Health inequality monitoring: with a special focus on low- and middle-income countries

Lecture 4: Simple measures of health inequality
How can health inequalities be measured?

• **Simple measures** make pairwise comparisons of health between two subgroups, such as the most and least wealthy
  – main type of measurement used in inequality monitoring
  – intuitive and easily understood
Difference and ratio measures

• **Difference** shows the *absolute* inequality between two subgroups
  – the mean value of a health indicator in one subgroup subtracted from the mean value of that health indicator in another subgroup

• **Ratios** show the *relative* inequality between two subgroups
  – the mean value of a health indicator in one subgroup divided by the mean value of that health indicator in another subgroup

• When there are only two subgroups to compare, difference and ratio are the most straightforward ways to measure absolute and relative inequality
Absolute and relative inequality

• **Absolute inequality** reflects the magnitude of difference in health between two subgroups
  – Absolute measures retain the same unit of measure as the health indicator
  – For example, if health service coverage were 100% and 90% in two subgroups of one population, and 20% and 10% in subgroups of another population, both cases would report absolute inequality of 10 percentage points

• **Relative inequality** measures show proportional differences in health among subgroups
  – For example, the relative inequality in a population with health service coverage of 100% and 50% in two subgroups would equal 2 (100/50 = 2); the relative inequality in a population with health service coverage of 2% and 1% in two subgroups would also equal 2 (2/1 = 2)
### Applied examples: difference and ratio

#### Table 1 Area-based inequality in antenatal care (at least four visits) in Colombia, DHS 1995, 2000, 2005 and 2010

<table>
<thead>
<tr>
<th>Survey year</th>
<th>Coverage in rural area (%)</th>
<th>Coverage in urban area (%)</th>
<th>Difference (urban – rural) (percentage points)</th>
<th>Ratio (urban / rural)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1995</td>
<td>53.8</td>
<td>82.4</td>
<td>28.6</td>
<td>1.5</td>
</tr>
<tr>
<td>2000</td>
<td>64.7</td>
<td>84.9</td>
<td>20.2</td>
<td>1.3</td>
</tr>
<tr>
<td>2005</td>
<td>73.1</td>
<td>87.1</td>
<td>14.0</td>
<td>1.2</td>
</tr>
<tr>
<td>2010</td>
<td>80.5</td>
<td>90.3</td>
<td>9.8</td>
<td>1.1</td>
</tr>
</tbody>
</table>

#### Table 2 Sex-based inequality in under-five mortality rates in Egypt, DHS 1995, 2000, 2005 and 2008

<table>
<thead>
<tr>
<th>Survey year</th>
<th>Female (deaths per 1000 live births)</th>
<th>Male (deaths per 1000 live births)</th>
<th>Difference (male – female) (deaths per 1000 live births)</th>
<th>Ratio (male / female)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1995</td>
<td>98.9</td>
<td>92.1</td>
<td>–6.8</td>
<td>0.9</td>
</tr>
<tr>
<td>2000</td>
<td>69.3</td>
<td>68.6</td>
<td>–0.7</td>
<td>1.0</td>
</tr>
<tr>
<td>2005</td>
<td>46.3</td>
<td>52.1</td>
<td>5.8</td>
<td>1.1</td>
</tr>
<tr>
<td>2008</td>
<td>27.7</td>
<td>38.4</td>
<td>10.7</td>
<td>1.4</td>
</tr>
</tbody>
</table>
Applied example: difference and ratio

Table 3 Wealth-based inequality in births attended by skilled health personnel in the Philippines, DHS 1998, 2003 and 2008

<table>
<thead>
<tr>
<th>Survey year</th>
<th>Quintile 1 (poorest) (%)</th>
<th>Quintile 2 (%)</th>
<th>Quintile 3 (%)</th>
<th>Quintile 4 (%)</th>
<th>Quintile 5 (richest) (%)</th>
<th>Difference (quintile 5 – quintile 1) (percentage points)</th>
<th>Ratio (quintile 5 / quintile 1)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1998</td>
<td>21.2</td>
<td>45.9</td>
<td>72.8</td>
<td>83.9</td>
<td>91.9</td>
<td>70.7</td>
<td>4.3</td>
</tr>
<tr>
<td>2003</td>
<td>25.1</td>
<td>51.4</td>
<td>72.4</td>
<td>84.4</td>
<td>92.3</td>
<td>67.2</td>
<td>3.7</td>
</tr>
<tr>
<td>2008</td>
<td>25.7</td>
<td>55.6</td>
<td>75.8</td>
<td>86.0</td>
<td>94.4</td>
<td>68.7</td>
<td>3.7</td>
</tr>
</tbody>
</table>
Ordered and non-ordered groups

• Ordered groups have an inherent positioning and can be ranked
  – For example, wealth, education level

• Non-ordered groups, by contrast, are not based on criteria that can be logically ranked
  – For example, region, ethnicity, religion, place of residence
Two subgroups and more than two subgroups

- Some equity stratifiers naturally generate two subgroups
  - For example, sex, urban-rural place of residence
- Other equity stratifiers may comprise multiple subgroups
  - For example, wealth quintiles, region
- Many equity stratifiers could be classified either way
  - For example, urban-rural place of residence could be expanded to include large cities, small cities, towns, villages, countryside, etc.
- Simple measures are appropriate to make pairwise comparisons of two subgroups; complex measures may be useful when there are more than two subgroups
Simple measures of inequality: multiple subgroups

• When there are multiple subgroups pairwise comparisons may be made between:
  – Subgroups with highest and lowest values of a health indicator
  – Specific pairs of subgroups, based on a selected reference subgroup or subgroups
    • For example, comparing each region with the capital region
    • For example, comparing each wealth quintile to the richest quintile
Limitations of simple measures of inequality

- #1. Pairwise comparisons ignore all other subgroups that are not being compared
Limitations of simple measures of inequality

Table 4 Wealth-based inequality in births attended by skilled health personnel in Ghana, DHS 2003 and 2008

<table>
<thead>
<tr>
<th>Survey year</th>
<th>Quintile 1 (poorest) (%)</th>
<th>Quintile 2 (%)</th>
<th>Quintile 3 (%)</th>
<th>Quintile 4 (richest) (%)</th>
<th>Quintile 5 (richest) (%)</th>
<th>Difference (quintile 5 – quintile 1) (percentage points)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2003</td>
<td>20.6</td>
<td>31.9</td>
<td>43.3</td>
<td>73.0</td>
<td>90.4</td>
<td>69.8</td>
</tr>
<tr>
<td>2008</td>
<td>24.2</td>
<td>50.0</td>
<td>64.8</td>
<td>81.7</td>
<td>94.6</td>
<td>70.4</td>
</tr>
</tbody>
</table>
Limitations of simple measures of inequality

Figure 1 Births attended by skilled health personnel in Ghana, by wealth quintile, DHS 2003 and 2008
Limitations of simple measures of inequality

• #2. Pairwise comparisons do not take into consideration subgroup size
Limitations of simple measures of inequality

Table 5 Education-based inequality in contraceptive prevalence (modern methods) in the Philippines, DHS 1993 and 2008

<table>
<thead>
<tr>
<th>Survey year</th>
<th>None (%)</th>
<th>Primary (%)</th>
<th>Secondary or higher (%)</th>
<th>Difference (secondary or higher – none) (percentage points)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1993</td>
<td>7.2</td>
<td>21.5</td>
<td>28.0</td>
<td>20.8</td>
</tr>
<tr>
<td>2008</td>
<td>8.7</td>
<td>30.3</td>
<td>35.8</td>
<td>27.1</td>
</tr>
</tbody>
</table>

Figure 2 Contraceptive prevalence (modern methods) in the Philippines, by education level, DHS 1993 and 2008
Limitations of simple measures of inequality

Figure 3 Proportion of women of reproductive age in the Philippines, by education level, DHS 1993 and 2008

Source: Data provided by: International Center for Health Equity, Federal University of Pelotas, Brazil.
Limitations of simple measures of inequality

- Interpretation challenges due to population shifts:
  - Example: more-educated subgroups may appear to be losing coverage of a health service over time, when in reality this could be the result of a population shift of uncovered persons from less-educated subgroups into more-educated subgroups
  - Should report the relative size of the population subgroups alongside disaggregated mean values of the health indicator
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http://apps.who.int/iris/bitstream/10665/85345/1/9789241548632_eng.pdf