4. MAKING COMPARISONS WITH ACS DATA

One of the main benefits of the American Community Survey (ACS) is the ability to make comparisons—over time, across different geographic areas, and across different population subgroups. For example, data users may be interested in:

- Comparing the proportion of people without health insurance in two counties.
- Comparing the child poverty rate with the poverty rate for the working-age population.
- Comparing the proportion of people who are foreign-born in a city in 2018 with the corresponding share in 2017.
- Comparing the proportion of people with college degrees from 2000 to 2018 in a state, based on data from the ACS and the 2000 Census.

When making comparisons with ACS data, note that differences in survey design, questionnaire content and design, sample size, or geography may affect comparability of estimates.

TIP: ACS data users interested in making comparisons also need to pay attention to sampling error because differences between estimates may, or may not, be statistically significant.

This section describes some of the key considerations for data users making comparisons with ACS data. The U.S. Census Bureau also provides extensive guidance on comparing ACS data on their Web site.[15] The section on "Understanding Error and Determining Statistical Significance" includes guidance on how to calculate and interpret the statistical significance of differences between estimates.

The Census Bureau created_a statistical testing tool to help data users test whether ACS estimates are statistically different from one another.[16]

Comparing ACS Data Across Geographic Areas

One of the challenges for data users is deciding how to compare geographic areas with different population sizes. Estimates for areas with fewer than 20,000 people are produced only in the form of 5-year estimates. However, for larger areas with at least 65,000 people (or 20,000 people in the case of the 1-year Supplemental Estimates) both 1-year and 5-year data are available, so data users need to choose which estimates to use.[17]

TIP: When comparing ACS estimates across different geographic areas or population subgroups, data users should avoid comparing ACS single-year estimates with ACS multiyear estimates. That is, 1-year estimates should only be compared with other 1-year estimates, and 5-year estimates should only be compared with other 5-year estimates.

For example, suppose a policymaker wanted to compare veterans' characteristics in Athens, Texas—a small city southeast of Dallas—with veterans in Houston. Although the ACS publishes annual estimates on veterans for Houston, only 5-year estimates are available for Athens. Thus, the policymaker should compare ACS 5-year estimates for Athens with ACS 5-year estimates for Houston, even though more recent, single-year estimates are available for Houston.

TIP: Another option for presenting ACS data for less populated areas is to show single-year estimates for large counties in Texas and then combine the remaining counties into a state "residual" by subtracting the available single-year data from the state total. Alternatively, data users could present ACS estimates for Public Use Microdata Areas, since they meet the 65,000-population threshold required for single-year estimates and are often used as a substitute for county-level data.[18]

Comparing ACS Data Over Time

TIP: Data users are encouraged to compare ACS data over time based on nonoverlapping estimates.

When using ACS 1-year data, these comparisons are generally straightforward. Using multiyear estimates to look at trends for small populations can be challenging because they rely on pooled data for 5 years. For example, comparisons of 5-year estimates from 2013 to 2017 and 2014 to 2018 are unlikely to show much difference because four of the years overlap; both sets of estimates include the same data collected from 2014 through 2017.[19] The Census Bureau suggests comparing 5-year estimates that do not overlap—for

[15] U.S. Census Bureau, American Community Survey (ACS), Comparing ACS Data, <www.census.gov/programs-surveys/acs/guidance/comparing-acs-data.html>.

[16] U.S. Census Bureau, American Community Survey (ACS), Statistical Testing Tool, <www.census.gov/programs-surveys/acs/guidance/statistical-testing-tool.html>.

[17] In July 2016, the Census Bureau also released a series of 1-year Supplemental Estimates—simplified versions of popular ACS tables available for geographic areas with at least 20,000 people.

[18] Although Public Use Microdata Areas typically follow county boundaries, this is not always the case, particularly in some New England states.

[19] While the interpretation of this difference is difficult, these comparisons can be made with caution. Users who are interested in comparing overlapping multiyear period estimates should refer to the section on "Understanding Error and Determining Statistical Significance" for more information.

example, comparing 2009–2013 ACS 5-year estimates with 2014–2018 ACS 5-year estimates. When new ACS 5-year data are released, it will be possible to update this trend, based on data from 2010–2014 and 2015–2019.

TIP: Changes to ACS questions over time may make it difficult to measure trends. For example, the Census Bureau made substantial changes to the 2008 ACS questions on labor force participation and number of weeks worked. As a result, the Census Bureau recommends using caution when comparing 2008 and later labor force data with 2007 and earlier estimates.

TIP: Data users are also encouraged to pay attention to sampling error associated with ACS data when looking at trends over time. For example, 1-year estimates for a relatively small population subgroup may vary widely from year to year because of sampling variation, obscuring an underlying trend. In this case, multiyear estimates may be useful for assessing an underlying, long-term trend.

However, because multiyear estimates have an inherent smoothing effect on trends—because of overlapping estimates from year to year—they will tend to mask rapidly developing changes.

Changes in Geography

ACS data generally reflect the geographic boundaries as of the year the data are collected. While geographic boundary changes are somewhat infrequent, they do occur, and those changes can affect a data user's ability to make comparisons over time. For example, congressional districts are redrawn every 10 years immediately following the decennial census. Congressional district data from the 2012 ACS and later years reflect the new boundaries that were drawn after the 2010 Census, while ACS data for earlier years reflect the 2000 Census boundaries. Given the major changes to district boundaries after each census, a comparison of congressional district data between 2011 and 2012 is not feasible.

ACS data are also regularly updated to reflect local changes in geographic boundaries. For example, the city of Jurupa Valley, California, incorporated in July 2011. Data for this city was first published in 2012, and has been updated each subsequent year, but data are not available for Jurupa Valley for 2011 and earlier years. The Census Bureau does not revise ACS data for previous years to reflect changes in geographic boundaries. For more information, visit the Census Bureau's Web page on Geography & ACS.[20]

[20] U.S. Census Bureau, American Community Survey (ACS), Geography & ACS, <www.census.gov/programs-surveys/acs/geography-acs.html>.

Changes in Population Controls

The ACS uses a weighting methodology to ensure that ACS estimates are consistent with official Census Bureau population estimates by age, sex, race, and Hispanic origin. With each annual release of population estimates, the Population Estimates Program revises and updates the entire time series of estimates from the previous decennial census to the current year. However, ACS estimates for prior years are not revised or reweighted based on updated population estimates.

The change in the population estimates from 2009 to 2010 was particularly significant. The 2010 ACS 1-year data and 2006–2010 ACS 5-year data were controlled to population estimates that reflected the results of the 2010 Census. However, the 1-year and 5-year data for 2009 and earlier years used population estimates that were based on the 2000 Census.

TIP: Because the 2009 ACS and 2010 ACS 1-year estimates use controls that are based on different decennial census base years, data users need to use caution when making comparisons across these years. Specifically, estimates of the number of people in a given geographic area or population subgroup are not strictly comparable between these two years. However, rates and percentages—as well as monetary data, such as median income values—are generally comparable between the two periods.

Comparisons With Data From the 2000 Census, the 2010 Census, and the 2020 Census

The ACS was modeled after the long form of the decennial census, and data users interested in long-term trends can, in many cases, make valid comparisons between ACS and the 2000 Census (and earlier decennial census) estimates. Census Bureau subject matter specialists have reviewed the factors that could affect differences between ACS and the 2000 Census estimates and they have determined that ACS estimates are similar to those obtained from past decennial census sample data for most areas and characteristics.

However, differences in residence rules, universes (base reference totals against which all other characteristics are compared), and reference periods between the two surveys should be considered when making these comparisons. For example, the ACS data are collected throughout the calendar year while the 2000 Census long form sampled the population as of April 1, 2000. Given the differences in the reference period, the two surveys may yield very different estimates for communities with large seasonal populations or those undergoing rapid change. The section

on "Differences Between the ACS and the Decennial Census" provides more information about these differences.

The 2010 Census and 2020 Census were short-form only censuses so they do not include all of the detailed social, economic, and housing data available from previous censuses. However, data users can make valid comparisons between ACS estimates and basic characteristics from these censuses, including age, sex, race, Hispanic origin, household relationship, and homeowner status. For basic counts of the U.S. population by age, sex, race, and Hispanic origin between censuses, data users are encouraged to use the Census Bureau's official population estimates, available on the Census Bureau's Population and Housing Unit Estimates Web site.[21]

Using Monetary Data

TIP: Data users also need to use caution in looking at trends involving income or other measures that are adjusted for inflation, such as rental costs, home values, and utility costs.

For example, to compare published monetary data for the most recent year with data from the 2010 ACS, data users need to adjust the 2010 data for inflation, based on a national-level consumer price index.

ACS multiyear estimates with dollar values are adjusted for inflation to the final year of the period. For example, the 2014–2018 ACS 5-year estimates are tabulated using dollars adjusted to 2018.

[21] U.S. Census Bureau, Population and Housing Unit Estimates, <www.census.gov/programs-surveys/popest.html>.

Note that inflation adjustment does not adjust for differences in costs of living across different geographic areas. The section on "Using Dollar-Denominated Data" provides more information on the adjustment of ACS single-year and multiyear estimates for inflation.

Additional Background Information

Geography & ACS
<www.census.gov/programs-surveys/acs/geography-acs.html>
This Web page describes changes to local geographic area boundaries, which may affect comparisons of ACS data over time.

Comparing ACS Data
<www.census.gov/programs-surveys/acs/guidance/comparing-acs-data.html>
This Web page provides guidance on making valid comparisons between the latest ACS data and ACS data from the previous year, the 2000 Census, and the 2010 Census.

Statistical Testing Tool
<www.census.gov/programs-surveys/acs/guidance/statistical-testing-tool.html>
The Statistical Testing Tool is a spreadsheet that tests whether ACS estimates are statistically different from one another. Simply copy or download ACS estimates and their margins of error into the tool to get instant results of statistical tests.