

# Understanding and Using American Community Survey Data

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*What Journalists Need to Know*

Issued February 2020



U.S. Department of Commerce  
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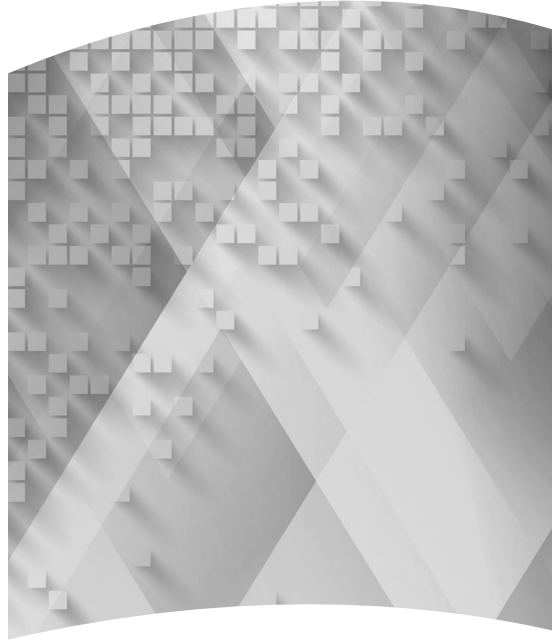
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**Wilbur Ross,**  
Secretary

**Karen Dunn Kelley,**  
Deputy Secretary

**U.S. CENSUS BUREAU**  
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# UNDERSTANDING AND USING AMERICAN COMMUNITY SURVEY DATA: WHAT JOURNALISTS NEED TO KNOW

Finding fresh data for news stories used to be difficult. With the U.S. Census Bureau's American Community Survey (ACS), data are now available on a wide range of topics, whenever they are needed. The ACS provides journalists with data they can use to strengthen news coverage and feature stories with up-to-date social, economic, housing, and demographic information about America's communities.

The ACS has become a valuable resource for data-driven journalism—where the goal is to tell compelling stories that are grounded in data. This guide provides a brief overview of how journalists are using ACS data to make comparisons across geographic areas and population subgroups, support anecdotal evidence by providing a broader context, report on trends and reversals, and conduct research. It also describes some

important considerations when working with ACS data—particularly estimates for small geographic areas and small population groups.

For more detailed information about the ACS—how to judge the accuracy of ACS estimates, understanding multiyear estimates, knowing which geographic areas are covered in the ACS, and how to access ACS data on the Census Bureau's Web site—see the Census Bureau's handbook on *Understanding and Using American Community Survey Data: What All Data Users Need to Know*.<sup>1</sup>

<sup>1</sup> U.S. Census Bureau, *Understanding and Using American Community Survey Data: What All Data Users Need to Know*, <[www.census.gov/programs-surveys/acs/guidance/handbooks/general.html](http://www.census.gov/programs-surveys/acs/guidance/handbooks/general.html)>.

## 1. ACS BASICS

The American Community Survey (ACS) is a nationwide survey designed to provide communities with reliable and timely social, economic, housing, and demographic data every year. A separate annual survey, called the Puerto Rico Community Survey (PRCS), collects similar data about the population and housing units in Puerto Rico. The U.S. Census Bureau uses data collected in the ACS and the PRCS to provide estimates on a broad range of population, housing unit, and household characteristics for states, counties, cities, school districts, congressional districts, census tracts, block groups, and many other geographic areas.

The ACS has an annual sample size of about 3.5 million addresses, with survey information collected nearly every day of the year. Data are pooled across a calendar year to produce estimates for that year. As a result, ACS estimates reflect data that have been collected over a period of time rather than for a single point in time as in the decennial census, which is conducted every 10 years and provides population counts as of April 1 of the census year.

ACS 1-year estimates are data that have been collected over a 12-month period and are available for geographic areas with at least 65,000 people. Starting with the 2014 ACS, the Census Bureau is also producing "1-year Supplemental Estimates"—simplified versions of popular ACS tables—for geographic areas with at least 20,000 people.

### ***What Is the ACS?***

- The ACS is a nationwide survey designed to provide communities with reliable and timely data every year.
- Data are available for a wide range of geographic areas.
- The annual sample includes 3.5 million addresses.
- Data are pooled across years to produce estimates for small geographic areas.
- The ACS includes social, economic, housing, and demographic measures.
- The ACS was designed to provide estimates of the characteristics of the population, not population counts.

The Census Bureau combines 5 consecutive years of ACS data to produce multiyear estimates for geographic areas with fewer than 65,000 residents. These 5-year estimates represent data collected over a period of 60 months.

## Topics Covered in the ACS

The primary purpose of the ACS is to help Congress determine funding and policies for a wide variety of federal programs. In fact, ACS data help determine how more than \$675 billion in federal funds are distributed to state and local areas each year.<sup>2</sup> Because of this, the topics covered by the ACS are diverse. They include social, economic, housing, and demographic measures, which yield a wealth of information journalists can use to write better stories (see Table 1.1).<sup>3</sup> Various tables in the ACS have different “universes,” or base reference totals against which all other characteristics are compared. Some tables cover population characteristics, while others cover housing characteristics. Among the population tables, some cover the entire population (such as tables of the population by age), while some cover only a subset of the population (such as tables of employment status, which include data only for the population 16 years and older).

<sup>2</sup> U.S. Census Bureau, “Uses of Census Bureau Data in Federal Funds Distribution,” 2017, <[www.census.gov/library/working-papers/2017/decennial/census-data-federal-funds.html](http://www.census.gov/library/working-papers/2017/decennial/census-data-federal-funds.html)>.

<sup>3</sup> U.S. Census Bureau, American Community Survey (ACS), Subjects Included in the Survey, <[www.census.gov/programs-surveys/acs/guidance/subjects.html](http://www.census.gov/programs-surveys/acs/guidance/subjects.html)>.

Many of these topics contain numerous subtopics. For example, “Journey to Work”—that is, commuting—includes data on means of transportation (e.g., car, truck, or van; bus; bicycle; walking), travel time (both duration and time departed), and whether a carpool is used. Data on the foreign-born population include information about citizenship, place of birth, and year of entry.

*TIP: The ACS was designed to provide estimates of the characteristics of the population, not to provide counts of the population in different geographic areas or population subgroups. The ACS can tell you the share of young adults in Multnomah County, Oregon, who bike to work, but is not intended to tell you how many young adults live in Multnomah County. For basic counts of the U.S. population by age, sex, race, and Hispanic origin, visit the Census Bureau’s Population and Housing Unit Estimates Web page.\**

\* U.S. Census Bureau, Population and Housing Unit Estimates, <[www.census.gov/popest/](http://www.census.gov/popest/)>.

Table 1.1. Population and Housing Data Included in American Community Survey Data Products

### Social Characteristics

Ancestry  
Citizenship Status  
Disability Status<sup>1</sup>  
Educational Attainment  
Fertility  
Grandparents as Caregivers  
Language Spoken at Home  
Marital History<sup>2</sup>  
Marital Status  
Migration/Residence 1 Year Ago  
Period of Military Service  
Place of Birth  
School Enrollment  
Undergraduate Field of Degree<sup>3</sup>  
Veteran Status<sup>2</sup>  
Year of Entry

### Economic Characteristics

Class of Worker  
Commuting (Journey to Work)  
Employment Status  
Food Stamps/Supplemental Nutrition Assistance Program (SNAP)<sup>4</sup>  
Health Insurance Coverage<sup>2</sup>  
Income and Earnings  
Industry and Occupation  
Place of Work  
Poverty Status  
Work Status Last Year

### Housing Characteristics

Computer and Internet Use<sup>5</sup>  
House Heating Fuel  
Kitchen Facilities  
Occupancy/Vacancy Status  
Occupants Per Room

### Plumbing Facilities<sup>6</sup>

Rent  
Rooms/Bedrooms  
Selected Monthly Owner Costs  
Telephone Service Available  
Tenure (Owner/Renter)  
Units in Structure  
Value of Home  
Vehicles Available  
Year Householder Moved Into Unit  
Year Structure Built

### Demographics Characteristics

Age and Sex  
Group Quarters Population  
Hispanic or Latino Origin  
Race  
Relationship to Householder  
Total Population

<sup>1</sup> Questions on Disability Status were significantly revised in the 2008 survey to cause a break in series.

<sup>2</sup> Marital History, Veterans’ Service-Connected Disability Status and Ratings, and Health Insurance Coverage were added in the 2008 survey.

<sup>3</sup> Undergraduate Field of Degree was added in the 2009 survey.

<sup>4</sup> Food Stamp Benefit amount was removed in 2008.

<sup>5</sup> Computer and Internet Use was added to the 2013 survey.

<sup>6</sup> One of the components of Plumbing Facilities, flush toilet, and Business or Medical Office on Property questions were removed in 2016.

Source: U.S. Census Bureau.



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A good way to learn about the topics covered in the ACS is to explore the information available through the Census Bureau's [data.census.gov](https://data.census.gov) Web site.<sup>4</sup> The Data Profiles in [data.census.gov](https://data.census.gov), which include the most frequently requested social, economic, housing, and demographic data, are especially useful for novice users who want to explore the range of topics available.<sup>5</sup>

Journalists with expertise in using statistical packages may also be interested in the Public Use Microdata Sample (PUMS) files, which contain a sample of individual records of people and households that responded to the survey (stripped of all identifying information). The PUMS files permit analysis of specific population groups and custom variables that are not available through pretabulated ACS tables.<sup>6</sup>

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<sup>4</sup> U.S. Census Bureau, <<https://data.census.gov>>.

<sup>5</sup> U.S. Census Bureau, [data.census.gov](https://data.census.gov/cedsci/table?q=dp), Data Profiles, <<https://data.census.gov/cedsci/table?q=dp>>.

<sup>6</sup> U.S. Census Bureau, American Community Survey (ACS), PUMS Data, <[www.census.gov/programs-surveys/acs/data/pums.html](https://www.census.gov/programs-surveys/acs/data/pums.html)>.

## When Are ACS Data Released?

ACS data are very timely because they are generally released during the year immediately following the year in which they are collected. The Census Bureau's ACS Data Releases Web page provides information about upcoming ACS data releases, including scheduled dates, notes about new estimates or new guidance, and technical information about geography and product changes. Users can also browse the notes from previous years.<sup>7</sup>

The Census Bureau provides accredited journalists with advance access to ACS data. Media embargos are typically available 48 hours before the public release of ACS 1-year and 5-year published estimates.

For more information about ACS data releases or to request an interview, please contact the Census Bureau's Public Information Office by phone (301-763-3030) or e-mail <[pio@census.gov](mailto:pio@census.gov)>.

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<sup>7</sup> U.S. Census Bureau, American Community Survey (ACS), Data Releases, <[www.census.gov/programs-surveys/acs/news/data-releases.html](https://www.census.gov/programs-surveys/acs/news/data-releases.html)>.

## 2. HOW JOURNALISTS USE ACS DATA

Journalists use the American Community Survey (ACS) for a wide range of applications—from accessing a single statistic in [data.census.gov](http://data.census.gov) to complex analyses of data for thousands of geographic areas. Many of the best news articles based on ACS data are written without the restriction of a deadline, by searching through tables on the U.S. Census Bureau's Web site to find the hidden stories in the data. This section provides some examples of how journalists use ACS data in their work.

### Using the ACS to Create Rankings or Identify Outliers

Journalists, bloggers, and others often use rankings to draw attention to geographic areas or population subgroups at the top or bottom of a distribution. For example, Chris Wilson at *Time* was interested in writing a story about occupations with high proportions of people working past retirement age. Using ACS data, he determined that tax preparers and members of the clergy had among the highest concentrations of workers over age 65—at around 14 percent each.<sup>8</sup>

Journalists interested in ranking population and housing characteristics across states can start with the Census Bureau's Ranking Tables, which provide state-level rankings for more than 80 key ACS variables.<sup>9</sup>

The ACS can also be used to identify outliers—data points that stand out because they are very different from other data points in a ranked series of numbers. Emily Alpert Reyes at the *Los Angeles Times* explains why outliers are so appealing:

“Outliers are easy to find—and they can be truly fascinating stories. What places in your area have the lowest levels of Internet use? The most single parents? The most multiracial people? If the answers end up surprising you, your readers will probably also be interested—and want to know the reasons behind those surprising facts. It's a great hook for traditional reporting—getting out and knocking on doors and finding the real people who are living those statistics.”<sup>10</sup>

<sup>8</sup> Chris Wilson, *Time*, “The 50 Jobs Where People Work the Longest,” April 5, 2017, <<http://time.com/4726657/retirement-age-jobs/>>.

<sup>9</sup> U.S. Census Bureau, American Community Survey, Ranking Tables, <[www.census.gov/acs/www/data/data-tables-and-tools/ranking-tables/index.php](http://www.census.gov/acs/www/data/data-tables-and-tools/ranking-tables/index.php)>.

<sup>10</sup> Emily Alpert Reyes, “Finding Stories in Census Data,” October 2014, <<https://source.opennews.org/articles/finding-stories-census-data/>>.

### Examples of How Journalists Can Use ACS Data

- *Using the ACS to create rankings or identify outliers:* ACS data are frequently used to rank states, metropolitan areas, counties, and other geographic areas on key social and economic statistics.
- *Using the ACS to provide a broader context:* ACS data are available for the nation, states, counties, and local communities, enabling journalists to put data for local areas into a broader context.
- *Using the ACS to report on trends and reversals:* Data on a wide range of topics are updated every year, sharpening journalists' understanding of key social, economic, housing, and demographic trends.

*TIP: Although using ACS data to create rankings and identify outliers can be very appealing, journalists need to use caution when comparing ACS estimates—especially those for small geographic areas or population subgroups. ACS estimates are based on only a sample, rather than all housing units and people, so they have a degree of uncertainty associated with them, called sampling error. In general, the larger the sample, the smaller the level of sampling error.*

To help users understand the impact of sampling error on data reliability, the Census Bureau provides a “margin of error” for each published ACS estimate. The margin of error gives users a range of values within which the actual, “real-world” value is likely to fall.

In general, data users should be careful in drawing conclusions about two ACS estimates because they may not be statistically different.

*TIP: In the case of state-level estimates and comparisons between large population subgroups, sizable differences between estimates are likely to be statistically significant. But for estimates based on smaller segments of the ACS sample, even large differences between estimates may not be statistically significant.*

## Testing for Statistical Significance

Suppose a journalist is interested in writing a story about states with the highest median household income. He or she can use Table B19013: Median Household Income in the Past 12 Months (in 2016 Inflation-Adjusted Dollars) to quickly generate a table of median household income values across states and the District of Columbia. In 2016, it appears that Maryland had the highest median household income (\$78,945), followed by Alaska (\$76,440), New Jersey (\$76,126), and District of Columbia (\$75,506). However, without conducting a statistical test, you cannot know whether the differences between these estimates are statistically significant.

The Census Bureau created a Statistical Testing Tool to help data users test whether ACS estimates are statistically different from one another. Data users can simply copy ACS estimates and their margins of error into the tool to get instant results of statistical tests. In this example, the results indicate that the 2016 median household income estimate for Maryland is not statistically different from that of District of Columbia (see Table 2.1).

For more information about margins of error, see the section on “Understanding Error and Determining Statistical Significance” in the Census Bureau’s handbook on *Understanding and Using American Community Survey Data: What All Data Users Need to Know*.<sup>11</sup>

<sup>11</sup> U.S. Census Bureau, American Community Survey (ACS), *Understanding and Using American Community Survey Data: What All Data Users Need to Know*, <[www.census.gov/programs-surveys/acs/guidance/handbooks/general.html](http://www.census.gov/programs-surveys/acs/guidance/handbooks/general.html)>.

**Table 2.1. Median Household Income in 2016 in Selected States and the District of Columbia: Results From the Census Bureau’s Statistical Testing Tool**

State	Median household income	Margin of error (±)	Maryland	Alaska	New Jersey	District of Columbia	Massachusetts	Hawaii	Connecticut	New Hampshire	Virginia	California
Maryland	\$78,945	±737	X	Yes	Yes	No	Yes	Yes	Yes	Yes	Yes	Yes
Alaska	\$76,440	±2230	Yes	X	No	No	No	No	Yes	Yes	Yes	Yes
New Jersey	\$76,126	±701	Yes	No	X	No	No	No	Yes	Yes	Yes	Yes
District of Columbia	\$75,506	±3416	No	No	No	X	No	No	No	Yes	Yes	Yes
Massachusetts	\$75,297	±771	Yes	No	No	No	X	No	Yes	Yes	Yes	Yes
Hawaii	\$74,511	±1776	Yes	No	No	No	No	X	No	Yes	Yes	Yes
Connecticut	\$73,433	±1059	Yes	Yes	Yes	No	Yes	No	X	Yes	Yes	Yes
New Hampshire	\$70,936	±1422	Yes	Yes	Yes	Yes	Yes	Yes	Yes	X	Yes	Yes
Virginia	\$68,114	±748	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	X	No
California	\$67,739	±356	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	X

X Not applicable.

Note: Cells labeled “No” indicate that the difference between two estimates is not statistically significant.

Source: Calculations from the U.S. Census Bureau’s Statistical Testing Tool, based on data from [data.census.gov](http://data.census.gov), Table B19013: Median Household Income in the Past 12 Months (in 2016 Inflation-Adjusted Dollars).

# Using the ACS to Provide a Broader Context

Many news articles rely on anecdotes, stories, and vignettes to create narratives that will resonate with a broad audience. For example, a recent story about childless cities in Iowa began with a journalist's description of an empty playground in the small town of Wiota, located in Cass County. Kyle Munson with the *Des Moines Register* used ACS data to put his anecdotal evidence into a broader context: In 2016, there were at least 280 Iowa cities with more people aged 65 and older than people under age 18, and there were five small towns with no children identified by the survey.<sup>12</sup> (Cities and towns are classified as "Places" in the ACS data.)

ACS data could also be used to compare data for a local community, such as Wiota, with data for the broader county or state in which that community is located. For example, the percentage of the population aged 65 and older in Wiota (29 percent) appears to be higher than the percentage in Cass County (21 percent) and the statewide average in Iowa (16 percent) (see Table 2.2), but results from the Statistical Testing Tool show that the estimate for Wiota is not significantly different from that of the county or state in which it is located.

Table 2.2. Population Aged 65 and Older in Selected Geographic Areas in Iowa: 2012–2016		
	65 years and older (%)	Margin of error
Iowa	15.8	0.1
Cass County, Iowa	21.4	0.1
Wiota city, Iowa	29.1	16.5

Source: U.S. Census Bureau, data.census.gov, Table DP05: ACS Demographic and Housing Estimates.

The estimates shown in Table 2.2 cover the period from 2012 to 2016. This is because ACS estimates for areas with fewer than 20,000 people—like Cass County and Wiota—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 1-year Supplemental Estimates) both 1-year and 5-year

<sup>12</sup> Kyle Munson, "Childless Iowa: More communities left with few, if any, kids," *Des Moines Register*, Dec. 27, 2017, <[www.desmoinesregister.com/story/news/local/columnists/kyle-munson/2017/12/27/childless-small-towns-iowa-struggle-aging-population/909256001/](http://www.desmoinesregister.com/story/news/local/columnists/kyle-munson/2017/12/27/childless-small-towns-iowa-struggle-aging-population/909256001/)>.

data are available, so data users need to choose which estimates to use.<sup>13</sup>

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. In the example shown in Table 2.2, only 5-year estimates are available for Cass County and Wiota city, while both 1-year and 5-year estimates are available for the state of Iowa. Thus, data users should compare 2012–2016 ACS 5-year estimates for Wiota with 2012–2016 ACS 5-year estimates for Iowa, even though more recent, single-year estimates for 2016 are available for Iowa.

For more information on comparing geographic areas, see the section on "Comparing ACS Data Across Geographic Areas" in the Census Bureau's handbook on *Understanding and Using American Community Survey Data: What All Data Users Need to Know*.<sup>14</sup>

# Using the ACS to Report on Trends and Reversals

Because the data are released annually, journalists can also use ACS data to identify year-to-year changes in population and housing characteristics. For example, Kristi Tanner, a journalist with the *Detroit Free Press*, used ACS data to look at income trends in Michigan. She reported that median household income in Michigan was \$52,492 in 2016, up 1.8 percent from the previous year.<sup>15</sup> Figure 2.1 shows trends in median household income in Michigan from 2012 through 2016, from the Comparison Profiles in data.census.gov. Comparison Profiles show data side-by-side from different years, indicating where there are statistically significant differences between estimates.<sup>16</sup>

In some cases, the data may show a continuation of trends from previous years, as in the example above. In

<sup>13</sup> Starting with the 2014 ACS, the Census Bureau is also producing a series of 1-year Supplemental Estimates—simplified versions of popular ACS tables available for geographic areas with at least 20,000 people.

<sup>14</sup> U.S. Census Bureau, American Community Survey (ACS), *Understanding and Using American Community Survey Data: What All Data Users Need to Know*, <[www.census.gov/programs-surveys/acs/guidance/handbooks/general.html](http://www.census.gov/programs-surveys/acs/guidance/handbooks/general.html)>.

<sup>15</sup> Kristi Tanner, "Census data: For a fourth year, Michiganders see incomes rise," *Detroit Free Press*, Sept. 14, 2017, <[www.freep.com/story/news/2017/09/14/michiganders-making-more-cash-even-detroit-new-stats-say/660518001/](http://www.freep.com/story/news/2017/09/14/michiganders-making-more-cash-even-detroit-new-stats-say/660518001/)>.

<sup>16</sup> U.S. Census Bureau, data.census.gov, Comparison Profiles, <<https://data.census.gov/cedsci/table?q=cp>>.

Figure 2.1. **Median Household Income in Michigan (in 2016 Dollars): 2012 to 2016**



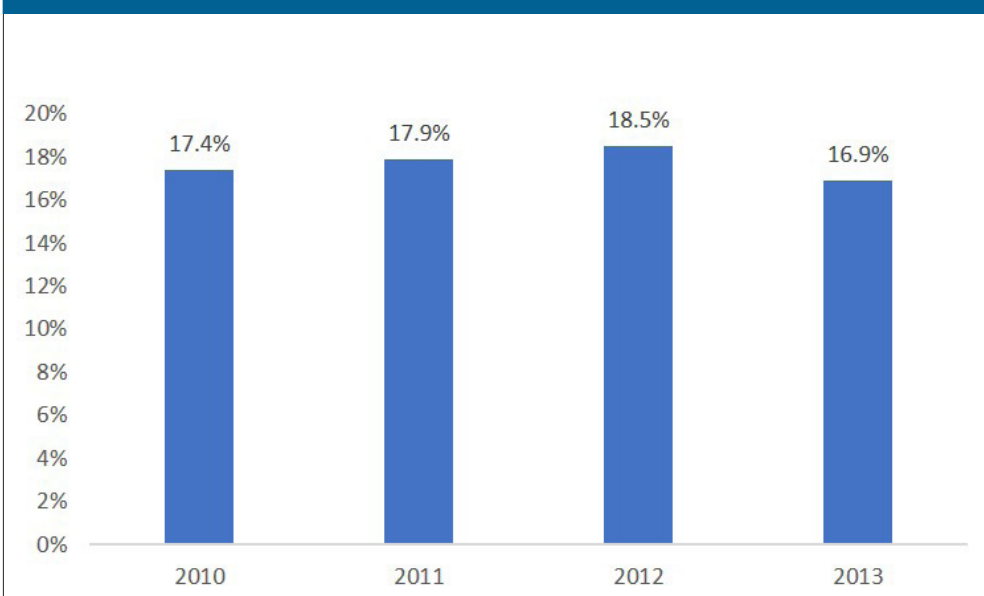
\*Estimate is statistically different from 2016 estimate.

Source: U.S. Census Bureau, data.census.gov, Table CP03: Comparative Economic Characteristics.

other cases, the data may show no change or a reversal. For example, the child poverty rate in Colorado fell from 18.5 percent in 2012 to 16.9 percent in 2013—a significant year-to-year decline. Figure 2.2 shows the results from data.census.gov.

Comparing ACS data over time is straightforward when working with 1-year estimates for larger geographic areas and population subgroups. But using multiyear estimates to look at trends for small populations can be challenging because they rely on data

Figure 2.2. **Child Poverty Rates in Colorado: 2010 to 2013**



Source: U.S. Census Bureau, data.census.gov, Table S1701: Poverty Status in the Past 12 Months.

combined over a 5-year period. For example, comparisons of 5-year estimates from the 2011–2015 ACS and the 2012–2016 ACS are unlikely to show much difference because 4 of the years overlap; both sets of estimates include the same data collected from 2012 through 2015.<sup>17</sup> The Census Bureau suggests comparing 5-year estimates that do not overlap—for example, comparing 2007–2011 ACS 5-year estimates with 2012–2016 ACS 5-year estimates.

There are additional challenges to making comparisons over time, such as changes made to geographic area boundaries, questionnaire items, and methods. For example, the Census Bureau made substantial changes to the 2008 ACS questions on labor force participation and the number of weeks worked. As a result, the Census Bureau recommends using caution when comparing 2008 and later labor force estimates with estimates from 2007 and earlier.

Data users can learn about issues impacting ACS data—including changes in the survey design, collection, and production procedures—in the “User Notes” section of the ACS Technical Documentation. The Census Bureau also provides information about

important changes in the “New and Notable” information that is provided with each new ACS data release.<sup>18</sup>

The ACS was modeled after the long form of the decennial census, and journalists interested in long-term trends can, in many cases, make valid comparisons between ACS and the 2000 Census (and earlier decennial census) estimates. However, differences in residence rules (defining who is included in a census or survey), universes (the total that is being counted), and time periods covered in the two surveys should be considered when making these comparisons. More information about these differences is available in the section on “Differences Between the ACS and the Decennial Census” in the Census Bureau’s handbook on *Understanding and Using American Community Survey Data: What All Data Users Need to Know*.<sup>19</sup>

For detailed guidance on comparing ACS and 2000 Census data, visit the Census Bureau’s Web page on Comparing ACS Data.<sup>20</sup>

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<sup>17</sup> 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” in the Census Bureau’s handbook on *Understanding and Using American Community Survey Data: What All Data Users Need to Know* <[www.census.gov/programs-surveys/acs/guidance/handbooks/general.html](http://www.census.gov/programs-surveys/acs/guidance/handbooks/general.html)> for more information.

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<sup>18</sup> U.S. Census Bureau, American Community Survey (ACS), Data Releases, <[www.census.gov/programs-surveys/acs/news/data-releases.html](http://www.census.gov/programs-surveys/acs/news/data-releases.html)>.

<sup>19</sup> U.S. Census Bureau, American Community Survey (ACS), *Understanding and Using American Community Survey Data: What All Data Users Need to Know*, <[www.census.gov/programs-surveys/acs/guidance/handbooks/general.html](http://www.census.gov/programs-surveys/acs/guidance/handbooks/general.html)>.

<sup>20</sup> U.S. Census Bureau, American Community Survey (ACS), Comparing ACS Data, <[www.census.gov/programs-surveys/acs/guidance/comparing-acs-data.html](http://www.census.gov/programs-surveys/acs/guidance/comparing-acs-data.html)>.



### 3. ACCESSING ACS DATA

#### **Accessing ACS Data in Pretabulated Tables**

The U.S. Census Bureau provides access to pretabulated American Community Survey (ACS) tables through two main sources: data.census.gov and the ACS Summary Files.

Data.census.gov is the Census Bureau's primary tool for accessing population, housing, and economic data from the ACS, the Puerto Rico Community Survey, the decennial census, and many other Census Bureau data sets.<sup>21</sup> Data.census.gov provides comprehensive access to pretabulated ACS data for a wide range of geographic areas, including states, cities, counties, census tracts, and block groups.<sup>22</sup>

Data users can access detailed ACS tables by using data.census.gov's "Advanced Search" feature, which allows users to conduct keyword searches, or search by using predefined topics, geographies, years, surveys, or codes (see Figure 3.1).

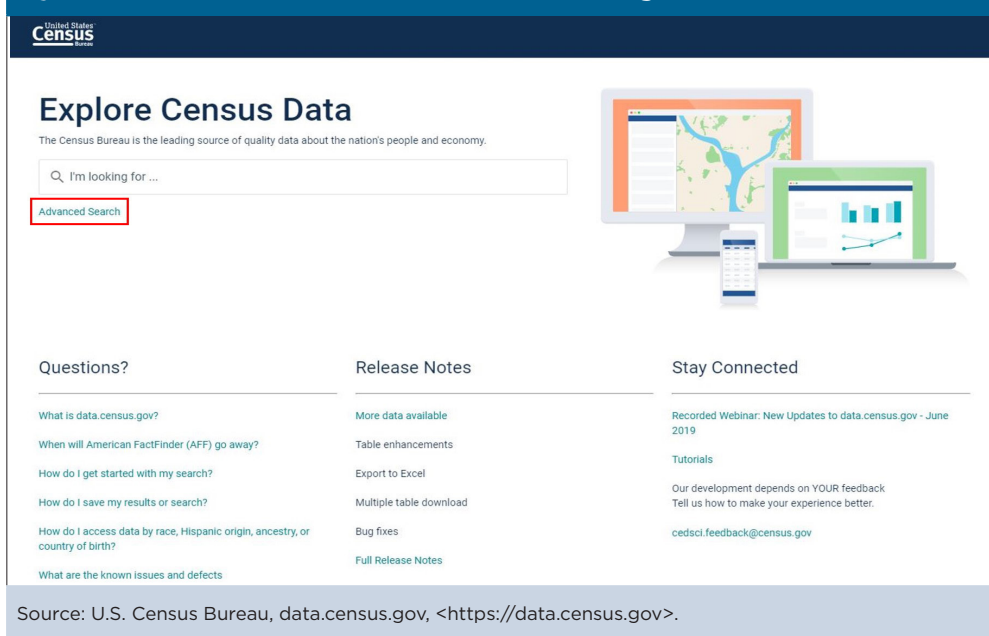
<sup>21</sup> U.S. Census Bureau, data.census.gov, <<https://data.census.gov>>.

<sup>22</sup> Block groups were available for the first time with the 2009–2013 ACS 5-year data release. Previously, this geography level was only available in the ACS Summary Files.

#### **Options for Accessing ACS Data**

- Data.census.gov provides access to population, housing, and economic data from the ACS and many other Census Bureau data sets.
- Journalists with programming skills can use the ACS Summary Files to access multiple ACS tables for large numbers of geographic areas.
- The ACS Public Use Microdata Sample files allow users to create custom estimates with variables of their choosing.
- State Data Centers and Census Information Centers can provide help in accessing ACS data.
- Journalists who want access to ACS data prior to their public release can apply for embargo access.

Figure 3.1. **Advanced Search Feature in Data.census.gov**



For information about accessing data from data.census.gov, see the section on “Accessing ACS Data” in the Census Bureau’s handbook on *Understanding and Using American Community Survey Data: What All Data Users Need to Know*.<sup>23</sup>

Journalists with programming skills can use the ACS Summary Files to download and analyze ACS data.<sup>24</sup> The Summary Files are useful for skilled programmers who want to access multiple ACS tables for large numbers of geographic areas. Working with these files can be difficult, so the Census Bureau recommends that users check to see if their tables of interest are easily available for download through data.census.gov before using this data product.<sup>25</sup>

### Accessing ACS Microdata Files

For some purposes, journalists may need to access microdata (individual) records from the ACS Public Use Microdata Sample (PUMS) files. Accessible through the Census Bureau’s Web site, the ACS PUMS files offer nearly unlimited possibilities because data users can create their own estimates with variables of their choosing.<sup>26</sup> Estimates created using the PUMS files may differ from pretabulated estimates available through data.census.gov because the PUMS files contain a subset of the cases contained in the full ACS data.

In general, the PUMS files are more difficult to work with than data.census.gov because data users need to use statistical software to access the data. Also, the responsibility for producing estimates from PUMS and judging their statistical significance is up to the user. Once a data user learns how to work with PUMS, the story possibilities are endless. The smallest geographic area on these files is the Public Use Microdata Area (PUMA), which has a minimum population of 100,000 (see the “Geographic Areas” section).

Many journalists access ACS microdata through the University of Minnesota’s Integrated Public Use Microdata Series (IPUMS) Web site, because it allows them to create custom tables online, without the use of statistical software.<sup>27</sup> For example, *Quartz’s* Data Editor, Christopher Groskopf, used ACS and decennial census data from IPUMS to show that the number of people

working full-time from home now exceeds the number of people who bike or walk to work combined.<sup>28</sup>

### Getting Help From Experts

Journalists with data analysis skills may be able to conduct research with ACS data themselves, but professional and academic demographers often are happy to give advice and provide data for free. City planning departments, school district planning offices, reference librarians, and college sociology departments are all good places to look for advice. Each state maintains an official State Data Center with knowledgeable staffers to answer your questions.<sup>29</sup> There are numerous Census Information Centers spread out across the country that can provide valuable assistance.<sup>30</sup> Data Dissemination Specialists from the Census Bureau also provide free training to individuals, organizations, government officials, and others to help them understand and work with ACS data.<sup>31</sup>

### Getting Advance Access to ACS Data

Journalists who want access to ACS data prior to their release to the public can apply for embargo access. Embargoed data are only available to “accredited media who give their chief attention to the gathering and reporting of news. Applicants must be employed or represent news organizations that regularly publish or broadcast a substantial volume of news material for public consumption.” For more information, see the Census Bureau’s Embargo Policy.<sup>32</sup>

*TIP: To learn more about the embargos and what will be new with upcoming releases, tune into the Census Bureau’s prerelease Webinars. They are typically held on Mondays during the week of a release. Please check the ACS Events page for updates.*<sup>33</sup>

For more general information about accessing ACS data, visit the Census Bureau’s Web site.<sup>33</sup>

<sup>23</sup> U.S. Census Bureau, American Community Survey (ACS), *Understanding and Using American Community Survey Data: What All Data Users Need to Know*, <[www.census.gov/programs-surveys/acs/guidance/handbooks/general.html](http://www.census.gov/programs-surveys/acs/guidance/handbooks/general.html)>.

<sup>24</sup> U.S. Census Bureau, American Community Survey (ACS), Summary File Data, <[www.census.gov/programs-surveys/acs/data/summary-file.html](http://www.census.gov/programs-surveys/acs/data/summary-file.html)>.

<sup>25</sup> U.S. Census Bureau, American Community Survey (ACS), Summary File Documentation, <[www.census.gov/programs-surveys/acs/technical-documentation/summary-file-documentation.html](http://www.census.gov/programs-surveys/acs/technical-documentation/summary-file-documentation.html)>.

<sup>26</sup> U.S. Census Bureau, American Community Survey (ACS), PUMS Data, <[www.census.gov/programs-surveys/acs/data/pums.html](http://www.census.gov/programs-surveys/acs/data/pums.html)>.

<sup>27</sup> University of Minnesota, Minnesota Population Center, IPUMS USA, <<https://usa.ipums.org/usa/>>.

<sup>28</sup> Christopher Groskopf, *Quartz*, “More Americans now work full-time from home than walk and bike to office jobs,” April 13, 2017, <<https://qz.com/952961/remote-work-more-americans-now-work-full-time-from-home-than-walk-and-bike-to-their-jobs/>>.

<sup>29</sup> U.S. Census Bureau, State Data Center (SDC) Program, <[www.census.gov/about/partners/sdc.html](http://www.census.gov/about/partners/sdc.html)>.

<sup>30</sup> U.S. Census Bureau, Census Information Centers (CIC), <[www.census.gov/about/partners/cic.html](http://www.census.gov/about/partners/cic.html)>.

<sup>31</sup> U.S. Census Bureau, Library, Data Dissemination Specialists: Helping the Public Understand Data, <[www.census.gov/library/video/data-dissemination-1.html](http://www.census.gov/library/video/data-dissemination-1.html)>.

<sup>32</sup> U.S. Census Bureau, Newsroom, Embargo Policy, <[www.census.gov/newsroom/embargo/embargo-policy.html](http://www.census.gov/newsroom/embargo/embargo-policy.html)>.

<sup>33</sup> U.S. Census Bureau, American Community Survey Data, <[www.census.gov/programs-surveys/acs/data.html](http://www.census.gov/programs-surveys/acs/data.html)>.



## 4. GEOGRAPHY AND THE ACS

Many journalists use American Community Survey (ACS) data to report on key trends in states, counties, and cities. But ACS data are available for many other geographic areas, including school districts, congressional districts, metropolitan areas, and “census designated places” (CDPs). A CDP is the U.S. Census Bureau’s term for a city, town, or village that lacks a separate municipal government but which otherwise physically resembles an incorporated place.

Journalists interested in smaller geographic areas may want to access ACS data for census tracts—small subdivisions of counties that typically have between 1,200 and 8,000 residents, with an optimum size of 4,000 people. Census tract boundaries usually follow visible features but may follow governmental unit boundaries and other nonvisible features in some cases. There are also more than 300 ACS data tables available for block groups—subdivisions of census tracts—that include between 600 and 3,000 people each. In the ACS, block groups are the smallest level of geography published. Data for census tracts and block groups are only available in the ACS 5-year data products.

### **Public Use Microdata Areas**

Public Use Microdata Areas (PUMAs) are non-overlapping regions that partition a state and contain at least 100,000 people each. State Data Centers

### **What Geographic Areas Are Available?**

- ACS data are available for states, counties, cities, and a wide range of other geographic areas down to the block group level.
- Journalists interested in small geographic areas may want to explore ACS data for census tracts—small subdivisions of counties that typically have between 1,200 and 8,000 residents.
- Public Use Microdata Areas (PUMAs) are nonoverlapping regions that partition a state and contain at least 100,000 people each.
- One of the benefits of working with PUMAs is that, unlike counties, they all meet the population threshold that is needed to produce ACS 1-year estimates.

define PUMAs in partnership with regional, state, local, and tribal organizations and agencies so the boundaries reflect local knowledge about the regions.

The value of using PUMA geography becomes apparent when looking at a state such as Kentucky (see

Figure 4.1. **Availability of Single-Year ACS Estimates for Kentucky: 2016**

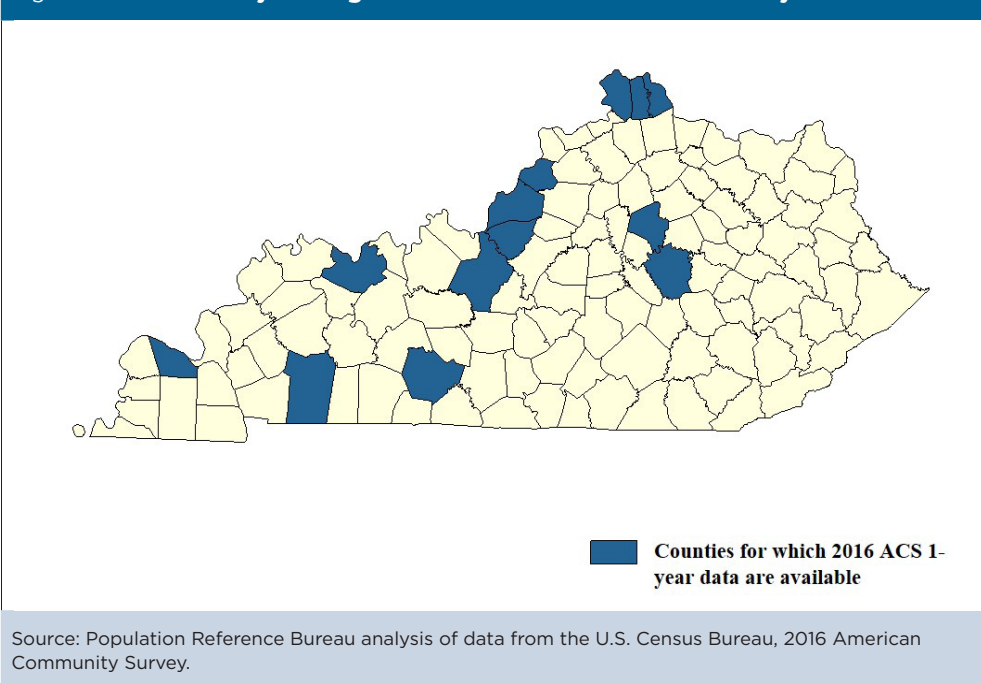
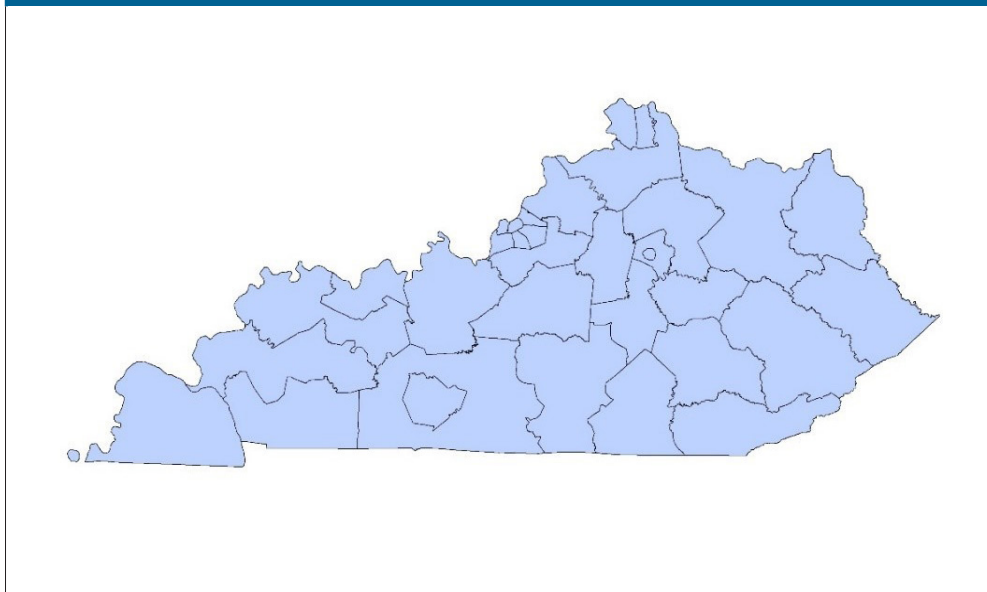


Figure 4.2. **Public Use Microdata Areas in Kentucky**



Source: U.S. Census Bureau, Public Use Microdata Sample Cartographic Boundary Shapefiles, <[www.census.gov/geographies/mapping-files/time-series/geo/carto-boundary-file.html](http://www.census.gov/geographies/mapping-files/time-series/geo/carto-boundary-file.html)>.

Figures 4.1 and 4.2). The 2016 ACS includes data for only 13 of Kentucky's 120 counties, but it also includes data for all 34 Kentucky PUMAs covering the entire state.

PUMAs are also useful for examining densely populated areas in depth. For example, New York City is subdivided into 55 PUMAs, each with its own single-year ACS estimates, which can be used to explore population and housing characteristics in the city's Community Districts.<sup>34</sup>

<sup>34</sup> New York City Department of City Planning, Population Division, "New York City PUMAs and Community Districts," <[https://www1.nyc.gov/assets/planning/download/pdf/data-maps/nyc-population/census2010/puma\\_cd\\_map.pdf](https://www1.nyc.gov/assets/planning/download/pdf/data-maps/nyc-population/census2010/puma_cd_map.pdf)>.

More information about the PUMS and other geographic areas in the ACS can be found in the section on "Geographic Areas Covered in the ACS" in the Census Bureau's handbook on *Understanding and Using American Community Survey Data: What All Data Users Need to Know*.<sup>35</sup>

<sup>35</sup> U.S. Census Bureau, American Community Survey (ACS), *Understanding and Using American Community Survey Data: What All Data Users Need to Know*, <[www.census.gov/programs-surveys/acs/guidance/handbooks/general.html](http://www.census.gov/programs-surveys/acs/guidance/handbooks/general.html)>.

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## 5. CASE STUDIES USING ACS DATA

### Case Study #1: American Community Survey: Understanding the Basics

**Skill Level:** Introductory

**Subject:** Understanding the basics

**Type of Analysis:** Working with ACS tables; understanding 5-year estimates and margins of error

**Tool Used:** Data.census.gov

**Author:** Paul Overberg, *Wall Street Journal*

Too often journalists seek a simple fact, like a city's population or poverty rate, and stumble into the endless stacks of the U.S. Census Bureau's data library.

They find variations and cross-tabulations, overlapping data sets, and a geographical menagerie. It's a hall of mirrors for anyone who cannot tell a "family" from a "household," or "earnings" from "income" or how to parse through "Sex by Work Status in the Past 12 Months by Usual Hours Worked Per Week in the Past 12 Months by Weeks Worked in the Past 12 Months for the Population 16 to 64 Years."

But journalists who spend some time to learn about the most important data behind those portals—the American Community Survey, or ACS—find that it pays rewards. This huge annual survey, the "every-year census," is the crown jewel of U.S. social statistics. ACS data shape academic research, public discussion, policy, and law on many issues. The data are especially useful for journalists because they can be used to study many issues—like racial/ethnic diversity and representation—that are central to our pluralistic society and its promise of equality before the law.

The ACS also drives a huge share of federal funding: An estimated \$675 billion in federal funds are distributed to state and local areas each year based on census data. This in turn drives spending of hundreds of billions of dollars each year in state funding, especially for Medicaid and business investment.

Finally, the ACS is relevant to topics that seem unrelated to its content, like disease rates. This is because ACS provides some of the raw material for the population estimates that form the denominators for disease rates reported by the Centers for Disease Control and Prevention and other agencies.

The ACS operates on an industrial scale. Its staff produces hundreds of millions of facts each year from more than 2 million housing units and more than 5 million people. It converts the raw data into 11 billion data points across 80 kinds of geographic areas—more than 650,000 in all.

To get a sense of how this factory works, let's focus on a single ACS table that journalists often use—B19001: Household Income in the Past 12 Months (in 2016 Inflation-Adjusted Dollars) (see Figure 5.1). There is a lot to unpack here. Let's take it in small steps.

Figure 5.1. Sample Table From Data.census.gov

The screenshot shows the Census data website interface. At the top, there's a search bar and navigation links. The main content area displays a table titled "HOUSEHOLD INCOME IN THE PAST 12 MONTHS (IN 2016 INFLATION-ADJUSTED DOLLARS)". The table is for the United States and shows income brackets with their respective estimates and margins of error.

	Estimate	Margin of Error
▼ Total:	118,860,065	+/-154,606
Less than \$10,000	7,963,784	+/-44,419
\$10,000 to \$14,999	5,699,549	+/-37,903
\$15,000 to \$19,999	5,615,371	+/-36,838
\$20,000 to \$24,999	5,928,371	+/-43,833
\$25,000 to \$29,999	5,501,898	+/-37,937
\$30,000 to \$34,999	5,777,895	+/-36,728
\$35,000 to \$39,999	5,338,202	+/-35,322
\$40,000 to \$44,999	5,380,237	+/-32,546
\$45,000 to \$49,999	4,734,622	+/-31,969
\$50,000 to \$59,999	9,209,026	+/-49,801
\$60,000 to \$74,999	11,850,363	+/-49,099
\$75,000 to \$99,999	14,672,995	+/-70,478
\$100,000 to \$124,999	10,312,781	+/-48,680
\$125,000 to \$149,999	6,355,018	+/-35,190
\$150,000 to \$199,999	6,924,913	+/-35,488
\$200,000 or more	7,595,040	+/-40,371

Source: U.S. Census Bureau, data.census.gov, <<https://data.census.gov>>.

This table is one of about 1,300 ACS Detailed Tables published each year. Most have names just like that: “B” followed by five digits. If you know that number, you can search for a table directly in data.census.gov. If you do not know the number, you can download a list of Table Shells from the Census Bureau’s Web site.<sup>36</sup> This is a good reference to keep handy because most ACS data products are built from Detailed Tables.

In most cases, each ACS table is published each year for any geographic area with at least 65,000 people. That includes every state, congressional district, metropolitan statistical area, lots of cities, and about a quarter of counties. It takes 5 years to accumulate enough responses so that the Census Bureau can publish the same table for less-populated areas. Those can range from small towns to even neighborhoods. They are also published each year, but each version covers the most recent 5 years.

There is more to the 5-year data than that. The Census Bureau restates dollars to reflect their value in the most recent year. It applies the most recent poverty thresholds. It retallies data to reflect changes in geographic boundaries, which is critical when city or metro boundaries change.

<sup>36</sup> U.S. Census Bureau, American Community Survey (ACS), Table Shells and Table List, <[www.census.gov/programs-surveys/acs/technical-documentation/table-shells.html](http://www.census.gov/programs-surveys/acs/technical-documentation/table-shells.html)>.

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Right under its name, this table declares: “Universe: Households.” This is key. The universe is the total that is being counted. In this case, it is “households,” which has a very specific meaning in the ACS. Most table universes are people, households, housing units, or subsets of those three. Some examples:

- Mortgage status: “Owner-occupied housing units.”
- People enrolled in school: “Population 3 years and over.”
- Language spoken at home: “Population 5 years and over.”
- Fertility rate: “Women 15 to 50 years.”
- Highest level of education: “Population 25 years and over.”

Checking a table’s universe helps you sharpen the questions you are asking, narrow your search, and shape how you will describe the data.<sup>37</sup>

For example, reporters often get confused between “household income” and “family income.” If you want to write about everyone in households, you would pick “household income.” Every occupied housing unit contains a household. That includes homes where just one person lives—28 percent of all households—as well as the homes of unrelated people, such as unmarried partners or roommates. “Family income” only covers families, which are two or more people related by blood, marriage, or adoption who live together. One measure of the difference can be seen in their median incomes. In 2016, the U.S. median household income was \$57,617; the median family income, \$71,062.

What period does this table cover? It says income “in the past 12 months,” but do not call it “2016 income.” Confusingly, the 2016 1-year estimates cover the 23 months that end with November 2016. Why? Since the ACS interviews respondents monthly and asks for income received during the “past 12 months,” it ends up with 12 different reference periods for income data collection in a single calendar year. The data are then put in terms of constant 2016 inflation-adjusted dollars by using the CPI-U-RS inflation factors from the Bureau of Labor Statistics.<sup>38</sup> For example, in 2016 a respondent filling out the survey in February would have a reference period of February 2015 through January 2016. A respondent filling out the survey in October would have a different reference period, October 2015 through September 2016. The inflation-adjustments put these different reference periods in constant dollars; in this example, “2016 inflation-adjusted dollars.”

Do people really tell the Census Bureau their incomes? Mostly. But you can look it up and couch your words accordingly. The ACS comes with 100 question-specific, quality-checking tables whose numbers begin with “B99.” Table B99192 tells us that the Census Bureau did not have to allocate any income responses for 65 percent of households in 2016.<sup>39</sup> Another 16 percent of households had 100 percent of their income allocated. The remaining 19 percent had either partial answers that had to be completed or a dollar value of zero allocated. How does the Census Bureau know how to impute missing values? It uses a set of rules to pull information from other parts of the household’s form. Then, if necessary, it uses statistical methods to pull data from a similar household nearby. Not surprisingly, people leave income questions blank more often than almost any other type. Just 1.7 percent of respondents leave the age and birthdate questions blank.

Almost all ACS tables carry a margin of error for each number of interest. Journalists tense up about the word “error,” so let’s work through what it means here. It’s a term to describe variation inherent in random samples. The ACS is a very big, complex version of the scientific opinion polls that some news organizations sponsor. (Guess where the demographic benchmarks for those polls come from?) If you had enough money to poll 1,000 different random samples of the U.S. population, each would have a slightly different makeup. One might overrepresent women, another homeowners. If you kept polling and averaged the results, you would see a bell curve of results form for, say, the percentage of women. Most often, you would get 51 percent. A little less often, you would get 50 percent or 52 percent. Most pollsters work at the 95 percent confidence level, which produces the familiar “ $\pm 3$  percentage points.” That means that 19 times out of 20 polls (95 percent of the time), you’d get 51 percent of women,  $\pm 3$  percentage points. And one time out of 20, you’d get a sample outside that margin—women would represent less than 48 percent or more than 54 percent.

The Census Bureau reports ACS margins of error at the 90 percent confidence level. Looking back to our table, 7,595,040 households ( $\pm 40,371$ ) had incomes of \$200,000 or more. That means we can be pretty comfortable

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<sup>37</sup> The Census Bureau produces a series of Appendix Tables for data users who want more information about ACS Detailed Tables, including table universes. The 1-year and 5-year appendixes can be downloaded as Excel files from the Summary File Documentation page at [www.census.gov/programs-surveys/acs/technical-documentation/summary-file-documentation.html](http://www.census.gov/programs-surveys/acs/technical-documentation/summary-file-documentation.html).

<sup>38</sup> U.S. Bureau of Labor Statistics, CPI Research Series Using Current Methods (CPI-U-RS), [www.bls.gov/cpi/research-series/home.htm](http://www.bls.gov/cpi/research-series/home.htm).

<sup>39</sup> A commonly used approach to imputation (a statistical procedure to fill in missing responses) is known as hot-deck allocation, which uses a statistical method to supply responses for missing or inconsistent data from responding housing units or people in the sample who are similar.

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writing “7.6 million” and saying they outnumber the “6.9 million” (6,924,913,  $\pm$  35,488) who made \$150,000 to \$200,000. See how handy rounding and error margins can be?

Instead of “margin of error,” think of this as a way to quantify the squishiness of the data. This is something that journalists deal with all the time—the ambiguity of the real world. Error margins just tell us how to precisely state the numbers and tune the words around them.

It’s also important to remember that surveys, even massive ones like ACS, are better tools for expressing quantitative relationships than totals. You can report rounded ACS totals, but the main strength of the ACS lies in its ability to tell you a group’s share of the population, or the ratio of two groups in the population, or how a group’s share has shifted across time.

Inevitably, you will want to add or subtract ACS totals. Let’s say we want to know the number and share of households with more than \$100,000 in annual income. It’s easy to just add the table cells, but to get the margin of error, you cannot just sum the same cells’ margins of error. The relevant formulas are available in the section on “Calculating Measures of Error for Derived Estimates” in the Census Bureau’s handbook on *Understanding and Using American Community Survey Data: What All Data Users Need to Know*.<sup>40</sup>

Finally, journalists often wonder “How big an error margin is too big?” Statistics teachers say, “It depends.” They are right, but that is less than helpful. Consider a simpler measure of data squishiness called the coefficient of variation (CV). Without getting too deep into statistics: Divide the margin of error for the ACS number you care about by 1.645. The result is what is called its standard error. Divide that by the ACS number itself and multiply by 100. A CV of 10 percent does not seem too wobbly, but one of 50 percent probably is for most purposes.

Finally, journalists who do learn a bit about the ACS quickly appreciate that it offers honest answers. Too often, reporters get fed dubious numbers by people who are not keen to explain where they came from or how they were massaged. By comparison, ACS documentation spells out:

- Exactly how each question was asked, including a facsimile of the questionnaire.
- Why each question was asked.
- The share of surveyed households each year that actually responded to each question in any given area. For instance, in 2016, the Census Bureau managed to get 98 percent of people to provide their race but just 84 percent of households to provide their income.
- How often each question gets left blank, and how the Census Bureau fills in blanks.

Like most people, the ACS becomes a better source as you learn more about what it knows and how to interrogate it. For example, you can ask questions that can’t be answered by any of its hundreds of tables if you know how to use its microdata to create a custom table.

So, the ACS can seem complicated, but it repays the time you invest in learning it with powerful ways to find and tell stories on many subjects and at many scales.

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<sup>40</sup> U.S. Census Bureau, American Community Survey (ACS), *Understanding and Using American Community Survey Data: What All Data Users Need to Know*, <[www.census.gov/programs-surveys/acs/guidance/handbooks/general.html](http://www.census.gov/programs-surveys/acs/guidance/handbooks/general.html)>.

## Case Study #2: Reporting Poverty Trends in Michigan

**Skill Level:** Introductory

**Subject:** Poverty trends

**Type of Analysis:** Analyses of economic trends within and across large communities

**Tools Used:** Data.census.gov and spreadsheet

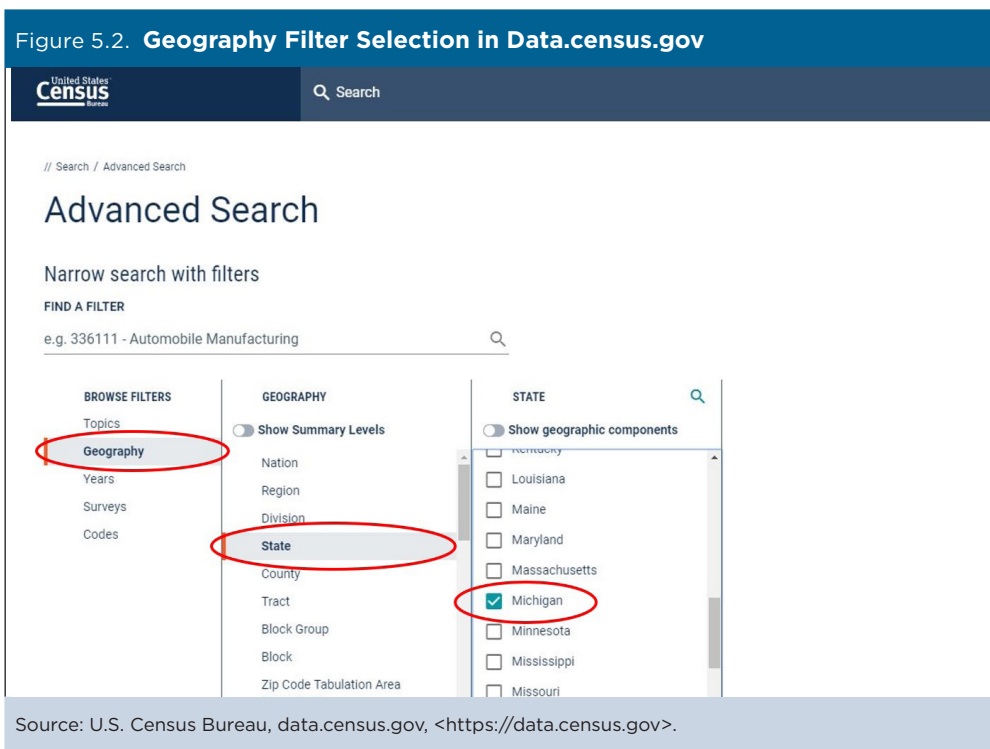
**Author:** Kristi Tanner, *Detroit Free Press*

Population and demographic estimates from the U.S. Census Bureau are a great resource for building data sets and writing about local demographic trends. American Community Survey (ACS) 1-year estimates are the most current data available for large geographic areas—65,000 residents or more—including cities, counties, metropolitan areas, and states. The ACS achieved full, nationwide implementation in 2005 for the household population and was expanded to cover the full population (including group quarters—such as college dormitories) in 2006.

Included in the annual ACS release are Comparison Profiles. These reports cover hundreds of variables and compare a current statistic to each year's values up to 4 years prior; any changes that are statistically significant are highlighted in a separate column in the report.

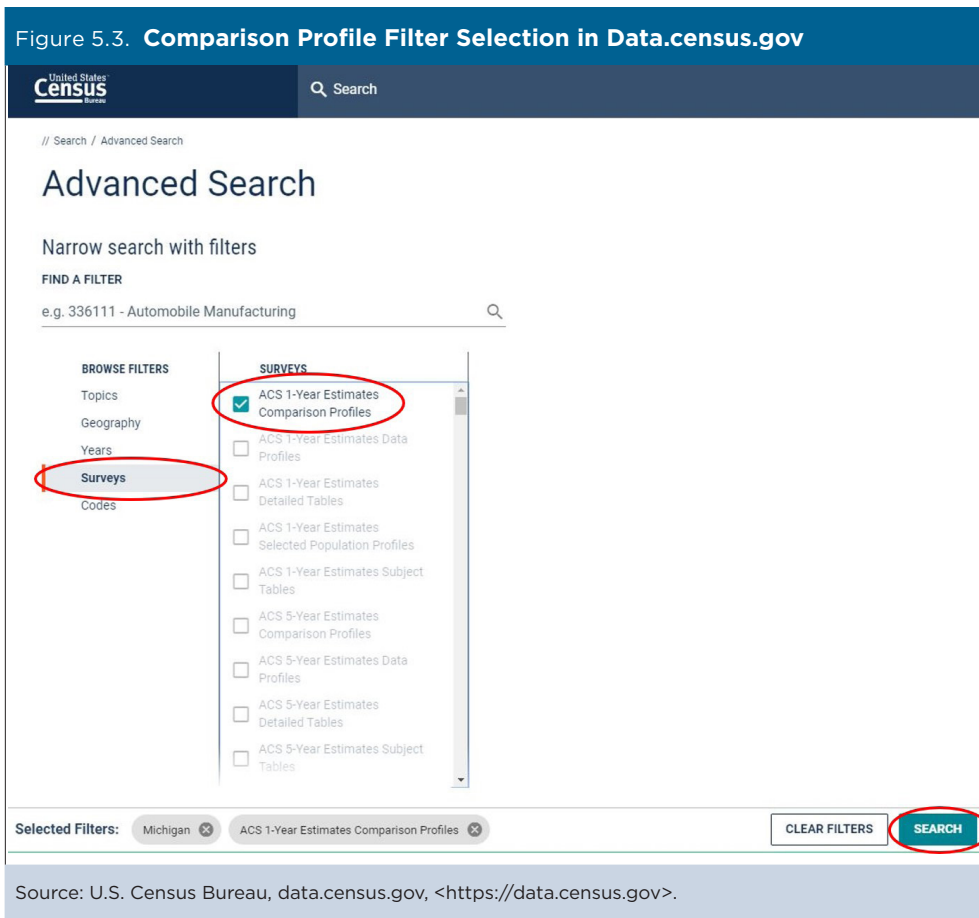
To see if Michigan's poverty rate changed last year, look at the latest Comparison Profile report:

- Go to the data.census.gov Web site at <<https://data.census.gov>>.
- Click on “Advanced Search” under the search bar. This will bring you to the Advanced Search page.
- Begin with the Geography filter. Select “Geography” in the navigation pane on the left side of the screen to display a list of available geographies.
- Select “State” and then select “Michigan” from the “State” filter (see Figure 5.2).





- Next, choose the “Surveys” filter and select “ACS 1-Year Estimates Comparison Profiles.”
- Both filters should appear in the “Selected Filters” at the bottom of the page.
- Next, click on “Search” in the lower right corner of the page (see Figure 5.3).



Comparison Profiles are organized by social, economic, housing, and demographic subject areas. Make sure you select the most recent data set available. When this analysis was initially conducted, the 2016 ACS 1-year estimates were the most current.<sup>41</sup> To find data on poverty and income, click on the link “Comparative Economic Characteristics” (see Figure 5.4).

<sup>41</sup> ACS 5-year estimates are useful for small geographic areas and are available down to the block group level.



Figure 5.4. Choosing a Comparison Profile

The screenshot shows the U.S. Census Bureau website interface. At the top, there is a search bar and navigation tabs for ALL, TABLES, MAPS, and PAGES. Below the navigation, it says 'About 1,178 results | Filter'. The main content area displays a list of tables. The first table is 'COMPARATIVE SOCIAL CHARACTERISTICS IN THE UNITED STATES' (Table: CP02). The second table, 'COMPARATIVE ECONOMIC CHARACTERISTICS' (Table: CP03), is circled in red. Below this, there is a table for 'COMPARATIVE HOUSING CHARACTERISTICS' (Table: CP04) and 'COMPARATIVE DEMOGRAPHIC ESTIMATES' (Table: CP05). The 'COMPARATIVE ECONOMIC CHARACTERISTICS' table is expanded, showing a table with columns for 2018 Estimate, 2017 Estimate, 2018 - 2017 Statistical Significance, 2016 Estimate, and 2018 - 2016 Statistical Significance. The table includes data for EMPLOYMENT STATUS, Population 16 years and over, In labor force, Civilian labor force, Employed, and Unemployed.

Source: U.S. Census Bureau, data.census.gov, <https://data.census.gov>.

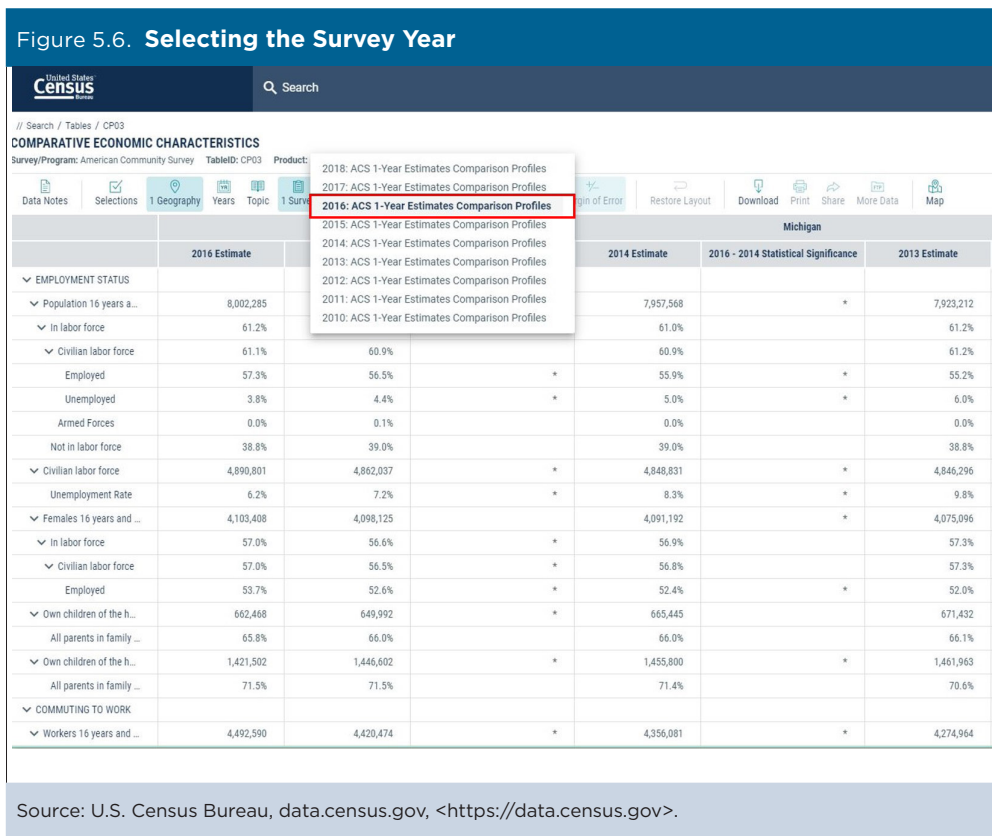
Next, Select “Customize Table” (see Figure 5.5).

Figure 5.5. Customize Table in Data.census.gov

The screenshot shows the U.S. Census Bureau website interface. At the top, there is a search bar and navigation tabs for ALL, TABLES, MAPS, and PAGES. Below the navigation, it says '4 Results | Filter | Download'. The main content area displays a list of tables. The first table is 'COMPARATIVE SOCIAL CHARACTERISTICS IN THE UNITED STATES' (Table: CP02). The second table, 'COMPARATIVE ECONOMIC CHARACTERISTICS' (Table: CP03), is selected. Below this, there is a table for 'COMPARATIVE HOUSING CHARACTERISTICS' (Table: CP04) and 'COMPARATIVE DEMOGRAPHIC ESTIMATES' (Table: CP05). The 'COMPARATIVE ECONOMIC CHARACTERISTICS' table is expanded, showing a table with columns for 2018 Estimate, 2017 Estimate, and 2018 - 2017 Statistical Significance. The table includes data for EMPLOYMENT STATUS, Population 16 years and over, In labor force, Civilian labor force, Employed, Unemployed, Armed Forces, Not in labor force, Civilian labor force, Unemployment Rate, Females 16 years and over, In labor force, Civilian labor force, Employed, Own children of the head of household, All parents in family, Own children of the head of household, and All parents in family. The 'CUSTOMIZE TABLE' button is circled in red.

Source: U.S. Census Bureau, data.census.gov, <https://data.census.gov>.

Check the data set, year, and geography on the report. Select the desired survey year by clicking on the current “Product” selection. Again, for the purposes of this case study, we are using 2016 ACS 1-year estimates. The header should read “2016 American Community Survey 1-Year Estimates” and the geography—“Michigan” (see Figure 5.6).



The poverty data are near the bottom of the table. If you want to expand the width of a column, hover over a column border in the shaded section at the top of the table and click and drag the border to the desired width. Poverty percentages are found below the “Percentage of Families and People Whose Income in the Past 12 Months Is Below the Poverty Level” row.

In 2016, Michigan’s poverty rate for all residents was 15 percent, a drop of nearly 1 percentage point from 2015. The asterisk in the column labeled “2016 - 2015 Statistical Significance” identifies a significant difference between the two estimates at a 90 percent confidence level. If there is no asterisk in the column between the 2 comparison years, for example the poverty rate of individuals aged 65 years and over, you can interpret the current year’s statistic as unchanged—in this case at about 8 percent in 2016 (see Figure 5.7).

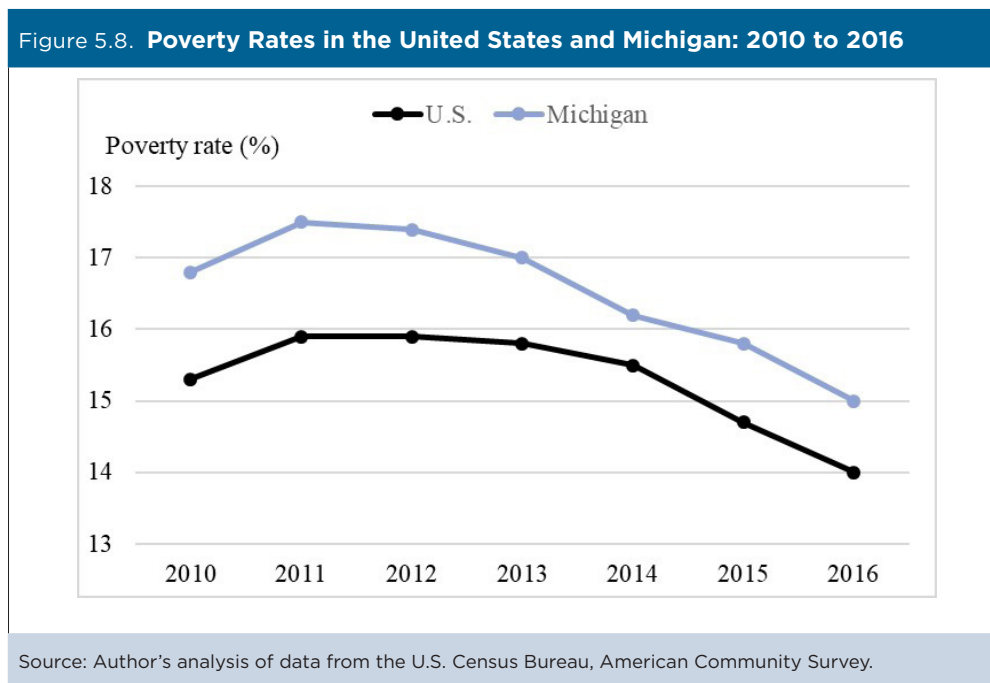
In 2016, Michigan's poverty rate for all residents was 15 percent, a drop of nearly 1 percentage point from 2015. The asterisk in the column labeled "2016 - 2015 Statistical Significance" identifies a significant difference between the two estimates at a 90 percent confidence level. If there is no asterisk in the column between the 2 comparison years, for example the poverty rate of individuals aged 65 years and over, you can interpret the current year's statistic as unchanged—in this case at about 8 percent in 2016 (see Figure 5.7).

**Figure 5.7. Checking for Statistical Significance**

	2016 Estimate	2015 Estimate	2016 - 2015 Statistical Significance
With related children of the householder under 18 years	39.8%	44.2%	*
With related children of the householder under 5 years only	46.5%	47.9%	
✓ All people	15.0%	15.8%	*
✓ Under 18 years	20.7%	22.4%	*
✓ Related children of the householder under 18 years	20.2%	22.0%	*
Related children of the householder under 5 years	24.0%	25.0%	
Related children of the householder 5 to 17 years	18.9%	21.0%	*
✓ 18 years and over	13.3%	13.9%	*
18 to 64 years	14.7%	15.4%	*
65 years and over	8.1%	7.8%	
People in families	11.6%	12.6%	*
Unrelated individuals 15 years and over	27.8%	28.3%	

Source: U.S. Census Bureau, data.census.gov, <<https://data.census.gov>>.

By clicking on earlier years of this report, at the top of the page, you can see that the poverty rate for Michigan residents (all people) has been steadily declining since 2014. Figure 5.8 shows the results of this analysis, which was featured in a recent article in the *Detroit Free Press*.<sup>42</sup>



<sup>42</sup> Kristi Tanner, *Detroit Free Press*, "Census data: For a fourth year, Michiganders see incomes rise," 2017, <[www.freep.com/story/news/2017/09/14/michiganders-making-more-cash-even-detroit-new-stats-say/660518001/](http://www.freep.com/story/news/2017/09/14/michiganders-making-more-cash-even-detroit-new-stats-say/660518001/)>.

Comparison Profiles are a great way to look for statistically significant differences in estimates over time. They allow you to say with a certain amount of confidence, in this case for individual poverty, that rates continue to decline.

To see how Michigan's poverty trend compares to the U.S. poverty trend:

- Scroll to the top of the table and select "1 Geography" to open the geography filter.
- Click on "Nation" and then select "United States."
- "United States" and "Michigan" should now be in your "Selected Geographies."
- Click on the "Close" button in the lower right corner to view the table with your updated geography selections.
- Check year-over-year trends to see if the change in poverty for all U.S. residents is statistically significant.

If you need additional years of data, follow the same steps used to select 2016 estimates by clicking on your "Product" selection at the top of the page.

You can also use Comparison Profiles to compare trends across multiple geographic areas. To determine, for example, which large Michigan counties saw poverty rates drop in 2016, complete the following steps:

- Scroll to the top of the table and select "2 Geographies" to open the geography filter.
- Click on "County" and then select "Michigan" from the list.
- Select "All counties in Michigan."<sup>43</sup>
- Close the filter by clicking on the "Close" button in the lower right corner.
- Scroll to the bottom of the table and click on the cell that says "All people" below the "Percentage of Families and People Whose Income in the Past 12 Months is Below the Poverty Level." This highlights the desired row of data (see Figure 5.9).

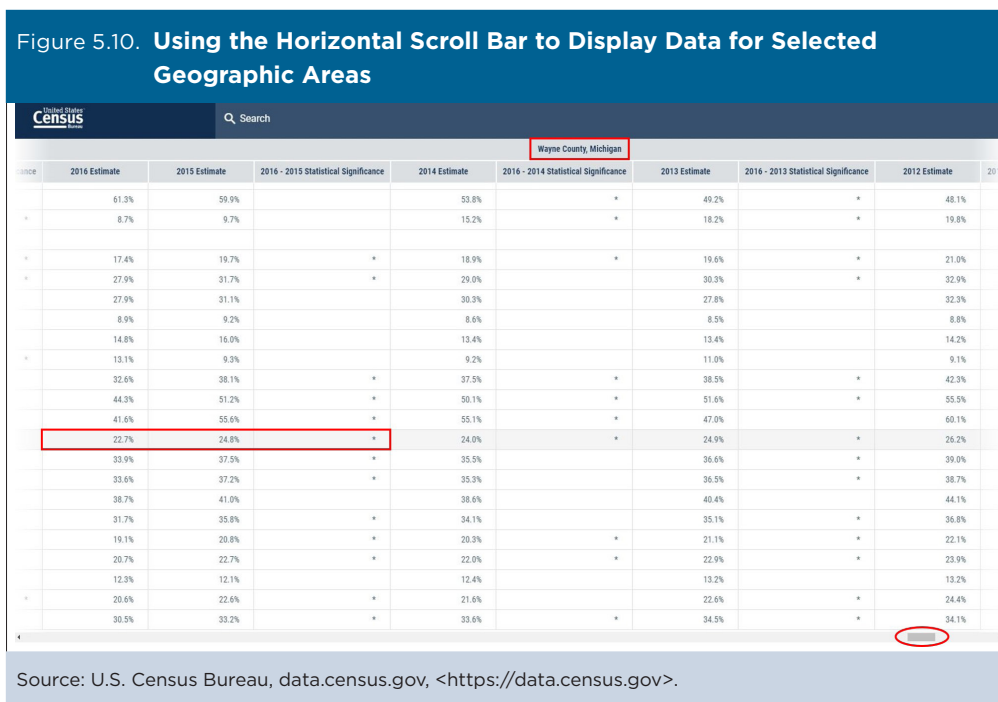
Figure 5.9. Highlighting a Row in Data.census.gov

<div> <div>United States Census Bureau</div> <div>Search</div> </div>				
	2016 Estimate	2015 Estimate	2016 - 2015 Statistical Significance	2014 Estimate
With public coverage	40.9%	46.1%		33.0%
No health insurance coverage	9.5%	8.5%		10.6%
▼ PERCENTAGE OF FAMILIES AND PEOPLE WHOSE INCOME IN THE PAST 12 MONTHS IS BELOW THE POVERTY LEVEL				
▼ All families	5.6%	9.1%	*	8.4%
▼ With related children of the householder under 18 years	7.8%	15.4%	*	14.4%
With related children of the householder under 5 years only	7.4%	10.4%		14.6%
▼ Married couple families	4.0%	4.5%		4.8%
▼ With related children of the householder under 18 years	3.9%	4.8%		7.3%
With related children of the householder under 5 years only	4.2%	4.5%		4.6%
▼ Families with female householder, no husband present	16.0%	31.2%		29.6%
▼ With related children of the householder under 18 years	25.8%	40.3%		42.6%
With related children of the householder under 5 years only	26.7%	27.7%		47.2%
▼ All people	7.7%	11.4%	*	11.1%
▼ Under 18 years	8.2%	15.5%	*	13.5%
▼ Related children of the householder under 18 years	7.4%	14.9%	*	13.5%
Related children of the householder under 5 years	8.9%	18.5%		17.1%
Related children of the householder 5 to 17 years	6.8%	13.9%	*	12.3%
▼ 18 years and over	7.5%	10.0%		10.3%
18 to 64 years	7.9%	10.4%		10.8%
65 years and over	6.0%	8.2%		8.1%

Source: U.S. Census Bureau, data.census.gov, <<https://data.census.gov>>.

<sup>43</sup> There are 83 counties in Michigan. Since the ACS 1-year data set is selected, only counties with 65,000 or more residents will be available—a total of 29. For statistics on less populous counties, use the ACS 5-year estimates.

Use the left/right arrow keys or the horizontal scroll bar at the bottom of the page to view the data for different counties in Michigan (see Figure 5.10). In Michigan, six counties had statistically significant changes in their poverty rate in 2016; four declined and two increased. Wayne County, the state's largest county, saw a 2.1 percentage-point decline in its poverty rate, from 24.8 percent in 2015 to 22.7 percent in 2016.



This example used Comparison Profile reports to analyze poverty trends for residents of Michigan and the United States, including identifying statistically significant changes in poverty rates by county. Data users working with other ACS estimates—such as those from the Detailed Tables—can test for significant difference among estimates by using the Census Bureau’s Statistical Testing Tool.<sup>44</sup>

<sup>44</sup> U.S. Census Bureau, Statistical Testing Tool, <[www.census.gov/programs-surveys/acs/guidance/statistical-testing-tool.html](http://www.census.gov/programs-surveys/acs/guidance/statistical-testing-tool.html)>.

## Case Study #3: Census Reporter

**Skill Level:** Advanced

**Subject:** File Transfer Protocol (FTP), Table structure, geographic areas

**Type of Analysis:** Working with large ACS data sets; repackaging ACS data

**Tools Used:** PostgreSQL, FTP

**Author:** Joe Germuska, Census Reporter Project Lead, Knight Lab at Northwestern University

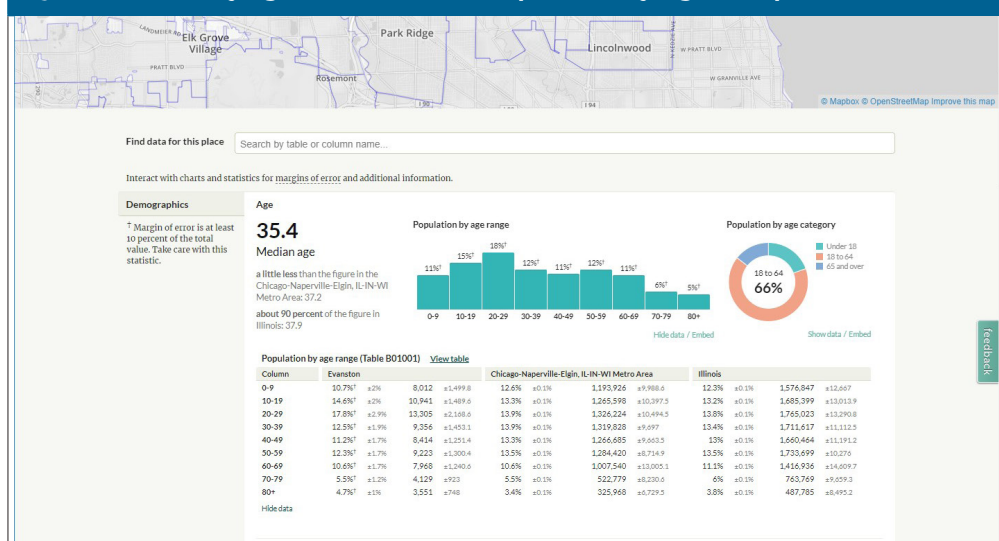
While open government data have recently become trendy, the U.S. Census Bureau has been releasing troves of American Community Survey (ACS) data for years—through raw data files as well as pretabulated tables available through the data.census.gov Web site. The Census Bureau's data.census.gov site is pure gold for journalists, but for novice users, it can be hard to mine.

Our team at Northwestern University's Knight Lab created Census Reporter to make it easier for journalists to write stories using ACS data.<sup>45</sup> With Census Reporter, we have the freedom to highlight certain data points and leave out others. We are applying the same principles that we have used to build news applications for a general public: we prefer clarity over completeness.

Although Census Reporter is not a substitute for all the detailed ACS data available on the Census Bureau's Web site, it provides a good place to start for journalists who want to explore ACS data for a given topic or geographic area. Since it was launched in 2014, Census Reporter has been widely used by journalists looking for background information for their stories. For example, the site was recently used in stories by *U.S. News & World Report* (on the best states to live), *The Texas Observer* (on the effects of Hurricane Harvey on Port Arthur, TX), and *Marketplace* (on gentrification in a Los Angeles neighborhood called Highland Park).<sup>46</sup>

We chose to focus on the ACS—as opposed to other federal data sources—because it provides the best combination of recent and local data. Census Reporter presents the latest ACS estimates for the nation, states, and many substate areas, down to the block group level. Charts, maps, and other data visualizations provide a friendly interface for navigating these data (see Figure 5.10). Users can also click on a “Show data” link below each chart to get more information about the underlying estimates and margins of error (see Figure 5.11).

Figure 5.11. Underlying Estimates of the Population by Age Group: 2016



Source: U.S. Census Bureau, Census Reporter, <<https://censusreporter.org/>>.

<sup>45</sup> Census Reporter, <<https://censusreporter.org/>>.

<sup>46</sup> Casey Leins, *U.S. News & World Report* (March 1, 2017), “New Hampshire Benefits From Neighbor as a Leading State,” <[www.usnews.com/news/best-states/articles/2017-03-01/new-hampshire-benefits-from-neighbor-as-a-leading-state](http://www.usnews.com/news/best-states/articles/2017-03-01/new-hampshire-benefits-from-neighbor-as-a-leading-state)>; Michael Barajas, *The Texas Observer* (March 28, 2018), “Without State Aid, Advocates Worry Port Arthur Will Bleed Residents Long After Harvey,” <[www.texasobserver.org/port-of-no-return/](http://www.texasobserver.org/port-of-no-return/)>; *Marketplace*, Wealth and Poverty Desk, “York & Fig: At the Intersection of Change,” <<https://features.marketplace.org/yorkandfig/>>.



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## ***Data Behind the Scenes***

While Census Reporter is easy for journalists to use, it is also a good case study in how more advanced users can adapt ACS data to other purposes. The growing availability of open-source software has created new opportunities for journalists with programming skills to analyze and filter large data sets like the ACS to create new applications.

One of the most important goals behind the scenes at Census Reporter is making a flexible system to fetch ACS data so that the team at Census Reporter can quickly refresh their database and Web site. The amount of data that comes directly from the Census Bureau is huge and unwieldy for real-time queries, so our first experiment was to try loading these data into a set of “PostgreSQL” databases. PostgreSQL is a language that programmers can use to store, manipulate, and retrieve data.<sup>47</sup>

We based our database schema on Lee Hachadoorian’s census-postgres project, giving us a good place to start.<sup>48</sup> His scripts created a flexible schema to load and query all ACS tables for the 2006–2010 and 2007–2011 ACS 5-year data sets.

Since we were interested in comparisons over longer periods of time, we “forked” his project (created a copy of the code repository where we could make modifications without changing the original code) and added scripts to load data from additional ACS releases.

To make the process of loading these data more repeatable and reliable, we wrote several scripts that are meant to be run on a server. After the scripts finish running, you end up with a PostgreSQL database with complete, nationwide ACS data split across several thousand tables queryable with SQL. Combining these data with the Census Bureau’s TIGER geographic data, we can make geographic, topical, and temporal queries against the ACS data.

## ***Building the ACS Database***

The data for Census Reporter are from the ACS Summary Files—a set of comma-delimited text files that contain all of the Detailed Tables for the ACS data releases—and were retrieved from the Census Bureau’s File Transfer Protocol (FTP) site.<sup>49</sup> The FTP client allows users to download large numbers of files or entire folders containing the Summary File data for each ACS release. Beginning with the 2011 ACS, the Census Bureau has made it easier to download the entire Summary File for an ACS release in two “TAR” files (Tape Archive files used in UNIX-based operating systems). Users should note that the TAR files are large and, depending on system constraints, may take some time to download.

Each data product (for example, 2012–2016 ACS 5-year data files) can be processed as one large file, but the data are horizontally partitioned by state and are vertically separated into “sequences” (chunks of data spanning 256 columns or fewer). A detailed explanation of the table structure and sequences can be found in the Summary File Documentation provided with each ACS data release.<sup>50</sup>

The collection of geography and sequence files makes for a large number of tables that have to be bulk loaded if a user wants to work with multiple files or multiple geographic areas. Import routines assume that all ACS data are separated into small geographic areas (tracts and block groups) and large geographic areas (all other areas), but file names are reused for both types of geographic areas. To distinguish between small and large geography files, the import routines assume that the two types of files are separated into directories named “All\_Geographies\_Not\_Tracts\_Block\_Groups” and “Tracts\_Block\_Groups\_Only.”

In each case, the parent directory name must match the name of the database schema where these data will be stored. For Census Reporter data work, we name the schemas after the data sets folder name on the Census Bureau FTP server (for example, “acs2016\_5yr”).

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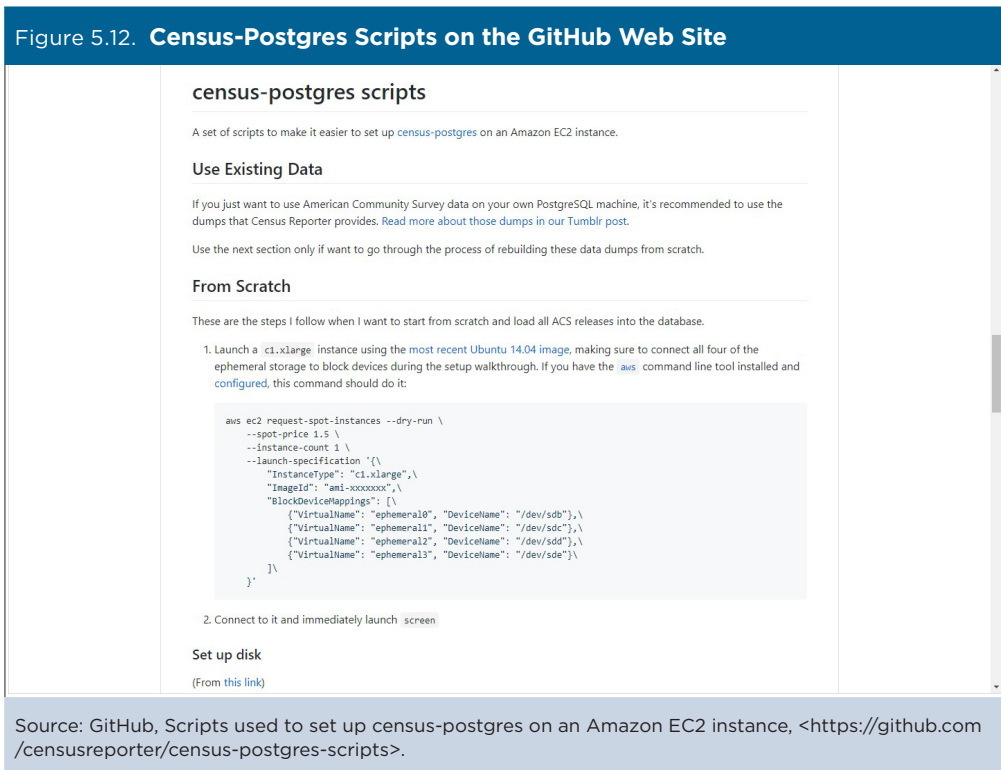
<sup>47</sup> PostgreSQL, <[www.postgresql.org](http://www.postgresql.org)>.

<sup>48</sup> GitHub, PostgreSQL schema and import scripts for recent U.S. Census Bureau data, <<https://github.com/leehach/census-postgres>>.

<sup>49</sup> U.S. Census Bureau, American Community Survey (ACS), Data via FTP, <[www.census.gov/programs-surveys/acs/data/data-via-ftp.html](http://www.census.gov/programs-surveys/acs/data/data-via-ftp.html)>.

<sup>50</sup> U.S. Census Bureau, American Community Survey (ACS), Summary File Documentation, <[www.census.gov/programs-surveys/acs/technical-documentation/summary-file-documentation.html](http://www.census.gov/programs-surveys/acs/technical-documentation/summary-file-documentation.html)>.

The resulting database is used to create the profile and comparison pages at our Census Reporter site. Since we did all this hard work to get Census Reporter started, we wanted to share our methods with others. We made the scripts available to the public for anyone else who wants to replicate the process or modify it for their own work (see Figure 5.12). You can find the scripts on the GitHub Web site.<sup>51</sup>



<sup>51</sup> GitHub, Scripts used to set up census-postgres on an Amazon EC2 instance, <<https://github.com/censusreporter/census-postgres-scripts>>.



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## 6. ADDITIONAL RESOURCES

**U.S. Census Bureau, What is the American Community Survey?**

<[www.census.gov/programs-surveys/acs/about.html](http://www.census.gov/programs-surveys/acs/about.html)>

**U.S. Census Bureau, Understanding and Using American Community Survey Data: What All Data Users Need to Know**

<[www.census.gov/programs-surveys/acs/guidance/handbooks/general.html](http://www.census.gov/programs-surveys/acs/guidance/handbooks/general.html)>

**U.S. Census Bureau, ACS Data Releases**

<[www.census.gov/programs-surveys/acs/news/data-releases.html](http://www.census.gov/programs-surveys/acs/news/data-releases.html)>

**U.S. Census Bureau, Geography & ACS**

<[www.census.gov/programs-surveys/acs/geography-ac.html](http://www.census.gov/programs-surveys/acs/geography-ac.html)>

**U.S. Census Bureau, ACS Data Tables and Tools**

<[www.census.gov/acs/www/data/data-tables-and-tools/](http://www.census.gov/acs/www/data/data-tables-and-tools/)>

**U.S. Census Bureau, data.census.gov Resources**

<<https://census.gov/data/what-is-data-census-gov.html>>

**U.S. Census Bureau, State Data Center (SDC) Program**

<[www.census.gov/about/partners/sdc.html](http://www.census.gov/about/partners/sdc.html)>

**U.S. Census Bureau, Census Information Centers (CIC)**

<[www.census.gov/about/partners/cic.html](http://www.census.gov/about/partners/cic.html)>

**Paul Overberg, How to Use the Census Bureau's American Community Survey Like a Pro**

<<https://source.opennews.org/articles/how-use-census-bureau-american-community-survey/>>

**Census Reporter**

<<https://censusreporter.org/>>

**University of Minnesota, Minnesota Population Center, IPUMS USA**

<<https://usa.ipums.org/usa/>>