

Institution: University of Liverpool		
Unit of Assessment: UoA2		
Title of case study: Food Policies and Disease Prevention - the IMPACT model		
Period when the underpinning research was undertaken: 2005 to date		
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:
Simon Capewell	Professor	1999-date
Martin O'Flaherty	Professor	2006-date
Period when the claimed impact occurred: 2014 to date		
Is this case study continued from a case study submitted in 2014? No		
1. Summary of the impact		
<p>Heart disease, stroke, diabetes, dementia and cancers cause over 90% of premature UK deaths; however, most are preventable. Our innovative computational modelling, developed and refined since 2000, can quantify and compare the potential benefits of different prevention policies. Our results have successfully advanced diverse food policies, by empowering advocacy groups and informing parliament and government, including:</p>		
<p>a) A UK sugary drinks tax (adopted into law 2016), raising GBP250,000,000 annual revenue for schools and slashing drink sugar content by 29%; hence 400,000 fewer people becoming obese or overweight by 2030.</p>		
<p>b) Our dietary salt reduction analyses empowered the <i>2019 Prevention Green Paper</i> salt target, potentially preventing over 25,000 heart attacks and strokes, and saving around GBP970,000,000 by 2025.</p>		
<p>c) Food trans fats elimination: the new EC regulation is predicted to annually prevent approximately 1,500 UK heart disease and stroke deaths, with GBP260,000,000 healthcare savings.</p>		
All three policies are already reducing inequalities, admissions and NHS costs.		
2. Underpinning research		
<p>Non-communicable diseases (NCDs) include heart disease, stroke, diabetes, dementia and cancers. NCDs prematurely kill over 175,000 Britons every year. However, most premature NCDs are preventable. Crucially, some 40% are attributable to poor diet and obesity.</p>		
<p>Capewell and O'Flaherty have led a comprehensive research programme using innovative computational models to define epidemiological trends, then quantify and compare potential health, economic and equity benefits of healthier food policies to prevent NCDs.</p>		
<p>Our IMPACT computational epidemiological models provide clear explanations for the dramatic cardiovascular and NCD trends in the UK, USA and diverse high-, middle- and low-income countries. Furthermore, we have shown that the number of older people with care needs in the UK will expand by 25% by 2025, due to population ageing; at age 65, a quarter of life expectancy will likely involve disability (a key issue for NHS service planners).[3.1]</p>		
<p>We have then quantitatively modelled and compared future disease prevention strategies leading to advocacy and policy change. Compared with medical treatments, population-wide NCD prevention policies consistently save more lives, reduce inequalities and achieve big cost-savings.[3.2-3.6]</p>		
<p>Our work informing evidence-based healthy food policies has three strands:</p>		
<p>a. Sugary Drinks Tax and Obesity Prevention</p>		
<p>b. Dietary Salt Reduction Policies</p>		
<p>c. Eliminating Industrial Transfats</p>		
<p>a. Sugary Drinks Tax and Obesity Prevention: We modelled the potential local and national impact of a 20% sugary drinks duty in England between 2010 and 2030. This could annually gain approximately 40,000 Quality Adjusted Life Years and prevent some 2,400 diabetes cases, 1,700 cardiovascular disease cases, and 400 cancer cases. We concluded <i>"This study adds to the growing body of evidence suggesting health benefits for a duty on sugary drinks"</i>.[3.2]</p>		
<p>b. Dietary Salt Reduction is a World Health Organization priority (SDG Goal 4.3). We modelled diverse dietary salt policy scenarios and demonstrated consistently large reductions in</p>		

cardiovascular and gastric cancer burdens, reduced inequalities and substantial savings. We concluded “*Additional structural policies could achieve further, more equitable health benefits*”.[3.3]

UK salt policies 2003-2010 powerfully reduced overall cardiovascular and gastric cancer burdens. However, the subsequent Public Health Responsibility Deal proved less effective. We predicted that introducing an evidence-based policy would prevent over 25,000 people from getting heart disease or strokes, and save the UK economy almost GBP1,000,000,000 by 2025.[3.4]

- c. Eliminating industrial transfats** hidden in British processed food would prevent over 1,500 deaths annually, substantially decrease health inequalities, and net some GBP260,000,000 annual savings.[3.5]

National public health prevention interventions are thus particularly cost-saving, as confirmed in our highly-cited systematic review, with a return-on-investment (ROI) averaging 27:1.[3.6].

3. References to the research

- 3.1.** M Guzman Castillo, S Ahmadi-Abhari, P Bandosz, S Capewell, A Steptoe, A Singh-Manoux, M Kivimaki, MJ Shipley, E J Brunner, M O’Flaherty. Forecasting trends in disability and life expectancies in England and Wales to 2025: a modelling study. *Lancet Public Health* 2017 2: e307–13. [http://dx.doi.org/10.1016/S2468-2667\(17\)30091-9](http://dx.doi.org/10.1016/S2468-2667(17)30091-9) Altmetric Score: 904
- 3.2.** B Collins, S Capewell, M O’Flaherty, H Timpson, A Razzaq, S Cheater, R Ireland, H Bromley. Modelling the Health Impact of an English Sugary Drinks Duty at National and Local Levels. *PLoS ONE* 2015; 10(6) e0130770. <http://dx.doi.org/10.1371/journal.pone.0130770> Altmetric Score:33
- 3.3.** Kypridemos, M Guzman-Castillo, L Hyseni, GL Hickey, P Bandosz, I Buchan, S Capewell, M O’Flaherty. Estimated reductions in cardiovascular and gastric cancer disease burden through salt policies in England: an IMPACT-NCD microsimulation study. *BMJ Open* 2017; e013791. <http://dx.doi.org/10.1136/bmjopen-2016-013791> Altmetric Score: 68
- 3.4.** A Lavery, C Kypridemos, P Seferidi, E Vamos, J Pearson-Stuttard, B Collins, S Capewell, M Mwatsama, P Cairney, K Fleming, M O’Flaherty, C Millett. Quantifying the impact of the Public Health Responsibility Deal on salt intake, cardiovascular disease and gastric cancer burdens: interrupted time series and microsimulation study. *J Epidemiol Community Health*, 2019; 73(9): 881-887. <http://dx.doi.org/10.1136/jech-2018-211749> Altmetric Score:885
- 3.5.** K. Allen, J Pearson-Stuttard, W Hooton, P Diggle, S Capewell, M O’Flaherty. Potential of transfats policies to reduce socio-economic inequalities in coronary heart disease mortality in England: cost-effectiveness modelling study. *BMJ* 2015;351:h4583. <http://dx.doi.org/10.1136/bmj.h4583> Altmetric Score:294
- 3.6.** R Masters, E Anwar, B Collins, R Cookson, S Capewell. Return on investment of public health interventions: a systematic review. *JECH* 2016;71,8. <http://dx.doi.org/10.1136/jech-2016-208141> Altmetric Score: 741

4. Details of the impact

a) Informing evidence-based NCD prevention policies

Our disease prevention research has quantified the benefits of diverse food policies in the UK, US, Europe, and beyond; empowering and mobilizing advocacy groups, and facilitating take-up by UK parliamentarians and government. Our **beneficiaries** and stakeholders thus include politicians and policy-makers, advocates and campaigners, media and the wider public.[5.1-5.10]

Our group’s research has been referenced in parliamentary briefings on healthy food policies, the PHE *Recent trends in mortality in England* [5.1], *Chief Medical Officer’s Report 2018*, and the UK government’s “*Prevention is Better than Cure*” and associated “*Prevention Green Paper*” 2019.[5.2] That report’s very first reference cites our systematic review detailing the big returns on investment (ROIs) from public health interventions.[3.6] It further highlighted and reinforced our group’s perennial message: that government has a leading role in creating environments which make healthy choices easier, by using incentives, regulations and laws.[5.2]

b) Sugary Drinks Tax and Obesity Prevention

Using our research evidence to mobilise stakeholders and inform advocacy

In 2014, ours was one of the very first groups to model the potential health benefits of a 20% sugary drinks duty in England. We concluded, “*This study adds to the growing body of evidence suggesting health benefits for a duty on sugary drinks*.”[3.2] **Capewell** was then a founder

member and media representative for the campaign group **Action on Sugar**. Our subsequent media strategy successfully mobilised stakeholders and powerfully made the case for public and political support of sugar reduction policies. Our subsequent research demonstrated that UK media, public and parliamentary support for a sugary drinks tax increased between April 2015 and November 2016.[5.3] Capewell’s expert voice was key; his statement ‘sugar is the new tobacco’, generated media impact that included front page articles in the *Daily Mail*, and *Glasgow Herald*. [5.3] This tobacco analogy became embedded in the policy debate and was used by key influencers (CMO, Health Secretary) to justify support for sugar regulation.[5.3] Capewell subsequently helped build the very influential **Obesity Health Alliance (OHA)**, chaired the OHA Annual General Meetings in 2018 and 2019, and continues on the OHA Steering Group. This advocacy group has brought together more than 40 leading organisations, royal colleges, charities and campaign groups. OHA are now routinely consulted on obesity issues by DHSC, PHE, parliamentarians and media.[5.4]

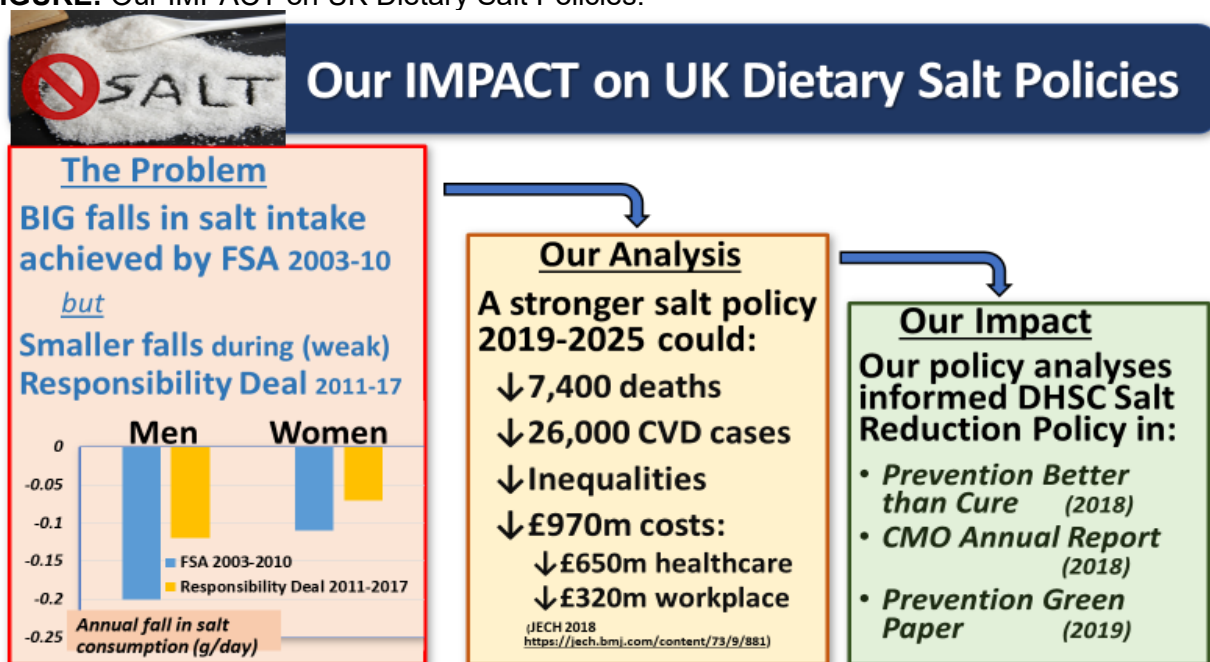
Informing UK Parliamentary and Government Actions

Capewell was one of the 15 expert signatories to the ‘Action on Sugar campaign’ statement (Jan 2014) which prompted a Parliamentary Early Day Motion on the issue.[5.5] Capewell then served as a House of Commons Health Select Committee expert witness, and was quoted in their 2015-2016 Report: *Childhood Obesity, Brave and Bold Action*. [5.5] That report then underpinned three progressive government *Childhood Obesity Plans* (2016, 2018, 2020), and the **Soft Drinks Industry Levy** (announced in 2016, then fully implemented in 2018). The SDIL was a major policy achievement, overcoming substantial barriers. It resulted in reformulation of 50% of targeted products, decreasing the average sugar content of targeted drinks by 29%, and annually raising GBP250,000,000 revenue (initially earmarked for school sports and breakfast clubs).[5.6] UK Government has now made a major commitment to halve current levels of childhood obesity by 2030 (*Prevention Green Paper 2019, & Tackling obesity: empowering adults and children to live healthier lives, July 2020*), plus considering extending sugar taxes to other commodities, e.g. sweetened milks (*CMO Annual Report, 2019*). These policies could together prevent over 400,000 people from becoming obese or overweight by 2030, substantially reducing diabetes admissions and NHS costs.[5.6]

c) Dietary salt reduction policies

Most dietary salt is hidden in processed food, making that the major policy target. Our Liverpool team is the only UK research group to extensively model the salt disease burden and compare different food policies in terms of health, finance and equity benefits.

FIGURE: Our IMPACT on UK Dietary Salt Policies:



Capewell was vice-chair for the initial NICE Cardiovascular Disease Prevention in Populations guidance and its subsequent Evidence Update Advisory Group (2014).[5.7] He co-authored three position papers and helped finalise all the food policy recommendations, notably including the halving of salt hidden in processed food. Working subsequently with campaign group CASH, Department of Health & Social Care (**DHSC**) colleagues and the Chief Medical Officer [5.8], we successfully “put salt back on the policy table”, after a period of stagnation under the government’s Responsibility Deal (2011-2018). We quantified the substantial UK disease burden preventable by stronger salt policies. These would prevent over 25,000 heart attacks and strokes, saving some GBP970,000,000 for the UK economy, including GBP650,000,000 for the NHS.[3.4] These modelling results informed two key 2019 DHSC policy documents: “*Prevention is Better Than Cure*”, and the *Prevention Green Paper* [5.2] which set a tougher 7g salt/ day target [5.2] and underpinned the related CMO recommendation of stronger salt policies.[5.8]

d) Eliminating industrial trans fats

As vice-chair for the NICE CVD Prevention in Populations guidance, Capewell co-authored the position paper on industrial trans fats (ITFs) and helped finalise the recommendation on ITF elimination.[5.7] Our subsequent BMJ analysis [3.5] suggested that cutting ITFs would generate substantial health benefits, potentially preventing over 1,500 deaths annually in the UK, (hence over 10,000 fewer deaths p.a. across the European population). Our BMJ recommendations [3.5] were then quoted in the key 2015 European Commission report defining a legal limit for dietary ITFs [5.9] which then resulted in EU legislation: (*Consolidation of Regulation (EC) 1925/2006 of the European Parliament & Council 2019*.[5.10] In parallel, O’Flaherty advised the WHO Eastern Mediterranean Regional Office on ITF reduction in 2015; WHO then launched the *Replace Initiative* to eliminate ITF from the world’s food supplies [5.10], following which six further countries subsequently applied the WHO recommendations.

5. Sources to corroborate the impact

5.1. Our **modelling of trends informing policy-makers**, e.g.: PHE, Dec 2018, ‘A review of recent trends in mortality in England’. We are 2/6 university-based Profs on review panel. Ref 3.1(above) is quoted (ref 63, p.64). Other of our papers cited (refs 65;91). These contribute key points (disparity in female mortality by deprivation; slowing of falls in mortality for some groups). www.gov.uk/government/publications/recent-trends-in-mortality-in-england-review-and-data-packs

5.2 Our epidemiology **research informing government reports** underpinning general preventative approach and informing food content targets:
 -HM Government (5 Nov 2018) ‘Prevention is better than cure: our vision to help you live well for longer’ <https://www.gov.uk/government/publications/prevention-is-better-than-cure-our-vision-to-help-you-live-well-for-longer>
 -DHSC, (July 2019) Prevention Green Paper ‘Advancing our Health: prevention in the 2020s’. The first reference cites our ROI work (p.33 regarding milk drinks and tonnes removed figure) <https://www.gov.uk/government/consultations/advancing-our-health-prevention-in-the-2020s>

5.3 Media coverage, sugar and Capewell as expert commentator

- Capewell’s “Sugar is the new tobacco” coverage in the media 09.01.14 and onwards (e.g. front pages Daily Mail, Glasgow Herald, also Independent)
- Sugar/tobacco analogy rehearsed by CMO and other influencers to justify levy
- Attribution of sugar/tobacco quote to Capewell evidenced: Action on Sugar Science Director presentation to World Public Health Nutrition Association, Sept 2014, slide 48.
- Public debate contributions: e.g. BBC 2 22.10.14; Radio 5 Live Breakfast 05.03.15.
- Paper showing subsequent increased public support for sugary drinks tax: **S Capewell** co-author Sugartax: Content analysis of UK newspaper coverage. PLoS ONE 2018 13 (12): e0207576.

5.4 **Related advocacy – Obesity Health Alliance:** Capewell as member/his OHA input: Letters to Times/Telegraph, Capewell as an expert signatory: <http://obesityhealthalliance.org.uk/news/> e.g.11.7.20; 26.7.18; 5.3.18; 6.2.17; 8.7.17. OHA overview <http://obesityhealthalliance.org.uk/2020/07/09/>

5.5 **Expert witness on Health Select Committee** Childhood Obesity 2015 inquiry:
 -Capewell 1/15 expert witnesses. Evidence session 20.10.2015, Q247-279. Comments reflecting

our sugar/salt work: Q254, lessons from tobacco; slowing reductions under Responsibility Deal; better via mandatory; Q269, improvements can be rapid; Q272, local authority role/finances.
<http://data.parliament.uk/writtenevidence/committeeevidence.svc/evidencedocument/health-committee/childhood-obesity-strategy/oral/23284.html>

-Capewell cited in subsequent 'Childhood obesity – brave and bold action' report, 17.11.15 p.24 (59);p.38(109) <https://publications.parliament.uk/pa/cm201516/cmselect/cmhealth/465/465.pdf>

-Early Day Motion 'Action on Sugar Campaign', Jan 2014: Capewell 1/15 expert signatories to Keith Vaz sponsored sugar EDM: <https://edm.parliament.uk/early-day-motion/46417/>

5.6. Beneficial effects resulting from sugar tax and predicted health benefits:

-PHE, 20 Sept 2019, 'Sugar reduction: report on progress between 2015 and 2018'. Summary stated: "The average sugar content of drinks subject to the SDIL decreased by 29% between 2015 and 2018 (measured in sales weighted average grams per 100ml)"

<https://www.gov.uk/government/publications/sugar-reduction-progress-between-2015-and-2018>

-HMRC UK Soft Drinks Industry Levy Statistics. October 2019, for reporting of revenue figures: <https://www.gov.uk/government/statistics/soft-drinks-industry-levy-statistics> See PDF, 734KB.

-HoC Library Briefing, SDIL, April 2017, for commitment to use revenue for schools/sport <https://commonslibrary.parliament.uk/research-briefings/cbp-7876/>

-'Sugar tax is already producing results' 12.03.18, Reformulation www.bbc.co.uk/news/health-43372295/

- BMJ article 2013;347:f6189. Effect of 20% UK sugar tax on obesity prevalence.' *Results*: "A 20% tax on sugar sweetened drinks...reduce the number of obese adults in the UK by 180 000 people, and overweight by 285 000 people." <https://www.bmj.com/content/347/bmj.f6189>

5.7 NICE CVD Prevention Guidance. Capewell as vice chair, authored the evidence papers on dietary salt and ITFs. Final guidance recommended halving salt intake and eliminating transfats.

<https://www.nice.org.uk/guidance/ph25/documents/ph25-prevention-of-cardiovascular-disease-evidence-update2>

5.8 CMO reports and recommendations, salt and sugar:

-Chief Medical Officer Annual Report 2018. "I recommend that in 2019, HM Government through Public Health England, set more ambitious targets for salt reduction in food." Several citations of our work. Evidence of direct link to our work: "The UK should embrace effective fiscal and regulatory policies for alcohol, and foods rich in sugar, salt and trans fats,⁴⁵ with strong monitoring and enforcement." (Ch.9, p.10). Ref 45 (in superscript) is Capewell.

<https://www.gov.uk/government/publications/chief-medical-officer-annual-report-2018-better-health-within-reach>

-Annual Report of the CMO, 2019. Consideration of extension of sugar tax to other products

<https://www.gov.uk/government/publications/chief-medical-officer-annual-report-2019-partnering-for-progress>

- Former CMO, our "substantial contribution" to salt policy development. (Contact 1.)

5.9. Research recommendations quoted by EC:

- Report from the Commission to the European Parliament and the Council regarding trans fats in foods and in the overall diet of the Union population. COM(2015) 619 final. {SWD(2015) 619 final} Brussels, 3.12.2015 (Liverpool work citation: 34)

https://ec.europa.eu/food/sites/food/files/safety/docs/fs_labelling-nutrition_trans-fats-report_en.pdf

- A. Jarvis et al. Study to support the impact assessment of the initiative to limit industrial transfats in the EU. ICF Final report. Feb 2018. (Liverpool work citations: 59,60,62,64,72)

https://ec.europa.eu/food/sites/food/files/safety/docs/fs_labelling-nutrition_transfats_is-study-report.pdf

5.10. Resulting EU legislation on ITFs:

-Consolidation of Regulation (EC) 1925/2006 of the European Parliament & Council 2019 restricting transfat in food in Annex III 15/05/2019: <https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:02006R1925-20190515&from=EN>.

-In parallel to EU evaluation, World Health Organisation call for the elimination of industrially-produced trans fatty acids from global food supply in report by N Carbonnelle. 'New EU regulation sets strict limitations on added trans fats content in foods'. 04-2019

<https://www.twobirds.com/en/news/articles/2019/global/new-eu-regulation-sets-strict-limitations-on-added-trans-fats-content-in-foods>