Impact case study: Statistics: London Metropolitan University

Title of case study: Fuel poverty modelling (London Metropolitan University)

1. Summary of the impact (indicative maximum 100 words)

This report discusses the impact of the work by Rudge and Gilchrist on the relationship between fuel poverty and poor health.This work has been used as evidence on the health effects of fuel poverty by consumer and advisory groups, NHS groups, UK central and local government and various overseas organisations.

2. Underpinning research (indicative maximum 500 words)

Research on morbidity relating to fuel poverty was carried out by Dr Janet Rudge (Research Fellow) and Dr Robert Gilchrist (Professor) in the period 2003-2008. The relationship between older people's health and fuel poverty in a London Borough was examined using morbidity data at small area level (enumeration districts, EDs). Excess winter morbidity modelling was based on winter and non-winter counts of emergency hospital episodes for respiratory diagnosis. Explanatory variables included energy inefficient housing. A proposed Fuel Poverty Index, based on combined variables, was found to be a predictor of excess winter morbidity.

Traditional approaches for analysing count data have used Poisson regression. In this work, the authors modelled morbidity by a wide range of distributions that allow for over-dispersion and they found that the Poisson Inverse Gaussian distribution was superior for analysis to the existing methodology.

Fossil fuel energy use in heating and cooling buildings is considered to be a major contributor to observed climate change effects, so there is an environmental imperative to reduce energy use in buildings. In one paper, the authors reviewed epidemiological research to illustrate problems associated with measuring the direct health impact of indoor temperatures, for which evidence remains limited. Conventionally, temperature-related health effects have been discussed in terms of seasonal excess deaths. The authors developed a population-based study in London that considered morbidity rather than mortality. The analysis indicated a link between the risk of cold homes and excess winter hospital episodes, demonstrating its potential for identifying small areas for priority action on improving domestic energy efficiency in terms of health as well as the environment.

3. References to the research (indicative maximum of six references)

The two principal papers cited by users of this research are:

Rudge J. & Gilchrist R. (2005) Excess winter morbidity among older people at risk of cold homes: a population-based study in a London borough. *Journal of Public Health*, **27**,4, 353-358. doi: 10.1093/pubmed/fdi051

Rudge J. & Gilchrist, R. (2007). Measuring the health impact of temperatures in dwellings: investigating excess winter morbidity and cold homes in the London Borough of Newham. *Energy and Buildings*, **39**, 847-858. . Doi: 10.1016/j.enbuild.2007.02.007

These papers were entered by Gilchrist as outputs 1 and 3 in the Statistics and Operational Research (UOA22) submission of London Metropolitan University, in the 2008 RAE.

4. Details of the impact (indicative maximum 750 words)

The work by Rudge and Gilchrist has been used as evidence on the health effects of fuel poverty by consumer and advisory groups, NHS groups, UK central and local government and various overseas organisations. As such, it has influenced the decisions of a wide variety of government and health authorities, and informed the public debate on fuel poverty and poor housing.

Thus, in proposing policies to discuss and alleviate fuel poverty, the following organisations, inter alia, have cited the Rudge/Gilchrist papers listed in section 3:

NHS:

- NHS Rotherham (Keeping warm in later life project),
- NHS Oldham, (Winter Warmth fact sheet),
- NHS Medway (Medway Keep Well Keep Warm),
- NHS Nottingham City (Excess Winter Deaths: A Health Needs Assessment for NHS),
- NHS Hillingdon (Excess Winter Deaths)

UK central and local authorities:

- UK Equality and Human Rights Commission see [1],
- Kirklees Council [2],
- Lewisham Council (Fuel poverty and Excess Winter Deaths in Lewisham),
- Carlisle City Council (Report to Chief Exec of Carlisle Council),
- Harrow Council (Wider determinants that affect health and well being: Housing and Health),
- Cumbria County Council (Anti Poverty Strategy),
- South East Regional Public Health Group,
- Health Protection Agency (An overview of winter planning & preparedness.), Mayor of London (The London climate change adaptation strategy draft report.)

Consumer groups:

- Consumer Focus [3],
- Friends of the Earth [4],
- National Women's Council of Ireland,
- The British Columbia Public Interest Advocacy Centre [5]

Advisory groups:

- Energy Action Scotland (The Relationship between Fuel Poverty and Health: A Discussion paper),
- Scottish Fuel Poverty Forum: (Review of the Scottish Government's Fuel Poverty Strategy, Interim Report, May 2012)
- Integrated Care Network (advises NHS, Local Government and 3rd Sector).

Overseas organisations:

- Organisation for Health Impact Assessment (USA),
- Australian Building Codes Board [6],
- Christchurch City Council, NZ [7],
- Otago Government (NZ),
- Connecticut Legislative District (USA) [8] .

In addition to the papers in section 3, Rudge and Gilchrist made presentations at substantive workshops and conferences, including at the House of Commons. Rudge was invited to contribute to the WHO publication on the burden of disease of inadequate housing on the basis of a Healthy Housing conference, published in 2011 [9].

5. Sources to corroborate the impact (indicative maximum of 10 references)

[1] Equality and Human Rights Commission: Socio-economic inequalities in older people's access to and use of public services http://justageing.equalityhumanrights.com/socio-economic-inequalities-in-older-peoples-access-to-and-use-of-public-services/

[2] Liddell C., Morris C., Lagdon S. (2011) Kirklees Warm Zone: The project and its impacts on well-being. University of Ulster, http://www.kirklees.gov.uk/community/environment/energyconservation/warmzone/ulsterreport.pdf

[3] Fahmy, E. (2011) The definition and measurement of fuel poverty. Consumer Focus briefing paper. http://www.consumerfocus.org.uk/files/2011/06/The-definition-and-measurement-of-fuel-poverty-Dr-Eldin-Fahmy.pdf

[4] The Marmot Review Team (2011) The Health Impact of Cold Homes and Fuel Poverty. http://online.eastherts.gov.uk/moderngov/documents/s8254/Housing%20and%20Health.pdf Friends of the Earth.

[5] Kelly Liz (2007) Affordable Energy. The British Columbia Public Advocacy Centre http://www.bcuc.com/Documents/Proceedings/2008/DOC_18821_C10-2-1_Attachment_3_Clean-Copy.pdf

[6] Williamson T., Grant E. Hansen A. Pisaniello D. and Andamon M. (2009) An Investigation of Potential Health Benefits from Increasing Energy Efficiency Stringency Requirements Building Code of Australia. The Australian Building Codes Board.

http://www.abcb.gov.au/~/media/Files/Download%20Documents/Archived/Major%20Initiatives/Energy%20Efficiency/Residential%20Housing/31114%20An%20Investigation%20of%20Potential%20Health%20Benefits%20from%20Increasing%20Energy%20Efficiency%20Stringency%20Requirements.pdf

[7] Christchurch NZ City Council (2008) Community Wellbeing Research review http://resources.ccc.govt.nz/files/CommunityResearchProject-fullreport-2009-11-23.pdf

[8] Colton R. D (2011)F isher, Sheehan & Colton Home Energy Affordability Gap. Connecticut Legislative Districts. http://www.operationfuel.org/wp-content/uploads/Connecticut-2011-HEAG-Final.pdf

[9] Braubach, M., Jacobs, D.E. and Ormandy, D. (2011). Environmental burden of disease associated with inadequate housing. Methods for quantifying health impacts of selected housing risks in the WHO European Region. Summary report. ISBN 978 92 890 0239 4 http://www.euro.who.int/en/what-we-publish/abstracts/environmental-burden-of- disease-associated-with-inadequate-housing.-summary-report