

## Identifying appropriate methods to incorporate concerns about health inequalities into economic evaluations of health care programmes

### Final Report

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### **What this study adds:**

- Reducing health inequality is a recognised goal of public policy, but changes to health inequality are not commonly incorporated in economic evaluations
- This study shows how health inequality impacts can be incorporated in economic evaluation in a way that clarifies the underlying social value judgements and their influence on results.
- The proposed framework could routinely be applied to the economic evaluation of health care programmes in cases where decision makers believe there may be potentially harmful or beneficial health inequality impacts.

## Abstract

### Introduction

Cost-effectiveness analysis (CEA) typically focuses on the efficiency of health care interventions in terms of improving expected total health outcomes in the general population. However, decision makers are sometimes also concerned with reducing health inequality. This study addresses how an economic evaluation of a health sector intervention should be conducted when the objectives are to improve total population health and to reduce inequality in the distribution of health. We explore appropriate extensions to CEA that would quantitatively incorporate concerns for health inequality. The objective is to develop a framework that can reflect decision makers' and stakeholders concerns about health inequality within the context of a deliberative decision making process.

### Methods

Drawing on the literature for measuring inequalities in health and the determinants of health we identify existing approaches that could be integrated with CEA, and examine their quantitative properties, practicality and underlying normative principles. We also draw on the income inequalities literature to explore how the methods used there can be translated to the health context.

### Results

We have developed a distributional cost-effectiveness analysis (DCEA) framework that describes the steps required to incorporate health inequality impacts into cost-effectiveness analysis. The first stage is to model the social distributions of health resulting from alternative decisions, including the pre-intervention distribution of health levels, the post-intervention distribution of health benefits, and the post-intervention distribution of health opportunity costs. This stage incorporates important social value judgements about the definition of health ("equality of what?") and which social variables are considered to represent unfair dimensions of health inequality ("equality between whom?"). The second stage is to evaluate the social distributions of health resulting from alternative decisions and to quantify any trade-offs between improving total health and reducing unfair health inequality. This stage incorporates important social value judgements about the definition of inequality ("equality measured how?") and how far society is prepared to forego gains in total health in order to secure reductions in unfair health inequality, which are explicitly formulated using health-related social welfare functions. The approach is capable of analysing multiple dimensions of health inequality in a unified framework – including income, ethnicity, gender, and so on – and is underpinned by a set of social value judgements that have to be made in order to model and to rank social distributions of health. Our framework makes these social value judgements transparent and provides methods to explore the sensitivity of results to these judgements.

### Discussion

The framework that we have developed enables quantitative evaluation of health care interventions funded within a fixed health sector budget when decision makers are concerned about impacts on health inequality as well as impacts on total health. In order to use this framework a number of factual and normative assumptions need to be made, for example about the distribution of health opportunity costs and about aversion to unfair health inequality. Further research is required in order to provide evidence to support these assumptions. The framework is also currently limited to only consider health outcomes and health opportunity costs of interventions under a fixed health sector budget. Further work is required to extend the framework beyond the health sector and to develop a full distributional cost benefit analysis (DCBA) framework capable of evaluating the health and income inequality impacts of wider cross-government public health and social policy interventions with costs and benefits falling outside the health sector.

## Executive Summary

### Background / Introduction

Economic evaluation – typically in the form of cost-effectiveness analysis (CEA) – is widely applied throughout the world to aid resource allocation decisions in the health care sector; a prominent example is provided by the National Institute for Health and Care Excellence (NICE) in the UK. The application of CEA focuses on the efficiency of health care interventions, often defined in terms of improving total expected health outcomes in the general population. However, policy makers may also be concerned about the impacts of health care interventions on unfair health inequalities – that is, differences in health between particular individuals or groups that are considered to be unfair or unjust. Such concerns are relevant in the UK where the Government has declared a commitment to narrowing the health gap between disadvantaged groups and the rest of the country as well as improving health overall (Department of Health, 2010). Currently the NHS Outcomes Framework highlights that the Secretary of State, NHS England and Clinical Commissioning Groups have a duty to have regard to the need to reduce inequalities between the people of England. The Public Health Outcomes Framework for England also embodies policy concern for reducing health inequality. It describes a vision to ‘improve and protect the nation’s health and wellbeing, and improve the health of the poorest fastest’, and incorporates two outcomes: (1) increased healthy life expectancy and; (2) reduced differences in life expectancy and health life expectancy between communities.

While there exists a substantial body of research into measuring and characterising health inequalities (O’Donnell, van Doorslaer, Wagstaff, & Lindelow, 2008), this has not been integrated with the methods of economic evaluation. It is common to see statistics published on the extent of health inequalities, how these compare between areas and (to a lesser extent) how these change over time. However, it is rare to see interventions evaluated in terms of their impact on health inequality, as was highlighted in both the Wanless report on public health (Wanless 2002, 2004) and the Marmot review of health inequality in England (Marmot 2010). It is rarer still to see the value of investing resources to reduce inequalities compared to the value that could have been obtained with alternative use of those resources. For example, the Health Inequalities Intervention Toolkit allows Local Authorities to view potential reductions in the life expectancy gap between the most deprived quintile group and the average for NICE approved interventions in four disease areas ([http://www.lho.org.uk/LHO\\_Topics/Analytic\\_Tools/HealthInequalitiesInterventionToolkit.aspx](http://www.lho.org.uk/LHO_Topics/Analytic_Tools/HealthInequalitiesInterventionToolkit.aspx)). However, the toolkit does not incorporate the cost of achieving this change and does not evaluate policies that would increase uptake of these, already freely available, interventions among more deprived groups.

Appropriate methods for CEA where the decision maker’s single objective is to maximise population health are well established (Drummond et al., 2005). Various approaches have been proposed for incorporating health inequality concerns into economic evaluation, including analysis of the health opportunity costs of equity constraints, equity weighting, and multi-criteria decision analysis (MCDA). In practice, however, the extent of inequality is rarely evaluated or incorporated formally alongside CEA. Researchers at the Disease Control Priorities 3 project have recently developed a method of “extended cost effectiveness analysis” that offers decision makers in low and middle income countries information on the socioeconomic distribution of costs, health benefits and financial protection benefits (<http://www.dcp-3.org/resources/universal-public-finance-tuberculosis-treatment-india-extended-cost-effectiveness-analysis>). However, these methods stop short of evaluating trade-offs between improving total health and reducing health inequality and do not allow for the fixed health budget that is a central feature of health care decision making in the UK NHS and in many other countries.

This study aims to address the main research question of how one should conduct an economic evaluation of a health care or public health intervention where the decision maker’s objectives are to

improve population health and to reduce inequality in the distribution of health. We explore options for how CEA can be extended to incorporate appropriately and quantitatively concerns for inequality. The objective is to develop a framework that can reflect decision makers' and stakeholders concerns about health inequality within the context of a deliberative decision making process, and does not seek to impose any particular value judgement about health inequality.

## **Aims**

The aim of this project is to produce an economic evaluation framework for distributional cost-effectiveness analysis of health care interventions. This framework has the following objectives:

1. To evaluate health sector interventions in terms of health outcomes and health opportunity costs.
2. To enable analysts to provide quantitative information about efficiency and health inequality impacts in a way that can support public sector decision making.
3. To be designed to reflect decision makers' and stakeholders' concerns about health inequality within the context of a deliberative decision making process.
4. To combine the quantitative information produced with these concerns making them transparent as social value judgements and use the combination to rank health interventions.
5. To be able to demonstrate the robustness of conclusions drawn to alternative sets of social value judgements.

## **Methods**

We started by reviewing the economic inequality literature identifying the key tools and methods used to measure inequality and social welfare as well as the assumptions underlying these tools and explored the key issues in translating these to the health domain.

We next adapted the standard CEA framework to make use of the relevant economic inequality concepts that we identified to create an initial model for DCEA. We conducted an expert workshop with experts in CEA to discuss our ideas on DCEA and revised the basic framework in light of this workshop. We presented our working paper on DCEA at a number of academic conferences to get further feedback and to finalise our framework implementation.

Our next step was to develop a real world case study of DCEA, we decided on the NHS Bowel Cancer Screening Programme (BCSP) as a suitable case study and worked with the modellers who undertook the initial CEA for the BCSP to adapt it and produce a DCEA model. We held a second workshop, this time with policy makers focussed on cancer and screening programmes, to present and to discuss our BCSP DCEA model, and we revised this model in light of these discussions. We presented our working paper on the BCSP at a number of academic conferences and workshops to finalise our case study prior to submitting for publication.

We finally presented our work to policy makers at the DH with a general interest in health inequalities to get some understanding of how best to present the results of our analysis and to get ideas for how to take the research forward policy relevant directions.

## **Key findings and conclusions**

We found that there is a rich literature in economics around how to incorporate inequality concerns into the evaluation of the distributions of outcomes. While there are important differences between income and wealth (the domains for which these methods have been developed) and health (our domain of interest), careful unpacking of the underlying assumptions of the methods allows us to utilise appropriately these methods in evaluating health distributions.

We found that we were able to adapt real world CEA models using publicly available data to produce plausible distributions of population healthy life expectancy taking into account differential impacts of health interventions and distributions of opportunity cost. We were also able to adjust these distributions to separate out fair and unfair dimensions of health inequality building on the work of Fleurbaey and Schokkaert (2009).

We evaluated our fairness adjusted distributions from our adapted CEA model with the health related social welfare functions that we derived from the economics literature and were able to use this approach to rank different health interventions. We developed tools to explore the sensitivity of our modelling conclusions to alternative social value judgements about fair and unfair dimensions of health inequality and the degree and form of inequality aversion assumed.

Our approach is an important first step towards routine incorporation of health inequality concerns into economic evaluation of health care interventions. However, our approach currently focuses only on healthcare interventions, and is unable to evaluate the health inequality impacts of wider public health and social policy interventions with costs and benefits falling outside the health sector.



## 1 Detailed description of project findings

Full details can be found in the four papers attached:

- 1) Miqdad Asaria, Richard Cookson, Susan Griffin (2014), Incorporating Health Inequality Impacts into Cost-Effectiveness Analysis, in the Elsevier On-line Encyclopaedia of Health Economics

This paper provides a general overview of what DCEA is and the key steps to conduct such an analysis

- 2) Miqdad Asaria, Susan Griffin, Richard Cookson (2013), Measuring Health Inequality in The Context of Cost-Effectiveness Analysis, in Pedro Rosa Dias, Owen O'Donnell (ed.) *Health and Inequality (Research on Economic Inequality, Volume 21)*, Emerald Group Publishing Limited, pp.491-507

This paper reviews the economic inequality literature and explains how the tools and measures of economic inequalities can be translated to the health domain.

- 3) Asaria, Miqdad, Griffin, Susan, Cookson, Richard, Whyte, Sophie and Tappenden, Paul, (2013), Distributional Cost-Effectiveness Analysis of Health Care Programmes, No 091 CHE RP, Working Papers, Centre for Health Economics, University of York.

This paper presents the distributional cost-effectiveness analysis case study of the NHS bowel cancer screening programme. This shows a real world example worked through the DCEA framework and typical outputs of such an analysis.

- 4) Asaria, Miqdad, Griffin, Susan, Cookson, Richard, Whyte, Sophie and Tappenden, Paul, (2013), Distributional cost-effectiveness analysis: a tutorial, No 092 CHE RP, Working Papers, Centre for Health Economics, University of York.

This paper describes in detail how to conduct a real world DCEA and can be used as a guide to an analyst familiar with the methods of CEA to enable them to convert their standard CEA models to DCEA models.

## 2 Contribution to Consortium themes

### 2.1 Health inequalities

The main focus of this project is on incorporating inequality concerns into the cost-effectiveness analysis of healthcare interventions so is directly addressing the theme of health inequalities.

#### 2.1.1 Methodological development

New methods were developed in this project and these were tested on a real world case study.

#### 2.1.2 Translation to policy

Expert workshops and presentations to policy makers have been used to communicate our new methods to policy makers and a real world policy relevant case study was worked up to demonstrate the features of the framework.

## References

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- O'Donnell, O., van Doorslaer, E., Wagstaff, A., & Lindelow, M. (2008). *Analysing health equity using household survey data: a guide to techniques and their implementation*. *Bulletin of the World Health Organization* (Vol. 86). World Bank Institute.

## Outputs / Dissemination

### Publications:

- 1) Miqdad Asaria, Richard Cookson, Susan Griffin (2014), Incorporating Health Inequality Impacts into Cost-Effectiveness Analysis, in the Elsevier On-line Encyclopaedia of Health Economics
- 2) Miqdad Asaria, Susan Griffin, Richard Cookson (2013), Measuring Health Inequality in The Context of Cost-Effectiveness Analysis, in Pedro Rosa Dias, Owen O'Donnell (ed.) *Health and Inequality (Research on Economic Inequality, Volume 21)*, Emerald Group Publishing Limited, pp.491-507
- 3) Asaria, Miqdad, Griffin, Susan, Cookson, Richard, Whyte, Sophie and Tappenden, Paul, (2013), Distributional Cost-Effectiveness Analysis of Health Care Programmes, No 091 CHE RP, Working Papers, Centre for Health Economics, University of York.
- 4) Asaria, Miqdad, Griffin, Susan, Cookson, Richard, Whyte, Sophie and Tappenden, Paul, (2013), Distributional cost-effectiveness analysis: a tutorial, No 092 CHE RP, Working Papers, Centre for Health Economics, University of York.

### Workshops

- Workshop 1, Kings Manor, York, 12 March 2012. This workshop presented our embryonic framework, and was accompanied by a detailed technical report. It was attended by 30 senior academics and policy analysts including internationally renowned experts in the fields of public health, health economics and income inequalities. Policy makers include officials from the Department of Health and the National Institute for Health and Clinical Excellence.
- Workshop 2, 26 February 2013, Tavistock Place, London School of Hygiene and Tropical Medicine in London. A selected group of senior DH officials, academics and bowel cancer specialists met to discuss an early version of the bowel cancer case study.

### Presentations

- University of York, 21 September 2011. A seminar was held to present the analytical framework to academic colleagues at the University of York.
- EU Equity Action Project, Department of Health, London, 15<sup>th</sup> November 2011, verbal presentation by Richard Cookson on the project aims, to an audience of DH officials and EU project partners on a EU-wide project on incorporating health inequality impacts into cross government health impact assessments in European countries.
- Population Health Methods Challenges Conference 24-26<sup>th</sup> April 2012. A poster on the framework was presented by Susan Griffin, and a related talk on equity given by Richard Cookson.
- Population Health Workshop, 3-4 May 2012, the University of Glasgow, verbal presentations by Richard Cookson and Miqdad Asaria on the framework on methods for measuring inequality.
- SCHARR at the University of Sheffield, June 2012, seminar presentation by Susan Griffin.
- Leicester University, October 2012, seminar presentation by Susan Griffin.
- UK Health Economists Study Group Meeting, Oxford, June 2012, presentation of the framework by Susan Griffin and Miqdad Asaria.
- UK Health Economists Study Group, Exeter, January 2013 – presentation of the first draft of bowel cancer case study by Miqdad Asaria.

### Project website

<http://www.york.ac.uk/che/research/equity/d-c-e-a/phrc/>