Author’s response to reviews

Title: Reductions in sugar sales from soft drinks in the UK from 2015-2018

Authors:

Lauren Bandy (lauren.bandy@dph.ox.ac.uk)
Peter Scarborough (peter.scarborough@ndph.ox.ac.uk)
Richard Harrington (richard.harrington@ndph.ox.ac.uk)
Mike Rayner (mike.rayner@ndph.ox.ac.uk)
Susan Jebb (susan.jebb@phc.ox.ac.uk)

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Reductions in sugar sales from soft drinks in the UK from 2015-2018

(Lauren Kate Bandy; Peter Scarborough; Richard A Harrington; Mike Rayner; Susan A Jebb)

Response to reviewers’ comments

Please see the authors’ response to each of the reviewers’ comments given below in blue. All line numbers refer to the final manuscript (with track changes).

Overview: In general, I think the authors understood many of my points but not all so I will be rather specific in what is needed.
1. Title: this is a combination of sugar company change and consumer demand changes. you are using sales data. The title must be changed to discuss sugar changes made by both consumers and companies or remove companies. in no way are you separating supply from demand. Nor are you looking at product specific reformulation and new products. And if so, you must realize that all of this is partly companies responding to consumer changes we are seeing globally in high income countries. So, remove companies from the title. You can in the introduction make it clear that these changes result from the complex interaction between company-initiated changes and consumer demand. Even the introduction ignores the massive public information campaign of advocates, the NHS and others and all the media. Just look at the newspaper articles in the UK on sugar, the TV programs, etc. So, the introduction must be reframed.

The title has been changed to “Reductions in sugar sales from soft drinks in the UK, 2015-2018”. Our aim with the introduction was to be concise, but we recognise that this can be at the expense of describing the context in which our work is situated. We have now expanded the introduction to include a brief discussion of other things besides the tax that might have affected sugary drink consumption – please see lines 116-119.

2. Your paper: by using total volume and not per capita per day you ignore many shifts that have gone on in population. In Mexico, we found a completely different trend when total Euromonitor sales and per capita was used. We found the same in the US. You must make this change in the figures and tables. you can put the total sales into an appendix but for the health community to understand how these sales translate to meaningful measure this shift is necessary. This is not done for your sugar content tables 1-3 but for the figures it would allow us to understand the impact on consumer intake; however, for table one total volume add a row for daily per capita sales. it sounds great to discuss total sugar volume of sales changes but to interpret that for the health community we must understand daily per capita changes. This is a public health and medical journal and not an industry one.

We recognise the concern of the reviewer and have made further amendments to the manuscript to address this. We have added a line to table 1 that gives the volume sales of soft drinks in ml/person/day. We have also added ml/person/day results to figure 1 alongside total volume. Table 4 (g/person/day) has been moved up (now table 3) so that all the per capita per day results are presented earlier.
The trends presented in this paper as total and per capita sales are virtually identical. This is because the size of the UK population has changed very little over the four years (the former shows a 29% reduction on total sugar sales over 4 years, and the latter a 30% reduction). While per capita terms may help the reader put the total volume into perspective, we believe that 'sales per capita' may be a crude measure when individual (or household) data are not available, as is the case for our analyses and imply a degree of accuracy that is not available with the datasets used. Moreover per capita volumes do not tell the reader anything about the distribution of sales within the population and will include a large percentage of zero consumers. While adding the per capita data as requested, we have not removed total volume sales completely (e.g. table 2 or changed figure 3).

3. Your sample of beverages: you need to be upfront about this. This is truly a low measure. For example, in Chile we had 2241 unique beverages in 2017 [ignoring the same item with 6-10 sizes etc.). This is a country of 19 million vs your much larger and higher income country. Our even larger countries had many more. Your sample is not a full sample. You can talk to your Cambridge team to learn what the numbers are and you must so readers have a full sense that this is a subsample only. In South Africa we had 5925 individual beverages with unique content. There is just no way the UK can have your tiny number. You must discuss this as a subsample. But ideally you can learn the true number from the White et al evaluation you are part of.

We thank the reviewer for raising this issue and we have investigated this further.

The Brand View data collected here is scraped from three online supermarkets and is an annual snapshot from a single date (13th December) for the 4 years from 2015-2018 (lines 159-163). Across the four snapshots we have a total of 10773 products in our dataset. 2134 products were removed as duplicates by matching on barcode and year (i.e. the same product sold in the same year). A further 1222 products were removed as their brand name and manufacturer were not matched with the Euromonitor sales data. This left 7377 unique products observed over the four years (an average of 1844 products in each snapshot).
We have checked the number against two sources from the Soft Drink Industry Evaluation project. The first is a dataset of drinks called foodDB. This is collected in a similar way to the Brand View data used here, by scraping the websites of six UK supermarkets (Tesco, Sainsbury’s, Asda – as are included in this manuscript – and Morrisons, Waitrose and Ocado). These six supermarkets account for 70% of UK grocery sales. Using foodDB we find on average there are 4780 soft drinks available on the UK marketplace in any given week. However, this figure includes all observations of the same drink sold in different volumes and the same drinks sold in different supermarkets, as barcode is not collected. It therefore contains duplicates, unlike our Brand View dataset where duplicates were removed. It does, however, provide an upper estimate for the number of soft drinks available in UK supermarkets at any single time point, which is of the same magnitude as our estimates and lower than the amount observed by the reviewer in South Africa.

Neither the BrandView dataset that we use or the foodDB dataset can account for churn in the soft drinks marketplace over time. Our own data show that based on barcodes, only 58% of the products in the 2018 snapshot were found in the 2015 snapshot.

The second source we have compared it to are the results of the Kantar Worldpanel used by the SDIL Evaluation team. They have the nutrition information for the products purchased by households between 2015-2018. In any one 4-week period, they have 2716 unique products. Over the course of three years, this amounts to a total of 6844 products, including multiple sizes with the same formulation, but with duplicate barcodes removed. This does not accurately reflect the true churn in the soft drink marketplace, as at any timepoint in the Kantar dataset only drinks that were purchased by the panel are identified, rather than all drinks that are available on the marketplace.

The Brand View (1735 products in 2018) and Kantar data (2716 for any given 4-week period) seem reasonably aligned but are not directly comparable. This is because the Kantar data include products purchased over a 4-week period, compared to Brand View, which is looking at the availability on one single date annually. The Brand View snapshot was also collected in December and will not account for seasonal fluctuations.
The aim of this paper was to estimate the volume of sugar sold from soft drinks over time, using sales data and nutrition composition data. We believe that the number of beverages included in the Brand View database, combined with the sales data, give us a big enough sample size for our study. According to Euromonitor, the top 10 UK soft drink companies represent 70% of volume sales, and the companies we have included here represent an estimated 80%.

Lines 343-352 discuss these issues. We explain that the number of products included in our study is likely to be an underestimation of the total market as 1) we have only included data from three supermarkets, and 2) because a single annual snapshot in time does not capture the churn of soft drinks market. We hope that this makes it clearer to the reviewer - and the reader - the strengths and weaknesses of our dataset.

4. In the figures could you add the exact numbers [just in boxes inside each bar so interpretation is easier. you will find that is important also for presentations and to expand usage of your figures. you did this in figure 4 so why not add to other figures. it would help the reader. you put percentage change on the top of one but why not absolute per capita amounts in the figure bars?

This has been done for figure 1, and is not relevant for figures 2 or 4. We have not changed figure 3 as many of the per capita/day figures are very low, so it seems unnecessary and makes the figure less clear. We think keeping the percentage change of total sugars by company is the most useful way of displaying this data.

5. There is a separate paper by Peter Scarborough et al on which several of the coauthors are involved. How your paper differs from that one needs to be discussed in the discussion. That is being reviewed at another major medical journal and will confuse readers if both papers do not discuss and make clear how they are different.
We have added lines to the discussion that states again that this paper is not an evaluation of the SDIL (line 390 and line 475), and that such an evaluation is currently being undertaken (line 477). It is correct that there is a different paper that includes authors Pete Scarborough, Richie Harrington and Mike Rayner that is currently under review at PLoS Medicine. That paper is an in-depth evaluation of the impact of the SDIL on sugar levels in drinks, price, product size and market diversity. It uses different datasets and does not use data on sales of soft drinks. The PLoS Medicine paper reports interrupted time series analyses to isolate the impact of the SDIL on the outcomes of interest. The manuscript under consideration at BMC Medicine is not an evaluation of the SDIL (as has been made clear in the manuscript at multiple points). This manuscript reports on trends in sales of soft drinks and sugar in the UK from 2015 to 2018 – a time period over which the SDIL was enacted but the SDIL was certainly not the only contextual variable over this time period.

6. Discussion: one thing we are seeing globally with cutoffs from both taxes and both front-of-the-package warning label and positive logos is heaping of composition to get foods and beverages below key cutoffs. you can see that in your shift in content of the low sugar products. and even the mid sugar ones. you might note this. The SDIL design drove this I would think. I have certainly seen this in several other countries [studies in process].

While the SDIL is an important policy introduced during this period, the data we have are not granular enough to distinguish between the general trend in beverage sales and reformulation and the specific impact of the SDIL when it was introduced in 2018. Lines 473-477 highlight that the pace of change was greatest after the introduction of the levy. Lines 480-483 state that the fact that products excluded from the levy have seen no change suggests that the levy acted as an incentive for reformulation. We have also highlighted that the volume sales of low sugar products have increased (lines 475), implying (as far as we’re able to here) that the SDIL has been successful.

7. Discussion: discuss the per capita changes in the first paragraph. total volume is not as important as is that. you should see a larger decline if you had population growth and if none, then a lower decline. but that is the decline that matters. Again you must be clear throughout that you are discussing a total decline in sales and in the methods and again here exactly if you are doing including sales from retailers and away-from-home chains but not vending and/// You might want to use your national diet data for one year to give a sense of the proportion of intake your coverage might represent.
We agree that decline in sugar intake per capita is what really matters for public health and have adjusted the results as recommended (see point 2). The methods section now includes a line about Euromonitor’s coverage (line 144-145). Euromonitor’s coverage has also been highlighted in the discussion (lines 362-364).

Differences in estimated levels of soft-drink consumption using different types and source of data (the National Diet and Nutrition Survey Euromonitor, Nielsen, Kantar, etc.) vary and there is no known gold standard for this. We provide a table below showing our results compared with results from the NDNS and from a PHE analysis of Kantar data. It is clear that we are accounting for far more drinks than recorded in consumption data, which has long been thought to be an under-estimate based on poor self-reporting. It is notable that the overall decline in sugars that we report here from Euromonitor is almost identical to that recently reported by PHE based on Kantar data. We have not added this table to the paper as it risks confusing readers. However, we do discuss the limitations of Euromonitor data in lines 366-373.

<table>
<thead>
<tr>
<th>NDNS category (ml per person per day 2015)</th>
<th>Euromonitor</th>
<th>Kantar</th>
<th>NDNS</th>
<th>BSDA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bottled water</td>
<td>71</td>
<td>35</td>
<td></td>
<td>107</td>
</tr>
<tr>
<td>Diet carbonates</td>
<td>45</td>
<td>64</td>
<td>95</td>
<td></td>
</tr>
<tr>
<td>Non-diet carbonates</td>
<td>114</td>
<td>49</td>
<td>116</td>
<td></td>
</tr>
<tr>
<td>Non-diet concentrates</td>
<td>33</td>
<td>3</td>
<td>16</td>
<td></td>
</tr>
<tr>
<td>100% fruit juice</td>
<td>34</td>
<td>28</td>
<td>40</td>
<td></td>
</tr>
<tr>
<td>Total soft drinks (ml per person per day)</td>
<td>322</td>
<td>231</td>
<td>129</td>
<td>553</td>
</tr>
</tbody>
</table>

8. You are not just studying company specific changes but a mix of consumer and company changes. You slip into this often. This gives the companies too much credit. And if you look at low sugar category dynamics these changes came after the SDIL. So, what is causing this—just companies? Not likely not are many other changes. Your use of language suggests results you cannot justify.
We agree that the changes we report in company sales of beverages are the end result of complex shifts in the whole system. Although we have reported the data by company, we did not intend to suggest that any changes were only due to their actions. We have adjusted the aim so it is clearer that we have analysed the net effect of shifts in consumer demand and changes made by the industry (lines 121-125). Reference to brand-level reformulation changes have been removed from the results to prevent implying this is the only driver of change. Throughout, “company progress/action/response” has been replaced with “company change”. The discussion also makes it clear that changes in both company and consumer behaviour have driven the reductions in sugar consumption presented in this paper (e.g. lines 338-339).

9. Discussion: you slip into results linked only to company behavior. that is wrong. these issues are subtle but critical for the public policy side of your paper and you are in a dept of population health. These are results of both purchases and supplies and you must shift your discussion greatly. You will need to make revisions and just show those changes but at present this discussion is just incorrect. your final paragraph in the discussion notes this issue but elsewhere in the discussion you are incorrect a few times.

Please see point 8 above. We have made changes throughout the discussion to emphasise that it is sugar sales per capita that is of public health importance rather than total sales of sugar. We also feel that this paper is clear that the observed changes in sales of soft drinks reflect both changes in consumer demand for soft drinks and changes in the supply of soft drinks in the marketplace. We wish to reiterate that this paper is not an evaluation of the SDIL.

10. The three-tiered SDIL tax design I think drove many of your changes and you showed that. you need to understand all extant tax studies focused on volume. L only the forthcoming south african ones with one tier come close. But you will see in the future that the Chilean FOPL warning labels also produces these changes. But I think for your discussion you need to note this is the first tax design to actively promote reformulation from one level of sugar intake to another and not any sugar to zero sugar.

We have noted that the SDIL is the first multi-tiered tax that actively encourages reformulation in the introduction (lines 111-112) and have noted in the discussion that a large number of products are now below the point at which the levy applies. However, this paper is not an evaluation of the SDIL, and we cannot make casual links based on these annual observations.