reid M. Sugar and obesity: Meta-analysis establishes the strength of correlation not the cause. *Nutrition Bulletin*. 2014;39(2):153-6.
40. Schoen V, Lang T. UK Food Prices: cooling of bubbling? Food Research Collaboration 2014.
41. Office of National Statistics. Consumer Price Indices - Tables. In: Statistics OoN, editor. 2014.
42. Morris M, Hulme C, Clarke G, Edwards K, Cade J. What is the cost of a healthy diet? Using diet data from the UK Women's Cohort Study. *J Epidemiol Community Health*. 2014;doi:10.1136/jech-2014-204039.
43. Nakamura R, Suhrcke M, Jebb S, Pechey R, Almiron-Roig E, Marteau T. Price promotions on healthier vs. less healthy foods: a hierarchical regression analysis of the impact on sales and social patterning of responses to promotions in Great Britain. *American Journal of Clinical Nutrition*. 2015;doi: 10.3945/ajcn.114.094227.
44. Thompson G. Economic impact of EU membership on the UK. London: Commons Library Standard Note; 2013.
45. COMMISSION REGULATION (EU) No 1006/2011 amending Annex I to Council Regulation (EEC) No 2658/87 on the tariff and statistical nomenclature and on the Common Customs Tariff. *Official Journal of the European Union*; 2011.
46. De Belder T. EU Exporter Guide for Fresh Fruit and Vegetables. GAIN Report Number E70007. 2012.
47. DEFRA. Overseas trade in food, feed and drink; detailed figures on the value and volume of UK imports and exports of food, feed and drink by indigeneity, degree of processing and commodity type, from 1988. Department for Environment, Food & Rural Affairs. 2014.
48. DEFRA. Implementation of CAP reform in England. Department for Environment, Food and Rural Affairs, 2013.
49. Cornelsen L, Green R, Dangour A, Smith R. Why fat taxes won't make us thin. *Journal of Public Health*. 2014;doi:10.1093/pubmed/fdu032.
50. Harding M, Lovenheim M. The effect of prices on nutrition: comparing the impact of product- and nutrient-specific taxes. 2014.
51. Sharma A, Hauck K, Hollingsworth B, Siciliani L. The effects of taxing sugar-sweetened beverages across different income groups. *Health Economics*. 2014;23:1159-84.
52. Vallgård S, Holm L, Jensen J. The Danish tax on saturated fat: why it did not survive. *European Journal of Clinical Nutrition*. 2014;10.1038/ejcn.2014.224:1-4.
53. Teittinen P, Teivanen A. Government backtracks on sweet tax hike. *Helsinki Times*. 2014 01.10.2014.
54. IMCO. Kilos de más, pesos de menos: los costos de la obesidad en México. Instituto Mexicano para la Competitividad 2015.
55. Impuestos. L. IEPS Sobre Comida Chatarra: 8% 2014 [updated 18.09.2014; cited 2015 19.03]. Available from: <http://losimpuestos.com.mx/impuestos-sobre-comida-chatarra/>.
56. City of Berkley Finance Department. Frequently Asked Questions (FAQ) for the Sweetened Beverage Tax of Berkeley, CA 2014 [cited 2015 19.03]. Available from: http://www.ci.berkeley.ca.us/uploadedFiles/Finance/Level_3_-_General/SBB-FAQ.pdf.
57. Limb M. UK Government rules out a "sugar tax". *BMJ*. 2014;348:g4216.
58. Gray N. UK political party rules out sugar or fat tax, but takes aim at advergaming. *foodnavigator.com*; 2014.
59. Briggs H. WHO: Daily sugar intake 'should be halved'. *BBC News*; 2014.
60. Gallagher J. Call to halve target for added sugar. *BBC News* 26.06.20142014.
61. Halliwell K, editor Opinions in the food industry. Perspectives on food taxes and other policy initiatives. British Nutrition Foundation seminar on Food taxes: what role they might have in the battle against obesity; 2014 07.04.2014; London.

62. Department of Health. Public Health Responsibility Deal 2014 [21.01.2015]. Available from: <https://responsibilitydeal.dh.gov.uk/pledges/>.
63. Knai C, Petticrew M, Durand M, Eastmure E, James L, Mehrota A, et al. Has a public-private partnership resulted in action on healthier diets in England? An analysis of the Public Health Responsibility Deal food pledges. *Food Policy*. 2015;54:1-10.
64. MacGregor A, He F, Pombo-Rodrigues S. Food and the responsibility deal: how the salt reduction strategy was derailed. *BMJ*. 2015;350:h1936.
65. Gornall J. Sugar's web of influence 3: Why the responsibility deal is a "dead duck" for sugar reduction. *BMJ*. 2015;350:h219.
66. Shankar B, Brambila-Macias J, Traill B, Mazzocchi M, Capacci S. An evaluation of the UK Food Standards Agency's salt campaign. *Health Economics*. 2013;22(2):243-50.
67. Wyness L, Buttriss J, Stanner S. Reducing the population's sodium intake: the UK Food Standards Agency's salt reduction programme. *Public Health Nutrition*. 2012;15(2):254-61.
68. EUFIC. Replacing sugars - rationale, benefits and challenges: European Food Information Council; 2014 [18.03.2015]. Available from: http://www.eufic.org/article/en/artid/Replacing_sugars_rationale_benefits_and_challenges/.
69. Timpson H. Exploring views of a tax on sugar-sweetened beverages. British Nutrition Foundation seminar on Food taxes: what role they might have in the battle against obesity; 07.04.2014; London2014.
70. Mazzocchi M, Cagnone S, Bech-Larsen T, Niedzwiedzka B, Saba A, Shankar B, et al. What is the public appetite for healthy eating policies? Evidence from a cross-European Survey. *Health Economics, Policy and Law*. 2014;doi:10.1017/S1744133114000346.
71. Emm L, Gillison F, Juszczak D. Support for obesity-related policy and its association with motivation for weight control. *Psychology, public policy, and Law*. 2013;19(3):321-30.
72. Petrescu D, Hollands G, Ng D, Marteau TM. Public acceptability in the UK and USA of nudging to reduce obesity: the example of reducing sugar-sweetened beverages consumption. UK Society for Behavioural Medicine Conference Patients, Populations and Policy-makers: Behavioural medicine in practice; 4.12.20142014.
73. Ally A, Meng Y, Chakraborty R, Dobson P, Seaton J, Holmes J, et al. Alcohol tax pass-through across the product and pricerange: do retailers treat cheap alcohol differently? *Addiction*. 2014;109:1994-2002.
74. Guthrie A. Survey Shows Mexicans Drinking Less Soda After Tax. *The Wall Street Journal*. 2014 13.10.
75. Guthrie A. Mexican Soda Tax Effect Waning, Coca-Cola Femsa Says. *The Wall Street Journal*. 2014 22.10.
76. Hernandez K. Erario, el único ganador con el IEPS a refrescos. *El Economista*. 2015 06.03.
77. Smed S, editor Food taxes:Opportunities and blocks to their use in policy making. World Public Health Nutrition Association Conference; 2014 8-9 September; Oxford.
78. Guthrie A. Companies in Mexico Find Healthier Packaged Foods a Tough Sell. *The Wall Street Journal*. 2014 02.10.
79. Esquivel E. Comida "chatarra" baja poco su demanda pese a los impuestos especiales. *SDPnoticiascom*. 2014 08.03.
80. Marshall T. Exploring a fiscal food policy: the case of diet and ischaemic heart disease. *BMJ*. 2000;320:301.
81. Mytton O, Gray A, Rayner M, Rutter H. Could targeted food taxes improve health? *Journal of Epidemiology and Community Health*. 2007;61:689-94.
82. Nnoaham K, Sacks G, Rayner M, Mytton O, Gray A. Modelling income group differences in the health and economic impacts of targeted food taxes and subsidies. *International Journal of Epidemiology*. 2009;38:1324-33.
83. Tiffin R, Arnoult M. The public health impacts of a fat tax. *European Journal of Clinical Nutrition*. 2011;65(4):427-33.
84. Briggs A, Mytton O, Kehlbacher A, Tiffin R, Rayner MT, Scarborough P. Overall and income specific effect on prevalence of overweight and obesity of 20% sugar sweetened drink tax in UK: econometric and comparative risk assessment modelling study. *BMJ*. 2013;347:f6189.
85. Tiffin R, Kehlbacher A, Salois M. The health effects of a soft drink tax in the UK. *Health Economics*. 2014;DOI: 10.1002/hec.3046.
86. UNESDA. Why Food and Drink Taxes Won't Work: the Facts about Food and Drink Taxes 2014 [12.12.14]. Available from: fooddrinktax.eu.
87. Griffith R, O'Connell M. Public policy towards food consumption. *Fiscal Studies*. 2010;31(4):481-507.
88. Leicester A, Windmeijer F. The 'Fat Tax': Economic Incentives to Reduce Obesity. Institute of Fiscal Studies 2004.
89. Griffith R, von Hinke Kessler Scholder S, Smith S. Getting a healthy start? Nudge versus economic incentives. Centre for Market and Public Organisation, University of Bristol, Working Paper No. 14/328. 2014.
90. Cornelsen L, Mazzocchi M, Green R, Dangour AD, Smith RD. Estimating the relationship between food prices and food consumption – methods matter. *Forthcoming*. 2014
91. Finkelstein E, Zhen C, Bilger M, Nonnemaker J, Farooqui A, Todd J. Implications of a sugar-sweetened beverage (SSB) tax when substitutions to non-beverage items are considered. *Journal of Health Economics*. 2013;32:219-39.
92. Zhen C, Finkelstein E, Nonnemaker J, Karns S, Todd J. Predicting the effects of sugar-sweetened beverage taxes on food and beverage demand in large demand system. *American Journal of Agricultural Economics*. 2014;96:1-25.

93. Woodcock A. David Cameron defends 'pasty tax'. The Independent. 2012 28.03.2012.



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