



Lean, M. E.J., Garcia, A. and Gill, T. (2018) Sugar taxation: a good start but not the place to finish. *American Journal of Clinical Nutrition*, 108(3), pp. 435-436. (doi:[10.1093/ajcn/nqy211](https://doi.org/10.1093/ajcn/nqy211))

This is the author's final accepted version.

There may be differences between this version and the published version. You are advised to consult the publisher's version if you wish to cite from it.

<http://eprints.gla.ac.uk/169325/>

Deposited on: 20 September 2018

Enlighten – Research publications by members of the University of Glasgow
<http://eprints.gla.ac.uk>

1 Invited Editorial for Am J Clin Nutr

2 To accompany "The impact of the tax on sweetened beverages: a systematic review" (MS #AJCN-D-
3 18-00013)

4 **Sugar taxation: a good place to start but not the place to finish**

5 *The 21st century is presenting a fascinating chapter for the already-extensive social history of sugar,*
6 *around taxation specifically of sugar-sweetened beverages.*

7

8 Michael E. J. Lean, Ada L. Garcia, Tim Gill

9

10 **Lean and Garcia:** Human Nutrition, School of Medicine, College of Medical, Veterinary & Life
11 Sciences, University of Glasgow, Scotland, UK

12

13 **Gill:** Boden Institute and Charles Perkins Centre, University of Sydney, NSW, Australia

14

15 Corresponding author: Michael Lean

16 Email: mike.lean@glasgow.ac.uk

17 Mailing address: Human Nutrition, University of Glasgow, R2.19, Level 2, New Lister Building,
18 Glasgow Royal Infirmary G31 2ER

19 Phone number: 0141 201 8604

20

21

22 **Words: 1000**

23

24

25 In April 2018, the UK introduced a levy on sugar-sweetened beverages (SSBs), with two bands of
26 taxation: beverages containing 5g-8g of added sugar per 100ml are taxed at 18p per litre, and those
27 with 8g or more, 24p per litre(1). Of course, familiar loud voices oppose taxation, supporting the
28 principle of market freedom and dismissing the public health arguments that taxation will reduce
29 SSBs consumption thereby opposing obesity and related chronic diseases and raising valuable
30 revenue to amplify public health gains (2). Taxation changes behaviours, and has effectively reduced
31 harms from tobacco and alcohol, although their continued excessive consumption among more
32 deprived communities is worrying (3). Reassuringly, Redondo et al (2018) find SSB taxation is
33 effective among people from poorer socioeconomic circumstances and without a damaging tax
34 burden (4).

35 The systematic review by Redondo and colleagues (2018) lays to rest one notion, that people will
36 simply absorb a tax and continue as before: if a tax is at least 8%, people will buy and consume less
37 SSBs, at least for a period. The new UK levy adds about 10%, so consumption will probably fall. But
38 Redondo et al (2018) conclude that increasing by over 20% may be necessary to reduce SSB and
39 total caloric intake, particularly in deprived obesity-prone communities (4). But will such taxes
40 improve public health or generate valuable revenue?

41 SSBs are widely consumed, totally discretionary, products, so appropriate targets for taxation. For
42 effective revenue-raising, sales should be maintained or tax increased. The initial estimate for UK's
43 SSB tax was £500m per year, but that has already been reduced drastically because the
44 manufacturers rapidly reformulated their products, adding artificial sweeteners to avoid exceeding
45 the tax thresholds (5).

46 Historically, sugar has generated vehement opposition since its arrival into Europe in the 16th
47 century. Sugar upset the aristocracy, land-owners and church by providing sweetness without having
48 to contend with the vagaries of bees, and as a new easy source of alcohol. Sugar was taxed initially
49 as a Molasses Tax from 1733. The purpose to raise revenue was also an effort to curb the enormous

50 wealth of colonial (including American) sugar producers. Slavery and rum manufacture were also
51 factors considered to justify the Sugar Tax (6). It was repealed in 1766 but played a key role behind
52 the alienation of the American colonies and their Declaration of Independence.

53 Sugar has been raised as a cause of a huge range of diseases. A vast body of modern research has
54 concluded that while sugar is associated with several conditions, its role in their causation remains
55 confounded, with the possible exception of dental caries. Of course, extreme high-sugar diets
56 displace more nutritious foods and deplete essential micronutrients (7, 8). When the city of Glasgow
57 expanded from a small regional town to become the second city of the empire in the 19th century,
58 there was no food provision service, and the population demand was met with a stereotypic
59 imported diet of white bread, jam and sugary tea, which persisted through habit and regional
60 poverty as ship-building declined, well into the 20th century. Its upshot was widespread stunting,
61 and a dramatic rise in heart disease in Scotland, compared to England, which even now appears to
62 relate in part to lower fruit and vegetable consumption (9).

63 Meta-analyses show that sugar consumption does promote weight gain in children (OR 1.55) and
64 adults (0.75-1.19 kg), and that may contribute to increased risk of type 2 diabetes (10, 11). However,
65 this is not a unique metabolic effect of sugar as isocaloric replacement of sugar with other
66 macronutrients produces similar consequences (10).

67 Evidence appears adequate to support targeting of SSBs, but doubt remains whether such taxes
68 alone will impact obesity or other health outcomes, which would demand a sustained effect? The
69 likely effects can be gauged by modelling using current consumption data. **Figure 1** assesses the
70 best-case scenario, applying the reported impact from 12 months of the Mexican SSB taxes (12) to
71 the UK group with highest SSB consumption (11-18y olds) (13). The very small reduction in sugar
72 intakes, if maintained over a number of years could in principle result in reduced weight gain.
73 However, that would only occur if there is no compensatory increase in other sources of calories. It
74 is a depressing reality from most research on free-living individuals that weight-loss achieved is

75 below what should occur with full adherence to diet prescriptions: human appetite is good at
76 compensation. Early signs suggest that consumers in Mexico replace SSBs with water (14), which
77 may reduce appetite for sweet snacks (15). However, artificially-sweetened beverages are cheaper
78 to produce, and their market share already increasing. People accustomed to drinking 10% sugar
79 solutions may prefer a shift to artificially sweetened alternatives, which may potentially maintain
80 their appetites for sweet high-calorie snacks (16).

81 To conclude, it seems likely taxation will achieve reduction in SSB consumption, but the current SSBs
82 taxation regimes in Mexico and UK are unlikely to produce the reduction required to have a major or
83 sustained effect on obesity. It is critically important that governments have agreed with public
84 health advocates that damage from excessive consumption of unhealthy food and beverages
85 represents unacceptable externality from the free market: government intervention is necessary in
86 the same way as to protect the public against environmental and water pollution. To be more
87 effective, taxation may need to be increased substantially for SSBs as suggested by Redondo and
88 colleagues (2018), widened to other sugar-containing products or even directed at other obesogenic
89 product-classes such as intensively marketed high-fat sweetened snacks (17). Serious efforts for
90 health promotion might go on to ban undesirable foods and beverages in vending machines. Other
91 measures might address caffeine, which increases SSB consumption addictively (18). No single policy
92 or program will sufficiently impact the complex problem of obesity. Lessons from other complicated
93 public health problems such as road safety, alcohol and drug use, show that a sustained,
94 comprehensive portfolio of complementary strategies, delivered at scale, will be required. A tax on
95 SSB is a good start, but not the place to stop.

96

97 **Conflicts of interest:** The authors have no conflicts to declare

98

99 **Authors contribution:** All authors contributed to writing.

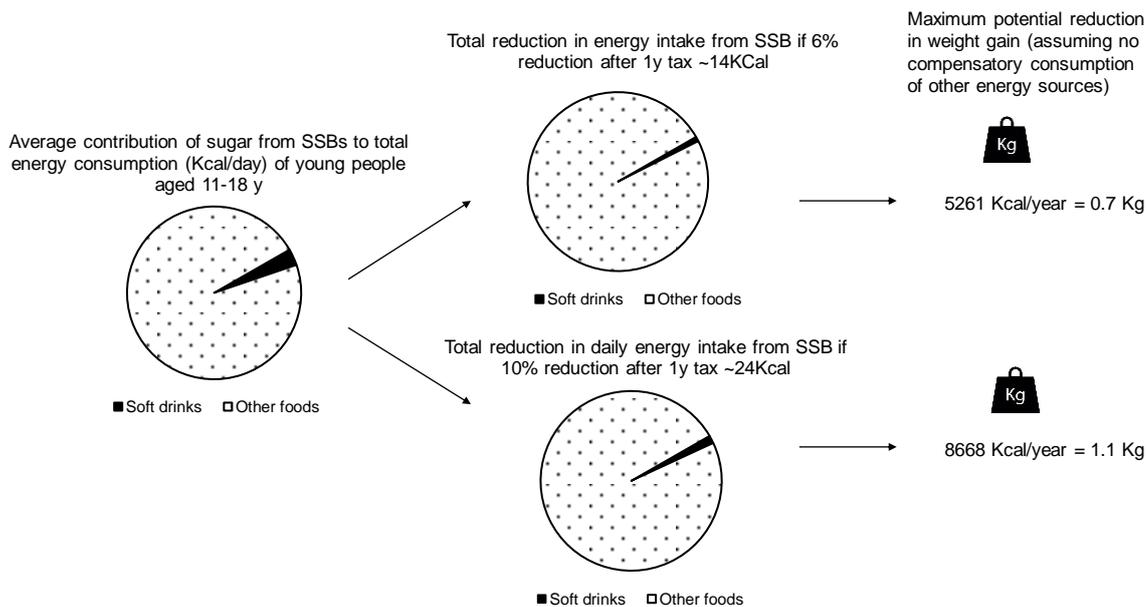
100

101

102

- 103 1. HM Revenue Customs. Policy Paper Soft Drinks Industry Levy. United Kingdom, 2016.
- 104 2. Barber S, Baker C, Foster D. The Soft Drinks Industry Levy Briefing Paper Number 7876, 12
105 April 2017. London, UK: House of Commons Library, 2017.
- 106 3. Sassi F, Belloni A, Mirelman AJ, Suhrcke M, Thomas A, Salti N, Vellakkal S, Visaruthvong C,
107 Popkin BM, Nugent R. Equity impacts of price policies to promote healthy behaviours. *The*
108 *Lancet* 2018;391(10134):2059-70. doi: 10.1016/S0140-6736(18)30531-2.
- 109 4. Redondo M, Hernández-Aguado I, Lumbreras B. The impact of the tax on sweetened
110 beverages: a systematic review. *American Journal of Clinical Nutrition* 2018.
- 111 5. Daneshkhu S. Internet: [https://www.ft.com/content/1e9703e0-0401-11e7-aa5b-](https://www.ft.com/content/1e9703e0-0401-11e7-aa5b-6bb07f5c8e12)
112 [6bb07f5c8e12](https://www.ft.com/content/1e9703e0-0401-11e7-aa5b-6bb07f5c8e12) (accessed 22-07-2018 2018).
- 113 6. Southwick AB. The Molasses Act -- Source of Precedents. *The William and Mary Quarterly*
114 1951;8(3):389-405. doi: 10.2307/1917421.
- 115 7. Mok A, Ahmad R, Rangan A, Louie JCY. Intake of free sugars and micronutrient dilution in
116 Australian adults. *The American journal of clinical nutrition* 2018;107(1):94-104. doi:
117 10.1093/ajcn/nqx008.
- 118 8. DiNicolantonio JJ, Berger A. Added sugars drive nutrient and energy deficit in obesity: a new
119 paradigm. *Open Heart* 2016;3(2):e000469. doi: 10.1136/openhrt-2016-000469.
- 120 9. Chambers S, Barton KL, Albani V, Anderson AS, Wrieden WL. Identifying dietary differences
121 between Scotland and England: a rapid review of the literature. *Public health nutrition*
122 2017;20(14):2459-77. doi: 10.1017/s1368980017001380.
- 123 10. Te Morenga L, Mallard S, Mann J. Dietary sugars and body weight: systematic review and
124 meta-analyses of randomised controlled trials and cohort studies. *BMJ : British Medical*
125 *Journal* 2013;346. doi: 10.1136/bmj.e7492.
- 126 11. Lean MEJ, Te Morenga L. Sugar and Type 2 diabetes. *British Medical Bulletin* 2016;120(1):43-
127 53. doi: 10.1093/bmb/ldw037.
- 128 12. Colchero MA, Popkin BM, Rivera JA, Ng SW. Beverage purchases from stores in Mexico
129 under the excise tax on sugar sweetened beverages: observational study. *Bmj*
130 2016;352:h6704. doi: 10.1136/bmj.h6704.
- 131 13. Roberts CS, T.; Maplethorpe, N.; Cox, L.; Meadows, S.; Nicholson, S.; Page, P.; Swan, G.
132 National Diet and Nutrition Survey. Results from Years 7-8 (combined) of the Rolling
133 Programme (2014/15 to 2015/16). In: Health Do, ed. London, 2018.
- 134 14. Colchero MA, Molina M, Guerrero-Lopez CM. After Mexico Implemented a Tax, Purchases of
135 Sugar-Sweetened Beverages Decreased and Water Increased: Difference by Place of
136 Residence, Household Composition, and Income Level. *J Nutr* 2017;147(8):1552-7. doi:
137 10.3945/jn.117.251892.
- 138 15. Appleton KM, Tuorila H, Bertenshaw EJ, de Graaf C, Mela DJ. Sweet taste exposure and the
139 subsequent acceptance and preference for sweet taste in the diet: systematic review of the
140 published literature. *The American journal of clinical nutrition* 2018;107(3):405-19. doi:
141 10.1093/ajcn/nqx031.
- 142 16. Drewnowski A, Mennella JA, Johnson SL, Bellisle F. Sweetness and food preference. *J Nutr*
143 2012;142(6):1142S-8S. doi: 10.3945/jn.111.149575.

- 144 17. Mytton OT, Clarke D, Rayner M. Taxing unhealthy food and drinks to improve health. *BMJ : British Medical Journal* 2012;344. doi: 10.1136/bmj.e2931.
- 145
- 146 18. Keast RSJ, Swinburn BA, Sayonpark D, Whitelock S, Riddell LJ. Caffeine increases sugar-sweetened beverage consumption in a free-living population: a randomised controlled trial. *The British Journal of Nutrition* 2015;113(2):366-71. doi: 10.1017/S000711451400378X.
- 147
- 148
- 149
- 150



152
153

154 **Figure 1.** Projected maximal impact on energy balance and body weights from a 6% reduction in
 155 consumption of sugar weetened beverages, as reported in Mexico one year after introduction of
 156 taxation. This example illustrates the impact among UK children, the highest consumers of SSBs.
 157 The effect among adults is slightly smaller. This projection assumes that there is no compensatory
 158 change in caloric intakes if sugar in SSBs is removed from chlden’s diets, and does not account for
 159 any changes which might be made by the food industry to incorporate the removed sugar into other
 160 products.