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## Analysis

# Taxing unhealthy food and drinks to improve health

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An increasing number of countries are introducing taxes on unhealthy food and drinks, but will they improve health? **Oliver Mytton**, **Dushy Clarke**, and **Mike Rayner** examine the evidence

In the past year Denmark has introduced a “fat tax,” Hungary a “junk food tax,” and France a tax on sweetened drinks.<sup>1</sup> <sup>2</sup> Peru has announced plans to tax junk food, and other countries, notably Ireland, are also considering such taxes. Last year’s UN high level summit on non-communicable disease recognised a role for food taxes,<sup>3</sup> and the UK prime minister, David Cameron has said the UK should consider them.<sup>4</sup>

Despite this recent interest among policy makers there has been relatively little critical analysis. Discussion of the evidence of health effects and the important question of what to tax has often been lacking. Government intervention in the food market, in the form of agricultural subsidies and taxation that is unrelated to health, is often overlooked.

The terms used in the debate can be unclear and misleading. A fat tax may refer to a tax on fat, saturated fat, or the dietary causes of obesity. We prefer the broader term: health related food taxes, which includes any tax levied at a higher rate on food items that are considered unhealthy. This suggests a focus on overall health, rather than just obesity, and opens up the possibility of targeting different nutrients or parts of the diet to maximise overall health gains. As the burden of diet related disease (cancer, cardiovascular disease, type 2 diabetes, and dental caries) is large and greater than that attributed solely to obesity,<sup>5</sup> this seems a more pragmatic approach.

## Present taxes

The Hungarian and Danish health related food taxes are often held up as the first of a kind. While they are unusual in being explicit about their health aims, similar taxes can be found in other parts of the world (table 1<sup>↓</sup>). Most of these other taxes are either goods and services taxes, levied principally on unhealthy food items, or small excise taxes levied on sugar sweetened beverages. Other countries have proposed introducing health related food taxes.<sup>6 7</sup>

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Table 1

Examples of health related food taxes

## Rationale

Price is an important determinant of food choices and diet.<sup>8</sup> Economic theory predicts that as the price of an item rises the consumption of that item will typically fall. Increasing the price of unhealthy foods, by taxation, should reduce consumption of the taxed foods. Observational data suggest that food consumption is relatively insensitive to price changes, the proportional change in consumption being less than the proportional change in price.<sup>9 10 11 12</sup> Moreover, when the price of one good rises, consumption of some goods that are co-consumed will fall and consumption of other goods (substitutes) rise. How much consumption changes in response to price is described by price elasticity values—that is, the percentage change in consumption for a one percentage change in price. The balance of these overall effects, as well as the health benefit of food items, will determine the overall health effect of any health related food tax.

Economists generally agree that government intervention, including taxation, is justified when the market fails to provide the optimum amount of a good for society's wellbeing. The argument has been applied for alcohol and tobacco. Suggested market failures for food include a failure to appreciate the true association between diet and disease, time inconsistency (preference for short term gratification over long term wellbeing), and not bearing the full health and social costs of consumption.<sup>13</sup>

## Evidence of effectiveness

Evidence on the effectiveness of health related food taxes comes from three sources: natural experiments, controlled trials of price changes in closed environments, and modelling studies.

### Natural experiments

Natural experiments may provide the most convincing evidence of effect, but it can be difficult to tease apart the effects of other factors on any observed changes.<sup>14</sup> Only two studies have explicitly examined the health effects of actual food taxes. Both are from the US, where many states have introduced small taxes on sweetened drinks.<sup>15 16</sup> While neither study found a significant association between taxes and the prevalence of obesity at a state level, the taxation level, at 1-8%, may have been too low to observe an effect on population health.<sup>17</sup> A study of soft drinks taxation in Ireland, in place during the 1980s, found an 11% decrease in consumption for each 10% increase in price but did not examine health effects.<sup>18</sup>

A systematic review of the association between food price and population weight found weak evidence of an inverse association. It concluded that small price changes (from taxes or subsidies) were not likely to produce significant changes in obesity prevalence but that larger changes might.<sup>19</sup> Effects were greater for the young, poor, and those most at risk of being overweight.

### Controlled trials

Randomised controlled trials are the preferred research design for studies of effectiveness, although they have limitations in assessing some public health interventions.<sup>14</sup> Several experiments have manipulated price in closed or simulated environments.<sup>20</sup> The results suggest that taxation of unhealthy food items is an effective means of reducing consumption of these foods (supplementary web table).<sup>20</sup> For example a 35% tax on sugar sweetened drinks (\$0.45 (£0.28; €0.34) per drink) in a canteen led to a 26% decline in sales.<sup>21</sup> However, compensatory behaviour might occur away from the study environment—for example, the consumption of more drinks away from the canteen. It is also unclear how well simulated environments where artificial constraints, fixed budgets, and restricted choices are imposed on subjects predict actual life choices.<sup>20</sup>

### Modelling studies

Most published work on the dietary or health effects of health related food taxes has used modelling.<sup>22</sup> This reflects the limited use of these taxes. The modelling studies use economic data (price elasticity measures) to estimate how price changes will affect consumption and diet. Some of these studies extend changes in diet to estimate the effect on health, based on the relationship between diet and health.

Particular interest has focused on sugar sweetened drinks because of their strong association with obesity and diabetes.<sup>23</sup> US studies predict a daily reduction in energy consumption of 29-209 kJ per person for a 20% tax (table 2↓), the lower values coming from studies that considered only home

## consumption.[24](#) [25](#)

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Table 2

### Summary of work modelling effects of taxes on sugar sweetened beverage

Estimating the impact of these changes on weight and health requires an understanding of how any reduction in total energy consumed translates to weight loss. Newer techniques for modelling the effect of energy intake on weight show good agreement with empirical data. These techniques predict that a 20% tax on sugary drinks in the US would reduce the prevalence of obesity by 3.5%.[17](#) [29](#) This rate is much higher than any of the taxes currently imposed by individual states.

The effect of a similar tax in the UK would be less than in the US, equivalent to around 12-29 kJ per person per day,[27](#) reflecting the lower consumption of sugar sweetened drinks. However, mean changes in the population will hide larger reductions in regular consumers, who are at greater risk of developing obesity and diabetes.

Studies that have examined taxes on other foods present a more complicated picture (table [3](#)[↓](#)). This reflects differences in taxation scenarios, datasets used, and health outcomes assessed. The studies suggest that the changes in food purchasing are small relative to the taxes introduced, both because food consumption is relatively inelastic and because of cross-price elasticity effects, whereby untaxed or cheaper foods are substituted for taxed foods, reducing the effect on nutrient intake. However, small changes in diet can lead to meaningful changes in important risk factors across the whole population, resulting in substantial health benefits.[30](#) The 1-3% reduction in incidence of ischaemic heart disease predicted by several studies modelling the effect of extending value added tax (at 17.5%) to unhealthy foods in the UK,[31](#) [32](#) [33](#) [34](#) equates to 900-2700 fewer deaths a year. Some of these studies have also flagged important considerations for policy makers—taxing one nutrient (such as saturated fat) may have negative effects on consumption of other nutrients (such as salt or fibre).[31](#) [32](#) [35](#) The overall impact on health depends on the balance of these changes and could be negative.[31](#) [32](#) Nutrient based taxes also seem to be more effective than food based taxes.

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Table 3

### Summary of work modelling the effects of health related food taxes on food consumption[22](#)

Despite recent advances, modelling the effects of diet on health is relatively new.<sup>36</sup> Its accuracy is limited by the quality of dietary, health, and economic data. There are concerns about how well the economic data, based on small weekly fluctuations in price, will predict the consumption changes that would result from sustained price changes due to taxation.<sup>22</sup> Other compensatory behaviour that might increase energy intake or reduce energy expenditure are not well captured in most models.

Assumptions have to be made about how food purchases map to food consumption. Understanding the overall effect on health is complicated and depends on mapping the effect of multiple nutrient changes, including energy intake, to multiple health outcomes. However, modelling does highlight some of the key considerations surrounding these taxes.

## Impact on the poor

Health related food taxes are regressive—that is, poor people pay a greater proportion of their income in tax than do the rich.<sup>40</sup> However the health gains may be progressive,<sup>35 41</sup> and, as is found with many population-wide health interventions, health inequalities may consequently narrow.<sup>42</sup>

Progressive health gains are expected because poor people consume less healthy food and have a higher incidence of most diet related diseases, notably cardiovascular disease.<sup>43</sup> Consequently the absolute reduction in disease incidence would be greater among poorer groups, assuming similar dietary changes. Moreover there is some evidence that those who are poorer are more sensitive to price changes and so would experience greater dietary improvements. <sup>19 35</sup>

## Acceptability and feasibility

Views on the acceptability of health related food taxes vary widely.<sup>44 45</sup> Opinion polls from the US put support for sugared beverage taxes at 37% to 72%, support being greater when the health benefits of the tax are emphasised.<sup>14</sup> These polls pre-date the era in which rising food prices and falling real incomes have raised concerns about food poverty.<sup>46</sup> None of this work has addressed the question of an acceptable level of taxation. Initially, cigarette taxes were low and gradually increased as public opinion changed.<sup>19</sup>

The food industry argues that the taxes would be ineffective, unfair, and would damage the industry leading to job losses.<sup>47 48</sup> Similar arguments were used by the tobacco industry against tobacco taxes.<sup>49</sup>

From a legislative point of view, it is still unclear how such taxes are best introduced and enforced. Should the tax be levied on the raw ingredients or on the final product? Should all sweetened drinks be taxed, as in France, or just sugar sweetened? How much sugar needs to be added before the drink is taxed?

## Other approaches

While we have focused on the ability of taxes to change individual behaviour to improve health, others have advocated that the taxes be used to raise funds to treat diet related diseases, subsidise healthy foods, or to stimulate industry reformulation of food (such as removal of salt, sugar, or saturated fats from foods). Subsidies on healthy foods may alleviate the regressive nature of food taxes<sup>32</sup> as well as maximise the health gains.<sup>22</sup> Redesign of fishing and agricultural subsidies, to promote the health of consumers and environmental sustainability, has also been advocated. Such redesign will be challenging and could happen in parallel with the introduction of health related food taxes.

## Conclusion

Health related food taxes could improve health. Existing evidence suggests that taxes are likely to shift consumption in the desired direction, although policy makers need to be wary of changes in other important nutrients. However, the tax would need to be at least 20% to have a significant effect on population health.

### Key to a successful health related food tax

- Taxing a wide range of unhealthy foods or nutrients is likely to result in greater health benefits than would accrue from narrow taxes; although the strongest evidence base is for a tax on sugar sweetened beverages
- Taxation needs to be at least 20% to have a significant effect on obesity and cardiovascular disease
- Taxes on unhealthy foods should ideally be combined with subsidies on healthy foods such as fruit and vegetables

## Notes

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## Footnotes

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- Contributors and sources: MR has advised on nutrition policy at national, European, and international level, particularly around nutrient profiling, marketing of unhealthy foods and health related food

taxes. OTM is a previous clinical adviser to the chief medical officer for England. He has modelled the effects of different health-related food taxes in the UK. This article arose from discussions between the three authors and from work that DC undertook for the National Heart Forum. OTM researched and wrote the article. DC undertook much of the preparatory work and produced the first draft. MR oversaw the work and critiqued the manuscript.

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