

Impact case study (REF3b)

<p>Institution: UNIVERSITY OF LIVERPOOL</p>
<p>Unit of Assessment: UOA2 - Public Health, Health Services and Primary Care</p>
<p>Title of case study: IMPACT Coronary Heart Disease Policy Model and Prevention Policies</p>
<p>1. Summary of the impact Capewell's MRC/EU/NIHR funded IMPACT programme has been developed at the University of Liverpool (UoL) since 1999. It examines why cardiovascular disease (CVD) death rates have recently halved in the UK, USA and Europe (mainly risk factor improvements plus modern treatments), and why CVD rates are increasing in China and most developing countries (adverse risk factor trends reflecting a Westernised diet). Results have informed CVD prevention strategies in the UK and beyond, notably NICE Guidance on CVD prevention in whole populations. The strong NICE recommendations on diet and tobacco were recently endorsed in NICE Commissioning Guidance and European and American guidance.</p>
<p>2. Underpinning research Cardiovascular disease (CVD) mainly comprises coronary heart disease and stroke. CVD generates a huge and unequal burden of premature mortality globally. In the UK, annually causing over 100,000 deaths and costing over £30 billion in the UK. However, CVD is eminently preventable.</p> <p>Capewell has been Professor of Clinical Epidemiology in the University of Liverpool (UoL) from 1999. Research funding has come from the MRC, EU, BHF, NHS, NIH, NIHR and a variety of foreign sources. His team has included UoL Senior Lecturers Martin O'Flaherty and David Taylor-Robinson (since 2006), plus many other UK and international colleagues.</p> <p>Capewell's policy model, IMPACT, has been progressively developed and refined at the UoL since 2000. The IMPACT model is comprehensive, synthesising data on all standard treatments in all patient groups, plus changes in all the major risk factors. It has been tested, refined and validated, particularly since 2008. IMPACT is the most widely used comprehensive CVD policy model in the world. It can now estimate deaths prevented or postponed, life-years-gained, the cost-effectiveness of different interventions, and the future deaths prevented by different prevention policies (such as increases in specific treatments or decreases in particular risk factors [1,2]).</p> <p>IMPACT results have now been used to help to explain Coronary Heart Disease (CHD) mortality trends in over twenty very different populations, including England and Wales, Scotland, Northern Ireland, Ireland, Finland, Sweden, Iceland, Poland, the Czech Republic, Italy, Spain, Syria, Palestine, Tunisia, Turkey, China, New Zealand, Canada and the USA [1,4,5].</p> <p>The consistent findings from the IMPACT studies are that the largest component of the widespread declines in cardiovascular mortality rates reflects population-wide improvements in major risk factors - notably smoking, blood pressure and cholesterol (mainly reflecting diet). Additional important contributions then coming from specific medical treatments for acute cases and thereafter for patients with chronic cardiovascular disease [1-6].</p> <p>Worryingly, the recent rises in obesity and diabetes prevalence have generated additional deaths in the UK and far beyond [4]. Westernisation of diet has been particularly powerful and damaging in low and middle income countries (such as China, Syria & Tunisia) which are now suffering dramatic and costly increases in non-communicable disease burdens (notably cardiovascular disease and diabetes) [5].</p> <p>Since 2006, this MRC-funded research programme has been exploring the complex relationships between evidence, policy makers and decision making [3]. Collaborations with UCL since 2010 have produced IMPACTsec. This is the first comprehensive CHD policy model able to quantify trends in specific socio-economic groups. These studies confirmed the more powerful effects of major risk factors in deprived groups. Happily, they also demonstrated remarkably equitable treatments across all socioeconomic groups [4]. From 2010 onwards, Capewell's group has also developed increasingly refined food policy models. Results suggest that reducing dietary intake of salt, trans fats and saturated fats and increasing fruit and vegetable consumption could massively reduce death rates [6].</p>

3. References to the research

These references report Capewell's coronary heart disease modelling to explain past mortality trends and to inform CVD prevention policies in the UK and beyond.

1. Ford ES, Ajani US, Croft JB, Critchley JA, Labarthe DR, Kottke DE, Giles WH, **Capewell S**. Explaining the Decrease in U.S. deaths from Coronary Disease, 1980-2000. *New England Journal of Medicine* 2007; 356: 2388-2398. PMID: 17554120 Citations: 961 Impact Factor: 51.658
2. Huffman MD, Ning H, Shay CM, Ford ES, Lloyd-Jones BM, Guzman M, **O'Flaherty M, Capewell S**. Quantifying Options For Reducing Coronary Heart Disease Mortality By 2020. *Circulation*. 2013 127 2477. Citations: 0 Impact Factor: 15.202
3. **Taylor-Robinson DC** et al. Policy-makers' attitudes to decision support models for coronary disease: a qualitative study. *BMC Public Health*. 2008, 8:415 Citations: 9 Impact Factors: 2.076
4. Bajekal M, Scholes S, Love H, Hawkins N, **O'Flaherty M**, Raine R, **Capewell S**. Analysing recent socioeconomic trends in coronary heart disease mortality in England, 2000-2007: a population modelling study. *PLoS Medicine* 2012; 9(6): e1001237. doi:10.1371/journal.pmed.1001237 Citations: 9 Impact Factor: 15.253
5. Saidi O, Ben Mansour N, **O'Flaherty M, Capewell S**, Critchley J, Ben Romdhan H. Analyzing recent coronary heart disease mortality trends in Tunisia between 1997 and 2009. *PLoS ONE* 2013 8(5): e63202. doi:10.1371/journal.pone.0063202 Citations: 0 Impact Factor: 3.730
6. **O'Flaherty M**, Flores-Mateo G, Nnoaham K, Lloyd-Williams F, **Capewell S**. Potential cardiovascular mortality reductions with different food policy options in the UK. *Bulletin of WHO* 2012, 90: 522-531. PMID: 22807598 Citations 8 Impact Factor 5.25

Key grant awards relating to this work

2006-2008. **Medical Research Council MRC. (£405,000)**. Extending the IMPACT coronary heart disease model to different health policy contexts [G0500920], PI S Capewell

2008-2012. **Liverpool Primary Care Trust, MerseyBEAT, £2m, S Capewell** (PI and Programme Director), **M Gabbay, J Wilding, M Pearson, M Whitehead, J Neilson, T Walley, K Wilson**; Liverpool Institute for Health Inequalities Research (LivHIR).

2009-2012. **Medical Research Council. (NPRI₃). (£500,700)** *Prevention IMPACT*: developing and evaluating economic models for planning optimal cardiovascular prevention strategies, £500k, PI **S Capewell**

2008-2012. **European Commission PHEA. 2008 –2012. (2,800,000 Euros)**.

“MedCHAMPS - MEDiterranean studies of Cardiovascular disease and Hyperglycaemia: Analytical Modelling of Population Socio-economic transitions. €2.8m. N Unwin, JA Critchley, **S Capewell**, K Bennett, B Ahmad, P Phillimore, B Unal, Y Demiral, B Kilic; W Maziak; A Mataria, A Hussein, N Abu-Rmeileh, R Khatib, H Rhomdane & H Aounallah). .

2012-2016. **NIHR School for Public Health Research Liverpool & Lancaster Collaboration (£2.5m)** **M Whitehead**, J Popay, **S Capewell**, P Diggle and **C Dowrick**; (including: Modelling preventive interventions to address inequalities in chronic disease. PI **S Capewell**).

2012-2017 British Heart Foundation Programme Grant (£1,507,000) *Vascular risk and*

functional decline in old age. E Brunner (PI), M Kivimaki, A Singh-Manoux, M Marmot, & S Capewell.

4. Details of the impact

The process through which the research led to the impact

Since 2000, this University of Liverpool programme led by Capewell has provided innovative and robust analyses consistently showing that upward or downward trends in death rates from heart disease and stroke mainly reflect changes in powerful cardiovascular risk factors, particularly smoking and diet. The contributions from specific medical treatments have also been consistently quantified. This and subsequent work enabled Capewell and Liverpool colleagues to widely disseminate evidence-based key messages on strategies for the prevention of cardiovascular disease and non-communicable diseases. Notably, **that population-wide preventive policies can be powerful, rapid, equitable and cost saving.**

This cutting edge IMPACT CHD Policy research has influenced public policy debate in the UK and internationally. It has provided scientific evidence endorsing UK policies on tobacco control and healthy diet. It has informed the evaluation of the subsequent interventions in Europe and beyond. Furthermore, Professor Capewell has shared his findings with policy makers in numerous countries developing CVD prevention strategies, including Sweden, Tunisia, China and the USA.

The principal beneficiaries have been policy makers and the general public through improved public health policies and information that reduces CVD and improves health. Capewell's seminal work has been widely cited. He has also received invitations to talk to politicians and policy makers in London, the European Parliament in Brussels and the World Health Organisation (details below), plus presentations to lecture in prestigious academic settings in the UK, Europe, the USA (Harvard, Yale etc), and Australia (Sydney & Melbourne universities).

Proof of contribution

Capewell's research has been seen as a key contributor to CVD prevention policy for well over a decade. Capewell and colleagues have extensively disseminated their findings internationally including to policy makers and politicians. This led in 2008 to an invitation to Capewell from NICE (The National Institute of Health and Clinical Excellence) to write a specification for a full guidance review on *Cardiovascular disease prevention at the population level*. [7]. This was subsequently supported by the NICE Topic Review Group, and then approved by ministers. This then led to the formation of the NICE Programme Development Group (PDG) in 2009. Capewell was appointed as PDG Vice Chair. He also served as a topic expert, authoring three NICE evidence papers which were subsequently cited as evidence in the final NICE publication in 2010 [8].

The NICE Guidance was published in June 2010 [8]. Fully implemented, the recommendations could prevent up to 40,000 premature cardiovascular deaths each year. The NICE Guidance received extensive positive media coverage including the Telegraph (front page), The Times, BBC, ITV etc. Altogether totaling over 150 separate news items, plus invited editorials for Capewell in the New Scientist, JAMA, European Heart J and Heart (all 2010), thus influencing the wider clinical community.

The 2010 NICE guidance has now been endorsed and extended in the 2012 NICE Commissioning Guide on CVD prevention [9]. This has informed Primary Health Care Trusts and Clinical Commissioning Groups and Wellbeing Boards. Thus, directly influencing NHS and local authority CVD budgets which exceed £10 billion per year.

The NICE Report has also been endorsed by the European Society of Cardiology [10]. We also reinforced the nutrition messages in a BMJ editorial [11], which then fed into recent American Heart Association Guidelines on CVD prevention [12].

These publications also increased the weight of scientific evidence and political pressure acting on the policy makers and officials planning the UN High Level Meeting on Non-communicable Disease Prevention and Control in Sept 2011. That specifically recommended reductions in dietary salt and

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tobacco which were subsequently actioned by the World Health Organisation [11, 12].

Capewell's research has also translated into **UK Faculty of Public Health Position papers**. These are used as authoritative guidance by public health practitioners across the UK. Capewell has been notably active in co-authoring and advocating improvements in food policy, specifically around European subsidies from the Common Agricultural Policy, and front of pack Traffic Light Labelling to better inform consumers [13, 14].

Capewell was also invited as the sole public health expert on the Academy of Medical Royal Colleges Obesity Review [15]. He was thus able to advise on the most effective and cost-effective interventions. As well as dissemination to the AoMRC membership of over 200,000 doctors, the report, *Measuring Up: the medical profession's prescription for the nation's obesity crisis* received extensive positive media coverage, raising public awareness, and influencing policy makers and politicians. The recommendations highlighted the crucial need for effective policy interventions to prevent obesity (and subsequent chronic diseases), notably protecting children from the aggressive marketing of junk food and sugary drinks, putting a duty on sugary drinks, and ensuring that healthy food was routinely provided in ALL UK schools [15].

5. Sources to corroborate the impact

Each source listed below provides evidence for the corresponding numbered claim made in section 4 (details of the impact).

7. Capewell S, Blamey A, Lincoln P, Mwatsama M, Lloyd Williams F; Critchley JA, Ireland R, Birt C, Platt S, Summerton N, Miller C, Field J. *Cardiovascular disease prevention at the population level*. NICE Potential Public Health Programme Guidance, 2179. 2008. NICE, London.
8. NICE Public Health Guidance: Prevention of cardiovascular disease at population level. 2010 (PH25). <http://guidance.nice.org.uk/PH25>
9. NICE CMG45: Integrated commissioning for the prevention of cardiovascular disease. (2012). <http://www.nice.org.uk/usingguidance/commissioningguides/integratedcommissioningforpreventionofcvd/CardiovascularDisease.jsp>
10. Jørgensen T *et al.* Population level changes to promote cardiovascular health. *European Journal of Preventive Cardiology* (2013); **20** (3): 409-21
11. Mozaffarian D. United Nations dietary policies to prevent cardiovascular disease. Modest diet changes could halve the global burden. *BMJ* 2011; 343: d5747 PMID: 21933831
12. Mozaffarian D *et al.* American Heart Association Council on Epidemiology and Prevention, Council on Nutrition, Physical Activity and Metabolism, Council on Clinical Cardiology, Council on Cardiovascular Disease in the Young. Population approaches to improve diet, physical activity, and smoking habits: a scientific statement from the American Heart Association. *Circulation*. 2012;126:1514–1563.
13. Birt C, Maryon-Davis A, Stewart L, Parkin C, Mwatswama M, **Capewell S**. A CAP on Health. UK Faculty of Public Health. 2008. ISBN: 1-900273-25-X
14. UK Faculty of Public Health. Position statement: Traffic-light food labelling. August 2008. ISBN: 1-900273-35-7
15. Stephenson T, Bhui K, **Capewell S** *et al.* Measuring Up: the medical profession's prescription for the nation's obesity crisis. *Academy of Medical Royal Colleges, London*. February 2013.