Navigating Reliability of Small Area Data
Lessons from New York City

Presentation for
American Community Survey
Data Users Conference

May 29, 2014

Joel A. Alvarez & Joseph J. Salvo
Population Division

NYC Planning
Department of City Planning City of New York
## Reliability of ACS Poverty Data Across Tracts of Varying Size

<table>
<thead>
<tr>
<th>Tract Population</th>
<th>Number of Tracts</th>
<th>Median CV</th>
<th>Mean CV</th>
</tr>
</thead>
<tbody>
<tr>
<td>Less than 1000</td>
<td>713</td>
<td>31.3</td>
<td>37.9</td>
</tr>
<tr>
<td>1000-2999</td>
<td>18910</td>
<td>29.0</td>
<td>32.6</td>
</tr>
<tr>
<td>3000-4999</td>
<td>30568</td>
<td>28.1</td>
<td>31.0</td>
</tr>
<tr>
<td>5000-6999</td>
<td>16263</td>
<td>28.2</td>
<td>30.5</td>
</tr>
<tr>
<td>7000 or more</td>
<td>5831</td>
<td>27.8</td>
<td>29.6</td>
</tr>
</tbody>
</table>

Source: PRB analysis of 2008-2012 ACS data.
What are acceptable levels of relative reliability when using ACS estimates?

“CVs of 10-12 percent or less are often accepted as a reasonable standard of precision for an estimate.”
– *Using the American Community Survey: Benefits and Challenges, 2007*

“While there is no hard-and-fast rule, for the purposes of this handbook, estimates with CVs of more than 15 percent are considered cause for caution when interpreting patterns in the data.”
– *Census Bureau’s ACS Compass Handbook Series, 2009*

Remember:
Income of $60,000 with CV of 20 percent has MoE of +/-$20,000
Neighborhood Tabulation Areas (NTAs) New York City

NTAs are composed of Census Tracts

West Village

NTAs
- Median Population = 36,600
- Median # HUs = 15,100

NYC Count = 188

Source: U.S. Census Bureau, American Community Survey, 2006-2010 Summary File
Population Division-New York City Department of City Planning
Median Coefficients of Variation for Selected Variables
NYC Census Tracts and Neighborhoods (NTAs), 2008-2012 ACS

Ratio of NTA CV to Census Tract CV = 0.34

<table>
<thead>
<tr>
<th>Variable</th>
<th>Census Tracts</th>
<th>Neighborhoods</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nonrelative Population</td>
<td>37.3</td>
<td>12.6</td>
</tr>
<tr>
<td>Below Poverty Level</td>
<td>28.6</td>
<td>9.0</td>
</tr>
<tr>
<td>1 Unit, Detached Housing</td>
<td>36.3</td>
<td>11.8</td>
</tr>
</tbody>
</table>

Note:
CVs for tract estimates of zero were omitted.
For NTA aggregation, MOEs associated with tract estimates of zero were converted to zero.

Source:
U.S. Census Bureau, 2008-2012 American Community Survey-Summary File
Population Division-New York City Department of City Planning
Coefficients of Variation (CV) for Population Living Below Poverty
New York City Census Tracts & Neighborhoods (NTAs), 2008-2012

Source: U.S. Census Bureau, 2008-2012 American Community Survey-Summary File
Population Division-New York City Department of City Planning
## Tract Measure of Size (TMOS) Sampling Rates
### 2009 and 2013 American Community Surveys

<table>
<thead>
<tr>
<th>Tract Measure of Size In Housing Units</th>
<th>2009 Average of Post-reduction Sampling Rates</th>
<th>2013 Average of Post-reduction Sampling Rates</th>
<th>Ratio of 2013 Sampling Rate to 2009 Sampling Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>0&lt;TMOS&lt;=400</td>
<td>2.141</td>
<td>5.275</td>
<td>2.464</td>
</tr>
<tr>
<td>400&lt;TMOS&lt;=1,000</td>
<td>2.141</td>
<td>4.220</td>
<td>1.971</td>
</tr>
<tr>
<td>1,000&lt;TMOS&lt;=2,000</td>
<td>2.141</td>
<td>2.562</td>
<td>1.197</td>
</tr>
<tr>
<td>2,000&lt;TMOS&lt;=4,000</td>
<td>1.573</td>
<td>1.507</td>
<td>0.958</td>
</tr>
<tr>
<td>4,000&lt;TMOS&lt;=6,000</td>
<td>1.573</td>
<td>0.904</td>
<td>0.575</td>
</tr>
<tr>
<td>6,000&lt;TMOS</td>
<td>1.573</td>
<td>0.528</td>
<td>0.335</td>
</tr>
</tbody>
</table>

Source: U.S. Census Bureau, American Community Survey, ACS Design and Methodology Report 2009 and 2013 Population Division-New York City Department of City Planning
US Tract Housing Unit Summary Stats

<table>
<thead>
<tr>
<th>Metric</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean</td>
<td>1,780</td>
</tr>
<tr>
<td>Median</td>
<td>1,691</td>
</tr>
<tr>
<td>SD</td>
<td>803</td>
</tr>
<tr>
<td>Range</td>
<td>13,585</td>
</tr>
<tr>
<td>Sum</td>
<td>130,038,080</td>
</tr>
<tr>
<td>Count</td>
<td>73,057</td>
</tr>
<tr>
<td>1st Quartile</td>
<td>1,239</td>
</tr>
<tr>
<td>3rd Quartile</td>
<td>2,232</td>
</tr>
</tbody>
</table>

Tract Measure of Size (TMOS) Strata Tract Counts
United States, 2006-2010 ACS

Source: U.S. Census Bureau, American Community Survey, 2006-2010 Summary File
Population Division-New York City Department of City Planning
<table>
<thead>
<tr>
<th></th>
<th>Estimate</th>
<th>Unweighted Sample</th>
<th>Percent in Sample</th>
<th>Average Weight by Tract</th>
<th>Average Weight</th>
<th>SD of Tract Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>2006-2010 data</td>
<td>3,342,799</td>
<td>200,343</td>
<td>6.0</td>
<td>16.7</td>
<td>16.3</td>
<td>2.6</td>
</tr>
<tr>
<td>Simulated New Design</td>
<td>3,342,799</td>
<td>233,390</td>
<td>7.0</td>
<td>14.3</td>
<td>13.7</td>
<td>6.9</td>
</tr>
<tr>
<td>Percent Change</td>
<td>-</td>
<td>16.5</td>
<td>16.5</td>
<td>-14.2</td>
<td>-16.0</td>
<td>160.9</td>
</tr>
</tbody>
</table>

*Excludes tracts with estimates of zero and those in parks, airports, and Rikers Island Neighborhood Tabulation Areas (NTAs)
Percent Increase in MoEs (When Aggregating Tract Estimates) Attributable to Differential Weights Used in Old vs. New ACS Sample Design, 2006-2010 New York City Neighborhood Tabulation Areas (NTAs)

Note - In this analysis tract MoEs for estimates of zero were adjusted to zero. Tracts in parks, airports, and Rikers Island NTAs were excluded.

Source: U.S. Census Bureau, American Community Survey, 2006-2010 Summary File Population Division-New York City Department of City Planning
Percent Change in Coefficients of Variation Due to Differential Weights For Married Couple Families Variable, 2006-2010 New York City Neighborhood Tabulation Areas

Note - In this analysis tract MoEs for estimates of zero were adjusted to zero. Tracts in parks, airports, and Rikers Island NTAs were excluded.

Source: U.S. Census Bureau, American Community Survey, 2006-2010 Summary File Population Division-New York City Department of City Planning
Percent of Housing Units in the Sample According to New ACS Sample Design
New York City Neighborhoods (NTAs), 2006-2010

Percent of Housing Units in Sample
- 15% or more (8 NTAs)
- 12.5% to 14.9% (16)
- 10.0% to 12.4% (41)
- 7.5% to 9.9% (87)
- 5.0% to 7.4% (25)
- Less than 5% (11)

New York City
% of HUs in Sample = 7.0%
% Change in Sample Size w/ New Design = +16.5%

Bronx
- 6.8%
- +18.7%

Queens
- 8.2%
- +30.9%

Manhattan
- 4.6%
- -17.8%

Brooklyn
- 8.0%
- +29.6%

Staten Island
- 7.2%
- +15.4%

Note - In this analysis tracts with Housing Unit estimates of zero and tracts in parks, airports, and Rikers Island were excluded.

Source: U.S. Census Bureau, American Community Survey, 2006-2010 Summary File
Population Division-New York City Department of City Planning
Percent Change in CVs Due to Differential Weights and Sample Size Changes For Married Couple Families Variable, 2006-2010
New York City Neighborhood Tabulation Areas

Percent Change in CV
- Increase of 20% or more (12 NTAs)
- 10.0% to 19.9% (7)
- 5.0% to 9.9% (7)
- 2.0% to 4.9% (5)
- -1.9% to 1.9% (21)
- -4.9% to -2.0% (37)
- -9.9% to -5.0% (51)
- -19.9% to -10.0% (39)
- Decrease of -20% or more (9)

Note - In this analysis tract MoEs for estimates of zero were adjusted to zero. Tracts in parks, airports, and Rikers Island NTAs were excluded.

Source: U.S. Census Bureau, American Community Survey, 2006-2010 Summary File
Population Division-New York City Department of City Planning
Suggestions for the Census Bureau

• Provide more guidance on acceptable levels of reliability (examples)

• More guidance on aggregation of summary level ACS data

• Reconsider the impact of new sample design on data aggregation

• Longer-term: Press for further increases in sample size and/or endorse new small area geography
Data for neighborhoods were prepared by the Census Bureau for the first time from the 1980 Census of Population and Housing. Almost 1,300 cities, counties, townships, and other areas participated in the 1980 Census Neighborhood Statistics Program (NSP).

Following Census Bureau guidelines, NSP participants defined "Neighborhood Publication Areas" (which were usually whole cities or counties) and, within these areas, the neighborhoods for which they wanted data prepared. These neighborhoods do not always coincide with the common, local perception of neighborhoods. For example, some communities defined what actually are neighborhood subareas, because traditional neighborhoods were too large to be useful areas of analysis.

Information about the neighborhood boundaries was sent to the Census Bureau for use in tabulating the data. The neighborhood statistics then were provided to a local contact person for use in the community.

To find out if your community participated in the NSP, contact your local city or county planning agency, State Data Center, or the nearest Census Bureau regional office. More information about State Data Centers and regional offices is found at the end of this booklet.
Data Links

• **DCP Population Division website:**
  www.nyc.gov/population

• **New York City Census FactFinder:**
  maps.nyc.gov/census/