3. UNDERSTANDING AND USING ACS SINGLE-YEAR AND MULTIYEAR ESTIMATES

Each year, the U.S. Census Bureau publishes American Community Survey (ACS) 1-year estimates for geographic areas with populations of 65,000 or more. The 65,000-population threshold ensures that 1-year data are available for all regions, divisions, states, the District of Columbia, Puerto Rico, congressional districts, Public Use Microdata Areas, and many large counties and county equivalents, metropolitan and micropolitan areas, cities, school districts, and American Indian areas.[22] The 1-year Supplemental Estimates, simplified versions of popular ACS tables, are also available for geographic areas with at least 20,000 people. These annual data provide policymakers, planners, business leaders, and others with a critical source of up-to-date information to plan for services such as transportation, medical care, housing, and schools.

For geographic areas with smaller populations, the ACS samples too few housing units to provide reliable single-year estimates. For these areas, several years of data are pooled together to create more precise multiyear estimates. Since 2010, the ACS has published 5-year data (beginning with 2005–2009 estimates) for all geographic areas down to the census tract and block group levels.[23]

This means that there are two sets of numbers—both 1-year estimates and 5-year estimates—available for geographic areas with at least 65,000 people, such as the state of Virginia. Less populous areas, such as Bath County in Virginia's Shenandoah Valley, receive only 5-year estimates. The vast majority of geographic areas receive only 5-year estimates.

Understanding Period Estimates

Single-year and multiyear estimates from the ACS are all "period" estimates derived from a sample collected over a period of time, as opposed to "point-in-time" estimates such as those from past decennial censuses. For example, the 2000 Census "long form" sampled the resident U.S. population as of April 1, 2000.

While an ACS 1-year estimate includes information collected over a 12-month period, an ACS 5-year estimate includes data collected over a 60-month period.

In the case of ACS 1-year estimates, the period is the calendar year (e.g., the 2015 ACS covers the period from January 2015 through December 2015). In the case of ACS multiyear estimates, the period is 5 calendar years (e.g., the 2011–2015 ACS estimates cover the period from January 2011 through December 2015). Therefore, ACS estimates based on data collected from 2011–2015 should not be labeled "2013," even though that is the midpoint of the 5-year period.

Multiyear estimates should be labeled to indicate clearly the full period of time (e.g., "The child poverty rate in 2011–2015 was X percent."). They do not describe any specific day, month, or year within that time period.

Multiyear estimates require some considerations that single-year estimates do not. For example, multiyear estimates released in consecutive years consist mostly of overlapping years and shared data.

> TIP: As shown in Figure 3.1, consecutive 5-year estimates contain 4 years of overlapping coverage (for example, the 2010–2014 ACS 5-year estimates share sample data from 2011 through 2014 with the 2011–2015 ACS 5-year estimates). Because of this overlap, users should use extreme caution in making comparisons with consecutive years of multiyear estimates.

The primary advantage of using multiyear estimates is the increased statistical reliability of the data compared with that of single-year estimates, particularly for small geographic areas and small population subgroups. Figure 3.2 shows the improved precision of an ACS 5-year estimate, compared with a 1-year estimate, for child poverty statistics in Rice County, Minnesota—a county with about 65,000 residents in 2015. The lines above and below the point estimates represent the confidence intervals, or ranges of uncertainty, around each estimate. The confidence interval for the 1-year child poverty estimate ranges from 1.4 percent to 9.4 percent (8 percentage points) while the interval for the 5-year estimate is narrower, ranging from 12.8 percent to 19.2 percent (6 percentage points). (Refer to the section on "Understanding Error and Determining Statistical Significance" for a detailed explanation of uncertainty in ACS data.)

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[22] Public Use Microdata Areas, or PUMAs, are collections of counties—or tracts within counties—with approximately 100,000 people each. PUMAs do not cross state lines.

[23] For several years, the Census Bureau produced both ACS 3-year estimates (for areas with populations of 20,000 or more) and ACS 5-year estimates (for all geographic areas). Starting with the 2014 data release, the 3-year products were discontinued, but 5-year estimates are still published each year.

Figure 3.1. **Sample Cases Used in Producing ACS 5-Year Estimates**
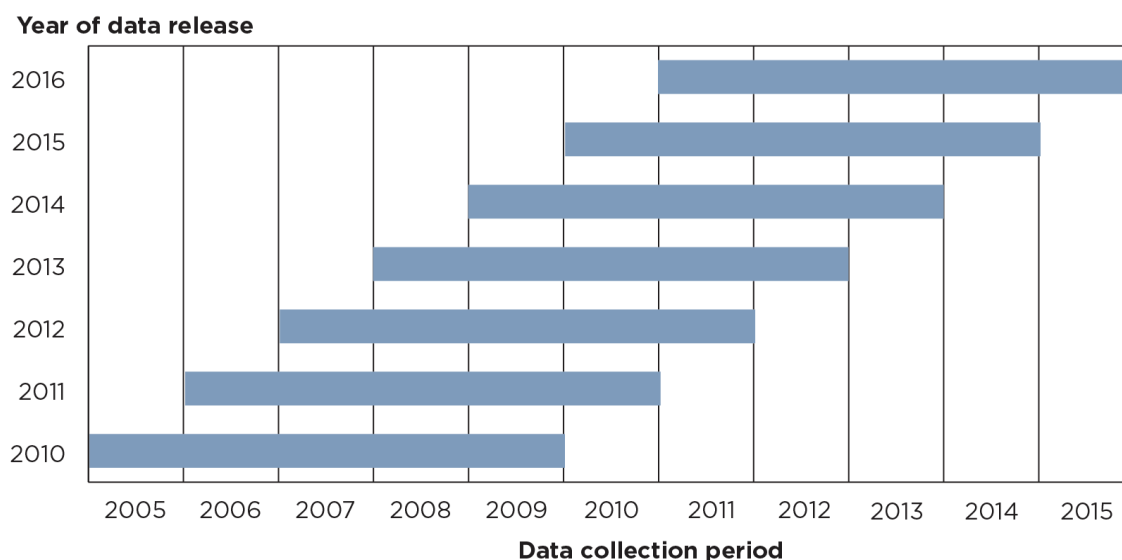
Source: U.S. Census Bureau, "When to Use 1-year, 3-year, or 5-year Estimates," accessed at <www.census.gov/programs-surveys /acs/guidance/estimates.html>.

Figure 3.2. **Child Poverty Rate in Rice County, Minnesota: 2015 and 2011–2015**
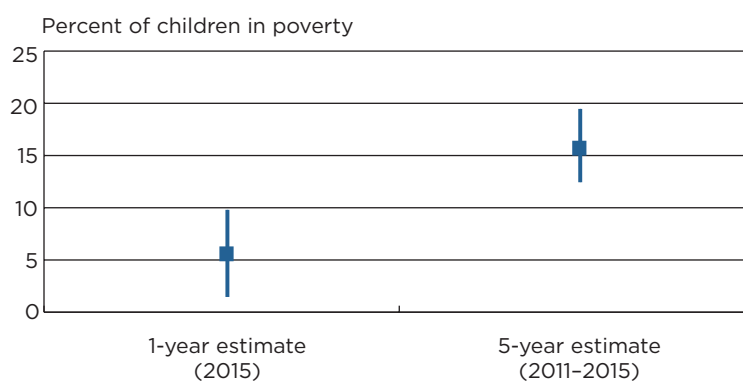
Source: U.S. Census Bureau, American FactFinder, Table DP03: Selected Economic Characteristics in the United States.

Deciding Which ACS Estimate to Use

For data users interested in obtaining detailed ACS data for small geographic areas (areas with fewer than 65,000 residents), ACS 5-year estimates are the only option.[24] However, data users interested in estimates for areas with populations of 65,000 or more have a choice between the 1-year and 5-year data series. Which data should be used?

The 1-year estimates for an area reflect the most current data but they have larger margins of error than the 5-year estimates because they are based on a smaller sample. The 5-year estimates for an area have larger samples and smaller margins of error than the 1-year estimates. However, they are less current because the larger samples include data that were collected in earlier years. The main advantage of using multiyear estimates is the increased statistical reliability for smaller geographic areas and small population groups.

One-year estimates are particularly useful for geographic areas with rapidly changing characteristics because they are based on the most current data—data from the past year. For example, ACS 1-year data were used to compare poverty rates before, during, and after the 2007–2009 recession. In contrast, 5-year estimates provide less current information because

they are based on both data from the previous year and data that are 2 to 5 years old. For many areas undergoing minimal change, using the "less current" multiyear estimates may not have a substantial influence on the estimates. However, in areas experiencing major changes over a given time period, the multiyear estimates may be quite different from the single-year estimates for any of the individual years. The single-year and multiyear estimates will not be the same because they are based on data from two different time periods. This will be true even if the ACS single year is the midyear of the ACS multiyear period (e.g., 2013 single year, 2011–2015 multiyear).

For example, suppose a school district official in Prince George's County, Maryland, is interested in measuring recent trends in the population speaking Spanish at home. Comparing data by release year shows that the 5-year estimates for the Prince George's County Public School District are lagging behind the 1-year estimates (see Figure 3.3). While the 1-year estimates show an increase in the share of people speaking Spanish at home, followed by a decline, the 5-year estimates show a steady increase over time.

> TIP: In general, ACS 1-year data are more likely to show year-to-year fluctuations, while consecutive 5-year estimates are more likely to show a smooth trend, because 4 of the 5 years in the series overlap from one year to the next.

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[24] In July 2016, the Census Bureau released a series of Supplemental Estimates, consisting of new 1-year estimates for geographic areas with populations of 20,000 or more. These tables provide 1-year estimates for many geographic areas that were previously only available through the 3-year or 5-year data products.

Figure 3.3. **Percentage of People Aged 5 and Older Who Speak Spanish at Home in the Prince George's County, MD, Public School District**
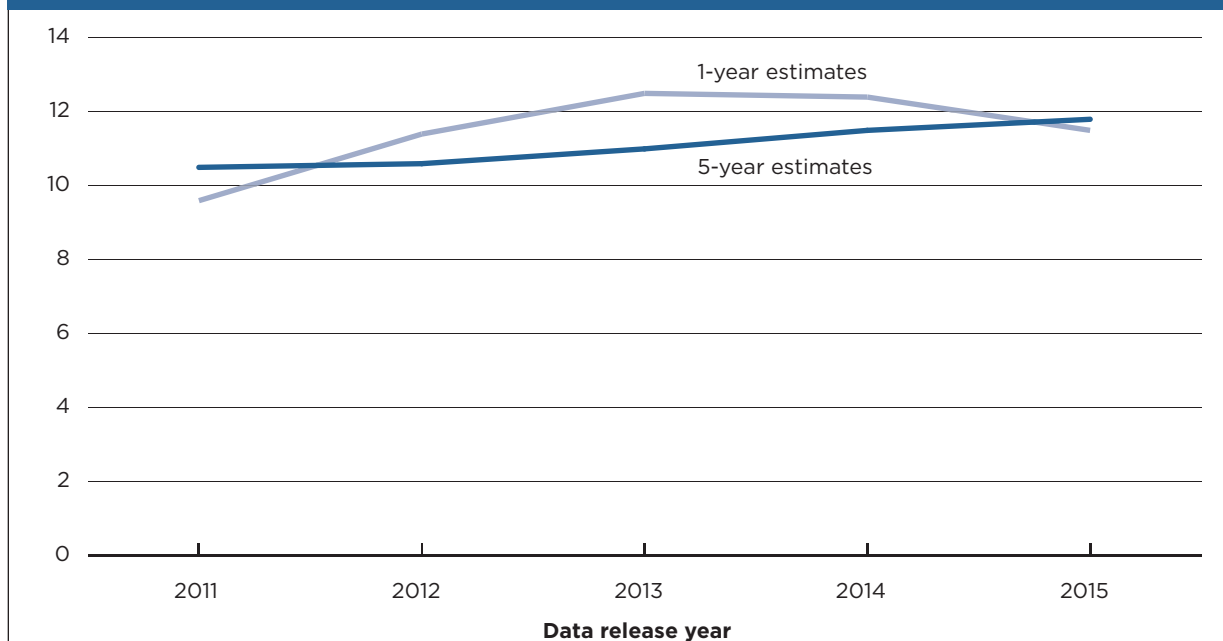
Source: U.S. Census Bureau, American FactFinder, DP02: Selected Social Characteristics in the United States.

What Users of Data for American Indians and Alaska Natives Need to Know

Table 3.1. Distinguishing Features of ACS 1-Year, 1-Year Supplemental, 3-Year, and 5-Year Estimates

1-Year Estimates	1-Year Supplemental Estimates	3-Year Estimates[1]	5-Year Estimates
12 months of collected data Example: 2015 ACS 1-year estimates Dates collected: January 1, 2015, to December 31, 2015	12 months of collected data Example: 2015 ACS 1-year Supplemental Estimates Dates collected: January 1, 2015, to December 31, 2015	36 months of collected data Example: 2011-2013 ACS 3-year estimates Dates collected: January 1, 2011, to December 31, 2013	60 months of collected data Example: 2011-2015 ACS 5-year estimates Dates collected: January 1, 2011, to December 31, 2015
Data for areas with populations of 65,000 and more	Data for areas with populations of 20,000 and more	Data for areas with populations of 20,000 and more	Data for all areas
Smallest sample size	Smallest sample size	Larger sample size than 1-year	Largest sample size
Less reliable than 3-year or 5-year	Less reliable than 5-year	More reliable than 1-year; less reliable than 5-year	Most reliable
Most current	Most current	Less current than 1-year; more current than 5-year	Least current
Annually released: 2005 ACS 1-year data to present	Annually released: 2014 ACS 1-year data to present	Annually released: 2005–2007 ACS 3-year data to 2011–2013 ACS 3-year data	Annually released: 2005–2009 ACS 5-year data to present
Best used when	**Best used when**	**Best used when**	**Best used when**
Currency is more important than precision Analyzing large populations	Currency is more important than precision Analyzing smaller populations Examining smaller geographic areas because the standard 1-year estimates are not available	More precise than 1-year, spans fewer years than 5-year Analyzing smaller populations Examining smaller geographic areas because the standard 1-year estimates are not available	Precision is more important than currency Analyzing very small populations Examining tracts and other small geographic areas because 1-year estimates are not available

[1] ACS 3-year estimates have been discontinued. The 2005–2007, 2006–2008, 2007–2009, 2008–2010, 2009–2011, 2010–2012, and 2011–2013 ACS 3-year estimates will remain available to data users, but no new 3-year estimates will be produced. Every community in the nation will continue to receive a detailed statistical portrait of its social, economic, housing, and demographic characteristics through 1-year and 5-year ACS products.

> TIP: Data users may think that multiyear estimates are only appropriate when working with data for small areas, but this is not the case. Large geographic areas also benefit from the larger sample used for 5-year estimates, resulting in more precise estimates of population and housing characteristics, especially for subpopulations within those areas.

In addition, ACS 5-year estimates are not subject to the same data suppression rules that the Census Bureau applies to 1-year estimates. The Census Bureau restricts some 1-year data tables from publication because the estimates are not reliable. For more information, visit the Census Bureau's Web page on Data Suppression.[25]

Some users may prefer to use 1-year estimates, despite their reduced reliability, as building blocks to produce estimates for meaningful higher levels of geography. For example, data for neighboring counties could be combined to produce estimates for a metropolitan or regional planning area. These aggregations will similarly benefit from the increased sample sizes, through improved precision.

There are no hard-and-fast rules for choosing between 1-year and 5-year data, but the margins of error provided with ACS data can help data users decide on the tradeoff between currency and reliability. Table 3.1 shows the different features of ACS 1-year, 1-year Supplemental, 3-year, and 5-year estimates that data users can consider in choosing which estimates to use. Data users can also refer to the section on "Understanding Error and Determining Statistical Significance" for guidance on assessing the reliability of ACS estimates.

[25] U.S. Census Bureau, American Community Survey, Data Suppression, <www.census.gov/programs-surveys/acs/technical-documentation/data-suppression.html>.