Institution: Newcastle University		
Unit of Assessment: UoA 3		
Title of case study: Informing the WHO Guideline on sugars contributed to the global introduction of limits on sugar intake		
Period when the underpinning research was undertaken: 2002-2014		
Details of staff conducting the underpinning research from the submitting unit:		
Name(s):	**Role(s) (e.g. job title):**	**Period(s) employed by submitting HEI:**
Professor Paula Moynihan	Professor of Nutrition and Oral Health	1991-2019
Dr Sarah Kelly	Research Associate	2006-2012
Period when the claimed impact occurred: 2015-present		
Is this case study continued from a case study submitted in 2014? No		

1. Summary of the impact

Dental caries and obesity are the most prevalent non-communicable diseases worldwide. Caries cause pain, anxiety and functional limitation, and treatment consumes 5–10% of healthcare budgets in industrialised countries. Newcastle research quantified a link between dental caries and the amount and frequency of free sugars intake. This evidence underpinned a strong recommendation in the 2015 WHO Guideline on sugars intake to cap intake at <10% of total daily energy. Consequently, this Guideline directly influenced the worldwide introduction of sugar taxes. In the UK, a public campaign to introduce a sugar tax, informed by the WHO Guideline, generated Parliamentary debate. The resulting "Soft Drinks Industry Levy" was introduced in April 2018, prompting manufacturers to reformulate their products to substantially reduce sugar content.

2. Underpinning research

Background and unmet need

Free sugars contribute to two separate major health concerns: obesity and dental caries. Dental caries are the most prevalent global non-communicable disease and lead to pain, anxiety and social limitations including poor school attendance. In addition, treating dental diseases consumes 5–10% of healthcare budgets in industrialised countries[1]. In 2010, untreated caries in permanent teeth was the most prevalent health condition worldwide, affecting 35% of the global population or 2.4 billion people[2].

It is well known that a major cause of dental caries and obesity is free sugars, and a 2003 WHO recommendation set an upper limit for free sugars intake of 10% of energy intake at the population level. However, data were insufficient to set a precise numerical limit on sugar consumption relating to obesity and dental caries at the individual level.

Newcastle research set a numerical cap on free sugars intake

In response, Newcastle conducted a series of studies to determine a precise cap for free sugars intake. An initial review (R2) summarised the existing field of research into the link between dental caries and the amount, and frequency, of free sugars intake. The paper recommended a maximum value of free sugars intake of 10% of energy intake and to limit the frequency of consuming free sugars to four times a day. A later review (R3) found that "sugars are the main dietary factor associated with dental caries" and stated that when sugar intake is capped at 15 kg/person/year, the level of dental caries was low. Controlling free sugars intake via a precise cap was therefore identified as an important part of preventing caries. Subsequently, the WHO commissioned the WHO Collaborating Centre at Newcastle University, headed by Professor Paula Moynihan, to undertake a systematic review into the relationship between amount of sugar intake and the risk of dental caries. The WHO commissioned the Centre due to their track record in the area of diet and caries, as represented by R1-R4.

[1] https://www.fdiworlddental.org/oral-health/ask-the-dentist/facts-figures-and-stats
[2] http://health.gov/dietaryguidelines/2015-scientific-report/pdfs/scientific-report-of-the-2015-dietary-guidelines-advisory-committee.pdf

The Centre drew on their expertise and experience in the field to produce a high-quality systematic review of 55 international studies, following the PRISMA guidance[3] and assessed according to GRADE Working Group guidelines[4] (R5). This review found consistent evidence of moderate quality showing a decrease in caries when free sugars intake was <10% of energy, but a significant relationship when sugars intake was <5%. The data provided by R5 were robust enough to allow a numerical cap to be set which applied to both obesity and dental caries. The data also underpinned the WHO's decision to reduce their 2003 recommendation of an upper limit of 10% at the population level to 10% at the individual level, and to suggest a further reduction to 5% at the individual level. The new limits discovered in R5 were central to 2015 WHO guidance on sugar intake relating to both dental caries and obesity, and the resulting worldwide impact is described below.

3. References to the research

SciVal field-weighted citation impact (FWCI) as of December 2020. Newcastle researchers in **bold.**

R1. **Moynihan PJ**. (2002) Dietary advice in dental practice. *British Dental Journal*. 193(10):563-8. DOI: 10.1038/sj.bdj.4801628. FWCI: 2.42.

R2. **Moynihan P**, Petersen PE. (2004) Diet, nutrition and the prevention of dental diseases. *Public Health Nutrition* 7(1A):201–26. DOI: 10.1079/phn2003589. FWCI: 2.24.

R3. **Moynihan PJ**. (2005) The role of diet and nutrition in the etiology and prevention of oral diseases. *Bulletin of the World Health Organization*. 83(9):694-9. https://pubmed.ncbi.nlm.nih.gov/16211161. FWCI: 2.19.

R4. **Huew R**, **Waterhouse PJ**, **Moynihan PJ**, **Maguire A**. (2011) Prevalence and severity of dental caries in Libyan schoolchildren. *International Dental Journal*. 61(4):217-23. DOI: 10.1111/j.1875-595X.2011.00060.x. FWCI: 1.66.

R5. **Moynihan P**, Kelly SAM. (2014) Effect on caries of restricting sugars intake: systematic review to inform WHO guidelines. *Journal of Dental Research* 93(1): 8-18. DOI: 10.1177/0022034513508954. FWCI: 18.48.

4. Details of the impact

<u>Impact on World Health Organization (WHO) Guideline on Sugars</u>

Newcastle research provided the basis for the WHO 2015 Guideline "Sugars intake for adults and children" (EV1), which assesses the effect of free sugars on unhealthy weight gain and dental caries. The latter aspect is informed entirely by R5; in addition, the data from R5 were robust enough to provide a numerical cap that applies to both aspects, as stated on page 16 of the Guideline. On pages 4 and 16, the Guideline strongly recommends reducing free sugars intake to below 10% of total energy intake, and recommends a further reduction to below 5%.

The Guideline was subsequently endorsed by two bodies, both citing R5. The first was the US Dietary Guidelines Advisory Committee, whose 2015 Scientific Report[5] strongly recommends keeping sugars intake to below 10%, citing the WHO Guideline and R5 specifically on page 344. Secondly, the FDI World Dental Federation's 2015 response[6] to the WHO recommendations requests that "the 5% reduction is not a conditional but a strong recommendation." In addition, the report states that "the systematic review by Moynihan and Kelly [R5] is the most extensive and rigorous on the subject."

<u>Impact of WHO Guideline on global implementation of a Sugar Tax</u>

In direct response to the WHO Guideline, three countries implemented a Sugar Tax on soft drinks as a vehicle to limit free sugars intake. The first country was South Africa, who in April 2018 introduced a tax as a result of a July 2016 Policy Paper (EV2), directly citing the Guideline (page 5). Secondly, in May 2018 Ireland announced a tax of 20c/litre on drinks with 5-8g of sugar per

[3] http://www.prisma-statement.org/
[4] https://www.gradeworkinggroup.org/
[5] https://health.gov/sites/default/files/2019-09/Scientific-Report-of-the-2015-Dietary-Guidelines-Advisory-Committee.pdf Page 342.
[6] Available on request

100ml, and 30c per litre on drinks with ≥8g/100ml (EV3). This resulted from an October 2016 Working Paper citing both R5 and the Guideline. The third country was Bermuda, who in October 2018 introduced a 50% tax on sugary products, which increased to 75% in April 2019. This resulted from a Ministerial brief delivered in June 2018 (EV4) which cites the Guideline.

The 2015 Guideline also informed a 2017 WHO Technical Document (EV5). On page 2, the document proposes a tax on sugary drinks as a major action to help prevent obesity, promote population health and reduce healthcare costs. Consequently, 13 further countries and cities have introduced or updated a sugar tax since the publication of the Technical Document, increasing the population now benefitting from a cap on sugar intake to over 536 million. These are (EV6): Brazil (2018), Estonia (2018), France (2018), French Polynesia (2018), Malaysia (2019), Norway (2018), Oman (2019), Peru (2018), the Philippines (2018), Qatar (2019), the Seychelles (2019) and Thailand (2019); and San Francisco and Seattle, (both 2018, EV7).

Campaign to introduce a Sugar Tax in the UK

In 2015, a "Sugar Rush" campaign took place in the UK to reduce sugar intake. The accompanying Channel 4 Documentary mentions the WHO report and repeatedly calls for a "Sugar Tax". The campaign led to a petition for a tax on sugary drinks, which closed with over 155,000 signatures and was debated in both Parliament and in the House of Lords. A July 2016 Public Health England document (EV8) cites the WHO figures in a recommendation to reduce free sugars to 5% of energy intake to combat both dental caries and obesity, especially in children. In April 2017 this was cited, along with the WHO recommendations directly, in a House of Commons Library Briefing Paper that calls for a tax on sugary drinks (EV9). Consequently, the Soft Drinks Industry Levy (SDIL) came into effect across the UK in April 2018. Under the SDIL, drinks containing 5-8g of sugar/100ml are taxed at 18 pence per litre; and drinks containing >8g/100ml at 24 pence per litre.

Response by manufacturers and retailers to the Sugar Drinks Industry Levy (SDIL)

In response to the SDIL, most soft drink manufacturers and retailers reformulated their products, including Suntory (Lucozade and Ribena), Britvic (Robinson's, J20 and Fruit Shoot); AG Barr (Irn Bru and Rubicon), Coca-Cola Fanta; and retailers' own brands including Tesco, Morrisons, Asda and Co-op. Internationally, in September 2017 Unilever announced a reduction in the sugar content of certain drinks in line with WHO recommendations (EV10).

A September 2019 report by Public Health England (EV11) found that the average sugar content per 100ml of drinks subject to the SDIL decreased by 28.8% between 2015 and 2018, saving 30,000 tons of sugar from entering the food chain. In addition, sales shifted towards products with a lower sugar content, indicating that the higher price of drinks subject to the SDIL has changed consumer buying habits.

Summary

Research by Newcastle University allowed a numerical cap to be placed on free sugars intake. This evidence underpinned 2015 WHO guidance, which contributed towards several countries introducing a sugar tax on soft drinks. This high-level change in policy has already led to reformulations of sugary drinks, which are a step towards reducing obesity and dental caries at a population level.

5. Sources to corroborate the impact

EV1. World Health Organization 2015 Guideline: sugars intake for adult and children; see page 12 for direct reference to R5. Available at https://www.who.int/publications/i/item/9789241549028
EV2. National Treasury, Republic of South Africa Policy Paper July 2016 Taxation of sugar sweetened beverages. http://www.treasury.gov.za/public comments/Sugar sweetened beverages/POLICY PAPER AND PROPOSALS ON THE TAXATION OF SUGAR SWEETENED BEVERAGES-8 JULY 2016.pdf
EV3a. Introducing A Tax On Sugar Sweetened Drinks, Health Rationale, Options And Recommendations. A Department of Health Working Paper October 2016
EV3b. News article "Ireland sugar tax comes into effect" by Rachel Arthur May 2018. https://www.beveragedaily.com/Article/2018/05/02/Ireland-sugar-tax-comes-into-effect

EV4. Government of Bermuda June 2018 Ministerial brief on The Sugar Tax.
https://www.gov.bm/articles/sugar-tax
EV5. World Health Organization 2017 Technical Document Taxes on sugary drinks: Why do it?
https://apps.who.int/iris/bitstream/10665/260253/1/WHO-NMH-PND-16.5Rev.1-eng.pdf
EV6. News article "Sugar taxes: The global picture" by Rachel Arthur et al. December 2018.
https://www.foodnavigator-latam.com/Article/2018/12/14/Sugar-taxes-the-global-picture
EV7. Update on countries that have implemented taxes on sugar-sweetened beverages (SSBs) February 2020. https://www.obesityevidencehub.org.au/collections/prevention/countries-that-have-implemented-taxes-on-sugar-sweetened-beverages-ssbs
EV8. Public Health England document July 2015 Why 5%? An explanation of SACN's recommendations about sugars and health.
https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/489906/Why_5_-_The_Science_Behind_SACN.pdf
EV9. House of Commons April 2017 Briefing Paper 7876.
https://researchbriefings.files.parliament.uk/documents/CBP-7876/CBP-7876.pdf
EV10. Unilever's position statement on improving nutrition.
https://www.unilever.com/Images/unilever-position-on-sugar-reduction_tcm244-423167_en.pdf
EV11. Public Health England report September 2019 Sugar reduction: Report on progress between 2015 and 2018.
https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/832182/Sugar_reduction__YR2_progress_report.pdf