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Understanding the vertical equity judgements underpinning health inequality measures

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Abstract

The choice of income-related health inequality (IRHI) measures in comparative studies is often determined by custom and analytical concerns, without due recognition of how or why this choice can affect the ranking of populations by health inequality. We use an inequality map to illustrate graphically that alternative measures can only generate different rankings if they embody distinct vertical equity judgments about how a given change in the total health of the population should be distributed so as to leave health inequality unchanged from its initial value. In particular, it is shown that relative and absolute IRHI indices can produce different rankings because they are invariant to equiproportionate and uniform changes in health respectively. Moreover, whether health is measured with respect to attainments or shortfalls also matters for relative indices, where each may represent ethically defensible positions in specific contexts. We conclude that studies should present and interpret findings for a range of measures in order to provide policymakers with a number of alternative viewpoints from which to compare health distributions, justifying any choice of preferred measure in terms of its underlying vertical equity judgement.

Introduction

- A range of alternative measures of the social gradient in health are commonly used both by official agencies for monitoring and evaluation purposes and in the academic literature
  - Absolute measures with respect to health
    - Slope Inequality Index
    - Generalised Concentration Index
    - Erreygers Index
  - Relative measures with respect to health
    - Relative Inequality Index
    - Concentration Index
  - Relative measures with respect to ill-health
    - Relative Inequality Index
    - Concentration Index
• Clarke et al. (2002) illustrates the general point that different measures can produce different rankings of populations in terms of measured levels of health inequality.

• In particular absolute and relative health inequality indices (e.g. the slope and relative slope inequality indices) may produce different rankings.

• Moreover, whether health is measured with respect to attainments or shortfalls also matters for relative indices.

• Aim of the presentation is to explain why this is the case and hence provide some guidance on the appropriate choice of measures.

**Why can alternative measures produce different rankings?**

• When two populations have the same average health all absolute and relative health inequality measures will produce the same ranking of distributions.

• However this is not the case when average health differs between populations because different measures embody alternative value judgements about how a change in the total health of a population should be equitably shared between individuals.

• A health inequality equivalence criterion (HIEC) specifies how a given change in the total health of a population should be distributed between individuals so as to leave health inequality unchanged from its initial value:
  
  - Absolute measures are unchanged if the health of all individuals changes by the same absolute amount (i.e. by a uniform change in the health of the population).
  
  - Relative measures in health are unchanged if the health of all individuals changes by same amount in relative terms (i.e. by a equiproportionate change in health attainments).
  
  - Relative measures in ill-health are unchanged if the ill-health of all individuals changes by same relative amount (i.e. by a equiproportionate change in health shortfalls).
  
  - Other measures...

Alternative HIECs reflect different vertical equity judgements about the fair or equitable treatment of individuals (with initially unequal levels of income).

• These vertical equity judgements can be illustrated using an inequality map.
Two-person inequality map - introduction

Health is bounded in the unit interval. Health attainments and shortfalls are measured from the origins at the bottom left and top right corners of the diagram respectively.

The set of health distributions corresponding to perfect equality is a ray at 45° through the origin(s). Points below this line such as A correspond to distributions in which the richer person is also healthier.

A mean-preserving spread of health outcomes from A can be represented by a perpendicular movement away from the line of perfect equality (along the mean-preserving line for A), resulting in an increase in inequality according to all health inequality measures that satisfy the principle of health transfers.

Source: Own construction
Two-person inequality map – Absolute measures

Source: Own construction

Absolute inequality measures are unchanged from A if the health of both individuals is changed by the same absolute amount so the iso-inequality line is parallel to the ‘line of perfect inequality’

Points between the ‘line of perfect inequality’ and the iso-inequality line are less unequal than A. Points further away from the ‘line of perfect inequality’ than the ‘iso-inequality line’ are more unequal than A

For absolute measures, health and ill-health can be seen as “two sides of the same coin” since the ‘iso-inequality line’ is symmetric about the ‘mirror line’, which is defined by the set of distributions with mean health equal to the mid-point of the health range.
Relative inequality measures in health are unchanged if the health of both individuals is changed by the same relative amount so the ‘iso-inequality line’ is a ray from the attainments origin passing through A.

An equiproportionate increase in health from A will lead to an unambiguously more unequal distribution than a uniform absolute increase in health (along the iso-inequality line for absolute measures).

Following the convention in the income inequality literature, the vertical equity judgments implied by relative and absolute measures in health may be labelled as ‘rightist’ and ‘leftist’ respectively.

But note that an equiproportionate decrease in health from A will lead to a less unequal distribution than a uniform absolute decrease.
Two-person inequality map – Benchmark inequality comparisons

Source: Own construction

Health distributions such as B lying between the two iso-inequality lines will be ranked more unequal than distribution A according to one criterion and less unequal according to the other.

To see why, let C and D be the benchmark distributions obtained by transforming A in accordance with the ‘rightist’ and ‘leftist’ HIECs respectively such that mean health equals that of B in each case. B will be ranked less unequal than C but more unequal than D by any health inequality measure satisfying the principle of health transfers.

The ethical injunction to “heal the sick” might be taken to imply that healthcare improvements should be equalising not just in relative but also in absolute terms, given that the poor are more likely to be sick, e.g. to a distribution such as E.
Two-person inequality map – Relative measures in ill-health

For relative measures, whether health is measured with respect to attainments or shortfalls makes a difference since the corresponding iso-inequality lines are NOT symmetric about the ‘mirror line’.

For relative inequality measures in ill-health, the iso-inequality line is a ray from the shortfalls origin passing through A.

Thus relative inequality measures in ill-health reflect an ‘extreme leftist’ judgment consistent with the Marmot Review (2010) principle of ‘proportionate universalism’: “To reduce the steepness of the social gradient in health, actions must be universal, but with a scale and intensity that is proportionate to the level of disadvantage”.

Source: Own construction
Extensions and applications

The analysis may be extended to the general \(n\)-person case with the benchmark inequality comparison procedure continuing to provide a convenient analytical procedure for determining whether two distributions will be ranked differently by IRHI measures associated with alternative HIECs.

- The ‘rightist’ and ‘extreme leftist’ HIECs continue to generate the most and least unequal benchmark distributions respectively if an original distribution A is being compared to a distribution with higher mean health (and vice versa if compared to a distribution with lower mean health).

- The same set of judgements will hold when considering the ranking of unequal sized populations (e.g. different countries) by health inequality if attention is restricted to measures that are invariant to population replication.

The analysis is equally applicable to the comparison of pure health inequality measures, such as the health Gini, in which the weights attached to individuals’ health outcomes are determined by their position in the health rather than income distribution.

- In this case individuals will be identified as being more and less healthy, rather than richer and poorer, with consideration limited to distributions of health below the line of perfect equality in order to preserve this ranking.
Conclusion
Choice of health inequality measure and whether inequality is measured with respect to health or ill health are both important since may affect conclusions.

- Different measures embody different benchmarks of distributional neutrality reflecting alternative vertical equity judgements. Choices may be guided by public/official perceptions of what health changes would be inequality-preserving in particular policy contexts:
  - Priority to “Heal the sick”, who are disproportionately poor, might be taken to imply that healthcare improvements should be equalising not just in relative but also in absolute terms.
  - Marmot Review (2010) principle of ‘proportionate universality’ might be taken to imply that a distributionally neutral programme of healthcare improvements would maintain relative ill health inequalities.

- However, the evidence around what value judgements people actually hold is mixed. Until more is known about these values, studies should present findings using both relative and absolute indices, and with inequality measured with respect to both health and ill health.

**Addendum: Two-person inequality map – Wagstaff measure**

Source: Own construction


These judgements are bounded by the ‘rightist’ and ‘extreme leftist’ views embodied in relative indices in health attainments and shortfalls respectively, tending to the former as mean attainments tend to zero and to the latter as mean shortfalls tend to zero.

The measure is symmetric about the ‘mirror line’, reflecting a ‘leftist’ view if mean health is equal to the mid-point of the health range.