Session I
Measurement

Social and Economic Aspects of Fertility Decline

Population, Family and Reproductive Health
380.655
AY 2008-2009
Objectives of the Lecture

• At the end of this lecture and the accompanying readings, students will be able to:
  – identify and distinguish among the major measures of fertility
Brief Discussion of Measurement of Fertility

• Crude Birth Rate
  – Number of births during t/mid-year population in t
• General Fertility Rate
  – Number of births during t/mid-year population of women aged 15-49
• Age Specific Fertility Rate
  – Number of births to women aged x during t/mid-year population of women aged x
Crude Birth Rate

\[
\frac{\text{Number of Births in the U.S. in 1988}}{\text{Number of People in the U.S. in 1988}} \times 1000 = \frac{3,046,162}{298,444,215} \times 1000
\]

10.2
General Fertility Rate

\[
\text{General Fertility Rate} = \left( \frac{\text{Number of Births in the U.S. in 1988}}{\text{Number of Women aged 15-49 in the U.S. in 1988}} \right) \times 1000
\]

\[
\left( \frac{3,046,162}{54,022,000} \right) \times 1000 = 56.4
\]
### Age Specific Fertility Rates (U.S. 1988)

<table>
<thead>
<tr>
<th>Age</th>
<th>Number of Births (A)</th>
<th>Number of Women (B)</th>
<th>ASFR ((A/B) \times 1,000)</th>
</tr>
</thead>
<tbody>
<tr>
<td>15-19</td>
<td>319,544</td>
<td>7,213,000</td>
<td>44.30</td>
</tr>
<tr>
<td>20-24</td>
<td>804,622</td>
<td>7,852,000</td>
<td>102.47</td>
</tr>
<tr>
<td>25-29</td>
<td>1,010,748</td>
<td>9,057,000</td>
<td>111.60</td>
</tr>
<tr>
<td>30-34</td>
<td>661,414</td>
<td>9,069,000</td>
<td>72.93</td>
</tr>
<tr>
<td>35-39</td>
<td>217,754</td>
<td>8,110,000</td>
<td>26.85</td>
</tr>
<tr>
<td>40-44</td>
<td>31,068</td>
<td>7,024,000</td>
<td>4.42</td>
</tr>
<tr>
<td>45-49</td>
<td>1,012</td>
<td>5,697,000</td>
<td>0.18</td>
</tr>
</tbody>
</table>
Total Fertility Rate

• The number of children a woman would have if she experienced a specific set of age specific fertility rates for her whole lifetime
• Remember, there is no woman who experiences the age specific rates of the U.S. in 1988
  – That is, a woman 20-24 in 1988 will experience the 1988 20-24 rates, but will experience the 25-29 rates from 1993
Total Fertility Rate U.S. 1988

<table>
<thead>
<tr>
<th>ASFR</th>
<th>Cumulative ASFR</th>
</tr>
</thead>
<tbody>
<tr>
<td>44.30</td>
<td>221.51</td>
</tr>
<tr>
<td>102.47</td>
<td>733.87</td>
</tr>
<tr>
<td>111.60</td>
<td>1291.87</td>
</tr>
<tr>
<td>72.93</td>
<td>1656.52</td>
</tr>
<tr>
<td>26.85</td>
<td>1790.77</td>
</tr>
<tr>
<td>4.42</td>
<td>1812.89</td>
</tr>
<tr>
<td>0.18</td>
<td>1813.78</td>
</tr>
<tr>
<td></td>
<td>1.80</td>
</tr>
</tbody>
</table>
Gross Reproduction Rate

• Special Case of the TFR
• Counts only daughters
• Indicator of how women are reproducing themselves, assuming no mortality
• Can multiply the TFR by the proportion of births that are female
  – Imprecise because in some populations the sex ratio at birth varies by age at mother, so the GRR will depend on how births are distributed by age of mother
Net Reproduction Rate

• Same as the GRR (i.e. counts only daughters), but
• Includes mortality of women
Some data from Taiwan

- **1970**
  - CBR = 27.2/1000
  - GFR = 120/1000
  - TFR = 4.0
  - GRR = 1.94
  - NRR = 1.84

- **1980**
  - CBR = 23.3/1000
  - GFR = 91/1000
  - TFR = 2.5
  - GRR = 1.22
  - NRR = 1.17
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