MEASURING HEALTH INEQUALITIES

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Topics

• Measuring SEP
• Measuring interventions, and combining them
  • Composite coverage indicator
  • Co-coverage
• Measuring inequalities
  • Which measures and how to calculate – focus on
    • CIX = concentration index
    • SII = slope index of inequality
  • Shape of inequality – linear, top, bottom
• Assessing trends in inequalities
  • Changes in absolute and relative measures
  • Putting it all together
What we already know

• Equity is based on judgment
• We measure inequalities
• Health is a difficult concept
• We measure more concrete indicators
  • Health status
    • infant mortality rates, undernutrition
  • Access and use of health services
    • number of times tried to get appointment, number of medical consultations
  • Coverage by health interventions
    • Contraception
    • Antenatal care
    • Vaccines
Multiple dimensions in inequality

- Gender
- Sexual orientation
- Age
- Ethnicity
- Education
- Area of residence
- Socioeconomic position / wealth
Issues in measurement of stratifiers

• Gender and age – these are easy
• Sexual orientation
  • People may be reluctant to tell the truth
  • Potential for discrimination, even violence
  • Usually calls for special data collection strategies
• Ethnicity
  • Potential for discrimination, even violence
  • There is great interest in inequalities by ethnicity
  • Available in a few surveys
• Education
  • Easy to ask, but subject to error
• Area of residence, region – also easy to record
Measuring SEP

- Education (as a proxy of SEP)
  - Easy to measure, unbalanced groups

- Income
  - Measured with error, unstable over time, problematic in rural areas

- Consumption
  - Popular with economists, stable over time, very difficult to measure

- Occupation
  - Commonly used in HICs; changing, multiple or informal jobs make this problematic in LMICs setting
Asset indices

• SEP without tears (Filmer & Pritchett, 1998): use
  • Household possessions, dwelling construction materials, access to infrastructure (water, sanitation, electricity), educational achievement – all easy to measure indicators (assets)
  • An information dimensionality reduction technique (factor analysis) to produce one single combination of the above to obtain a proxy of permanent income of each household

• PROS – easy to collect info and to calculate, robust in terms of addition of irrelevant indicators, relates well to consumption

• CONS – sensitive to choice of assets, relative classification only, puts rural households in lower position
In DHS & MICS

- Wealth index is readily available
- Based on a list of assets that include
  - Household possessions
  - Building materials
  - Infrastructure
- The list varies by survey
- The score is derived using principal components analysis
- Quintiles are calculated for households
  - The poorest quintiles include more individuals, esp. children
    - Higher fertility rates
  - For specific analysis there is the need to recalculate the quintiles
    for individuals, always taking sample weights into account
Measuring intervention coverage

• Single indicator approach
  • Selected indicators are measured individually
    • E.g. SBA, ANC, immunization
  • Discussed in detail previously

• Combined indicator approach
  • Co-coverage: how many interventions each child/mother received
  • Composite coverage: average results of a set of indicators

We detail these two in the sequence
Co-coverage

- A set of 9 health interventions were selected
  - BCG, DTP3, measles vaccine, ITN (child)
  - ANC, vitamin A, tetanus vaccine, SBA (mother)
  - Safe water (household)
- The number of interventions received by each child/mother is summed up
- Proportions of each count presented by wealth quintiles
Co-coverage in India 2005

Wealth quintiles

5% with 6+ interventions

20% 6+ int.

Source: India DHS 2005
Composite coverage index

- Originally proposed as the coverage gap
  - Not well received/understood by policy makers
- Weighted average of 8 interventions
  - equal weights to 4 stages in the continuum of care
    - family planning
      - demand satisfied
    - maternal and newborn care
      - skilled birth attendant, 1+ antenatal care by skilled provider
    - vaccination
      - DPT3 x 2, measles, BCG
    - case management of sick children
      - ORT for diarrhea, care for pneumonia

\[
CCI = \frac{1}{4} \left( FPS + \frac{SBA + ANCS}{2} + \frac{2DPT3 + MSL + BCG}{4} + \frac{ORT + CPNM}{2} \right).
\]
Mean CCI by wealth quintile

Figure 1: Mean coverage in each wealth quintile for the studied interventions in 54 Countdown countries. Coloured dots show the average coverage in each wealth quintile. Q1 is the 20% poorest wealth quintile; Q5 is the 20% richest. The distance between quintiles 1 and 5.
How well the CCI resumes overall info?

- We used principal components analysis to combine information on 15 health interventions for 138 surveys
- The resulting score was compared to the CCI

Correlation coef. = 0.96
How well the CCI relates to health status?

Correlations around 0.8 for mortality

Correlations between 0.6-0.7 for undernutrition
Flavors of inequalities

- **Absolute and relative**
  - When comparing two groups one can measure
    - Distance = absolute, by difference
    - Ratio = relative, by division

- **Absolute inequality**
  - How far one group from the other
  - Tends to decrease when the one group achieved the limit

- **Relative inequality**
  - How many times one group better than another
  - Behaves strangely when one group close to the limit
    - Especially approaching zero (mortality, for instance)
Inequality – absolute or relative

• Absolute inequality
  • Remains constant when all groups increase or decrease by the same amount (+ or – Y)

• Relative inequality
  • Remains constant when all groups increase or decrease by the same factor (× Y)
Measures of inequality

- Dozens of measures available
  - Indicates that no one is a clear winner!
- Simplest measures – ratio and difference
  - Do not take into account intermediate groups, only the extremes of distribution, thus insensitive to changes in part of the population
  - Not always the extremes will present lowest/highest coverage
- More complex measures
  - Deal with the whole population
  - Based on several ideas
    - Concentration, variance, statistical models
Let’s start simple

% people that never had been to a dentist (PNAD, 1998)
Inequalities measured differently
Different interpretations?

- Are the measures giving conflicting messages?
- Are inequalities increasing or decreasing?
- For the moment, let’s leave this as such
- And explore other measures
  - That take into account the full distribution
Concentration index (relative)

- CIX: twice the area of the concentration curve that shows cumulative distribution of outcome for increasing wealth.
  - Positive: pro-rich
  - Negative: pro-poor
A closer look - stunting

7% stunted children among the 20% richest
50% stunted children among the 20% poorest
Slope index of inequality (absolute)

- SII: the slope of the regression of outcome on midpoints of wealth groups.

Usually estimated by linear regression, best if done with logistic regression.
SII – a closer look

- The slope index of inequality (SII)
  - For absolute inequality

SII: the slope of the regression of outcome on midpoints of wealth groups. Interpreted as the difference between the fitted coverage for the top and bottom of the wealth scale.
A few caveats

CIX
• scale dependent, bounded
  • Careful when comparing different characteristics
  • The higher the coverage, more limited the variation of the CIX

SII
• For proportions, may result in predictions out of [0,1]
  • Need to use logistic regression
  • Relationship may not be linear
  • Logistic regression may help again

Figure 1. The bounds on the value of the concentration index
Wagstaff, 2005.
Another issue: choice of grouping can make a difference

![Bar chart showing smoking rates by wealth quintiles and deciles.]

- **Wealth quintiles**
  - Ratio: 3.3
  - Difference: 29.1

- **Wealth deciles**
  - Ratio: 4.2
  - Difference: 32.9

But for CIX, whole sample is used

CIX = -21.7
Summary points

• There has been considerable progress regarding how to measure SEP in surveys, how to measure inequalities and how to interpret their magnitude and time trends

• Conclusions
  • That there is no single measure of inequality, and recommend that at least one absolute and one relative measure should always be presented
  • Absolute and relative measures of inequality are complementary in the interpretation of change in inequality
  • Measures that are limited to comparison of extreme groups should be complemented by measures that take into account the full distribution