The economics of health inequalities in the English NHS

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Overview

1) Introduction
2) Cost of inequality
3) Inequality indicators
4) Distributional CEA
5) Conclusion
1. Introduction
Equity is Normative

- **Inequality** to economists just means *variation* or differences
- **Equity** refers to a *fair* or socially just allocation
  - Defining what we mean by fair requires us to make *social value judgements*
  - Equity does not always imply equality
Equality vs Equity

Source: The Partnership for Southern Equity (PSE) http://psequity.org/
Equality Measured How?

• **Relative** inequality

  • *Difference between 40 years and 50 years equivalent to difference between 80 years and 100 years*

• **Absolute** inequality

  • *Difference between 40 years and 50 years equivalent to difference between 80 years and 90 years*
Horizontal & Vertical Equity

• Horizontal equity means the **equal treatment of equals** in relevant respects
• Vertical equity means the **unequal treatment for those who are unequal** in relevant respects
2. Cost of Inequality

Imagine if poor people were as healthy as rich people
Inpatient Hospital Episodes 2011/12
Inpatient Hospitalisation Rate 2011/12

![Graph showing hospitalisation rates for different age groups and genders.]
Inpatient Hospital Cost 2011/12

Average Annual Cost (£)

Female

Male

Average Annual Cost (£)

Age

Age
Survival Curves 2011/12

<table>
<thead>
<tr>
<th>Source ONS</th>
<th>Poorest</th>
<th>Richest</th>
</tr>
</thead>
<tbody>
<tr>
<td>Men</td>
<td>73.9 years</td>
<td>83.3 years</td>
</tr>
<tr>
<td>Women</td>
<td>78.8 years</td>
<td>86.2 years</td>
</tr>
</tbody>
</table>
Expected Lifetime Costs

B

Cumulative Expected Lifetime Cost (£)

Female

Cumulative Expected Lifetime Cost (£)

Male

Age

Age

0 40 80 120

0 40 80 120

0 20,000 40,000 60,000

0 20,000 40,000 60,000

Cumulative Expected Lifetime Cost (£)

Cumulative Expected Lifetime Cost (£)
The numbers (2011/12)

- Cost of inequality in inpatient admissions: £4.8 billion per year
- Cost of lifetime inpatient healthcare use

<table>
<thead>
<tr>
<th></th>
<th>Poorest</th>
<th>Richest</th>
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</thead>
<tbody>
<tr>
<td>Men</td>
<td>£50,200</td>
<td>£43,400</td>
</tr>
<tr>
<td>Women</td>
<td>£59,300</td>
<td>£48,400</td>
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</tbody>
</table>

- Cost of overall inequality in healthcare estimated at £12.52 billion
- Total NHS budget 2011/12 was approx. £100 billion
Summary

• Poor people use more health care at any point in their lives than rich people
• Poor people die earlier than rich people
• If poor people were to live as healthy lives as rich people they would
  – use less health care every year of their lives
  – live longer accumulating health care use over more years
• On balance our analysis suggests longer healthier lives require less aggregate health care than shorter sicker lives
• However reducing health inequalities is not necessarily easy or cheap
• Our estimates are not causal - only associations
References

• Asaria M, Doran T, Cookson R. The costs of inequality: whole-population modelling study of lifetime inpatient hospital costs in the English National Health Service by level of neighbourhood deprivation, *Journal of Epidemiology and Community Health* 2016; doi: 10.1136/jech-2016-207447

• Asaria M. Health care costs in the English NHS: reference tables for average annual NHS spend by age, sex and deprivation group; in L. Curtis & A. Burns (eds) *Unit Costs of Health & Social Care (2017)*, Personal Social Services Research Unit, University of Kent, Canterbury; doi: 10.22024/UniKent/01.02/65559

3. Inequality Indicators

2004/5 - 2011/12
Primary care supply

Primary Care Supply: Patients per full time equivalent GP, excluding registrars and retainers, adjusted for age, sex and health deprivation.

Primary Care Supply: Patients per full time equivalent GP, excluding registrars and retainers, adjusted for age, sex and health deprivation.
Primary care quality

Primary Care Quality: clinical performance in the quality and outcomes framework as reported (weighted by public health impact)

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Preventable hospital admissions

Preventable Hospitalisation: hospitalisations per 1,000 population for conditions amenable to healthcare adjusted for age and sex

Relative Index of Inequality

Slope Index of Inequality
Amenable mortality

Amenable Mortality: deaths per 1,000 population from causes amenable to health care adjusted for age and sex

Amenable Mortality: days before death from causes amenable to health care adjusted for age and sex
What is the counterfactual?

• We did some additional work to compare England with Ontario
• England invested a lot to reduce inequality in access to primary care over this period
• Ontario also invested in primary care but without a specific focus on inequality
• We find that inequalities in amenable mortality in both places were reducing at similar rates prior to the investment made in England
• After the inequality reducing primary care investment in England inequality in amenable mortality in Ontario widened whilst it stayed the same in England
• Perhaps things would have evolved similarly in England without this investment as the distributions of risk factors such as obesity, smoking etc. become increasingly concentrated in poor populations
CCG Inequality Indicators

Unplanned hospitalisation for chronic ambulatory care sensitive conditions 2015/16

More details
Select CCG to show details:
Ashford

Trim outliers beyond 95% CI of mean on scatter plots:
True

The scatter plot shows LSOAs within CCGs with the size of the point representing the population that the LSOA contributes to the CCG. The caterpillar plot shows CCG All values and their 95% confidence intervals with the average values at CCGs plotted represented by the red dashed line.


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Compare inequalities at CCG level

North Lincolnshire

Ashford

Inequality gradient
- National
- Similar areas
- North Lincolnshire

Inequality gradient
- National
- Similar areas
- Ashford

Least Deprived
Most Deprived
Least Deprived
Most Deprived

Standardized emergency admission rate
Summary

• Inequalities in **primary care** supply and quality **reduced** over the period
• Inequalities in **preventable hospitalisation** and **amenable mortality** stayed **constant**
• Unclear what happened to inequality in underlying **need** over the period
• Comparison with Ontario suggests **inequality in need widened**
• Some areas (CCGs and LAs) performed better in terms of equity than others and **lessons** could be learnt
References


• Sheringham J, Asaria M, Barratt H, Raine R, Cookson R. Are some areas more equal than others? Socioeconomic inequality in potentially avoidable emergency hospital admissions within English local authorities from 2004/5 to 2011/12; *Journal of Health Services Research and Policy* 2017; doi: 10.1177/1355819616679198


• Cookson R, Asaria M, Ali S, Shaw R, Goldblatt P. Health equity monitoring for healthcare quality assurance; *Social Science and Medicine* 2018; doi: 10.1016/j.socscimed.2018.01.004

• Cookson R, Mondor L, Asaria M, Kringos D, Klazinga N, Wodchis W. Primary care and health inequality: Difference-in-difference study comparing England and Ontario; *PLOS One* 2017; doi: 10.1371/journal.pone.0188560

4. Distributional CEA
The WHO UHC Cube

Three dimensions to consider when moving towards universal coverage
The Economic Problem

• Resources are **scarce**
• Decision makers need to **prioritise**
• Cost-effectiveness analysis is about doing as much **good** as possible with **fixed budget**
• In this case maximise overall health benefits
Cost-Effectiveness Analysis

- More effective, less costly
- Less effective, more costly

Decision:
- Accept
- Reject

Health Opportunity Cost

Cost-Effectiveness Analysis

- ∆ Cost
- ∆ Effectiveness
Cost-Effectiveness Analysis

• **Cost** of funding one health policy is the **health we lose** by not funding an alternative health policy

• CEA only focusses on **maximising total health** – has nothing to say on the distribution of health
Social Welfare Analysis

Equity efficiency trade off

More equitable more efficient

Less equitable less efficient

△ Equity Impact

△ Health Impact

Accept

Reject

More equitable more efficient

Less equitable less efficient

Miqdad Asaria

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A Primer in Distributive Justice

Health of person 1 (disadvantaged; e.g. poor childhood circumstances)

Health of person 2

“utilitarian” social indifference curves

MaxiMin point

“Rawlsian” social indifference curves

Egalitarian point (Health Pareto efficient)

Maximising point

Line as close to equality as possible

Cost-effectiveness: the point with the largest sum total health is “efficient”

Possibility frontier

Starting point

Equality

Health of person 2
Equally distributed equivalent

Average = 69 QALYs

Plausible range of EDEs
Comparing health distributions

Health Distribution A

Health Distribution B

Average = 70 QALYs
Average = 71 QALYs

Inequality aversion

Choose policy with max EDE

EDE A
EDE B
Social Welfare Functions

- SWFs allow us to quantitatively evaluate this equity efficiency trade off
- They require parameterisation with an inequality aversion parameter to specify the curvature of the indifference curves to give something between the “utilitarian” (parameter=0) and “Rawlsian” (parameter=∞) extremes

<table>
<thead>
<tr>
<th>Atkinson SWF (relative)</th>
<th>Kolm SWF (absolute)</th>
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<tbody>
<tr>
<td>$h_{\text{Atkinson}} = \left[ \frac{1}{n} \sum_{i=1}^{n} [h_i]^{1-\alpha} \right]^{\frac{1}{1-\alpha}}$</td>
<td>$h_{\text{Kolm}} = -\left( \frac{1}{\alpha} \right) \log \left( \frac{1}{n} \sum_{i=1}^{n} e^{-\alpha h_i} \right)$</td>
</tr>
</tbody>
</table>
Focus group exercises to elicit inequality aversion

Now it’s time to make your choice

1. Starting at the top, move the slider down
2. Stop when both programmes are equally good
3. Once you reach that point, press the “DONE” button on the bottom right to record your response

Comparing the Programmes

Choosing Programme B means 1 more year(s) of total gain and reducing the inequality gap by 9 years (10.7%)

The poorest fifth gain more in Programme B and the richest fifth gain less

Efficiency (Total Gain)
- Programmes B is more efficient
  - Programme A: Total Gain = 10 years
  - Programme B: Total Gain = 11 years

Inequality (Health Gap)
- Programme B is more equal
  - Programme A: Health Gap = 16 years
  - Programme B: Health Gap = 7 years
Inequality Aversion in England

84% of people are willing to sacrifice some health for more equal distribution

84% of people are willing to sacrifice some health for more equal distribution

84% of people are willing to sacrifice some health for more equal distribution

84% of people are willing to sacrifice some health for more equal distribution
### The Inequality Aversion Parameter

<table>
<thead>
<tr>
<th></th>
<th>SWF</th>
<th>Median* (95% CI)</th>
<th>Implied weight** (95% CI)</th>
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</thead>
<tbody>
<tr>
<td><strong>Atkinson (ε)</strong></td>
<td></td>
<td>10.95</td>
<td>6.95</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(9.23 - 13.54)</td>
<td>(5.12 – 10.98)</td>
</tr>
<tr>
<td><strong>Kolm (α)</strong></td>
<td></td>
<td>0.15</td>
<td>6.20</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(0.13 - 0.19)</td>
<td>(4.76 – 9.78)</td>
</tr>
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</table>

* Median preference and confidence intervals identified through bootstrapping; population weights used

** Implied weight of marginal health gain to poorest fifth of the population compared to the marginal health gain to the richest fifth of the population
Summary

• If we want to tackle inequality we need to consider it explicitly when we are making policy decisions

• Tackling inequality may involve trade-offs between aggregate health and the desired distribution of health

• Such trade-offs involve social value judgements rather than technical problems to be solved by analysts
References


5. Conclusion
Conclusion

- Economics can help provide *tools to think about and quantify* health inequality
- Economics can help to *identify efficient policies* to address inequalities and make trade-offs if and when necessary
- Economics can help to make a *business case* for reducing inequalities
- *Social value judgements need to be made* in order to make trade-offs, analysts are not the people who should be making these