

# Adapting methods for CEA to incorporate inequality concerns

Susan Griffin, Karl Claxton, Nigel Rice, Mark Sculpher

Centre for Health Economics, University of York

# Overview

- Economic evaluation, efficiency and inequality in health care
  - Background and policy context
  - Methods for CEA
  - Methods for assessing distribution of health
- Adapting a case study – CEA in malaria
  - Relevant patient population
  - Relevant health gains
  - Measure of inequality
  - Data requirements
  - Reporting/Interpretation of results
- Future work
  - Bringing together methodological work

# Background

- Health is valued by individuals and society
  - Welfare increases with amount of health
- Distribution of health between individuals influences extent of welfare gain
  - Inequality aversion: greater inequality reduces the value to society of a given amount of population health
- Society invests resources in interventions to improve health
  - Intervention/programme offering greatest increase in overall health may not provide greatest improvement in distribution
  - Intervention/programme that would result in most equal distribution of health may not provide greatest increase in overall health
  - Evaluations that seek to inform resource allocation must assess improvements in quantity and distribution of health
  - Trade offs may be required between efficiency and equality

# Equity and equality

- Health equity
  - Fair distribution of health care resources according to some measure of 'need'
  - Often measured in terms of inequalities in distribution of health inputs or health outcomes
- Equity and equality not interchangeable
  - Equity objective may not be perfect equality
  - Some unequal distributions not regarded as unfair
- Identification problems for economic evaluation
  - Which inequalities are regarded as unfair
  - Relevant comparators for reducing inequality
  - Value of reducing inequalities (value of more equitable distribution)

# Economic evaluation to inform health care resource allocation in the UK

- Green book methods for policy appraisal and health
  - Utilise methods for CBA
  - Distributional impacts related to diminishing marginal utility of consumption
  - Health expressed in monetary terms with VPF linked to QALY or WTP
    - Weights derived from diminishing marginal utility of income not applicable to health
- Recognises improvements in health affected by public bodies outside health
- In 1999 NICE set up to ensure equality of access to healthcare
  - Equality of access  $\neq$  equality of health outcomes
  - Access to select interventions based on assessment of value for money
  - Utilise established methods for CEA developed with focus on efficiency for HTA
    - Importance of budget constraint for NHS
  - No equity weights for QALYs
  - Since 2005 PHIAC prioritises equity concerns for PH guidance
    - Informal analysis

# Policy context

- Successive Government policies revealed preference for
  - Improvement in overall health
  - Equality of health between groups
    - E.g. Routine and manual groups and other socio-economic groups
    - E.g. Areas of greatest deprivation and rest of country
- 2009 HoC SC report on health inequalities identified
  - Lack of adequate evaluation of interventions aimed at reducing health inequalities
  - Lack of knowledge regarding appropriate level of funding to devote to reducing inequalities in health as opposed to improving overall health

# Research context

- Methods for CEA focussing on efficiency
- Methods for measuring inequality
  - In income
  - In health
- Methods for evaluating the determinants of health
- **Research required**
  - Bring together strands of research to develop formal analytical framework for economic evaluation of interventions/programmes aimed at improving health and improving the distribution of health

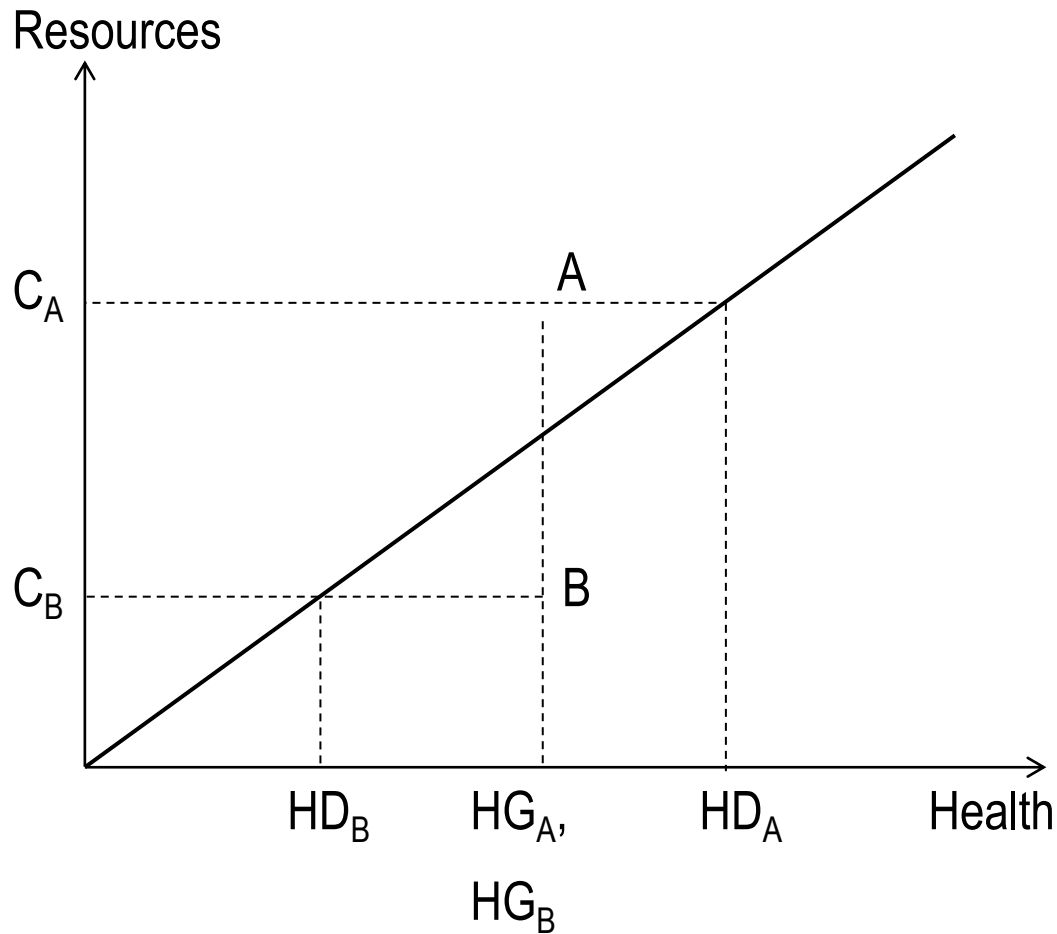
# Methods for cost-effectiveness analysis

Focussing on efficiency



# Current methods for CEA

- Efficiency objective
  - Maximise population health gain from available resources
- CEA typically concerned with value of health improvements at the margin
  - Compare health gains to health displaced with introduction of intervention/programme
    - Mean health
    - Health related to disease of interest
      - assume translate directly to overall health
  - Consider average patient with disease
    - Homogenous in factors that affect expected costs and health outcomes and treatment decision

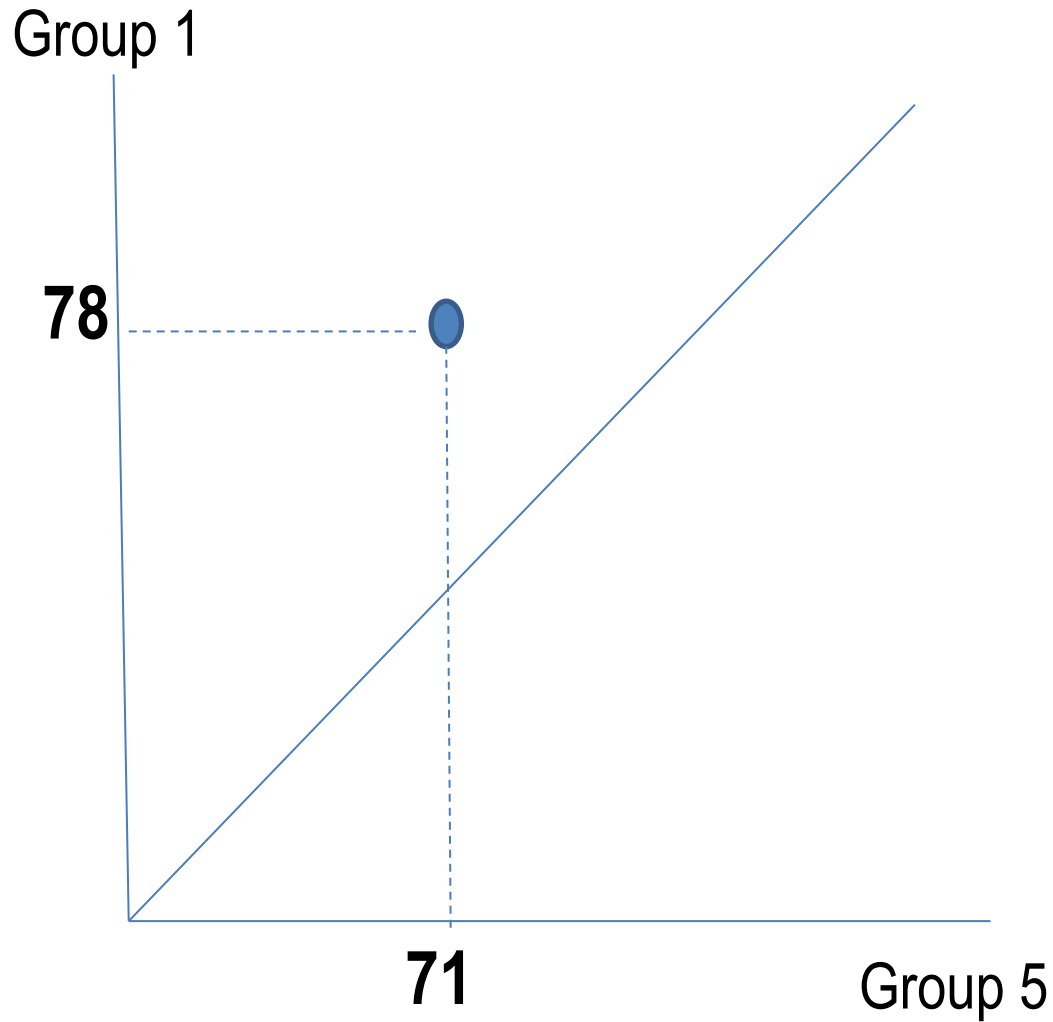


- Opportunity cost of investing in A exceeds gains in terms of health
- Health loss as a result of disinvestment in B exceeds gains from released resources

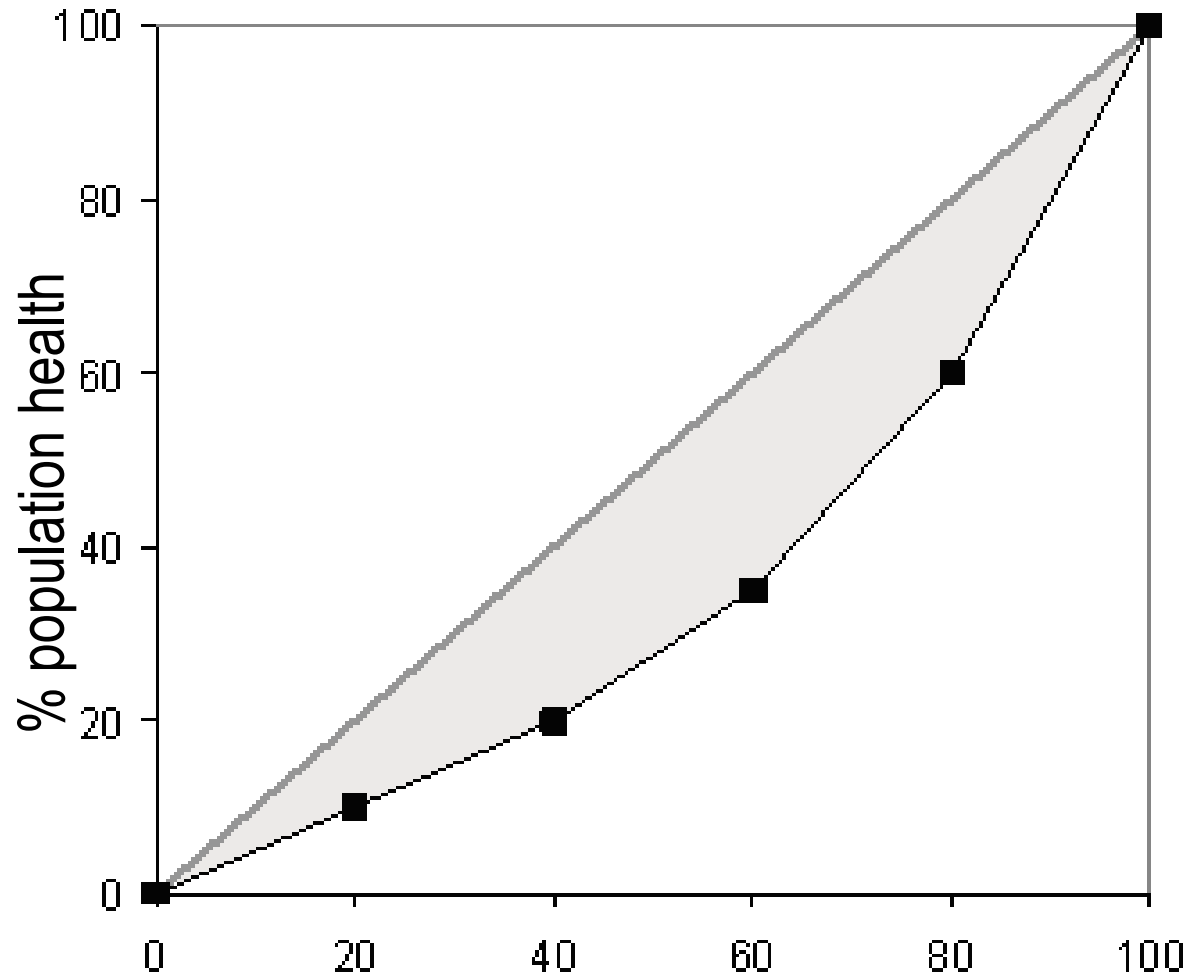
# Methods for measuring the distribution of health

# Measuring the distribution of health

- Discrete or continuous measures
  - Ratios, gaps
  - Gini coefficient, concentration indices (absolute, relative)
- Absolute, relative or mixture of both
  - E.g. SST index to combine health gap ('fair innings') with concentration index
- Univariate, pure health inequality
  - Health endowment evaluated by rank in distribution of health
- Bivariate
  - Health endowment evaluated by rank in distribution of other characteristic (income, SES)
  - Assume link between characteristic and health
    - E.g. health by SES relies on gradient of LE by SES
    - Implications for derivation of weights



- Gap = 7
- Ratio = 0.91



- Health on x-axis
  - Gini coefficient
  - Atkinson index

- SES or other characteristic on x-axis
  - Conc Index
  - Multiply by mean health

# Extending focus to include inequality

- Focus on equality in health as equity objective
  - In combination with preference for greater health
- Requires consideration of the distribution of health
  - How health is distributed between individuals or groups
  - Potential for intervention/ programme to improve distribution
  - Other determinants of health
- Requires prior judgement that unequal allocations unfair
  - Allocation according to expected health (pure inequality)
  - Other characteristics
    - SES may be more acceptable than gender or smoking status
    - Different characteristics may imply different weights
    - Incomplete ordering will lead to problems

# Interpersonal comparison of health (social valuation)

“A QALY is a QALY is a QALY”

- Severity
- Lifetime health experience
- Non health-related disadvantage
- Short life expectancy
- Degree of ‘blame’

Those that gain health

Generally known

Those that lose health

Generally unknown



# What is being distributed, and to whom?

- Could think about total population health or total opportunities for health
  - Latter recognises differences in health resulting from different individual preferences and choices may not be inequitable
- Typical CEA could evaluate inequality by
  - Components of the population (i.e. subgroups)
  - Components of health (i.e. health derived from health care programmes aimed at a particular disease)
  - How would/could measure of inequality translate to overall inequality?

# Quantifying inequality concerns

- Same amount of health valued more if given to individual with less than average share vs one with a greater than average share of overall health
  - Essentially weight health gains lower in those with greater endowment
- To quantitatively identify optimal intervention/programme require weights
  - Valuation exercises
  - Revealed weights based on prior allocation of resources that cite equity concerns
  - Concentration indices embody implicit weights according to rank
  - Can be adapted to allow explicit characterisation of inequality aversion (Atkinson)
- Cost-effectiveness analyses consider patients with the disease of interest
  - Calculate cost and QALYs lost for average patient with specified characteristics
    - Characteristics must include that used in defining inequality
  - For concentration index need information on rank in overall population
  - Control for/compare to other determinants of health

# Research objective

- Decisions about resource allocation in health care aided by CEA
- How could methods for CEA be adapted to
  - Bring together methods for CEA based on efficiency and methods for measuring inequality?
  - Establish impact of interventions on distribution of health?
  - Aid decisions about value of more equal distribution relative to increase in overall health?

# Adapting a case study

# MSc dissertation project

- Three month placement
- Objective to design CEA to explore technical issues
  - Manuel Espinoza supervised by Susan Griffin, Richard Cookson, Mike Drummond. Collaboration with Don de Seigny, Peter Tugwell
- Case study
  - Most cost-effective strategy for the management of a patient with uncomplicated fever (suspected malaria) in countries of Africa where malaria is endemic?
  - What is the equity-efficiency trade-off between the most equitable alternative and the most efficient alternative in terms of “DALYs averted”?

# Equity effectiveness loop

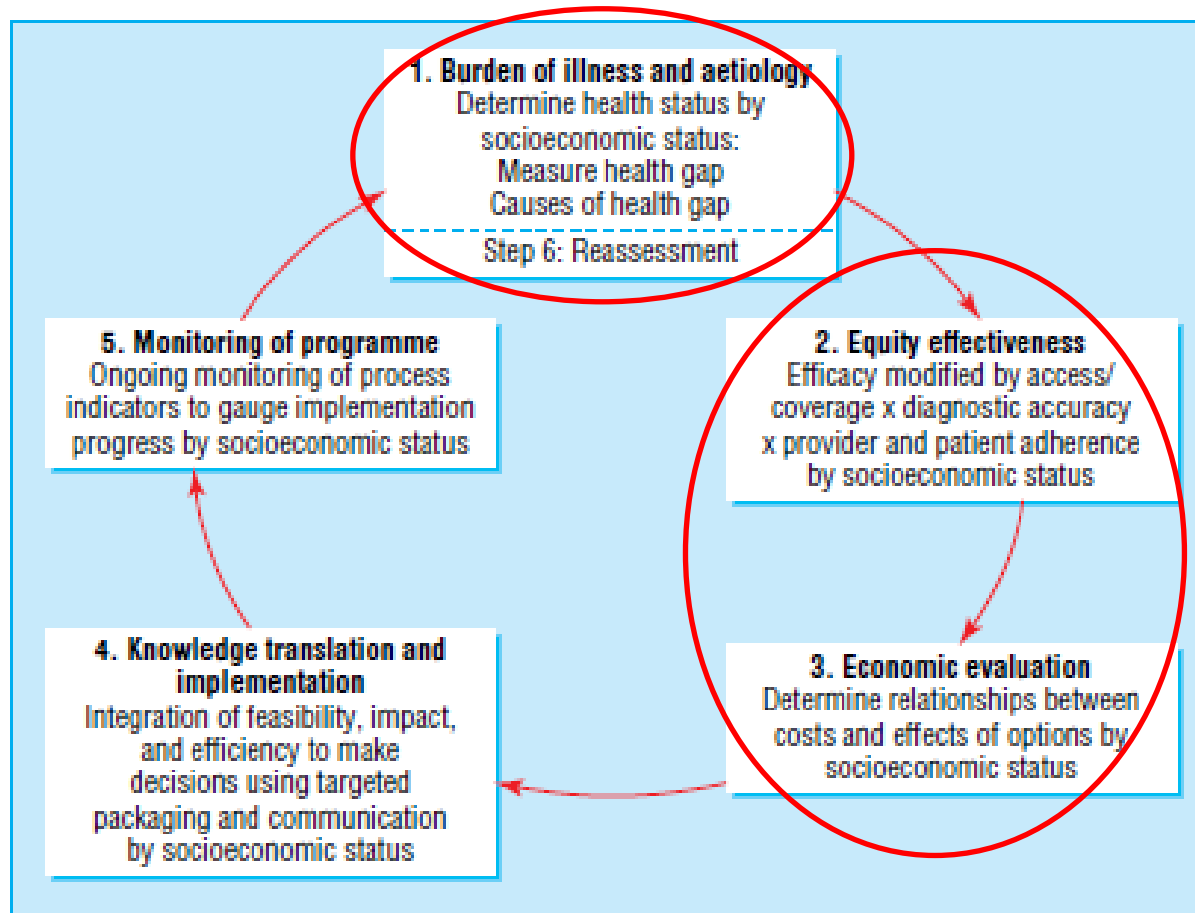


Fig 1 Equity effectiveness loop

# Ability for health care to affect inequality

- Staircase



Efficacy of prevention

Adherence to prevention

Access to prevention

Presence of risk factors

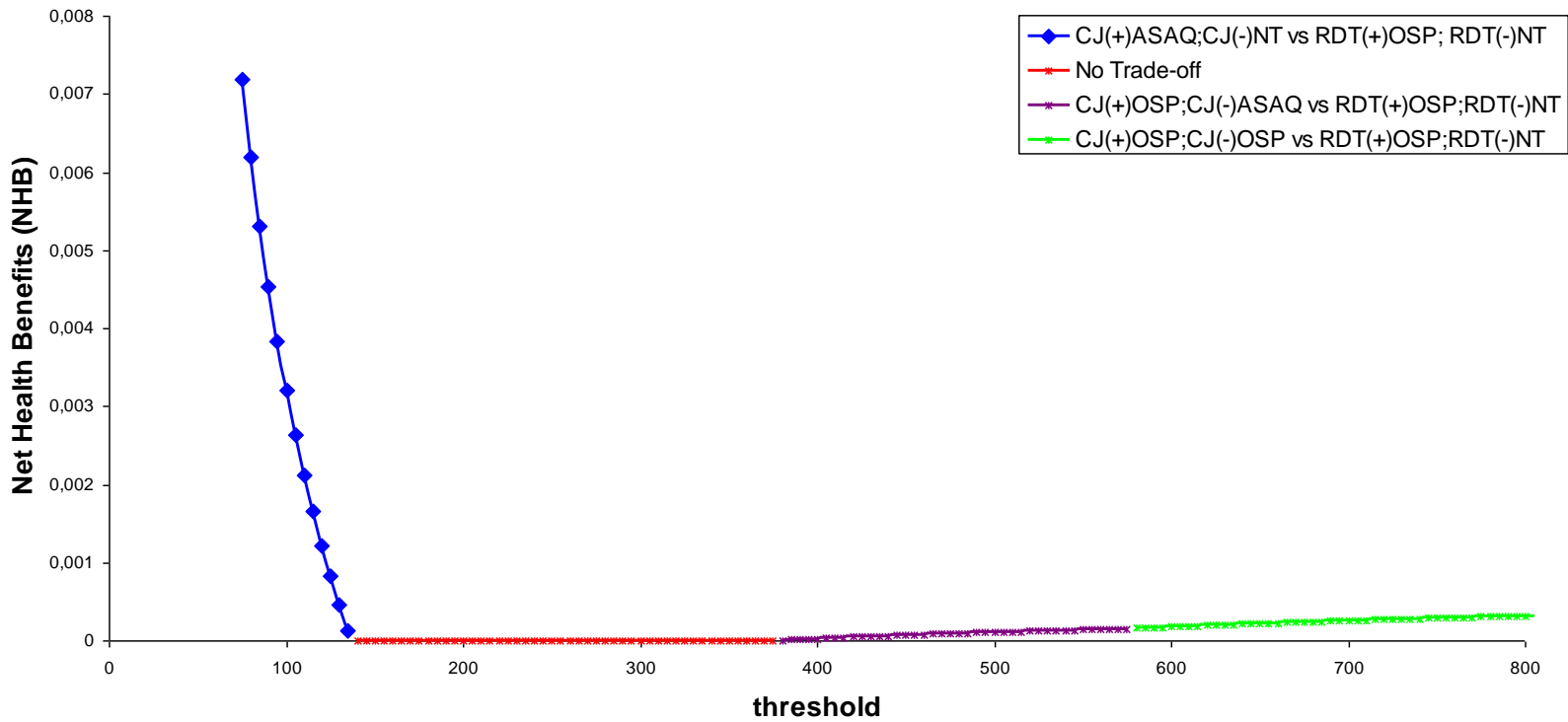
	poorest	Q2	Q3	Q4	Least poor
Access (%)	66	55	65	68	77
Adherence (OR)	0.16	0.39	0.32	0.56	1

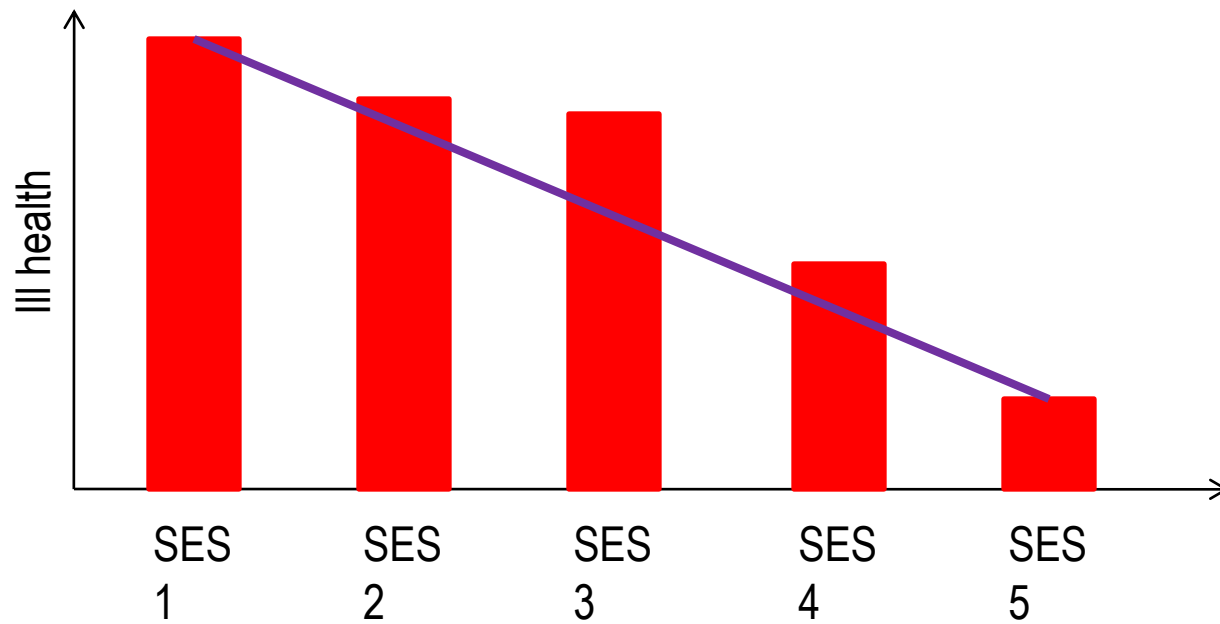
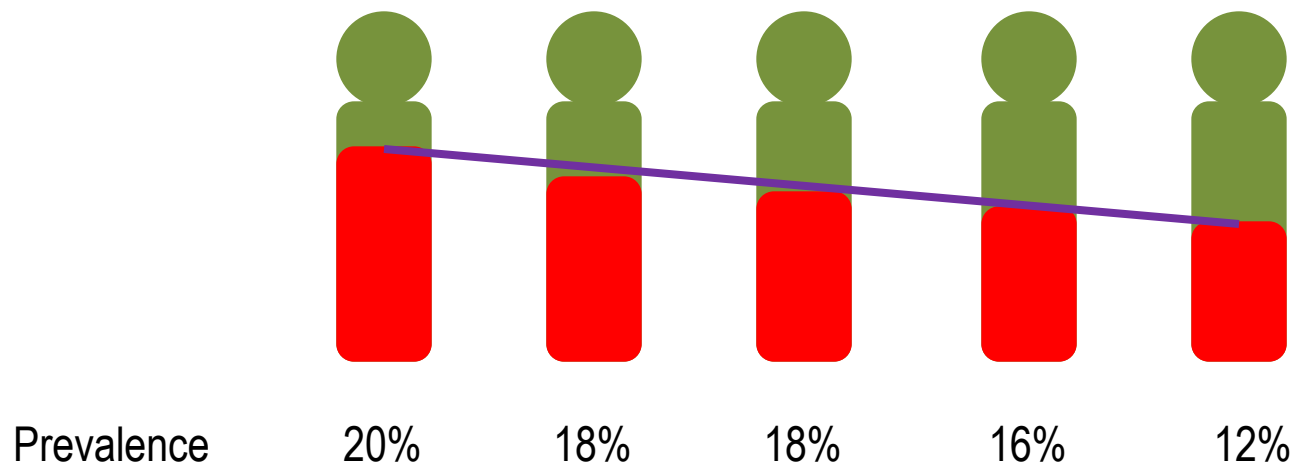
# Estimated measures of inequality

- Concentration index across quintiles
  - Lowest concentration index indicated most equal
  - Trade off in terms of NHB (additional DALYs) to achieve additional % point reduction in CI
- Equity Ratio: ratio of DALYs in the bottom quintile (poorest) compared to the top quintile (richest).
  - Most equitable strategy has ratio is closest to 1
  - Trade off in terms of NHB (additional DALYs) to achieve % point increase in ratio

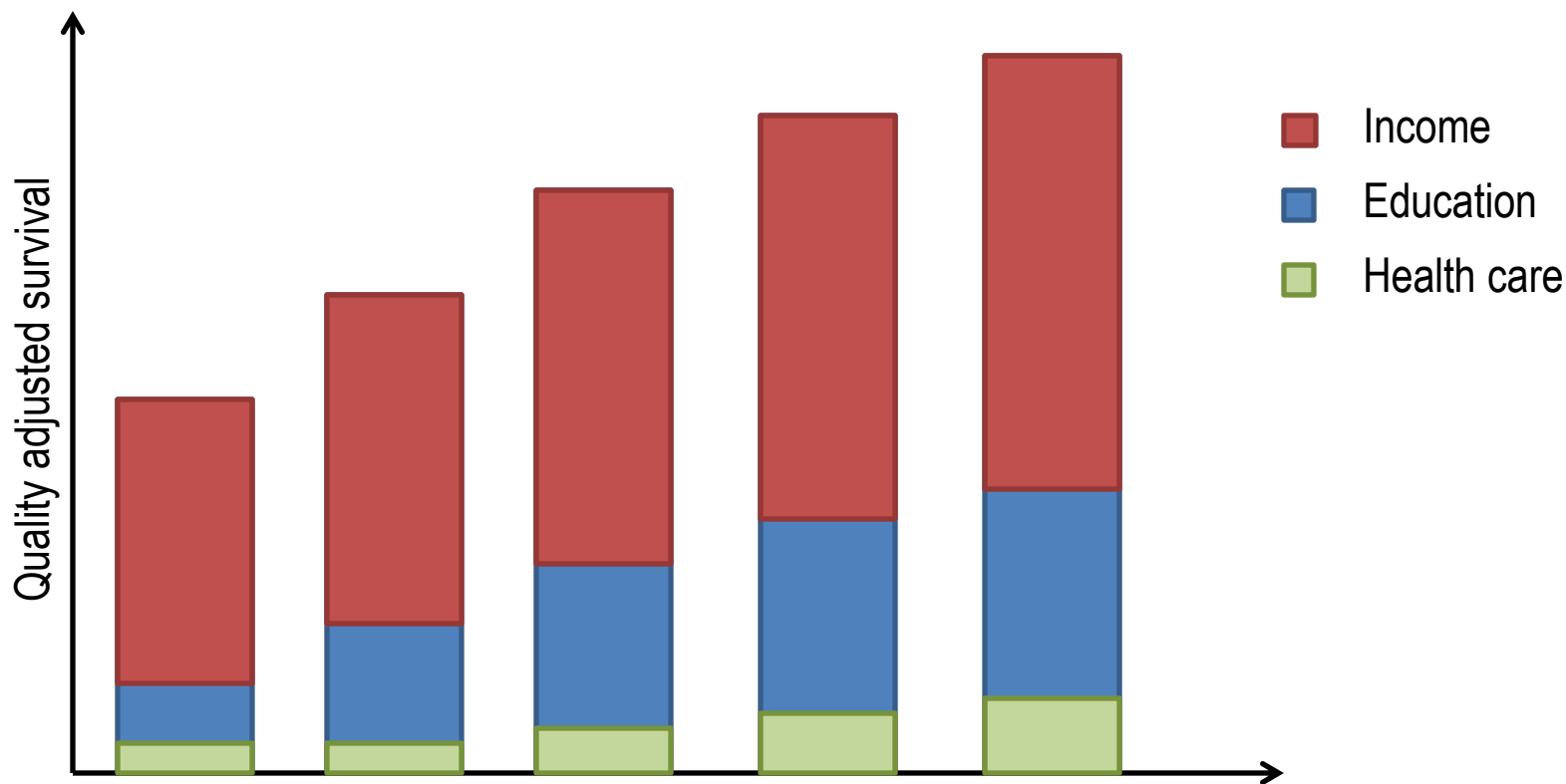


### Opportunity Cost between the most equitable and the most cost-effective strategy by Willingness to Pay





# Components of overall health differences



- Elimination of health inequality attributable to health care  $\neq$  elimination of health inequality
- Upper limit to reduction in inequality achievable with health care programme

# Conclusions of case study

- Focus on diagnostic tests and treatment of mild malaria resulted in no real trade offs
- Brief length of placement curtailed results
- Achievements
  - Additional data requirements
  - Issues in interpretation of data and results
- Further work
  - New project focussing on prevention of severe malaria
    - Larger health impact both overall and distributionally

Future research

# PHRC methodological work

- Extending CEA to incorporate additional objective to minimise health inequalities will draw from three bodies of work
  - Methods for CEA
  - Methods for measuring and characterising health inequalities
  - Methods to assess the determinants of health
- Objective to outline conceptual and analytical framework

# Stages of analysis

- Overview of methodological literature
- Identification of health inequalities considered preventable and unfair
  - E.g. Spearhead group of 70 LAs with worst health and deprivation indicators
- Identification of disease areas where health care programmes may play a role in reduction of health inequalities
  - E.g. Coronary heart disease
- Appropriateness of alternative measures of inequality in context of CEA
  - Quantitative features, underlying normative assumptions, ease of measurement
- Additional data requirements for routine CEA
- Reporting and interpretation of results
- Methods to identify optimal intervention amongst those compared

# Summary

- Extending CEA to incorporate concerns about inequality in health requires careful consideration
  - To describe any equity-efficiency trade-offs in terms of importance to decision maker
    - Important for determining relative value of improved equality vs increase in overall health (whether informal or formal)
  - To avoid recommending trade-offs where alternative use of resources could have provided better value for money