Adapting methods for CEA to incorporate inequality concerns

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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 ≠ 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 focusing 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 Sevigny, 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

1. Burden of illness and aetiology
   - Determine health status by socioeconomic status:
     - Measure health gap
     - Causes of health gap
   - Step 6: Reassessment

2. Equity effectiveness
   - Efficacy modified by access/coverage x diagnostic accuracy x provider and patient adherence by socioeconomic status

3. Economic evaluation
   - Determine relationships between costs and effects of options by socioeconomic status

4. Knowledge translation and implementation
   - Integration of feasibility, impact, and efficiency to make decisions using targeted packaging and communication by socioeconomic status

5. Monitoring of programme
   - Ongoing monitoring of process indicators to gauge implementation progress by socioeconomic status

Fig 1 Equity effectiveness loop

Ability for health care to affect inequality

- Staircase

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<th>Q3</th>
<th>Q4</th>
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Efficacy of prevention
Adherence to prevention
Access to prevention
Efficacy of treatment
Adherence to treatment
Access to treatment

Presence of risk factors
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

Net Health Benefits (NHB)

threshold

- CJ(+ASAQ;CJ(-)NT vs RDT(+OSP; RDT(-)NT
- No Trade-off
- CJ(+OSP;CJ(-)ASAQ vs RDT(+OSP;RDT(-)NT
- CJ(+OSP;CJ(-)OSP vs RDT(+OSP;RDT(-)NT

Graph showing the relationship between Net Health Benefits and threshold, with different strategies represented by distinct lines.
Ill health

Prevalence

20%  18%  18%  16%  12%

SES

1  2  3  4  5

Ill health

SES

1  2  3  4  5
Components of overall health differences

- Elimination of health inequality attributable to health care ≠ 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