Alternative Assessment of Oral Health Disparities

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What can be gained?

- **Traditional approach with surveys**
  - Prevalence estimates
  - Risk estimates
  - No attributable risk
- **Alternative/additional approach**
  - Improved description of the inequality
  - Quantification of the inequality
Mean DMFT and the SiC

- **Mean DMFT**
  - Average number of carious teeth
- **Significant Caries Index (SiC)**
  - WHO, goal of 3.0 teeth
  - Mean DMFT of bottom one-third
  - [http://www.whocollab.od.mah.se/expl/siccalculation.xls](http://www.whocollab.od.mah.se/expl/siccalculation.xls)

The Lorenz Curve

- Plot of cumulative proportion of disease versus cumulative proportion of population
- Leads to statements such as…
  - 28% of Michigan children bear 75% of the caries burden
  - 13% of Michigan children bear 80% of untreated decay
“THE SINKING SHIP OF INEQUALITY”

Inequality in the burden of dental caries among 3rd grade Michigan children, Count Your Smiles 2005-06

Cumulative proportion of 3rd grade children

Cumulative proportion of teeth affected by dental caries

Lorenz DHII Line of Equality

“THE SINKING SHIP OF INEQUALITY”

Calculating Gini and DHII

• Gini coefficient
  – Proportion of area between the line of equality and the Lorenz curve out of the area under the line of equality
  – Calculus flashback…sum the trapezoids!
  – Limitation – based on continuous distribution

• Dental Health Inequality Index (DHII)
  – Same principle as Gini
  – Transform the line of equality for count data
Transforming the Line of Equality

- **P(\text{tooth had caries})**
  - Number of carious teeth
  - Number of examined teeth
- **P(\text{child had DMF} = X)**
  - Calculate the proportion of persons that should have \( X \) number of carious teeth
- **Plot the new distribution and calculate DHII**
  - Once again, fun with summing trapezoids
  - Proportion of area between the new line of equality and the Lorenz curve out of area under line of equality

Caries Inequality in Michigan, 2005-06

<table>
<thead>
<tr>
<th>Region</th>
<th>Caries Experience (%)</th>
<th>Mean DMFT (Teeth)</th>
<th>SiC Index (Teeth)</th>
<th>DHII</th>
<th>Proportion with 80% of caries burden</th>
</tr>
</thead>
<tbody>
<tr>
<td>Upper Peninsula</td>
<td>70%</td>
<td>3.16</td>
<td>6.93</td>
<td>0.334</td>
<td>38%</td>
</tr>
<tr>
<td>Northern Lower Peninsula</td>
<td>66%</td>
<td>3.09</td>
<td>7.06</td>
<td>0.391</td>
<td>37%</td>
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<tr>
<td>Southern Lower Peninsula</td>
<td>62%</td>
<td>2.41</td>
<td>5.75</td>
<td>0.389</td>
<td>33%</td>
</tr>
<tr>
<td>Suburban Detroit</td>
<td>48%</td>
<td>1.61</td>
<td>4.34</td>
<td>0.492</td>
<td>26%</td>
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<tr>
<td>Detroit</td>
<td>63%</td>
<td>2.35</td>
<td>5.37</td>
<td>0.345</td>
<td>38%</td>
</tr>
<tr>
<td>Michigan</td>
<td>58%</td>
<td>2.20</td>
<td>5.47</td>
<td>0.438</td>
<td>32%</td>
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</tbody>
</table>
Public Health Implications

• Population-based versus targeted public health approaches

• Reducing disease or reducing disparities?

• Monitor inequality changes over time to help evaluate programs

References

