Missouri Population Estimates in the Coming Decade

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Missouri Office of Administration
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Session Topics

- Comparison of year 2000 population estimates and Census 2000 counts
- Plans for annual estimates this decade

Uses of Population Estimates

- Allocation of $200 billion in federal funds annually
- Controls for federal surveys
  - Current Population Survey
  - American Community Survey
- Denominators for statistical rates
  - Birth and death rates
  - Per capita income
- Planning locations of public and private services

Population Estimates Products

- National population estimates
  - Annual by age, sex, race, Hispanic origin
- State population estimates
  - Annual by age, sex, race, Hispanic origin
- County population estimates
  - Annual by age, sex, race, Hispanic origin
- Subcounty population estimates
  - Annual total population for 40,000+ functioning governmental units

Population Estimates Methodology

- National, state and county levels
  Component method:
  \[ P_2 = P_1 + B - D + NM \]
- Subcounty level
  Distributive housing unit method:
  County populations distributed to subcounty parts based on updated estimates of housing units
### State / County Method

- Births and deaths (NCHS, FSCPE)
- Immigration (INS, State Department)
- Internal Migration (IRS)
- Internal Migration (SSA NUMIDENT)
- Medicare (CMS)
- Group Quarters Updates (FSCPE)

#### State and County Estimating System
- Dissemination Products
- Monthly Survey Controls
- Denominators
- Media and Government Briefing Tables
- Analytical Tables

### Subcounty Distributive Housing Method

- Housing Units and Population (Census 2000)
- Building Permits (Census)
- BAS Data (Census)
- Vacancy / PPH (Census 2000)
- Special Census Outputs
- County Population Estimates (State/County System)

#### Subcounty Estimating System
- Dissemination Products
- HUD Funds Allocation MSA Designation Updates
- Media and Government Briefing Tables
- Analytical Tables

### Evaluation of 2000 Population Estimates

- Differences from census
- Geographic and characteristic patterns
- Estimates vs. 1990 Census and other extrapolations

### April 2000 Estimates

- Derived from vintage July 2000 estimate
- April estimate interpolated between July 1999 and July 2000 estimates

### National Comparison

- Estimate: 274.6 Million
- Census: 281.4 Million
- Numeric Difference: 6.8 Million
- Percent Difference: 2.4 Percent

### Missouri Comparison

- Estimate: 5,500,607
- Census: 5,595,211
- Numeric Difference: 94,604
- Percent Difference: 1.7 Percent
County Estimates Comparison

Measures of Error: MAPE
- Mean Absolute Percent Error
- Does not account for size of county or direction of error.

\[
MAPE = 100\% \times \frac{1}{n} \sum_{i=1}^{n} \frac{|E_i - A_i|}{A_i}
\]

Measures of Error: MALPE
- Mean Algebraic Percent Error
- Shows direction of error

\[
MALPE = 100\% \times \frac{1}{n} \sum_{i=1}^{n} \frac{E_i - A_i}{A_i}
\]

MAPE and MALPE, 2000 vs. 1990 (All U.S. counties)

<table>
<thead>
<tr>
<th></th>
<th>2000</th>
<th>1990</th>
</tr>
</thead>
<tbody>
<tr>
<td>MAPE</td>
<td>3.3%</td>
<td>3.6%</td>
</tr>
<tr>
<td>MALPE</td>
<td>-1.6%</td>
<td>1.8%</td>
</tr>
</tbody>
</table>

U.S. Regional MAPEs
- West: 4.4%
- South: 3.8%
- Midwest: 2.5%
- Northeast: 2.3%
- U.S.: 3.3%

Missouri County MAPE = 3.0%
Smallest and Largest MAPEs

<table>
<thead>
<tr>
<th>Smallest</th>
<th>Largest</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ohio: 1.6%</td>
<td>Hawaii: 15.4%</td>
</tr>
<tr>
<td>Iowa: 1.8%</td>
<td>Nevada: 8.2%</td>
</tr>
<tr>
<td>Maryland: 1.9%</td>
<td>Arizona: 7.3%</td>
</tr>
<tr>
<td>Pennsylvania: 2.0%</td>
<td>Colorado: 5.8%</td>
</tr>
<tr>
<td>Illinois: 2.0%</td>
<td>Florida: 5.7%</td>
</tr>
</tbody>
</table>

Direction of Differences

<table>
<thead>
<tr>
<th>Difference</th>
<th>Counties</th>
<th>Average Population</th>
</tr>
</thead>
<tbody>
<tr>
<td>Estimate &lt; Census</td>
<td>2,113</td>
<td>108,012</td>
</tr>
<tr>
<td>Estimate = Census</td>
<td>3</td>
<td>11,944</td>
</tr>
<tr>
<td>Estimate &gt; Census</td>
<td>1,025</td>
<td>51,860</td>
</tr>
</tbody>
</table>

Estimates vs. Census, by County Size

Estimates vs. Census, by County Change

Estimates vs. Census, by Percent Group Quarters

Estimates vs. Census, by Percent of Population Age 65 and Older
Estimates vs. Census, by Percent Hispanic

MAPE Estimates vs. Census, by Hispanic Percent Change

Estimates vs. Census, by % of Population from International Migration, Counties

Alternate Methods
- Do nothing: Use 1990 Census number as 2000 estimate
- Constant growth: Assume growth rate between 1990 and 2000 is same as between 1980 and 1990 and apply that growth rate to 1990 census to obtain 2000 estimate

Overall MAPEs for All Methods
- 2000 estimates: 3.3%
- Do nothing: 11.1%
- Constant growth: 9.2%
Conclusions

- 1990s county estimates are slightly better than those from the 1980s.
- Typical patterns are exhibited for size and growth groups.
- “Real” estimate does better than simple substitutes.
- More research is needed into county characteristics and error.

Subcounty Estimates Comparison

Accuracy of 2000 Estimates
(All U.S. place and township governments)

- MAPE = 12.4% (2.8% points lower than 1980)
- 50% of errors were positive
- MALPE = 3.4%

Background

- Estimates produced for 40,630 cities, towns, villages, and township governments
- Distributive housing unit method replaced administrative records method in 1996

Geographic Differences

MAPE of Subcounty Population Estimates by State

Estimates vs. Census, by Place Size

Source: U.S. Census Bureau, Census 2000, and 2000 Subcounty Population Estimates
Estimates vs. Census, by Place Growth

Positive Error, by Place Change

Accuracy of 2000 Estimate Versus 1990 Census as Alternative

Conclusions
- Estimates accuracy improved since the 1980 estimates
- Accuracy increases for larger and more stable places
- MAPE for 1990 census results for places under 1,000 is lower than estimates

Issues in 2001
- No methodological changes
- Use Census 2000 as base
- Adjusted or unadjusted? (October 15 decision)
- Rework distribution of international migration to subnational areas

Estimates Enhancements in the 2000s
- Improve estimates of international migration
- Improve age, sex, race, Hispanic origin estimates
- Improve boundary change processing
- Adapt to new OMB race guidelines
- Integrate ACS and special censuses
- Improve dissemination of estimates
  - Improve web products for data viewers and data crunchers
  - Expand analytical reports
Population Estimates Release Schedule
July 1, 2001 Vintage Population Estimates

<table>
<thead>
<tr>
<th>Estimate</th>
<th>Release</th>
</tr>
</thead>
<tbody>
<tr>
<td>State and national totals</td>
<td>December 2001</td>
</tr>
<tr>
<td>County and state, with change components</td>
<td>March 2002</td>
</tr>
<tr>
<td>County and state by age-sex-race/Hispanic</td>
<td>July 2002</td>
</tr>
<tr>
<td>Subcounty (place/township)</td>
<td>July 2002</td>
</tr>
</tbody>
</table>

Sources

A special thanks to Population Estimates Branch staff for charts and data used in this presentation: Lisa Blumerman, Melissa Therrien, Jason Devine, and Josie Baker.