Institution: University of Cambridge

Unit of Assessment: UoA2

a. Context

Our research draws on strengths in Cambridge which range from aetiological investigation of the causation of major diseases, clinical approaches to early disease detection and individualised prevention, evaluation of health systems, and population-level public health interventions. We facilitate impact by capitalising on strategic NIHR investments, by promoting partnerships with NHS, industry, and not-for-profit sectors, and by creating cross-departmental applied research centres. The audiences for our research are similarly broad and include:

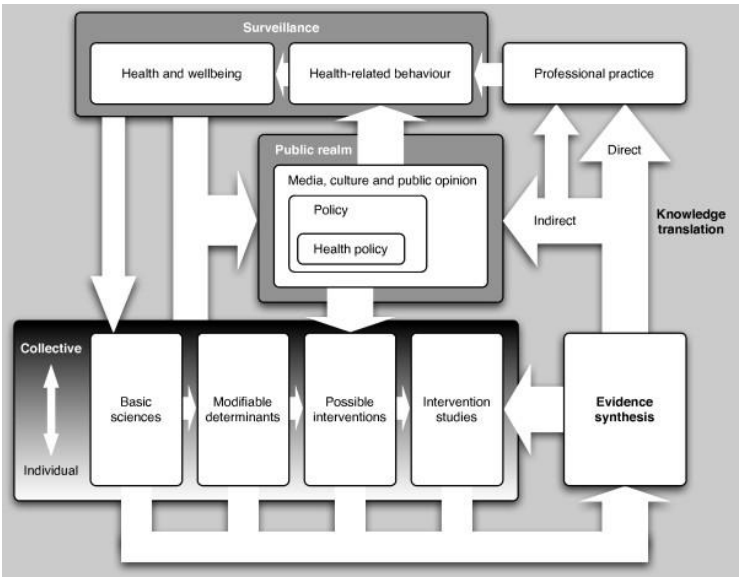
- Central government including Department of Health (e.g. dementia, impact of physical environments on diet), Home Office (alcohol taxation policies), Department of Education (school food review), DEFRA (transport policies), the Cabinet Office Behavioural Insights Team
- Clinicians, NHS purchasers and providers, NICE
- Industry (e.g., large pharma and small companies)
- Patient organisations

The general public, including work in schools, public exhibitions and the media.

b. Approach to impact

i. **Our framework to achieve impact**

The traditional approach to producing impact is articulated by the well-known Cooksey Report, with a linear model from basic research through the first 'gap in translation' to early clinical application, through the 'second gap in translation' to widespread implementation. However, public health research recognises that in the real world, impact rarely follows this linear path. We have published a model of translation for public health research on which our UoA's strategy for impact is based (Ogilvie et al. A translational framework for public health research. *BMC Public Health* 2009; 9: 116), which is summarised in the illustration below:



The key differences between this model and the Cooksey framework are that:

- the endpoint is improvement of population health rather than the institutionalising of effective interventions
- a wide range of biomedical, social and environmental basic sciences are integrated with epidemiological traditions of population health surveillance and the identification of modifiable risk factors
- a spectrum of determinants of health from the individual to the collective level is explicit, with

corresponding levels of intervention
- non-linear and inter-sectoral interfaces are identified within the public realm where decisions that influence population health take place
- there is an important role for evidence synthesis in evaluating the impact of interventions and policies designed to improve the health of the public

This strategy is evident across our research programmes, from those which focus on genetic epidemiology (that have led directly to risk profiling tools used in the NHS) to the work of the UKCRC Centre of Public Health Research Excellence (CEDAR) in which population-level interventions that evaluate the impact on diet and physical activity are taking place.

ii. **Structures to achieve impact**

The fundamental concepts described above underpin our approach to research and to achieving impact. We strongly encourage engagement of our research staff with a wide range of stakeholders, and we have created structures and groupings to facilitate this process. These include:
- cross-departmental research centres within Cambridge (e.g. NIHR Biomedical Research Unit on Dementia; NHS Blood and Transplant funded Population Donor Health Centre, RAND Europe supported Cambridge Centre for Health Services Research; Department of Health-funded Policy Research Unit on Behaviour and Health)
- secondment of senior scientists from the private sector including industry (e.g. Cambridge-Pfizer Cardiovascular Genomics Centre), health policy (RAND Europe), and joint supervision of PhD students with industrial partners

iii. **Examples of impact**

Examples of ways in which we have put our approach to translation into action include:

Health Policy
- Expert evidence to House of Commons Health Committee (Roland, Wareham, Ogilvie) and House of Lords Select Committee on Ageing (Brayne)
- Member of behavioural expert group, CMO's review of alcohol guidelines (Marteau, 2013) CMO's review of physical activity guidelines (Wareham)
- Advisory Committee on NHS cancer screening (Marteau, 2013), and mammography for breast cancer screening (S Thompson, 2013)
- Briefings for DH staff on how best to interact with academia (Roland, 2012)
- Member, DH Advisory Group on Ionising Radiation (Pharaoh)
- Member WHO Expert Committee on the use of HbA1c in the diagnosis of diabetes (Wareham)
- International Diabetes Federation Global Diabetes Plan 2011 (Wareham)

Wider Government Policy
- Expert evidence on behaviour change to House of Lords Science and Technology Committee (Marteau, Ogilvie) and sports and exercise (Wareham)
- Department for Education, member of School Food Review (Marteau, 2013)
- Advisory Group, Cabinet Office Behavioural Insights Team (Marteau, 2011-present)
- Faculty, Policy Leadership programme for Whitehall Directors-General (Marteau, 2013)

Professional practice
- Chair, NICE Public Health Guidance Programme Development Group. Preventing type 2 diabetes – population and community interventions (PH35) (Wareham)
- Member, NICE Public Health Guidance Programme Development Group. Physical activity and the environment (PHG8) (Ogilvie)
- Member NICE Public Health Guidance Programme Development Group. Promoting physical activity for children and young people (PH17) (van Sluijs)
- Member, NICE Familial Breast Cancer Guideline Development Group (Pharaoh)
- Member NICE Guideline Development Groups on Behaviour Change (Sutton)
- Member, NICE Public Health Advisory Committee (Sutton)

- Chair, British Psychological Society, Behaviour Change Advisory Group (Marteau)

Engagement with industry and the private sector

- Establishment of the Cambridge-Pfizer Centre for Cardiovascular Genomics in Cambridge in 2011 to use population study approaches to advance medicines development (Danesh, Butterworth, Howson, Di Angelantonio), which was highlighted as a success in the 2012 "Strategy for UK Life Sciences" report of the government's Department of Business, Innovation and Skills
- Working with the private sector partner (RAND Europe) to develop the Cambridge Centre for Health Services Research, a joint RAND University venture (Roland). In 2013, the Cambridge Centre for Health Services Research was named as second in a world ranking of health policy think tanks in a ranking constructed by the University of Pennsylvania based on 57,000 nominations reviewed by 793 expert panellists
- MRC-GSK collaborative programme to identify new targets and biomarkers from genetic association studies (Wareham, Langenberg, Ong)
- European Innovative Medicines Initiative – Metabolic Diseases (partners include GSK and Pfizer) (Wareham, Langenberg)
- Industrial / private sector funding or part-funding of senior or mid-grade academic posts (Danesh, Sandhu, Howson, Malarstig, Roland).
- Deep engagement with industry through advising large pharma (eg, Danesh is a member of the international advisory boards of Merck, Novartis, and Pfizer) and small companies that make innovative products (eg, Sutton advises Imperative Health which makes software to promote physical activity and Danesh advises BioScale which makes piezoelectric bioassays)
- Seven MRC CASE PhD studentships, including Unilever (3), Pfizer (2), GSK (2)
- Encouraging interactions with industry, leading to PhD students who have progressed to careers in industry (e.g., Fair, Ishihara, Oestergaard, Shurman, Sarwar, A Thompson).

Public engagement

- Participant engagement talks for EPIC-Norfolk study, Hertfordshire Physical Activity Trial, ADDITION trial, Fenland study)
- Talks: Cambridge Science Week (Roland, London 'Pint of Science' Festival (Marteau, 2013, MRC Epidemiology Unit and EPIC-Norfolk public participation stands)
- Coordination of Citizen Science project with CR-UK, resulting in >1,000,000 classifications of tumour images by the public www.clicktocure.net (Pharaoh)
- Weekend Science Museum workshop (www.goodfornothing.com) (Pharaoh)
- Many members of staff who have contributed to BBC TV and radio interviews, several Café Scientifiques.
- Contributions to the Science Media Centre (Pharaoh)

Schools outreach e.g. MRC Epidemiology School Outreach as part of SPEEDY study (90 schools in Norfolk), Hills Road Sixth Form college lectures (Wareham), Babraham Institute Sixth Form Science Conference (Wareham)

c. Strategy and plans

Using the framework described above, our strategy involves three key elements:

i. Creation of strategic partnerships within and without the university, recognising the wide range of stakeholders who have an interest in the health of the public
ii. Creation of cross-departmental research centres in applied health research with explicit translational objectives to achieve societal impact
iii. Provision of thought leadership through active engagement with public, professional and policy audiences.

The following examples show how these three principles are enacted in the work which we do:

We have established university-wide strategic network "PublicHealth@Cambridge"

(www.publichealth.cam.ac.uk/) which recognises the wide range of interests in public health across the university. Membership of the Network ranges from the physical sciences, engineering design and plant sciences to business, sociology and architecture. Important contributors to this work include the Cambridge Centre for Science and Policy (www.csap.cam.ac.uk/), which develops direct links with policymakers across a range of government departments many of whom meet with senior academics in UoA2 during mini-sabbaticals at the University of Cambridge.

As an example of the opportunities provided by enhanced multi-disciplinarity, two of our recent research initiatives (the Centre for Diet and Activity Research and the Behaviour and Health Research Unit) operate as cross-departmental groups. Furthermore, to develop policy aware researchers as well as research informed policy makers, both of these initiatives have created post-holders dedicated to "knowledge exchange" with a focus on a policy audience.

Our groups make novel and increasing use of social and print media to disseminate our work to a wide range of stakeholders. For example, our Collaborative Leadership in Applied Health and Care and the Centre for Diet and Activity Research produce evidence briefs for lay and policy audiences to maximise the impact of our research (www.clahrc-cp.nihr.ac.uk/resources, www.cedar.iph.cam.ac.uk/resources/evidence). Other groups make increasingly active use of social media, e.g. scheduled daily tweeting and regular blogs by the Cambridge Centre for Health Services Research both to disseminate our own work and to engage a wide constituency in discussion of issues relating to health policy.

d. Relationship to case studies

Our case studies have been chosen from a number of such studies that were prepared in draft to illustrate particular types of impact that our work has had. The case studies illustrate how different aspects of our implementation strategy have been a significant success across a wide range of areas:

- Changing clinical practice. The case study on aortic aneurysm screening demonstrates the impact of a major randomised trial, led from Cambridge, on national and international screening policies. Three other case studies included ─ on PREDICT (treatment decisions in early breast cancer), BOADICEA (screening for familial breast and ovarian cancer), and type 2 diabetes screening ─ demonstrate the translation of our research into management strategies and screening programmes that have been adopted nationally and changed clinical practice.

- Informing public policy. The case study on dementia demonstrates our involvement with the both government bodies and the Alzheimer's Society, as well as the subsequent impact of our work on national policies on dementia. The case study on physical activity demonstrates our broad approach to understanding the aetiological relationship between activity and chronic disease, evaluating efforts to change activity levels through both individual- and population-level approaches and contributing to NICE guidance on different forms of interventions to increase physical activity.

Developing strategic collaborations. The case study on cardiovascular risk prediction demonstrates how we have been able to lead major international collaborations, involving both industry and academia, resulting in substantial contributions to both national and international guidelines. Furthermore, this case study illustrates our ability to provide thought leadership, leading and harnessing the input of >200 scientists from 25 countries worldwide.