Measures of Marriage and Divorce

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Section A

Indicators of Marriage
Marriage

- *Marriage*—Legal union of persons of opposite sex
- The legality of the union may be established by civil, religious, or other means as recognized by the laws of each country
Consensual Union

- *Consensual Union*—Establishment of a marital union without recorded legal sanction
Marriage

Let $M$ = Number of marriages
$P$ = Mid-year population
$P_{15+}$ = Mid-year population age 15 and older
$P_{m15+}$ = Number of men age 15 and older
$P_{f15+}$ = $W_{15+}$ = Number of women age 15 and older
Crude Marriage Rate (CMR)

- *Crude Marriage Rate*—Number of marriages per 1,000 population

\[
= \frac{M}{P} \times 1000
\]
General Marriage Rate (GMR)

- General Marriage Rate—Number of marriages per 1,000 population age 15 and older

\[ \frac{M}{P_{15}} \times 1000 \]
Marriage

- Important note:
  - Most measures of marriage are sex-specific
  - In the remaining measures, whenever the rates are calculated for women, the same calculations can be done for men
General Marriage Rate for Women and Men

- General marriage rate for women (GMR\(^f\))
  \[
  GMR^f = \frac{M}{P_{15+}^f} \times 1000 \approx 2 \times GMR
  \]

- General marriage rate for men (GMR\(^m\))
  \[
  GMR^m = \frac{M}{P_{15+}^m} \times 1000
  \]

- Note: GMR\(^f\) ≠ GMR\(^m\)
Exercise
General Marriage Rate

Calculate the general marriage rate for women and compare it to the general marriage rate for Brazil (1988) based on the following data:

<table>
<thead>
<tr>
<th>Brazil, 1988</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of marriages : 951 236</td>
</tr>
<tr>
<td>Total population 15+ : 92 852 000</td>
</tr>
<tr>
<td>Total female population 15+: 46 706 000</td>
</tr>
</tbody>
</table>

You have 15 seconds to calculate the answer. You may pause the presentation if you need more time.

Exercise Answer

General Marriage Rate

- The correct answers for the general marriage rates are as follows:

<table>
<thead>
<tr>
<th>GMR</th>
<th>GMR^f</th>
</tr>
</thead>
<tbody>
<tr>
<td>10.24</td>
<td>20.37</td>
</tr>
</tbody>
</table>

Brazil, 1988

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
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</tr>
<tr>
<td>Total female population 15+</td>
<td>46 706 000</td>
</tr>
</tbody>
</table>
Age-Specific Marriage Rate (ASMR)

- **ASMR**—Number of marriages per 1,000 women (or men) of age “a”

\[
\text{ASMR} = \frac{M_a}{W_a} \times 1000
\]

- Where \( M_a \) = Number of marriages to women of age “a”
- \( W_a \) = Mid-year population of women of age “a”
Exercise
Age-Specific Marriage Rate

Calculate the age-specific marriage rate for women 25–29 for Brazil (1988) based on the following data:

Brazil, 1988

<table>
<thead>
<tr>
<th>Number of marriages, women 25-29:</th>
<th>161 086</th>
</tr>
</thead>
<tbody>
<tr>
<td>Female population 25-29:</td>
<td>6 362 000</td>
</tr>
</tbody>
</table>

You have 15 seconds to calculate the answer. You may pause the presentation if you need more time.

Source: U.N. Demographic Yearbook, 1990
The correct answer for the age-specific marriage rate for women 25–29 for Brazil (1988) is as follows:

- **25.32**

**Brazil, 1988**

<table>
<thead>
<tr>
<th>Number of marriages, women 25-29:</th>
<th>161 086</th>
</tr>
</thead>
<tbody>
<tr>
<td>Female population 25-29:</td>
<td>6 362 000</td>
</tr>
</tbody>
</table>
Order-Specific Marriage Rate (OSMR)

- **OSMR**—Number of order “i” marriages per 1,000 persons age 15 and older with marriage order “i-1”

\[
OSMR = \frac{M_i}{P_{i-1}^{15+}} \times 1000
\]

- Where \( M_i \) = Number of marriages of order “i”

\( P_{i-1}^{15+} \) = Mid-year population age 15+ with marriage order “i-1”

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*Continued*
Order-Specific Marriage Rate (OSMR)

Note:
- OSMR is normally sex-specific
- It can also be age-specific

**OSMR for women**

\[
\frac{M^i}{W_{15+}^{i-1}} \times 1000
\]

**OSMR for men**

\[
\frac{M^i}{P_{15+}^{m,i-1}} \times 1000
\]

\[
\sum_{i=1}^{w} \text{OSMR} \neq \text{GMR}
\]
First Order-Specific Marriage Rate

- First order-specific marriage rate is used for a nuptiality life table

\[
\frac{M^1}{P^s_{15+}} \times 1000
\]

- Where \( M^1 \) = Number of first marriages
  \( P^s_{15+} \) = Mid-year population of never-married (single) persons

- Note: Is usually calculated sex-specific
Age-Order Specific Marriage Rate (AOSMR)

Let $M_i^a = \text{Number of marriages of order } \text{“}i\text{” to women (or men) of age } \text{“}a\text{”}$

$P_{i-1}^a = \text{Mid-year population of women (or men) of age } \text{“}a\text{” who are at marriage order } \text{“}i-1\text{”}$
Age-Order Specific Marriage Rate (AOSMR)

- $AOSMR$—Number of marriages of order “i” per 1,000 women of age “a” who are at their “i-1th” marriage

\[
= \frac{M_a^i}{W_{a}^{i-1}} \times 1000
\]
Some Relationships

- **Note that:**
  \[ \sum_{i} AOSMR \neq ASMR \]

- **Since:**
  \[ ASMR = \sum_{i} \frac{M_{a}^{i}}{W_{a}^{i-1}} \ast \frac{W_{a}^{i-1}}{W_{a}} \]

- **Also that:**
  \[ \sum_{a} AOSMR \neq OSMR \]

- **Since:**
  \[ OSMR = \sum_{a} \frac{M_{a}^{i}}{W_{a}^{i-1}} \ast \frac{W_{a}^{i-1}}{W_{15+}} \]
Total Marriage Rate (TMR)

- *Total Marriage Rate*—Total number of marriages a person will have at the end of his/her marriageable age if he/she follows the given schedule of marriage

\[
65 + \sum_{a=15}^{M_a} P_a
\]

- Note: It is sex-specific
Total First Marriage Rate (TMFR)

\[ TFMR = \sum_{a} \frac{M_a^1}{P_a} \]

TFMR \leq 1.0 for cohort rate, but period rate can be above 1.0

Note: \( TMR^m > TMR^f \)

\[ TMR - TFMR = TRMR \text{ (Total remarriage rate)} \]
Exercise

Total First Marriage Rate (TMFR)

Calculate the total first marriage rate for women from Brazil (1988) based on the following data

<table>
<thead>
<tr>
<th>Age Group</th>
<th>1st Marriages</th>
<th>Population</th>
</tr>
</thead>
<tbody>
<tr>
<td>-20</td>
<td>311 233</td>
<td>32 885 000</td>
</tr>
<tr>
<td>20-24</td>
<td>346 361</td>
<td>6 875 000</td>
</tr>
<tr>
<td>25-29</td>
<td>161 086</td>
<td>6 362 000</td>
</tr>
<tr>
<td>30-34</td>
<td>61 085</td>
<td>5 443 000</td>
</tr>
<tr>
<td>35-39</td>
<td>29 653</td>
<td>4 479 000</td>
</tr>
<tr>
<td>40-44</td>
<td>16 503</td>
<td>3 590 000</td>
</tr>
<tr>
<td>45+</td>
<td>25 315</td>
<td>12 735 000</td>
</tr>
</tbody>
</table>

You have 15 seconds to calculate the answer. You may pause the presentation if you need more time.

Source: U.N. Demographic Yearbook, 1990
Exercise Answer
Total First Marriage Rate (TMFR)

- The correct answer for the age-specific marriage rate for women 25–29 for Brazil (1988) is as follows:
  - 0.55

<table>
<thead>
<tr>
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<tr>
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</table>
Singulate Mean Age at Marriage (SMAM)

- Estimate of the mean age at first marriage approximated by indirect method from cross-sectional data on marital status by age
  - Mean age at marriage of women marrying before they reach 50
Singulate Mean Age at Marriage (SMAM)

Basic assumptions:

- The change in the proportion single from age “x” to age “x+1” is a measure of the proportion of a birth cohort who married at that age if no woman dies between her 15th and 55th birthday.
- The risk of marriage has remained constant (otherwise we estimate the mean for some average cohort).
Singulate Mean Age at Marriage (SMAM)

Let $S_i, S_j =$ Proportions of women single at ages $i, j$, then

$$SMAM = \frac{1}{100} \left( \left( \sum_{i=15}^{49} S_i \cdot 5 \right) + 1500 \right) - \left( \sum_{i=45}^{49} S_i + \sum_{j=50}^{54} S_j \right) \div 2 \cdot 50$$
Other Measures

- Mean and median ages (of first marriage, of remarriages)
- Percent single
- Age of groom by age of bride
- Duration of marriage
Standardization

- Most of the marriage measures can and should be standardized for comparisons
- Can be done by direct or indirect method
- Used for comparative marriage analyses
<table>
<thead>
<tr>
<th>Age Group</th>
<th>Male First Marriage Rates U.S.</th>
<th>Single Male Population England and Wales</th>
<th>Expected First Marriages U.S.A</th>
</tr>
</thead>
<tbody>
<tr>
<td>15-19</td>
<td>0.031</td>
<td>1,604,910</td>
<td>49,752</td>
</tr>
<tr>
<td>20-24</td>
<td>0.210</td>
<td>989,661</td>
<td>207,829</td>
</tr>
<tr>
<td>25-29</td>
<td>0.190</td>
<td>425,643</td>
<td>80,872</td>
</tr>
<tr>
<td>30-34</td>
<td>0.111</td>
<td>262,656</td>
<td>29,155</td>
</tr>
<tr>
<td>35-44</td>
<td>0.060</td>
<td>373,918</td>
<td>22,435</td>
</tr>
<tr>
<td>45-64</td>
<td>0.019</td>
<td>498,549</td>
<td>9,472</td>
</tr>
<tr>
<td>65+</td>
<td>0.011</td>
<td>158,846</td>
<td>1,747</td>
</tr>
<tr>
<td>Total</td>
<td>Crude = 70.7</td>
<td>4,314,183</td>
<td>401,262</td>
</tr>
</tbody>
</table>

U.S. age-standardized first marriage rate =
\[
\frac{401,262}{4,314,183 \times 1,000} = 93
\]
Gross Nuptiality Table

- Assumes no person dies before passing through the marriageable ages
- Same techniques as in life table construction
- Allows one to determine what proportion of a cohort of single persons would be married at various ages assuming that the marriage rates used continues to prevail and there is no mortality
Net Nuptiality Table

- Takes into account mortality as well as marriage
- Indicates the pace at which a group of single persons is decreased annually by marriage and death

Continued
Net Nuptiality Table

- Also gives the probability of a single person marrying at each year of age according to the current nuptiality and mortality rates
- Provides information on the average age at marriage
- Multiple-decrement life table techniques are needed
Summary

- Marital status provides a static representation of the population with respect to its marital composition
- Measures on marriage focus on the dynamic aspect
- Marriage information are mainly derived from vital statistics whereas marital status is primarily analyzed from census and survey data
Summary

- Marriage rates directly measure changes in population composition characteristics rather than changes in population size.
- But if the change in population size is considered a function of the broader process of reproduction—which in most societies occurs through formation of families—then the rates of family formation and dissolution are part of population dynamics.
Section B

Indicators of Divorce
Divorce

• Divorce—Separation of the husband and wife by a judicial decree which confers on the parties the right to remarriage
Crude Divorce Rate

- **Crude Divorce Rate**—Number of divorces per 1,000 population

\[
\text{Div} \div \frac{P}{1000} = \text{Div} \times 1000
\]

- Where \( \text{Div} \) = Number of divorces
  \( P \) = Mid-year population
General Divorce Rate

- **General Divorce Rate**—Number of divorces per 1,000 persons age 15 and more

\[
\text{Div} \times 1000 = \frac{\text{Div}}{P_{15+}}
\]

- Where Div = Number of divorces
  \(P_{15+}\) = Mid-year population 15 and older
Exercise
Crude and General Divorce Rates

Calculate the crude divorce rate and the general divorce rate for Brazil (1988) based on the following data:

<table>
<thead>
<tr>
<th>Brazil, 1988</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of divorces : 33,437</td>
</tr>
<tr>
<td>Total population 15+ : 92,852,000</td>
</tr>
<tr>
<td>Total population : 144,428,000</td>
</tr>
</tbody>
</table>

You have 15 seconds to calculate the answer. You may pause the presentation if you need more time.

Source: U.N. Demographic Yearbook, 1990
Exercise Answer

Crude and General Divorce Rates

- The correct answers for the crude divorce rate for Brazil (1988) are as follows:
  - **Crude Divorce Rate** = 6.45 divorces per 1,000 population
  - **General Divorce Rate** = 10.03 divorces per 1,000 persons age 15+

<table>
<thead>
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<th>Brazil, 1988</th>
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<td>Total population : 144,428,000</td>
</tr>
</tbody>
</table>
Divorce Rate Among Married Couples

- *Divorce Rate Among Married Couples*—Number of divorces per 1,000 married persons
  \[
  \text{Divorce Rate} = \frac{\text{Div}}{\text{P}_m} \times 1000
  \]

- Where \( \text{P}_m \) = Mid-year population of married persons

- Note: Can be sex-specific
Age-Specific Divorce Rate

- **Age-Specific Divorce Rate**—Number of divorces per 1,000 women (or men) of age “a”

\[
\text{Div}_{a}^{f} = \frac{\text{Div}_{a}^{f}}{P_{a}^{f}} \times 1000
\]

- Where \( \text{Div}_{a}^{f} \) = Number of divorces by women age “a”

\( P_{a}^{f} \) = Mid-year population of women age “a”
Exercise
Age-Specific Divorce Rates

Calculate the age-specific divorce rates for women 30–34 and 40–44 for Brazil (1988) based on the following data.

<table>
<thead>
<tr>
<th>Age Group</th>
<th>Divorces</th>
<th>Population</th>
</tr>
</thead>
<tbody>
<tr>
<td>30–34</td>
<td>6,689</td>
<td>5,443,000</td>
</tr>
<tr>
<td>40–44</td>
<td>4,825</td>
<td>3,590,000</td>
</tr>
</tbody>
</table>

You have 15 seconds to calculate the answer. You may pause the presentation if you need more time.

Source: U.N. Demographic Yearbook, 1990
Exercise Answer

Age-Specific Divorce Rates

- The correct answers for the age-specific divorce rate are as follows:
  - 1.23 divorces per 1,000 women 30–34
  - 1.34 divorces per 1,000 women 40–44

<table>
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</tbody>
</table>
Duration-Specific Divorce Rate

- Let $\text{Div}_d = \text{Number of divorces to persons who have been married for a duration d}$

- $\text{P}^d_{\text{mar}} = \text{Mid-year married population of persons who have been married for a duration d}$
Duration-Specific Divorce Rate

*Duration-Specific Divorce Rate*—Number of divorces per 1,000 persons who have been married for a duration “d”

\[
\text{Div}_{d} \times \frac{P_{d}}{P_{\text{mar}}} \times 1000
\]
Order-Specific Divorce Rate

Let $\text{Div}^i = \text{Number of divorces of order "}i"$

$P^i_{\text{mar}} = \text{Mid-year married population of persons who have been married "}i" \text{ times}$

$P^{i-1}_{\text{div}} = \text{Mid-year population of persons divorced "}i-1" \text{ times}$
Order-Specific Divorce Rate

- *Order-Specific Divorce Rate*—Number of divorces of order “i” per 1,000 persons who have been married “i” times

\[
\text{Order-Specific Divorce Rate} = \frac{\text{Div}^i}{\text{P}^i_{\text{mar}}} \times 1000
\]

- Note: It may be hard to get the denominator
Alternatively:

Number of divorces of order “i” per 1,000 persons who have divorced “i-1” times

\[ \frac{\text{Div}^i}{P^i_{\text{div}}} \times 1000 \]
Standardization of Divorce Rates

- Crude and general divorce rates can be standardized
- Can be done by direct or indirect method
- Used for comparative divorce analyses
Comparison of Crude Annual Divorce Rates

Adapted from Joshua R. Goldstein, The Leveling of Divorce in the United States, Demography, Volume 36 (3), August 1999
Estimated Marital Duration Effects for Divorce

Adapted from Joshua R. Goldstein, The Leveling of Divorce in the United States, Demography, Volume 36 (3), August 1999
U.S. Annual Divorce Rate

Adapted from Andrew J. Cherlin, Marriage, Divorce, Remarriage.
Harvard University Press, 1992
Proportion of Marriages that Will End in Divorce

Adapted from Andrew J. Cherlin, Marriage, Divorce, Remarriage. Harvard University Press, 1992
Summary

- Measures on marriage and divorce focus on the dynamic aspect
- Divorce information is mainly derived from vital statistics
- Divorce rates measure changes in population composition characteristics rather than changes in population size