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## **Reducing consumption of unhealthy foods and beverages through banning price promotions: what is the evidence and will it work?**

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## **Abstract**

Increasing prevalence of overweight and obese people in England has led policymakers to consider regulating the use of price promotions on foods high in fat, sugar and salt content. In January 2019 the Government opened a consultation programme for a policy proposal which significantly restricts the use of price promotions that can induce consumers to buy higher volumes of unhealthy foods and beverages. These proposed policies are the first of their kind in public health and are believed to reduce excess purchasing, and therefore over-consumption of unhealthy products.

While the impact of price promotions on sales has been of interest to marketing academics for a long time with modelling studies showing its use increases food and drink sales by 12-43%, it is only now being picked up in the public health sphere. However, the existing evidence does not consider the effects of removing or restricting the use of price promotions across the food sector. In this commentary, we discuss existing evidence, how it deals with the complexity of shoppers' behaviour in reacting to price promotions on foods and, importantly, what can be learned from it in this policy context.

The current evidence base supports the notion that price promotions increase purchasing of unhealthy food, and while the proposed restriction policy is yet to be evaluated for consumption and health effects, there is arguably sufficient evidence to proceed. Close monitoring and proper evaluation should follow to provide empirical evidence of its intended and unintended effects.

Key words: Public health, Price promotions, Obesity, Econometrics, Food and nutrition

Word count: 2,027

## **Background**

Obesity is considered a global epidemic<sup>(1)</sup>. In England the issue is particularly acute among children, with 30% of children aged 2-15 overweight or obese<sup>(2)</sup>. In its recent update of the Childhood Obesity Strategy (Chapter Two), the Department of Health and Social Care (DHSC) in England have set out a strategy to halve the rate of obesity among children within 12 years. Part of its action plan included a consultation of a policy to ban or considerably restrict volume-based price promotions (PPs) and promotional placement of pre-packaged high fat, sugar and salt (HFSS) products<sup>(3, 4)</sup>. If passed, such policy would add to the existing measures targeting obesity implemented in England in recent years, including the Soft Drink Industry Levy (2018), Sugar Reduction Programme via voluntary reformulation (2017) and strategies for healthier “out-of-home” food provision<sup>(5-7)</sup>. While the results of the consultation (January-April 2019) are, at the time of writing, are yet to be released by DHSC, we argue in this commentary that, while the evidence base on the effects of PPs may be sufficient to proceed, it is not sufficiently developed to be conclusive on the effects of restrictive action. Since it is the first policy proposal of its kind, there is need for further evidence on how the proposed restrictions on PPs could change consumer behaviour and benefit health.

### **How frequent are price promotions in food retail?**

PPs incentivise customers to purchase through reductions below the recommended retail price. In the UK food retail sector there are predominantly either total price reductions, or volume-based PPs that encourage greater quantities to be purchased for the same cost (e.g. buy-one-get-one-free). Data on consumer expenditures (Table 1) shows that, in 2017, a third of take-home purchases were made on PPs; and products typically considered as HFSS (e.g. regular soft drinks) were twice as likely to be bought on promotion in comparison to fruits and vegetables or starchy foods.

[Insert table 1 here]

The public health rationale for the DHSC policy proposal follows from this frequent, on-promotion purchasing of unhealthy HFSS products. Even if the policy could be seen as anti-competitive in limiting this frequently used method of competition, regulation might be the only way to proceed as, on voluntary basis, retailers are unlikely to reduce price promotions unilaterally.

## **What evidence exists on price promotions and food buying behaviour?**

PPs have been studied by researchers in public health, focussing on the nutritional impact of “point of sale” health policies; and marketing, focussed on the sales and revenue impact of PPs. The challenge is that existing research is conducted in a retail industry filled with promotions, where high variability in prices boosts purchasing through different behavioural consumer responses.

### ***Public health***

Seven reviews of public health literature considering the impact of price interventions on food consumption or nutrition have been published between 2014 and 2018<sup>(8-14)</sup>. These reviews find evidence, based on demand modelling, experimental methods and randomised control trials (RCTs), that financial incentives can result in changes in food purchasing behaviour. For example, Hartmann-Boyce et al. (2018) focus on RCTs of in-store interventions to improve population health, finding discounts and subsidies to be effective in encouraging healthier food consumption. Policies to discourage less healthy food consumption typically involve taxation (e.g. taxes on sugary drinks<sup>(15)</sup> or junk food<sup>(16)</sup>), which is increasingly implemented given the successful use of fiscal measures in other areas of public health, such as tobacco and alcohol control<sup>(17, 18)</sup>.

The systematic reviews on price promotions however do not cite any literature that discusses the removal of PPs on unhealthy foods as a possible strategy and, while similarities exist with taxation as both increase prices, the two policies are different in their mechanisms for eliciting consumer and retailer responses and require further research from public health perspective.

### ***Marketing***

Marketing studies use highly disaggregated data from retailers or household expenditure panels to understand how PPs influence consumer behaviour. This literature takes the perspective of “managers” and explores ways to increase sales. The food or beverage categories used in these analyses do not distinguish between healthier or less healthy as this is not their purpose. The analysis relied upon by DHSC, finding that promotions which are more common on unhealthy products, increase purchases by up to 22%, is in fact one of the very few to make use of the link between nutrition and sales data<sup>(19)</sup> to analyse the effect of PPs.

Five relevant reviews<sup>(20-24)</sup> exist in the marketing literature on the impact of PPs on food and drink sales. Van Heerde and Neslin (2008, 2009) provide a thorough overview of the literature on the impact of PPs on brand and category sales. Hawkes's (2009) review is the only discussion of the marketing literature from a nutrition perspective. Two meta-analyses found that PPs lead to significantly increased sales for individual products<sup>(21, 24)</sup>. Santini et al. (2016) looked at both the short and long run effects of PPs on sales volume and purchase incidence and their meta-analysis of 75 studies concluded that PPs increase purchase incidence and sales volume (with no average effect size provided). Bijmolt et al. (2005), concluded from 198 elasticities that a 20% price promotion leads to a 73% increase in purchasing on average.

### **Do increased sales during price promotions lead to increased consumption?**

Considerable effort has gone into identifying how PPs increase sales, or the “promotion bump” as often referred to in the marketing literature. Generally, this is attributed to three forms of consumer reaction<sup>(20)</sup>;

- i. Consumer switching: purchasing the same quantity but of a different brand. This has little effect on total nutritional consumption;
- ii. Increased purchasing: promotions causing purchases that otherwise would not have occurred, creating a potential increase in consumption quantity;
- iii. Stockpiling: the increased purchase quantity to take advantage of a promotion and avoid higher spending on off-promotion purchases in the future. This does not necessarily increase overall consumption, but there is a possibility that it does, notably if it induces a change in consumption habits. When stockpiling is effective, purchases that would otherwise have occurred at a later date are brought forward. This is referred to as “purchase acceleration”.

From a health perspective, understanding the relative effects of the last two categories is crucial, particularly whether the “additional” purchases are stockpiled for later use or consumed.

For households, the frequency with which goods are purchased is important: infrequent “impulse” purchases are likely to be purchased for immediate consumption but, for frequently purchased goods, stockpiling behaviour can make the effects less straightforward. Stockpiling creates the opportunity to save the customer money, but it may also lead to unintended consumption. For example, a repeat customer of cola may buy one bottle per week, but with a

2-for-1 promotion they buy two, intending to save money by avoiding future purchases. Once the extra bottle is in the house it is drunk at a faster rate. If next week the potentially avoided purchase is still made, overall consumption has increased. The increased purchase can therefore be decomposed into “purchase acceleration” – the successful use of stockpiling, in which future purchases are avoided – and “increased consumption”.

Table 2 below, presents the decomposition of the “promotion bump” into primary demand increases (i.e. increased consumption and purchase acceleration) and secondary demand (i.e. switching brands). It is clear that the “promotion bump” varies a great deal depending on the product: 33-87% of these increases using the unit sales decomposition approach are increases of category sales, of which 10-56% are consumption increases (i.e. buying more altogether) and 9-69% purchase acceleration due to stockpiling. The key evidence however comes from two counterfactual analyses<sup>(25, 26)</sup> that are most appropriate from methodological point of view. These studies conclude that consumption increases of 12-43% occur as a result of promotions.

The product range studied is clearly restricted which makes generalisation of these estimates difficult, although Nijs et al.<sup>(27)</sup>, who used a large range (n=560) of products, found (without decomposition analysis) that promotions led to an increase in primary demand for more than half (58%) of these products.

[Insert table 2 here]

While increases in primary demand due to promotions appear prominent, we must question whether increased purchasing necessarily leads to increased consumption - which is what leads to detrimental effects on public health<sup>(20)</sup>. There is some evidence in behavioural and economics research that actual consumption rates can be affected by stockpiled food (or inventory)<sup>(28)</sup>. This is through a number of mechanisms including uncertainty about future prices<sup>(29-31)</sup>, scarcity – concerns of running out before the next shop reduce consumption rates<sup>(32, 33)</sup>, increased storage costs – stockpiling leads to crowded kitchens and pantries increasing holding costs and the desire to consume<sup>(34)</sup>, replacement costs – when prices fluctuate, stockpiled goods are replaced only when on promotion<sup>(34)</sup> and convenience – the presence of food in the kitchen, in the fridge, or on counter tops.<sup>(28, 35, 36)</sup>

### **What is the evidence relating to a restrictive policy on price promotions?**

This evidence, together with Public Health England's (PHE) estimated "effect" from PPs of up to 22% increase in purchases, presents a rationale for intervening to reduce PPs on unhealthy foods<sup>(18)</sup>. However, these methods still do not answer the question at hand: "what if price promotions on unhealthy foods were restricted or banned altogether?". Without direct evidence it is difficult, ex-ante, to quantify the potential benefits, as well as identify potential risks from unknown consumer and retailer response, because:

- Existing evidence largely ignores a crucial aspect of PPs: their efficacy relies on their repeated use (i.e. consumers may expect PPs and factor this into their purchasing decisions). In the current retail markets PPs are frequent and shoppers are likely to stockpile during sales and delay purchases when they are not on<sup>(22)</sup>.
- Consumers respond asymmetrically to price changes<sup>(37)</sup> meaning that the effect of price increase is not necessarily the opposite of the effect of a discount.
- Few studies have looked at what happens to the demand for a product once a promotion is withdrawn (rather than added)<sup>(26)</sup>. But removing all promotions on similar products with no promoted substitutes available altogether has never been addressed.
- The effects of this policy depend on the response from retailers who will act to maintain profitability. Will the new pricing strategy be a switch to pre-regulation non-promotional prices? Or a regular low-price? It could be that if retailers reduce their regular, every-day prices enough, the policy will have little effect.

There are techniques that allow researchers to deal with these dynamic difficulties. Structural demand estimation<sup>(26, 38-40)</sup> can identify the effect of price expectations on current purchasing and consumption decisions. These are difficult to implement but workable. Without their use, analysis will over-estimate the consumption effects of PPs. In the simplest terms, this is because there is no incentive to stockpile if shoppers know the price will be the same in a week's time; people can better plan their purchasing, allowing them to take control of their diets. The extent to which this occurs, as well as retailer response, could be estimated through dynamic structural modelling.

### **What can we conclude for current policy?**

Existing evidence suggests that PPs lead to significant increases in purchases that can lead to greater consumption, and likely over-consumption, but the evidence is not sufficient to know the extent to which banning or significantly restricting promotions reduces consumption. This

requires more studies to simulate effects of promotions removal. On the other hand, this is not new in public health policies, especially major government initiatives that are often based on a combination of evidence related to the problem and its solutions (e.g. public indoor smoking ban). It is rare to have *a priori* direct evidence on policy impact, especially if the scope for experimental investigation is limited.

Given the seriousness of adult and childhood obesity, it is clear that the usual playbook of individual-focused interventions and policies have not worked. More radical and structural policy initiatives, that rely less on consumer agency, might therefore be exactly what we need, even if the evidence is less than perfect. In this instance the rationale and logic for the policy of restricting PPs is clear. The evidence of intended and unintended consequences is of utmost importance and should be carefully monitored and evaluated if a policy is implemented. However, the lack of direct evidence now should not cause a missed opportunity.

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**Table 1. Share (%) of take-home food and beverage sales volume purchased on price promotion across broad food groups in 2017**

Food Group	Share (%) of volume purchased on price promotion
All	32%
Milk, eggs and bread	15%
Fresh vegetables and salad	24%
Starchy foods - e.g. pulses pasta rice	27%
Fresh fruit	28%
Fresh and frozen fish, red meat and white meat	37%
Ready meals	42%
Savoury snacks	49%

Diet soft drinks		50%
Biscuits, chocolate and confectionary		52%
Regular soft drinks		59%

Source: Author calculations, Kantar FMCG Panel volume weighted take-home purchases of foods and non-alcoholic beverages recorded by a nationally representative sample of approximately 30,000 British households annually.

Table 2: Product level sales increases associated with price promotions: decomposition into primary (purchase acceleration and increased consumption) and secondary effects

Author	Date	Product category	Increased consumption	Purchase acceleration	Combined (Primary)	Switching (Secondary)
<b>Unit sales decomposition approach</b>						
Teunter	2002	Soft drinks	27%	38%	<b>65%</b>	34%
		Fruit juice	17%	58%	<b>75%</b>	25%
		Ground coffee	14%	48%	<b>62%</b>	39%
		Potato chips	46%	41%	<b>87%</b>	13%
		Candy Bars	10%	63%	<b>73%</b>	27%
		Pasta	14%	47%	<b>61%</b>	39%
		<b>Average</b>	<b>21%</b>	<b>46%</b>	<b>67%</b>	33%
Van Heerde	2003	11 products (as in Bell et al.)			<b>33%</b>	67%
Sun et al.	2003	Ketchup			<b>44%</b>	56%
Van Heerde et al.	2004	Tuna	31%	38%	<b>69%</b>	31%
		Peanut Butter	33%	24%	<b>57%</b>	43%
		<b>Average</b>	<b>35%</b>	<b>32%</b>	<b>67%</b>	<b>33%</b>
Nair et al.	2005	Orange juice			<b>92%</b>	<b>8%</b>
Ailawadi et al.	2007	Yoghurt (average across brands)	56%	9%	<b>65%</b>	35%
		Ketchup (average across brands)	39%	18%	<b>57%</b>	44%
Chan et al.	2008	Tuna	29%	43%	<b>72%</b>	28%
Ebling and Klepper	2010	Beverage			<b>52%</b>	48%
		Spread			<b>50%</b>	50%
		Dessert			<b>74%</b>	26%
<b>Counterfactual analysis</b>						
Ailawadi and Neslin	1998	Yoghurt	35%			
		Ketchup	12%			
Sun	2005	Yoghurt	43%	18%	<b>61%</b>	39%
		Tuna	33%	25%	<b>58%</b>	42%

Notes: With the exception of Nijs et al. (2001) and Teunter (2002), which were conducted in the Netherlands, all studies used U.S. consumer scanner data.

