THE UNIVERSITY of York

Presentation to the Austrian Institute for Health Technology Assessment Symposium on Using Economic Evaluation in Decision Making: Learning from International Innovations

Distributional cost-effectiveness analysis: Making health inequality count in health technology assessment

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CHE
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Jan 2025

Health inequalities modular update to NICE health technology evaluations: the manual (PMG36)

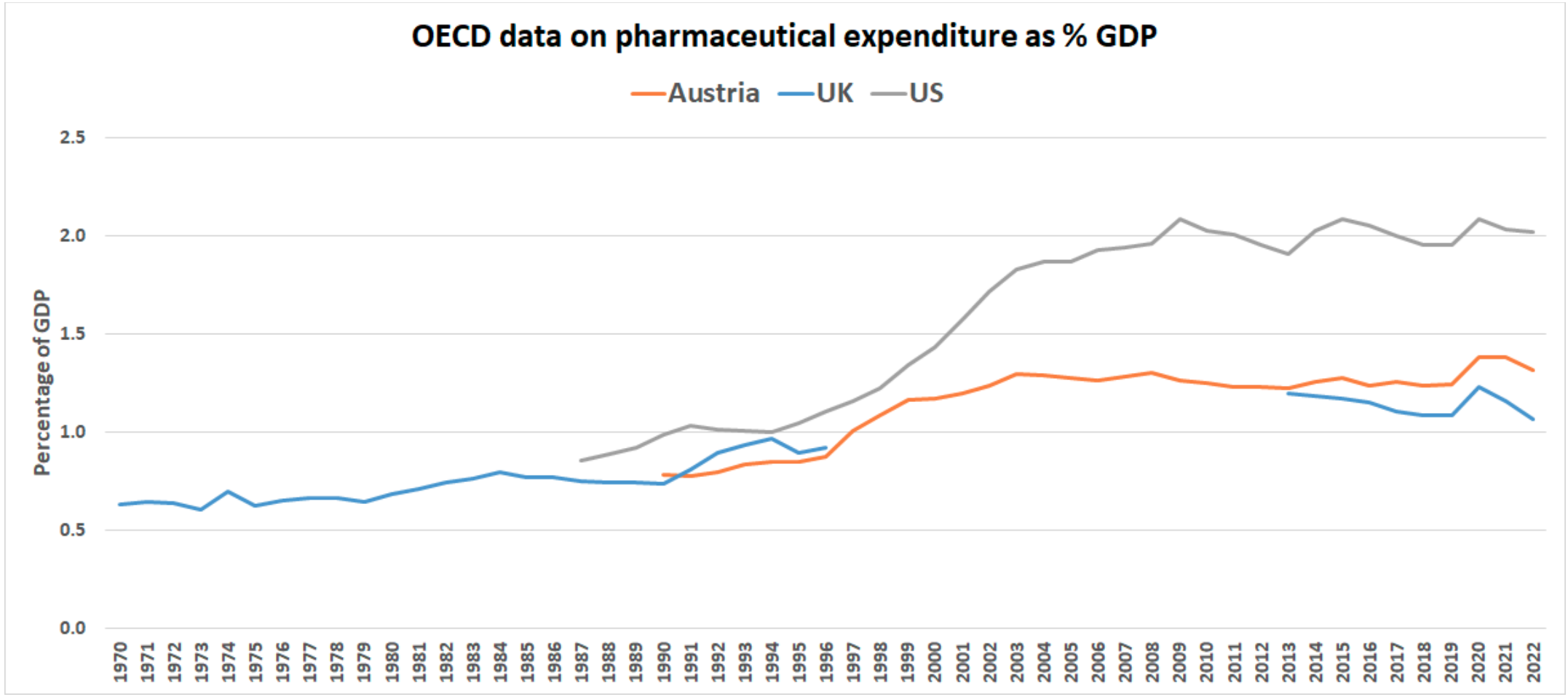
Proposed new content for the methods manual

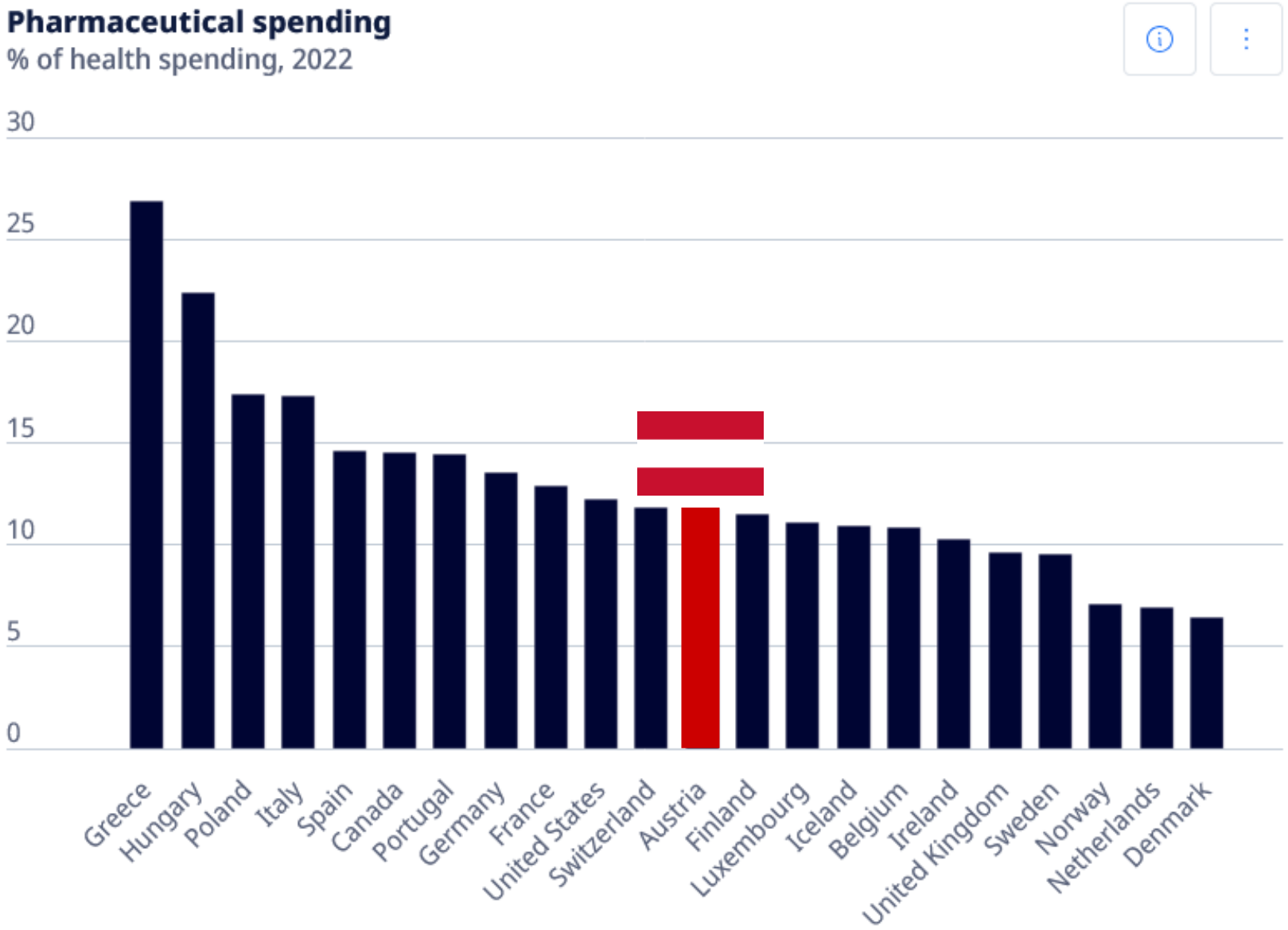
https://www.nice.org.uk/guidance/indevelopment/gid-pmg10009/documents

6.2.36 When there is robust evidence showing the technology substantially reduces or increases health inequalities, the committee will consider how this could impact its decision about whether the technology is an effective use of NHS resources (see section 6.2.38-6.2.39 below).

6.2.39 When considering the relevance of health inequality impacts on the value of the technology, the committee can apply flexibility to the range normally considered a cost-effective use of NHS resources, but it must consider the effects of healthcare displacement and opportunity cost before doing so and provide a rationale for stakeholders. This flexibility should only be applied when the size of the health inequality impacts of a technology are substantial.

Can Austria afford to pay more attention to HTA social value criteria alongside cost containment?





https://www.oecd.org/en/data/indicators/pharmaceutical-spending.html?oecdcontrol-b84ba0ecd2-var3=2022

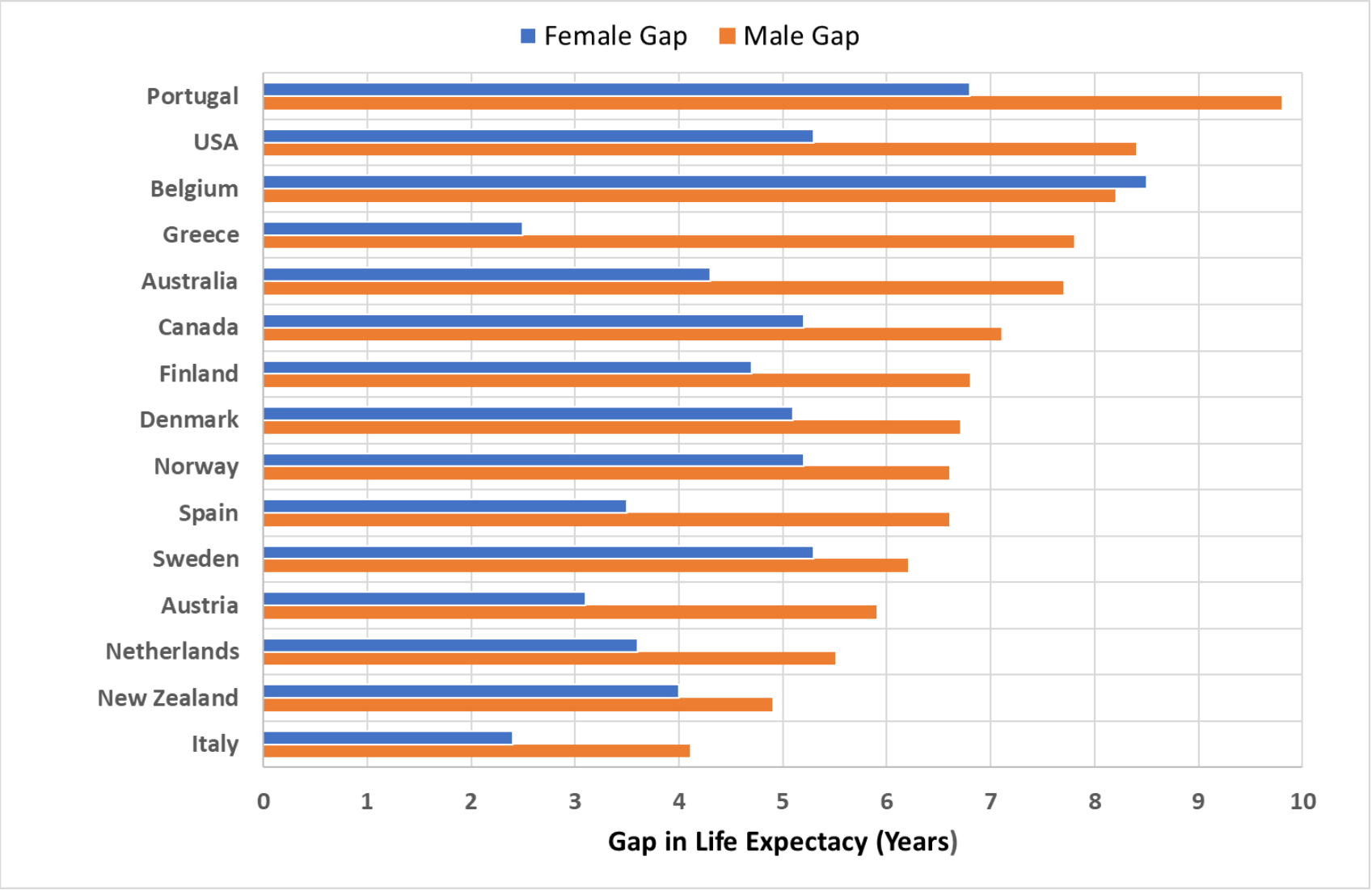
Health inequality

Health inequality means variation in health among social groups, where people in more socially disadvantaged groups tend to live shorter lives and experience more illness.

Health inequality matters because there is widespread concern about the "double disadvantage" experienced by social groups that are not only more socially disadvantaged – for example, in terms of economic status, ethnicity or location – but also more likely to suffer premature illness and death.

The policy objective of reducing health inequality appeals to people of all ages, social backgrounds and political opinions – left and right, moderate and populist – and achieving it may help to foster social solidarity.

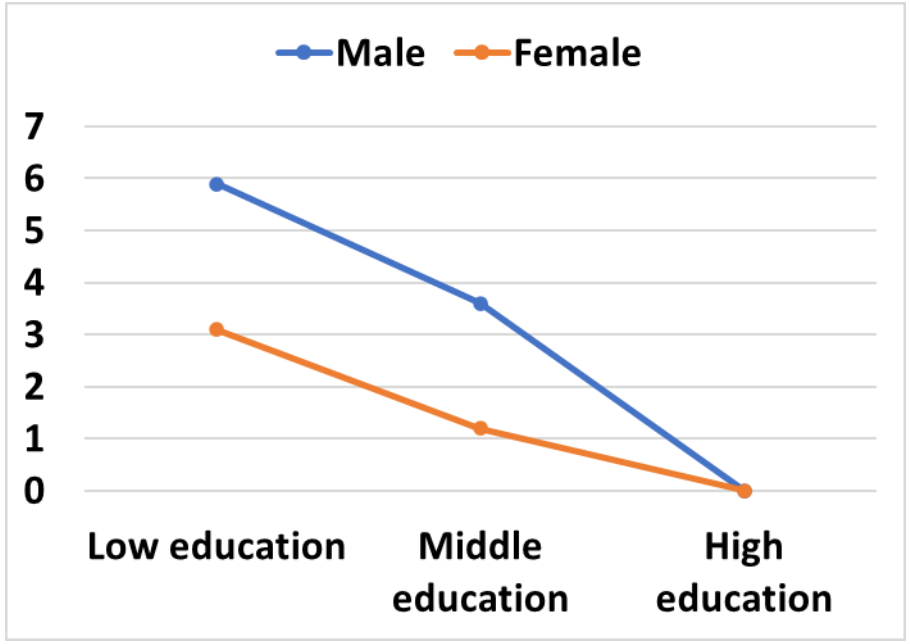
Gap in Life Expectancy at Age 25 Between High and Low Education Groups OECD Data, Around 2016



Source: Murtin, F. and C. Lübker (2022), "Educational inequalities in longevity among OECD countries around 2016", OECD Papers on Well-being and Inequalities, No. 8, OECD Publishing, Paris, https://doi.org/10.1787/5faaa751-en

Health Inequality in Austria

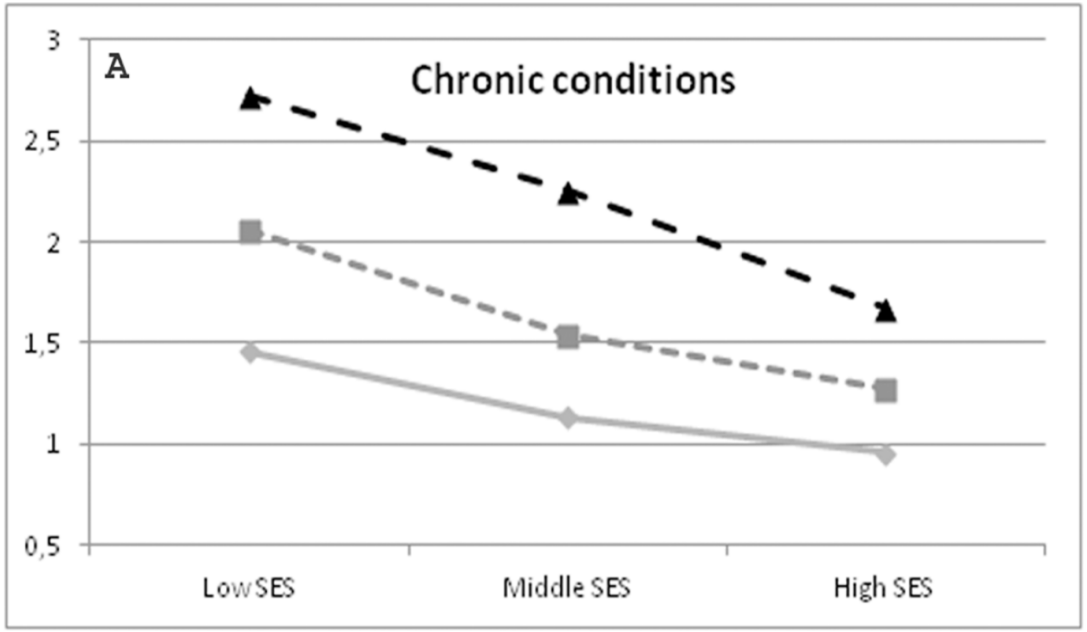
Mortality



Data from around 2016
Gap in life expectancy age 25 relative to high education

Source: Murtin, F. and C. Lübker (2022), "Educational inequalities in longevity among OECD countries around 2016", OECD Papers on Well-being and Inequalities, No. 8, OECD Publishing, Paris, https://doi.org/10.1787/5faaa751-en

Morbidity

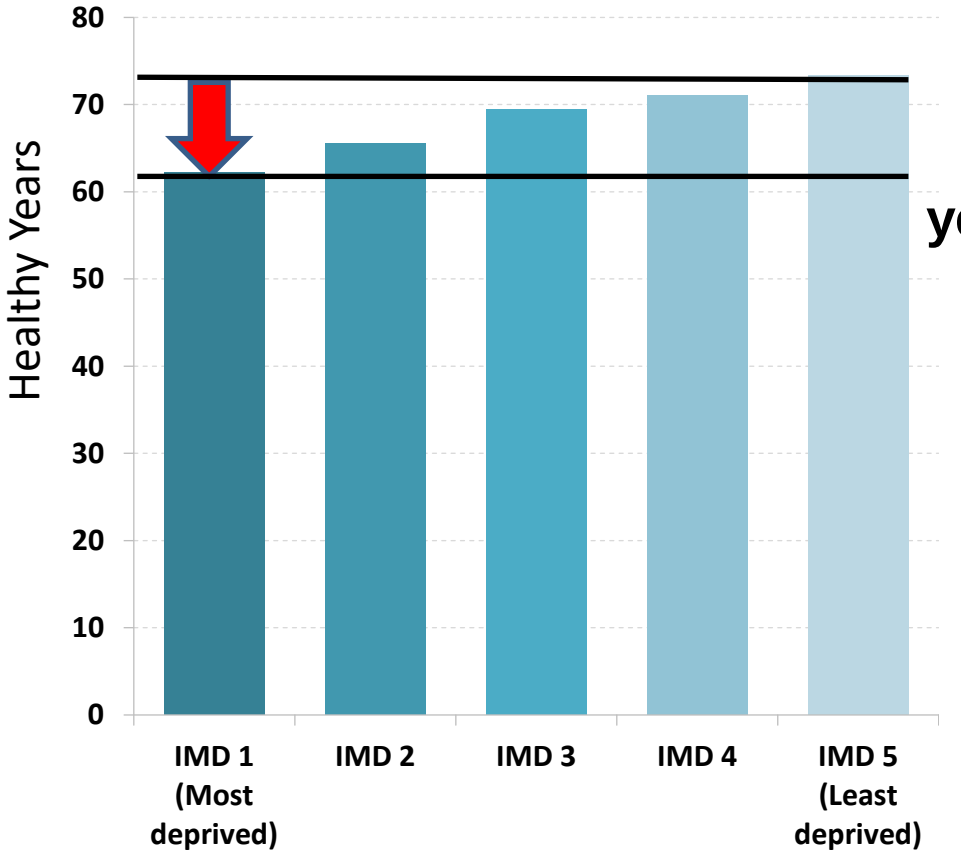


Data from around 2014/15
Mean number of self-reported chronic conditions (out of 17)
SES based on net equivalent income, education and occupation

Source: Burkert NT, Freidl W. 2019. Pronounced social inequality in health-related factors and quality of life in women and men from Austria who are overweight or obese. PeerJ 7:e6773 https://doi.org/10.7717/peerj.6773

Health Inequality in England

Group Average Health Gap



11.1 healthy years gap

Population Total Health Gap

128m healthy years gap

11.1 years average gap in the most deprived quintile group (2017-18 data)

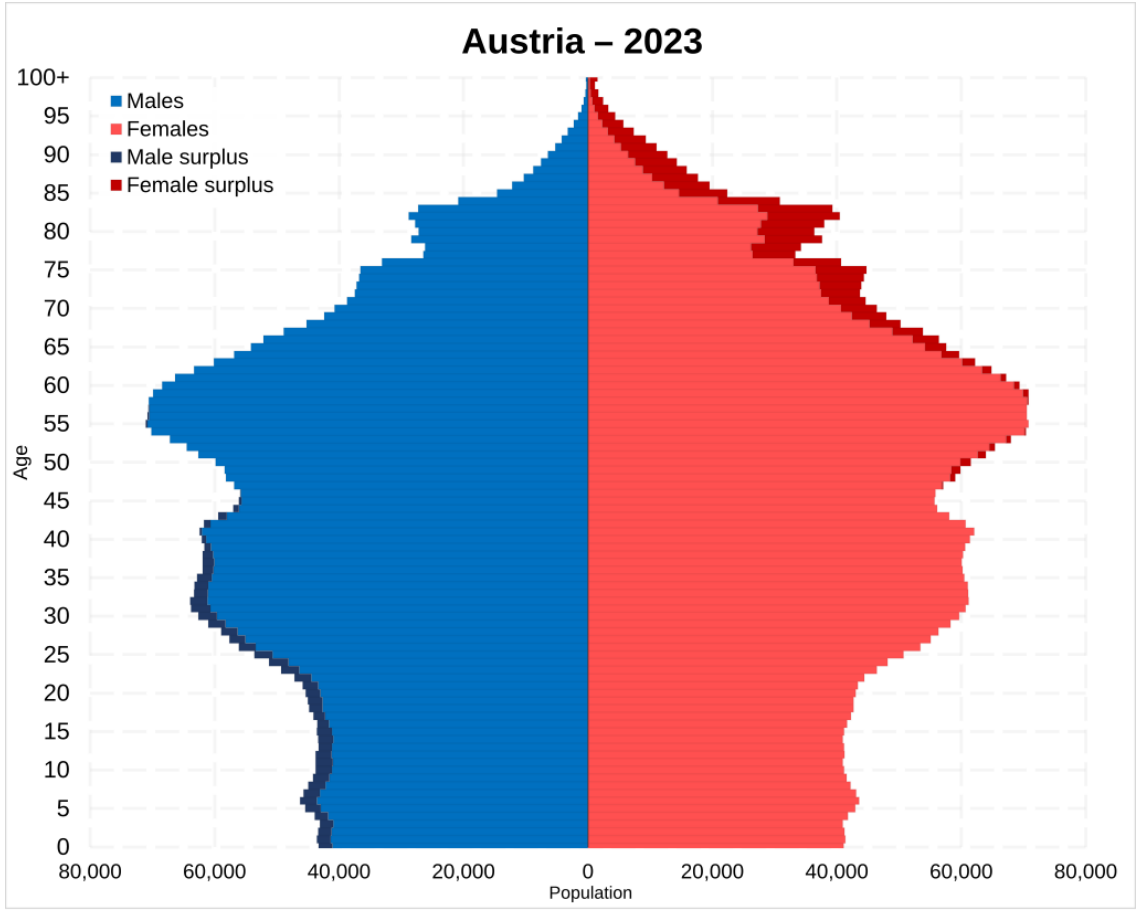
×

11.7m people in that group (2023 data)

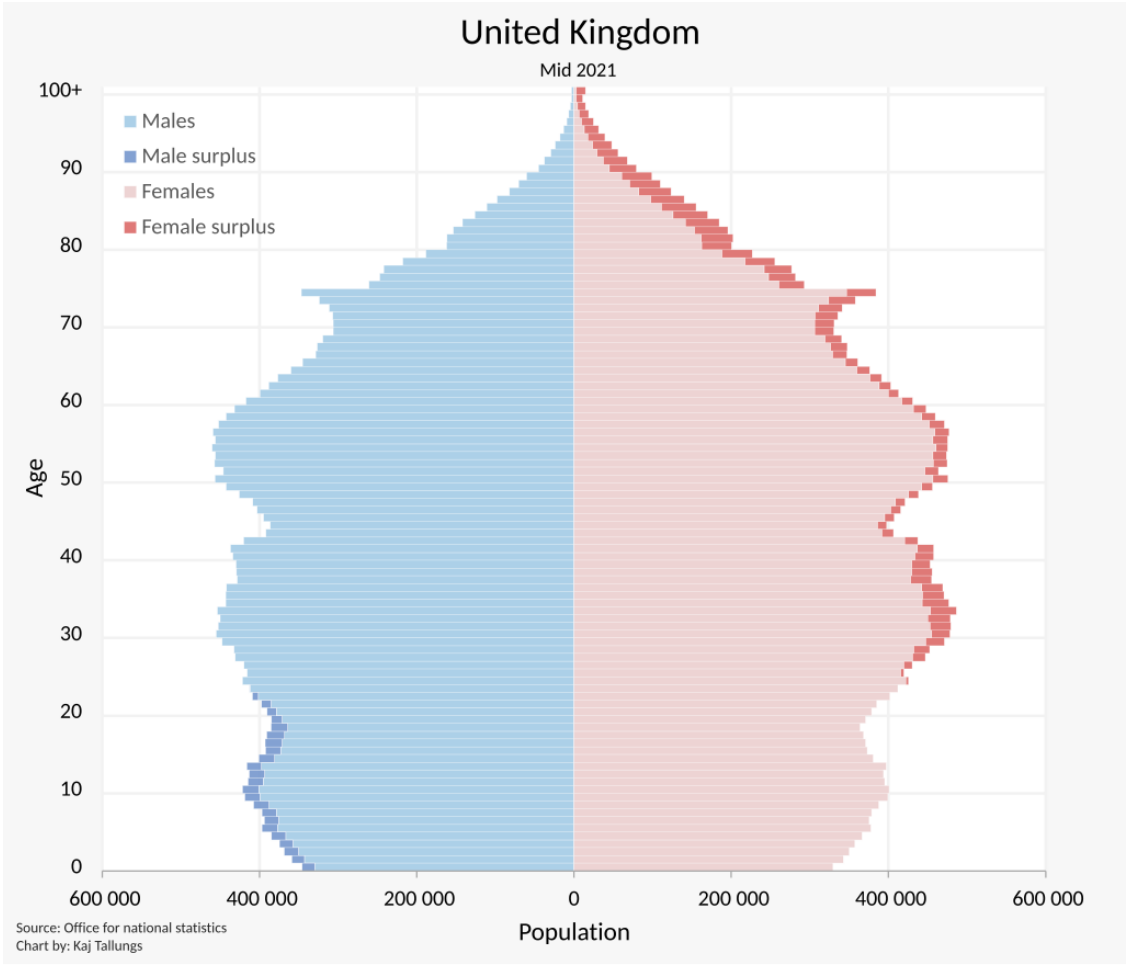
Source: Love-Koh J et al. (2023). PharmacoEconomics https://doi.org/10.1007/s40273-023-01264-9

Population Pyramids: Austria and UK

Austria: 9.13 million



UK 68.35 million

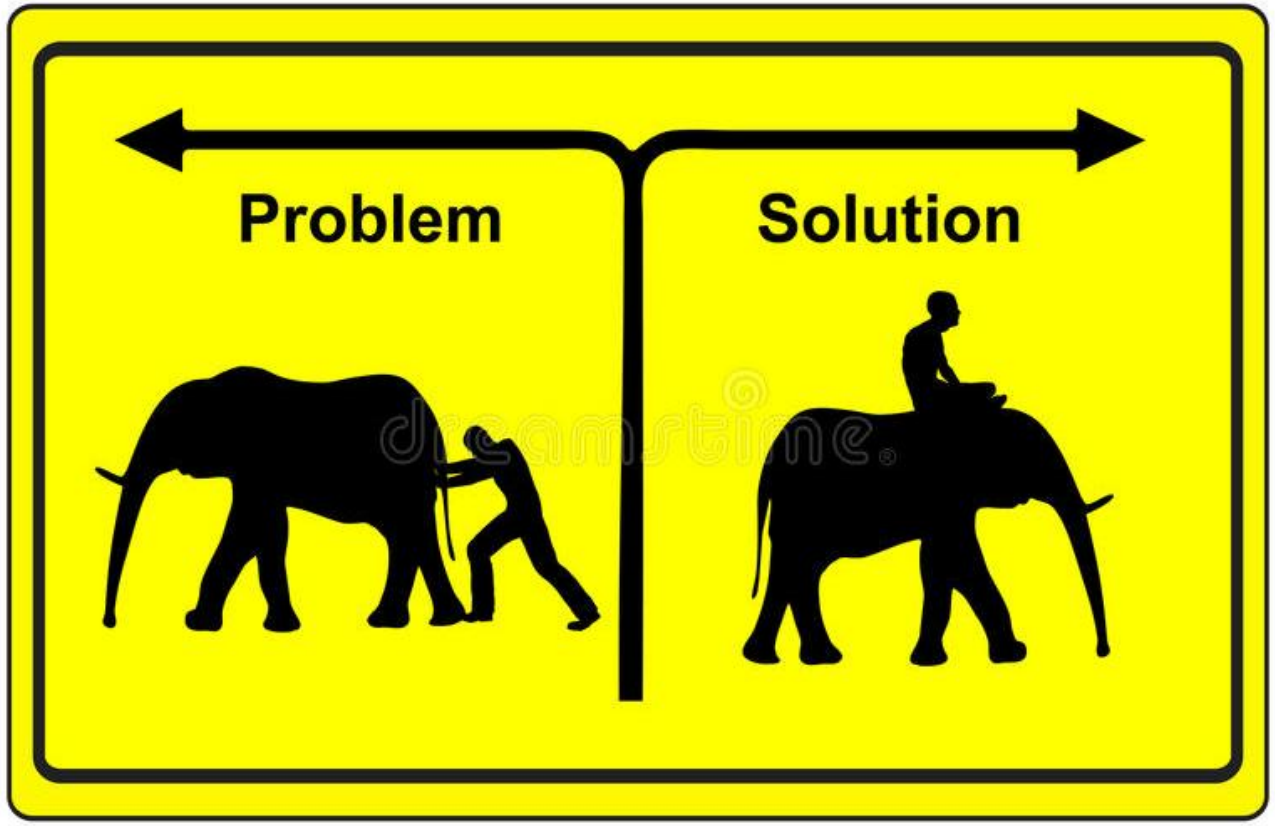


Why quantify health inequality impact?

- To take a more transparent, consistent and evidence-informed approach to reducing health inequality
  - Help prioritise health services that reduce health inequality
  - Help re-design services to increase uptake among socially disadvantaged groups
  - Help provide faster access to new technologies that disproportionately benefit socially disadvantaged groups
  - Help incentivise the global development of such technologies
- To help clarify and quantify the trade-offs that sometimes arise between reducing health inequality and other policy objectives, such as improving total health and prioritising the severely ill

Describing Problems vs. Evaluating Solutions

Cost of Illness	**Intervention IMPACT on Cost of Illness**
Burden of Illness	**Intervention IMPACT on Burden of Illness**
Health Inequality	**Intervention IMPACT on Health Inequality**

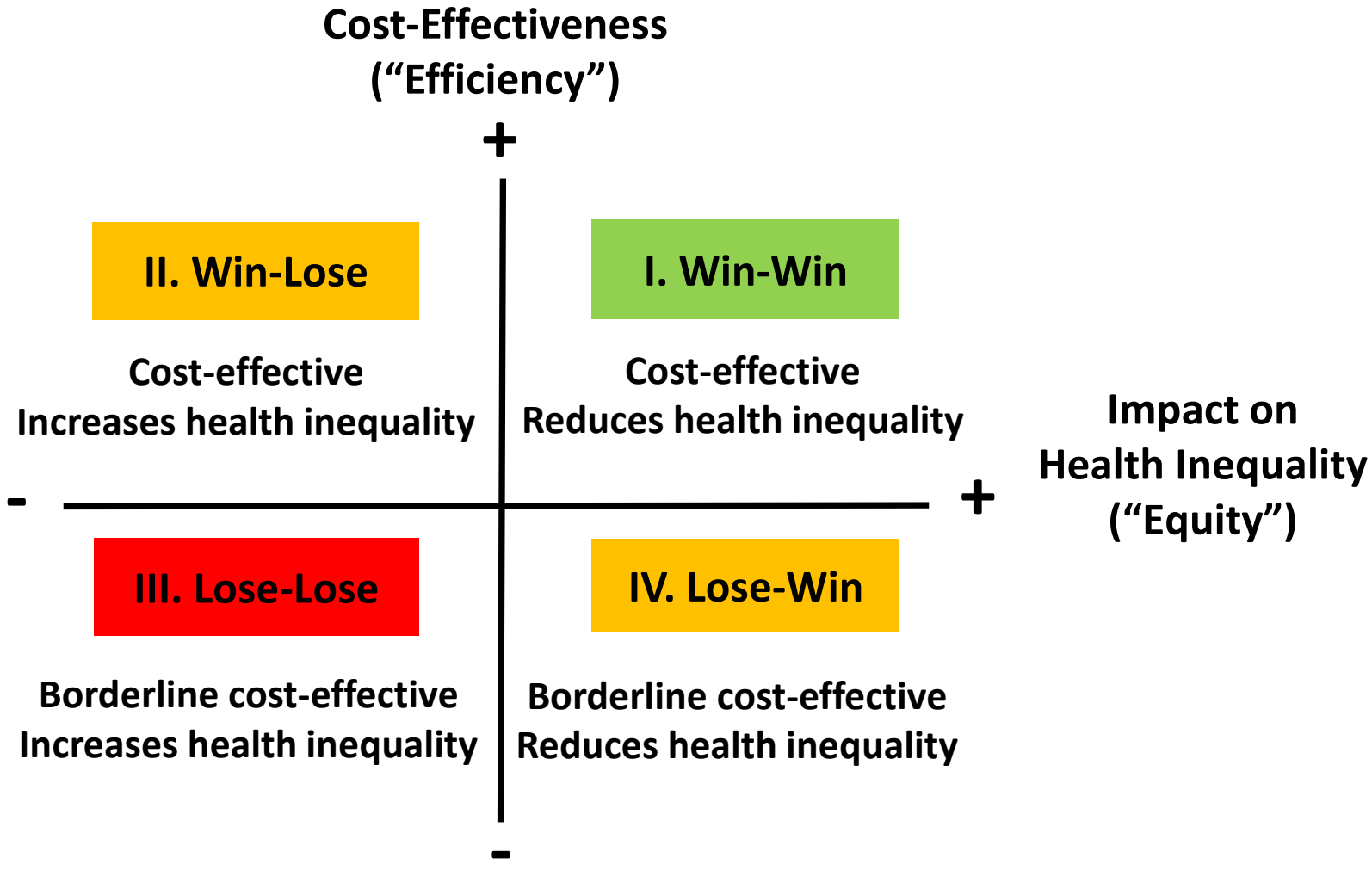


Equity-Efficiency Impact Plane

Currently, decision makers focus on the vertical axis: cost-effectiveness.

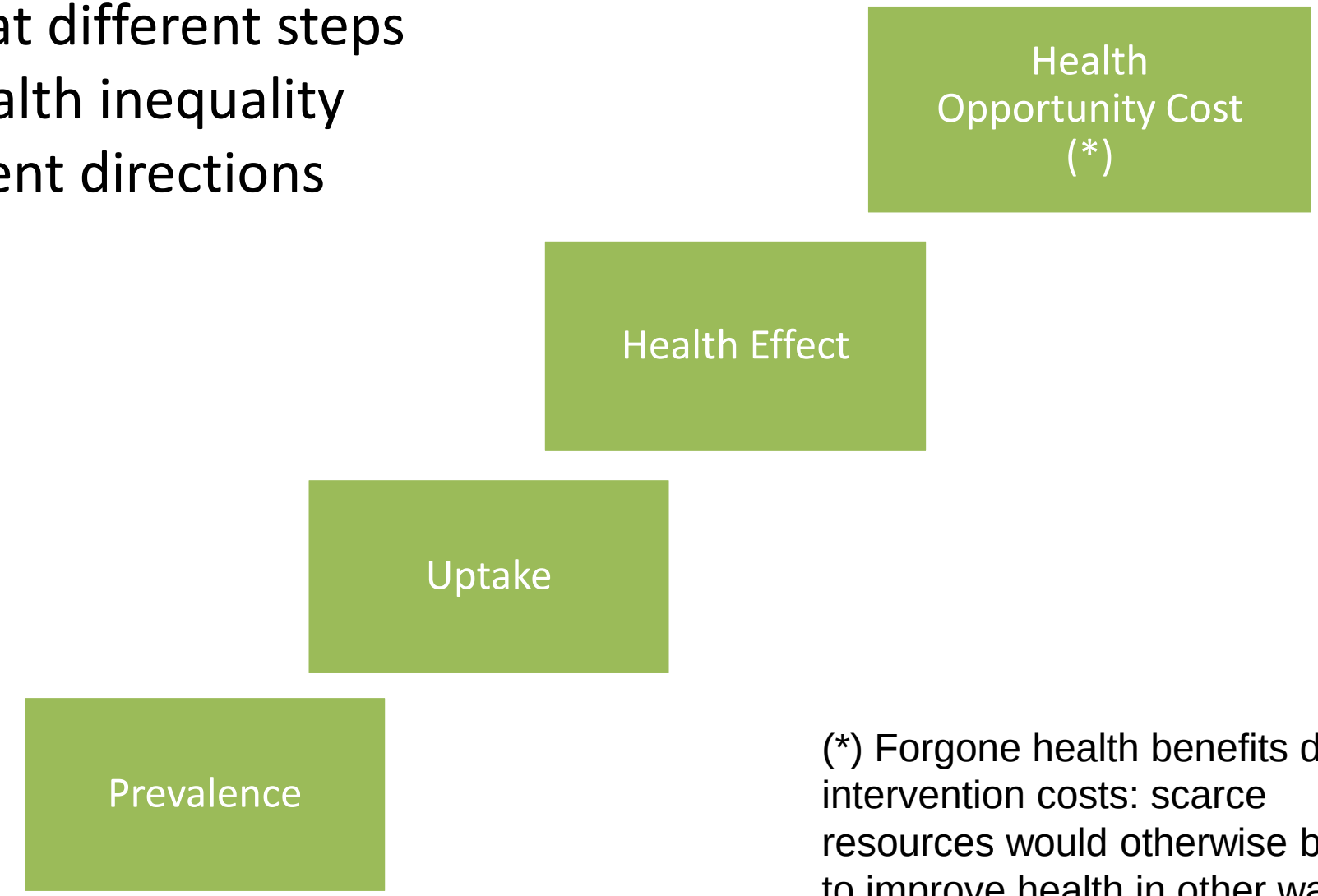
Need to add the horizontal axis: impact on health inequality.

Need to do this in a general way that allows comparisons of impact between disease areas and interventions.



The Staircase of Inequality Impact

Social inequalities at different steps may shift the health inequality impact in different directions

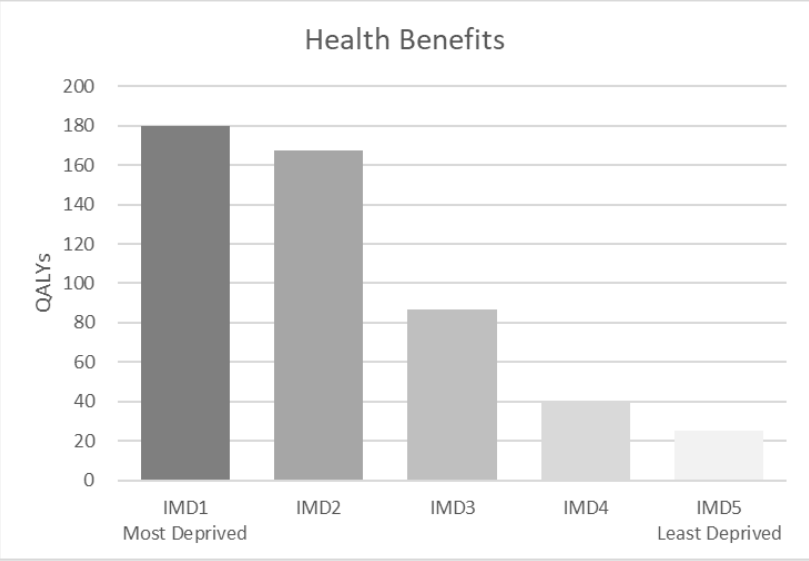


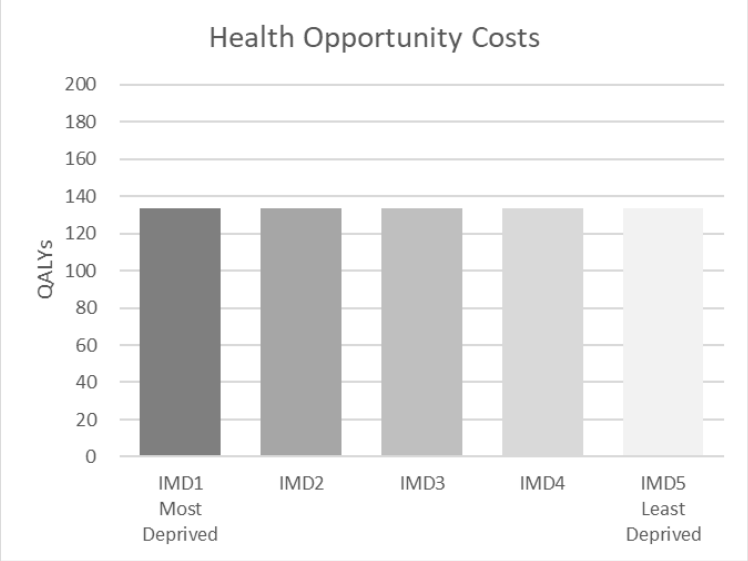
For new treatments, this first step of inequality in prevalence is often the most important driver

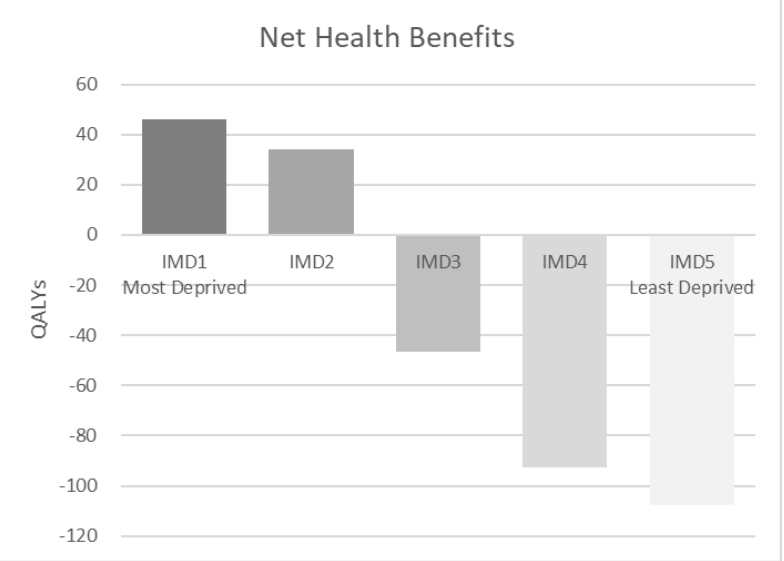
(*) Forgone health benefits due to intervention costs: scarce resources would otherwise be used to improve health in other ways.

Analysing Health Inequality Impact – An Example from England
Simulated New Treatment for Sickle Cell Disease
With £40,000 Incremental Cost-Effectiveness Ratio (ICER)

Reduction in actual England health inequality gap (annual basis)	154 QALYs[1]
Reduction in modelled England health inequality gap (based on slope index)	174 QALYs
Reduction in modelled gap per unit of opportunity cost (based on slope index)	0.261 QALYs

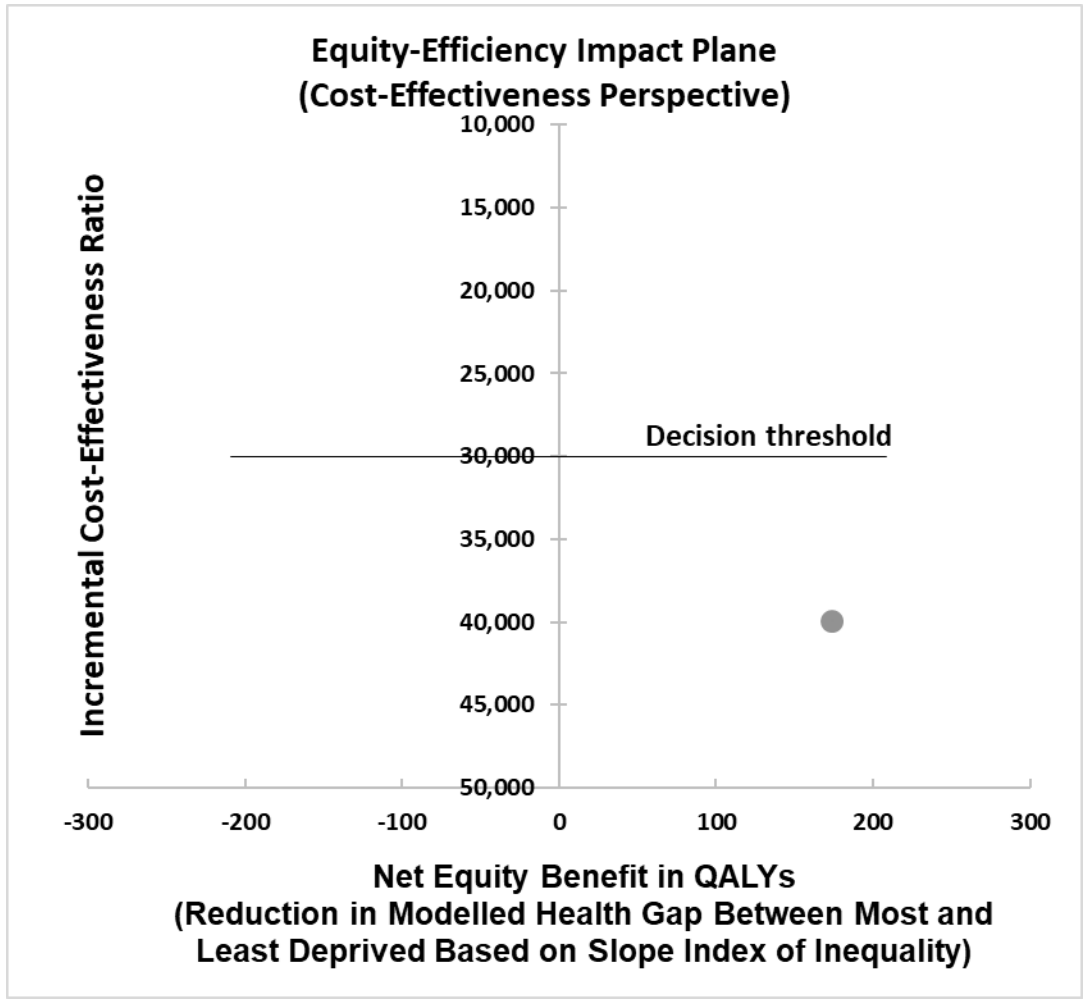


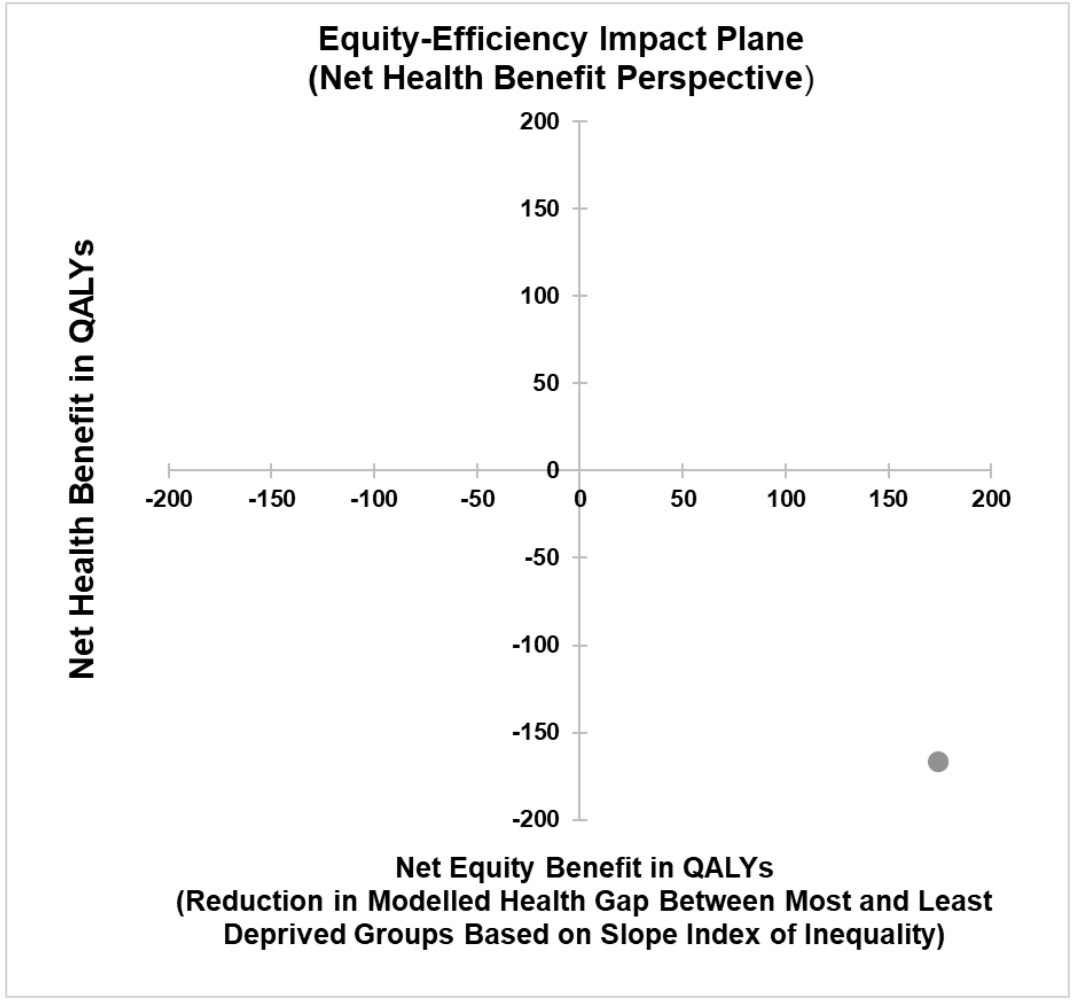




[1] Based on 2018 primary care prevalence data, assuming 500 patients per year receive 1 QALY of benefit and threshold £30k representing the marginal transformation rate between health care expenditure and health.
[2] Negative net health benefits mean that spending money on other things would generate larger health benefits; they do not mean that this treatment harms recipients.

Equity-Efficiency Impact Plane





ICER	£40,000
Equity Benefit	174 QALYs

Net Health Benefit	-167 QALYs
Equity Benefit	174 QALYs

Simulations for England showing the potential range of health inequality impacts of hypothetical new treatments for 1,336 disease categories

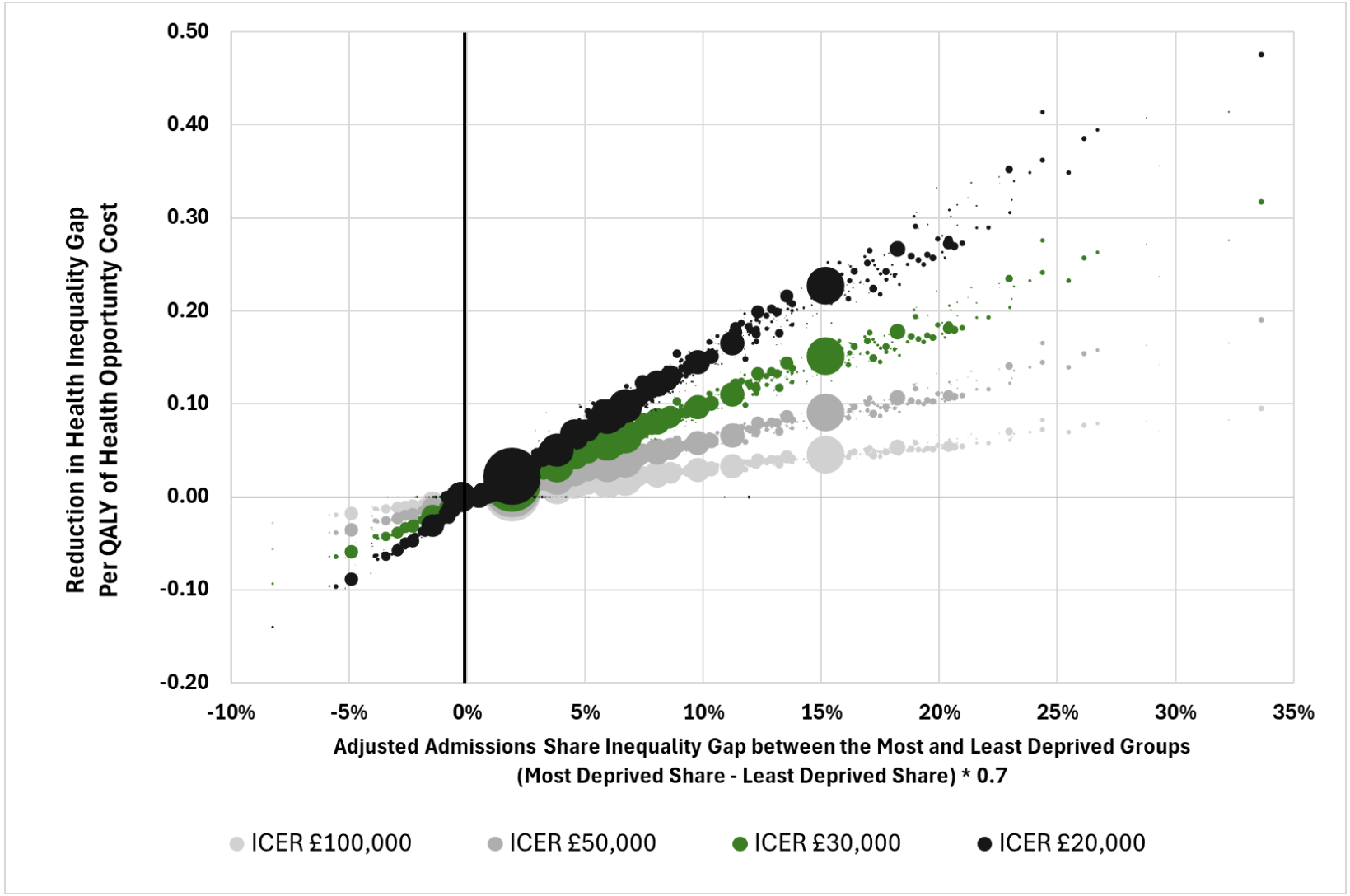
Aggregate DCEA simulations based on all-age hospital admission counts from 2010/11 for the whole of England, by disease and deprivation group.

(All 3-digit ICD-10 codes except 143 categories with censored data (small numbers) and Chapters 20 to 22 for external factors (e.g. accidents) and special codes)

Includes adjustment for repeat admissions bias in estimation of prevalence inequality, based on mapping to CPRD prevalence data for sample of 155 primary care conditions

Assumes no inequality in uptake or long-term health benefit or opportunity cost: health inequality impacts are entirely driven by inequality in prevalence

Simulated Reduction in Health Inequality Gap as a Proportion of Opportunity Cost
Hypothetical New Treatments for 1,336 Diseases (ICD-10 Three Digit Codes)
England 2011



Unpublished work in progress – not for citation

General DCEA building blocks

Getting DCEA ready to use in your country or decision context

1. **Standard set of social groups ranked by double disadvantage**
   - E.g., five social groups based on neighbourhood deprivation

2. **General health levels and specific disease prevalence by social group**
   - E.g. quality adjusted life expectancy at birth

3. **Opportunity cost distribution by social group**
   - E.g., benefit incidence analysis (average healthcare utilization by social group)

4. **Health inequality weights: base case, low, and high benchmarks**
   - E.g., survey of public or decision maker views

5. **Primary measure of health inequality impact**
   - E.g., reduction in population total health inequality gap based on the slope index of inequality

Building blocks for Austria

1. What social group measure can routinely be linked to data on general health and disease prevalence?
2. Using this measure, can up-to-date data be produced on general health and disease prevalence by social group?
   - General health: e.g. mortality linked to census education, e.g. morbidity Austrian Health Interview Survey (2006, 2014 and 2019)
   - Prevalence: e.g. proxy by hospital admissions linked to municipality
3. Using this measure, is it also possible to do benefit incidence analysis of health expenditure by social group?

Equity-efficiency trade-offs

Trade-offs between reducing health inequality and improving population total health

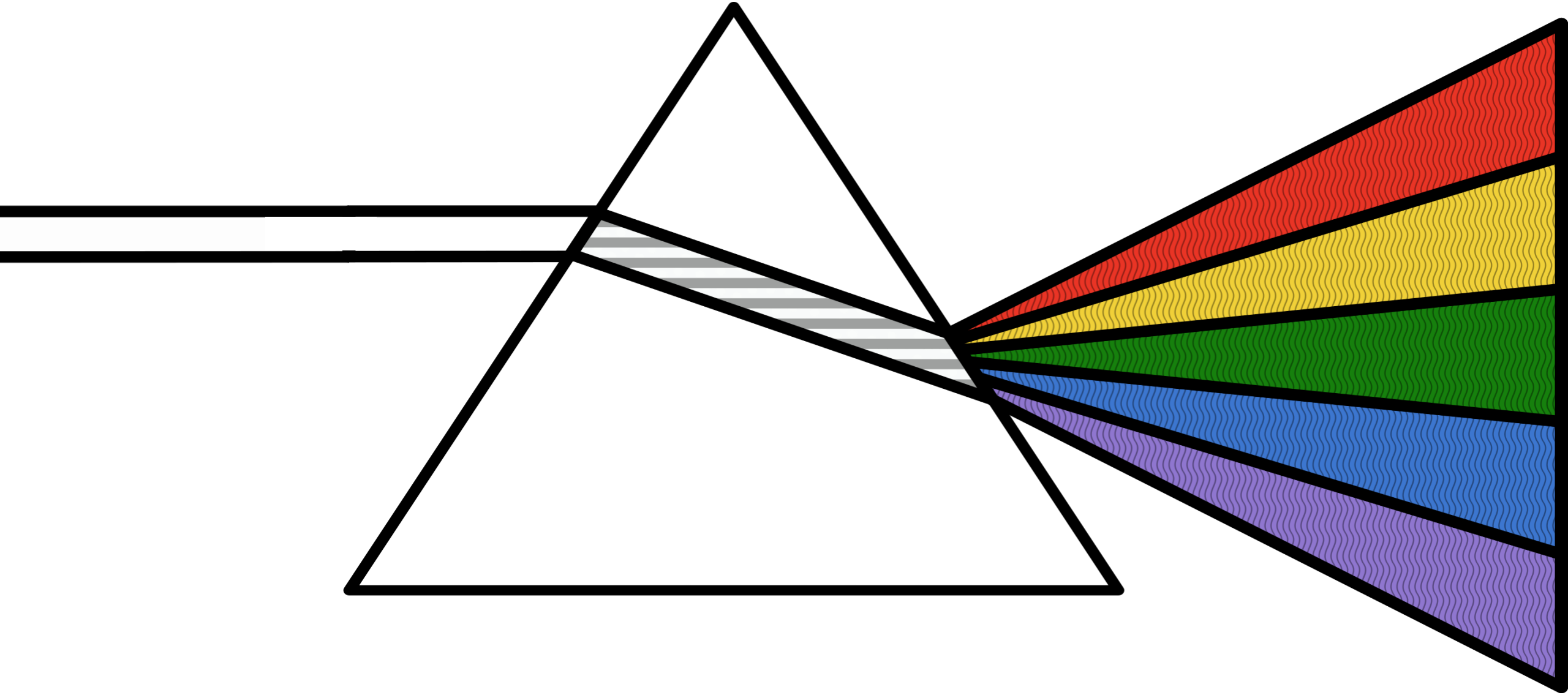
- It is sometimes more expensive and less cost-effective for governments to improve health services for people in more socially disadvantaged groups – i.e. fewer healthy years gained per dollar spent – because:
    1. More socially disadvantaged people tend to be less able to co-invest their own private resources in care seeking, compliance and recovery,
    2. More socially disadvantaged people tend to have worse long-term health service outcomes due to greater physical and mental co-morbidities, and
    3. More socially disadvantaged groups tend to live in areas with weaker health service infrastructure i.e. the buildings, equipment and staff needed to deliver effective care.

Equity-Efficiency Trade-Offs

- How much credit or “equity weight” to equity-enhancing interventions?

- Potential trade-off with maximising total health benefit
  - Health opportunity cost of funding less cost-effective options
  - How much health benefit would you forgo to reduce inequality?

- Standard economic concept: “health inequality aversion”



Thank you

Further Reading

OXFORD

DISTRIBUTIONAL COST-EFFECTIVENESS ANALYSIS

Quantifying Health Equity Impacts and Trade-Offs

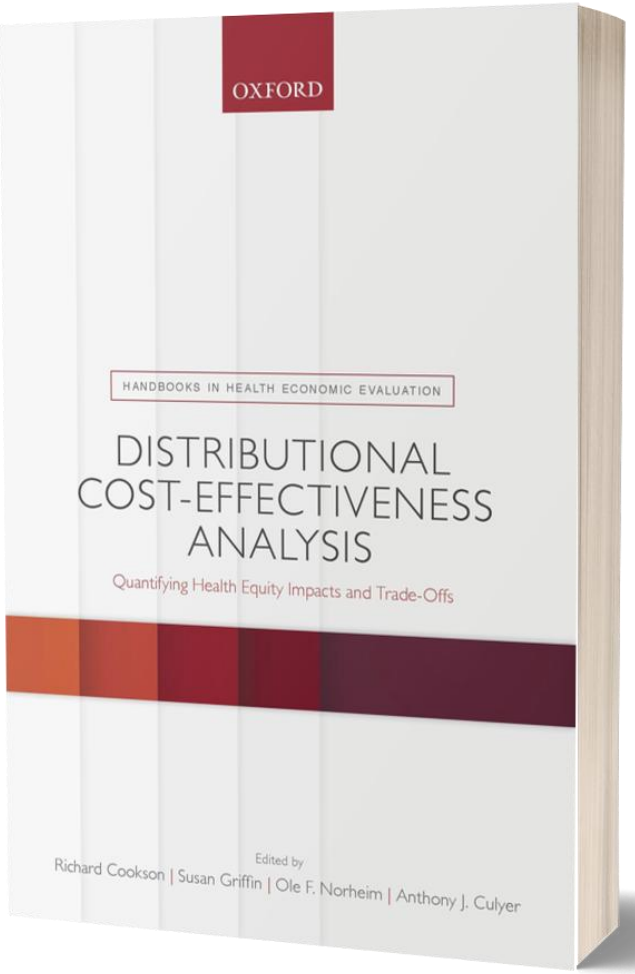
An Oxford University Press
Handbook in Health Economic Evaluation

Edited by Richard Cookson, Susan Griffin, Ole F. Norheim, and Anthony J. Culyer

- Flexible methods for any decision context
- Practical spreadsheet training exercises
- Clear overview for decision-makers

‘The definitive guide to equity methods in health economic evaluation - a landmark in the field.’

Michael Drummond, Professor of Health Economics, University of York, UK



https://www.york.ac.uk/che/equity/handbook/

NICE Clinical and public health guideline development

See Chapter 7, Section 7.8 Using economic evidence to formulate guideline recommendations, of **Developing NICE guidelines: the manual** NICE process and methods [PMG20] Published: 31 October 2014 Last updated: 29 May 2024.
https://www.nice.org.uk/process/pmg20/chapter/incorporating-economic-evaluation#the-role-of-economic-evaluation-in-guideline-development

"Considering health inequalities

We recognise the important role NICE guidance can play in the national drive to reduce health inequalities, defined by the UK Government and the NHS as unfair differences in health between more and less socially disadvantaged groups.

To support our commitment to addressing health inequalities, we have commissioned a prototype tool to explore the approach of providing quantitative estimates of the impact of NICE recommendations on health inequalities. The tool uses distributional cost-effectiveness analysis to model changes in health inequalities between 5 socioeconomic groups in England based on the neighbourhood index of multiple deprivation.

We encourage piloting the tool, when data allows, to determine its usefulness in informing committee consideration of health inequalities during guideline development. Piloting will also enable an exploration of operational considerations, possible trade-offs between cost-effectiveness and health inequality effects, and identify any limitations of the tool.

HEALTH INEQUALITY IMPACT CALCULATOR

Old Version: https://shiny.york.ac.uk/nice_equity_tool

New Version: https://shiny.york.ac.uk/dceasimple/

Value in Health | ISPOR

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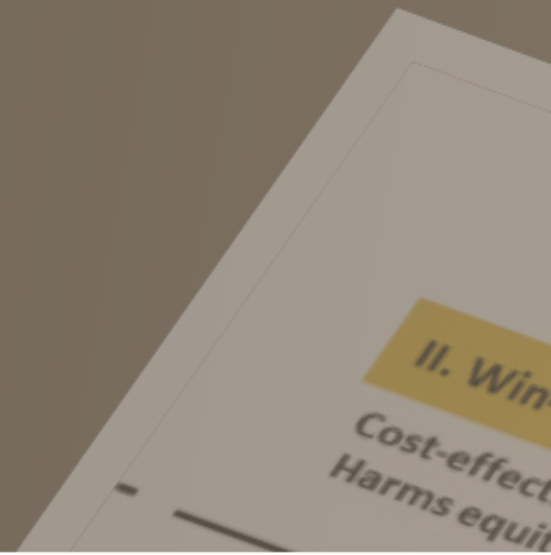
COMMENTARY | VOLUME 24, ISSUE 1, P118-120, JANUARY 01, 2021

Distributional Cost-Effectiveness Analysis Comes of Age

Richard Cookson, PhD • Susan Griffin, PhD • Ole F. Norheim, PhD • Anthony J. Culyer • Kalipso Chalkidou, PhD

Open Access • Published: November 07, 2020 • DOI: https://doi.org/10.1016/j.jval.2020.10.001 •

Check for updates



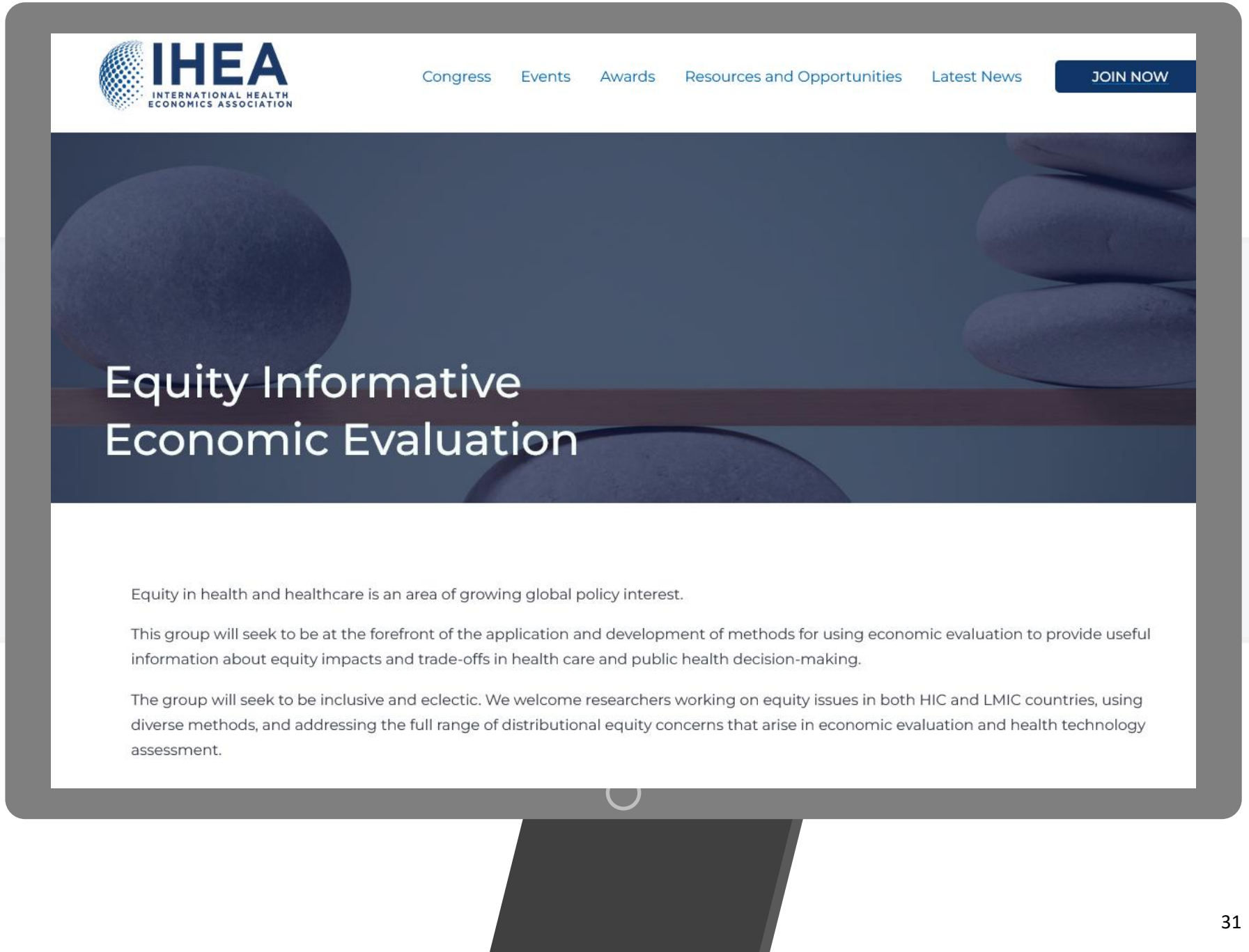
Introduction

Distributional cost-effectiveness analysis (DCEA) provides information about the equity impacts of health technologies and programs and the trade-offs that sometimes arise between equity and efficiency. This field has now come of age with a growing applied literature,[1] new training resources,[2] and a formal professional network: a special interest group on equity-informative economic evaluation within the International Health Economics Association.[3]

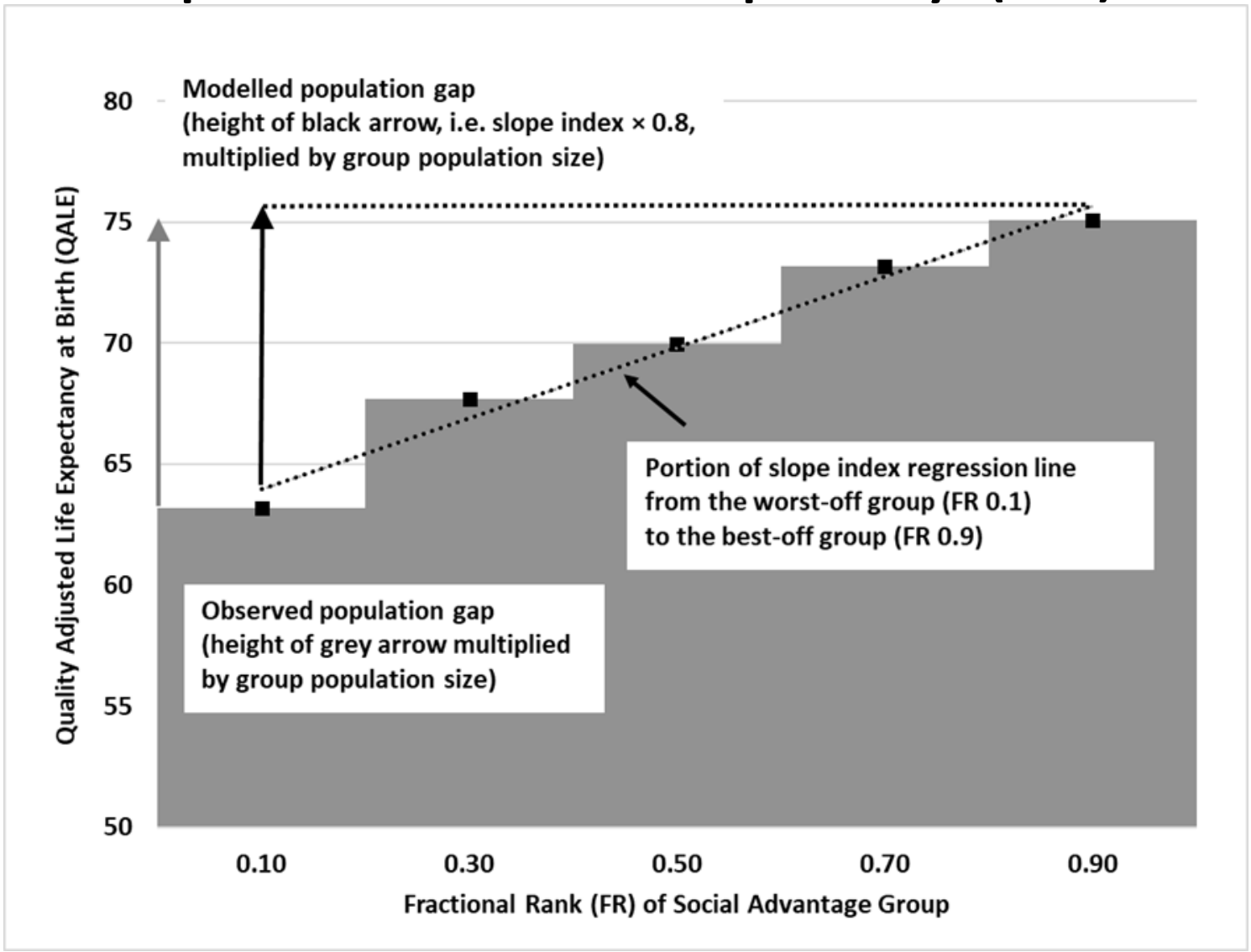
Cookson, R, Griffin, S, Norheim, O F, Culyer, A J and Chalkidou, K. (2020). Distributional Cost-Effectiveness Analysis Comes of Age. *Value in Health*. https://doi.org/10.1016/j.jval.2020.10.001

https://www.ispor.org/member-groups/special-interest-groups/health-equity-research

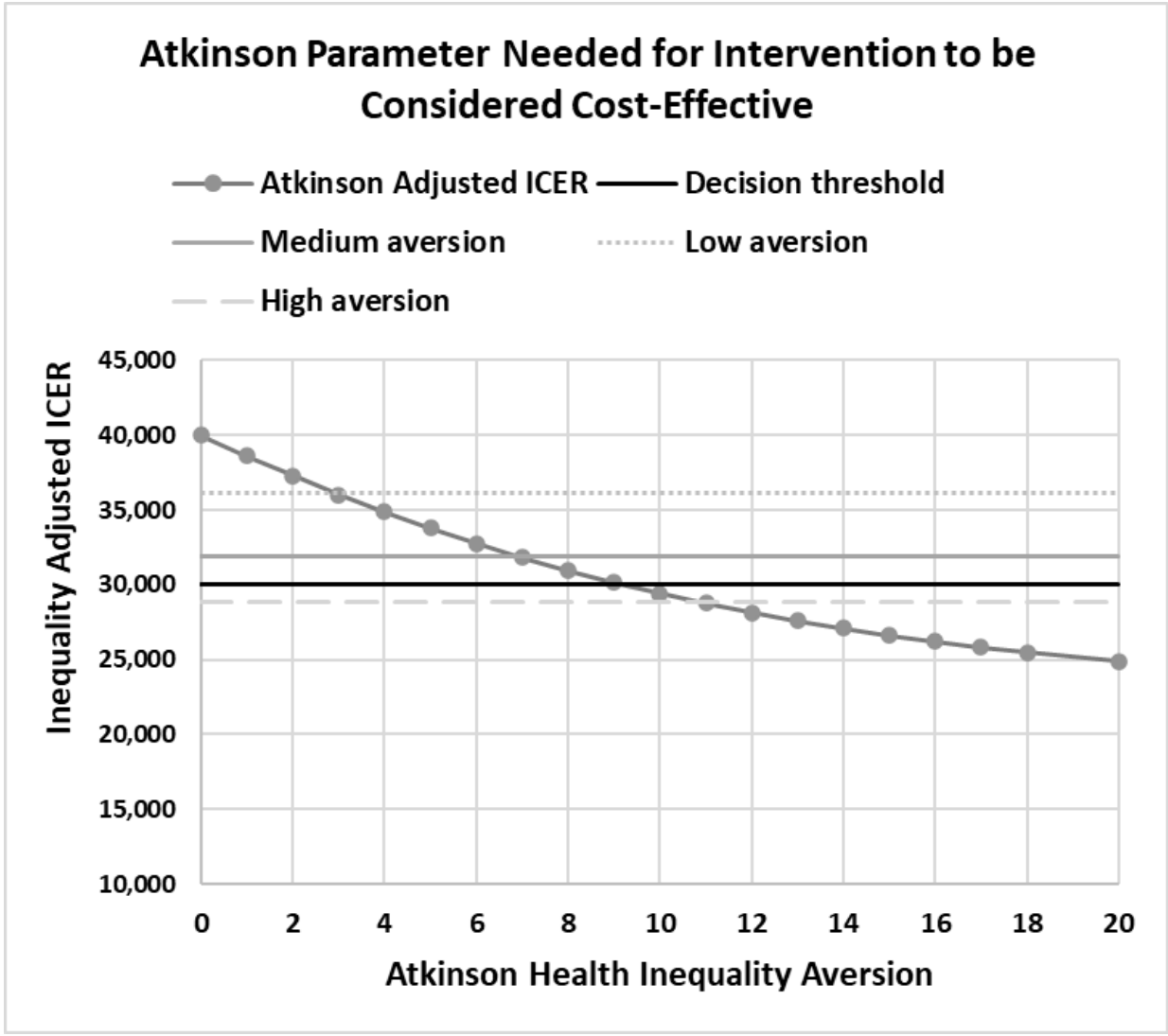
https://healtheconomics.org/sigs/eee/



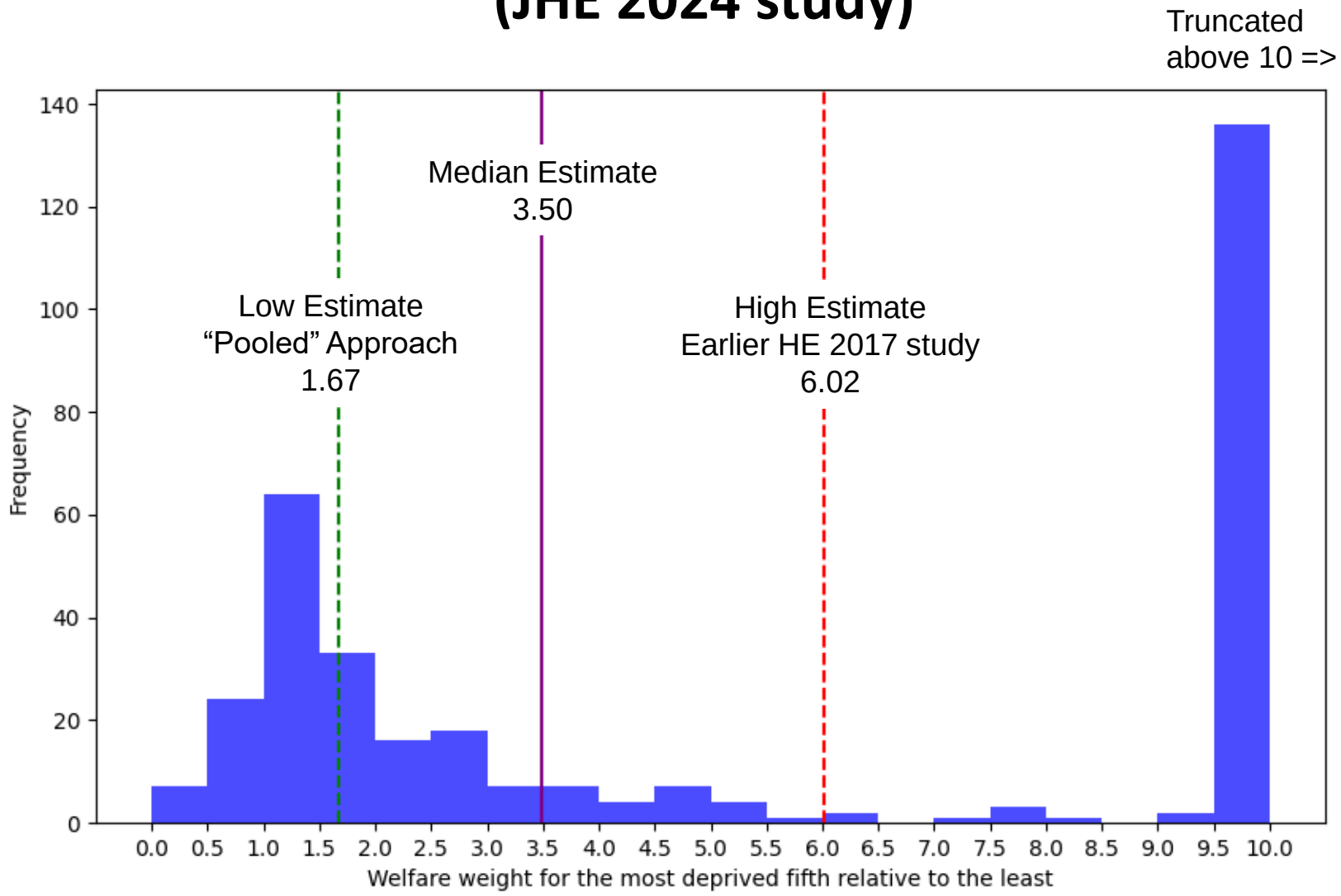
Actual gap vs. modelled gap based on slope index of inequality (SII)



Equity-efficiency trade-off analysis: Sickle cell example



UK public views on health inequality
(JHE 2024 study)



90% of respondents were averse to health inequality (weight to the most deprived > 1)

68% > 1.67 (Low)
50% > 3.50 (Median)
43% > 6.02 (High)
33% > 36

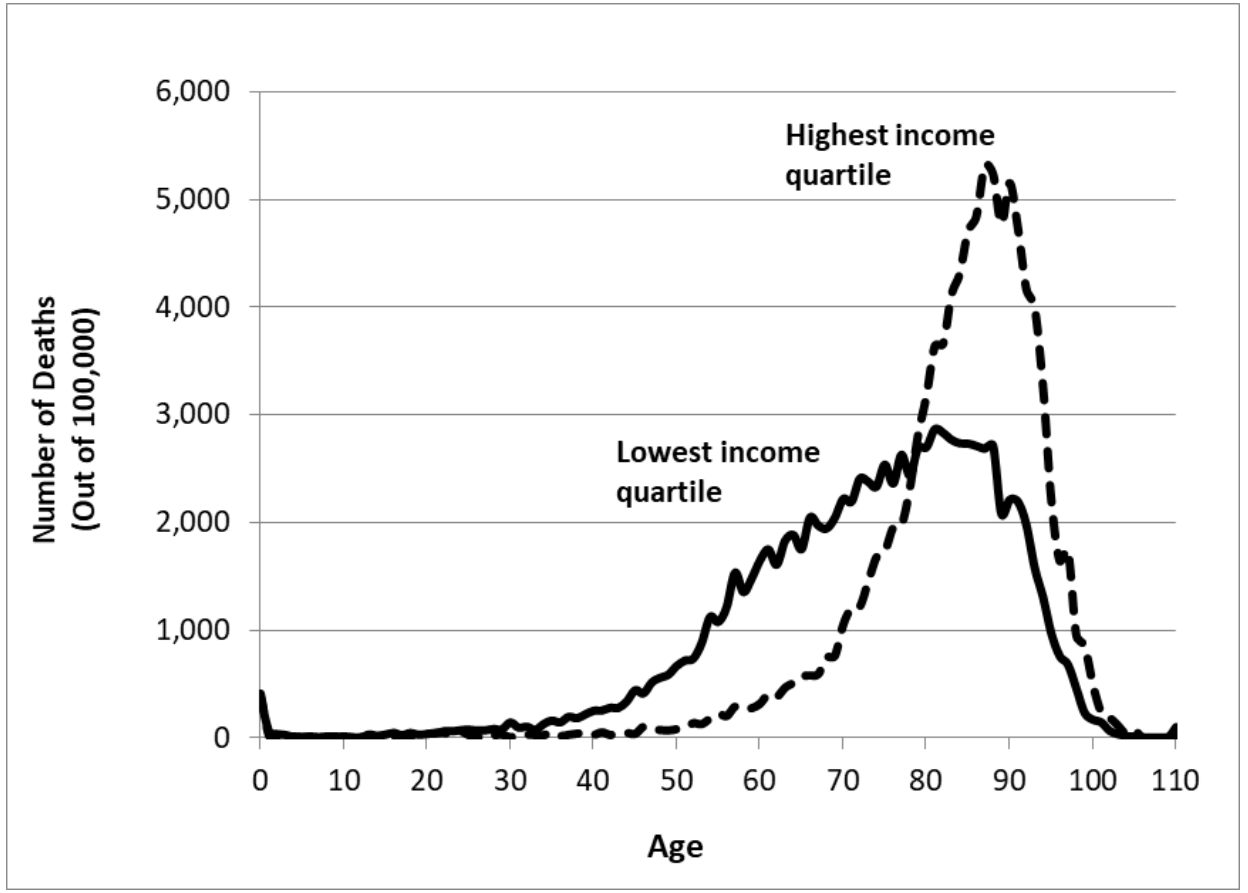
Notes:
Participant level health inequality aversion estimates from this study are combined with England 2017-18 data in inequality in quality adjusted life expectancy at birth by neighbourhood deprivation fifths.

The "Pooled" approach assumes all respondents have the same health inequality aversion but expressed with noise. Noise has more influence below the median than above, due to the strongly right-skewed distribution.

Reference: Robson, M., O'Donnell, O., & Van Ourti, T. (2024). Aversion to health inequality — Pure, income-related and income-caused. *Journal of Health Economics*, 94, 102856.

More socially disadvantaged groups have substantially higher risk of premature death before age 65

Age at Death Distributions, Danish Men, 2017



Source: Danish whole-population registry data, extracted and analysed by Brønnum-Hansen and colleagues (Brønnum-Hansen et al., 2021)