Understanding and Using
American Community Survey Data

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

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Acknowledgments

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Alaska Natives Need to Know*

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UNDERSTANDING AND USING AMERICAN COMMUNITY SURVEY DATA: WHAT DATA USERS FOR AMERICAN INDIANS AND ALASKA NATIVES NEED TO KNOW

Suppose a tribal planner needs current information about the local population to plan for future economic development, a Commission on Indian Affairs in a southeastern state wants to improve access to health services for tribal members, or a policy analyst at a federal agency wants to measure the effectiveness of programs that fund critical health care services to American Indian and Alaska Native populations nationwide. Where could they turn for this information?

The U.S. Census Bureau's American Community Survey (ACS) provides a detailed portrait of the social, economic, housing, and demographic characteristics of America's communities, including information about the characteristics of American Indians and Alaska Natives and the areas where they live. ACS data are important to tribal government officials, federal funding agencies, state government agencies, and nongovernmental organizations that provide services to improve the well-being of tribal populations. When American Indian and Alaska Native respondents complete the ACS, they are helping to ensure that the best statistics are available to their communities to inform future decisions.

This handbook provides an overview of the ACS to help tribal data users and others understand the basics of the survey, how the data can be used, how to judge the accuracy of ACS estimates, and how to access ACS data on the Census Bureau's Web site. It also includes some recent case studies that show how ACS data are being used to help address important policy and program issues facing American Indian and Alaska Native populations. Links to additional ACS resources, including technical documentation for more advanced users, are included throughout this handbook.

1. UNDERSTANDING THE ACS: THE BASICS

What Is the ACS?

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 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. 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.[1]

Because the ACS is based on a sample, rather than all housing units and people, ACS estimates 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, combined with the ACS estimate, gives users a range of values within which the actual "real-world" value is likely to fall.

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[1] The Census Bureau previously released 3-year estimates based on 36 months of data collection. In 2015, the 3-year products were discontinued. The 2011–2013 ACS 3-year estimates, released in 2014, are the last release of this product.

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

Social Characteristics	Economic Characteristics	Plumbing Facilities[6]
Ancestry	Class of Worker	Rent
Citizenship Status	Commuting (Journey to Work)	Rooms/Bedrooms
Citizen Voting-Age Population	Employment Status	Selected Monthly Owner Costs
Disability Status[1]	Food Stamps/Supplemental Nutrition Assistance Program (SNAP)[4]	Telephone Service Available
Educational Attainment	Health Insurance Coverage[2]	Tenure (Owner/Renter)
Fertility	Income and Earnings	Units in Structure
Grandparents as Caregivers	Industry and Occupation	Value of Home
Language Spoken at Home	Place of Work	Vehicles Available
Marital History[2]	Poverty Status	Year Householder Moved Into Unit
Marital Status	Work Status Last Year	Year Structure Built
Migration/Residence 1 Year Ago		
Period of Military Service	**Housing Characteristics**	**Demographic Characteristics**
Place of Birth	Computer and Internet Use[5]	Age and Sex
School Enrollment	House Heating Fuel	Group Quarters Population
Undergraduate Field of Degree[3]	Kitchen Facilities	Hispanic or Latino Origin
Veteran Status[2]	Occupancy/Vacancy Status	Race
Year of Entry	Occupants Per Room	Relationship to Householder
		Total Population

[1] Questions on Disability Status were significantly revised in the 2008 survey to cause a break in series.
[2] Marital History, Veterans' Service-Connected Disability Status and Ratings, and Health Insurance Coverage were added in the 2008 survey.
[3] Undergraduate Field of Degree was added in the 2009 survey.
[4] Food Stamp Benefit amount was removed in 2008.
[5] Computer and Internet Use was added to the 2013 survey.
[6] 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.

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

*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. 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.[2] The Population Estimates Program does not produce estimates by race for American Indian and Alaska Native areas. However, this program serves as a critical source of information for producing such estimates.*

The ACS provides vital information on a yearly basis about our nation and its people, helping local officials, community leaders, businesses, and the public plan and make decisions based on the changes taking place in their communities. Through the ACS, we know more about demographic trends, jobs and occupations, educational attainment, veterans, homeownership, and many other topics. Because data collection is ongoing, the ACS also provides essential, up-to-date information about population and housing characteristics both before and after natural disasters like Super Storm Sandy, economic crises like the Great Recession of 2007 to 2009, and public health emergencies like the COVID-19 pandemic.

The content collected through the ACS can be grouped into four main types of characteristics: social, economic, housing, and demographic, as shown in Table 1.1. 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 aged 16 and older).

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

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ACS content is designed to meet the needs of federal government agencies, and every question in the ACS is asked for a reason. For example, questions about how people get to work, when they leave, and the length of their commutes are used for planning improvements to roads, highways, rail lines, and bus routes, and for planning emergency response routes. Because participation in the ACS is mandatory, the Office of Management and Budget (OMB) will only approve necessary questions for inclusion in the ACS. The OMB's responsibility under the Paperwork Reduction Act requires that new questions demonstrate the practical utility of the data and minimize "respondent burden."

Respondent burden can be defined in different ways, but is often related to the length of the interview or questionnaire, or the extent to which questions are viewed as being intrusive or too personal.

Some people are reluctant to respond to the ACS because of concerns about the confidentiality of the data. However, strict confidentiality laws protect all ACS information that could be used to identify individuals or households under Title 13 of the U.S. Code.[3] This is true even for interagency communication: other

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[3] U.S. Census Bureau, Title 13, U.S. Code, <www.census.gov/history /www/reference/privacy_confidentiality/title_13_us_code.html>.

Box 1.1. **How Different Data User Communities Use ACS Data on American Indians and Alaska Natives**

Federal agencies: ACS data help determine how more than $675 billion in federal funds are distributed to state and local areas each year. Federal agencies use ACS data to fund programs providing services such as education, health care, tribal courts, and housing to American Indians and Alaska Natives. For example, the Department of Housing and Urban Development (HUD) uses ACS data in their report, *Housing Needs of American Indians and Alaska Natives in Tribal Areas,* which addresses issues of overcrowding and other housing problems among American Indians and Alaska Native populations.[1]

Nongovernmental organizations: The National Congress of American Indians (NCAI) helps locate the best data for tribal planners, data users, researchers, NCAI staff, and other leaders. NCAI's Census Information Center often fulfills requests for data and provides information on data accessibility and quality. Part of their goal is to explain the difference between reports based on the decennial census enumeration and data from the ACS and other federal surveys that are derived from sample data. Data users are often interested in basic population counts at the tribal, congressional district, and state levels; as well as the voting-age population; unemployment statistics; poverty and income statistics; housing conditions; and educational attainment in American Indian and Alaska Native areas.

Grant seekers: In 2015, the California Indian Manpower Consortium (CIMC) received a grant from the U.S. Department of Labor to support a "Career Pathways for Native Youth" Project. This project provides career training and resources for American Indian youth with limited or no work experience. In their grant proposal, CIMC cited unemployment data from the ACS to demonstrate the need for career services among American Indian youth.

Tribal Governments: The Navajo Nation's Division of Economic Development uses ACS data to brief chapter leaders on geographic differences in poverty, unemployment, household income, and language spoken at home. Although they acknowledge the limitations of ACS data—such as the large margins of error associated with some estimates for small geographic areas—they also value the ACS because it provides a "stable, consistently applied- and coded-" source of information for the Navajo Nation and other tribal leaders.[2]

Researchers: Researchers use ACS data to delve deeper into social, economic, housing, and demographic issues facing American Indian and Alaska Native populations. For example, researchers have used ACS data, linked with local labor market information, to investigate contemporary Native poverty and its potential links to urbanization of the American Indian population and the growth of tribally owned casinos.[3]

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[2] National Research Council, *Benefits, Burdens, and Prospects of the American Community Survey: Summary of a Workshop,* Daniel L. Cork, rapporteur, Committee on National Statistics, Division of Behavioral and Social Sciences and Education (Washington, DC: The National Academies Press: 2013).

[3] James J. Davis, Vincent J. Roscigno, and George Wilson, "American Indian Poverty in the Contemporary United States," *Sociological Forum*, Vol. 31, No. 1, March 2016.

[1] U.S. Department of Housing and Urban Development, *Housing Needs of American Indians and Alaska Natives in Tribal Areas,* <www.huduser.gov/portal/publications /HousingNeedsAmerIndians-ExecSumm.html>.

government agencies do not have the legal right to access individuals' confidential information.

Who Uses ACS Data and Why?

The ACS puts up-to-date information about important social issues at the fingertips of people who need it, including tribal leaders, planners, and program directors/managers; businesses; federal policymakers; researchers; nongovernmental organizations; journalists; teachers and students; and the public (see Box 1.1). Tribal governments are using ACS information to keep track of year-to-year population changes in their jurisdictions so they can better address the needs of their constituents. Businesses use the data to better understand their current or potential customers. The federal government uses ACS information to evaluate the need for federal programs and to run those programs effectively.

The topics included in the ACS were chosen because federal and state governments require the data to manage or evaluate programs. For example, information on income is used for grant allocation by the U.S. Social Security Administration, the National School Lunch Program, the Low Income Home Energy Assistance Program, and the U.S. Department of Education. For more information about how federal agencies and other data users use the ACS in their work, visit the Census Bureau's Web page showing Questions on the Form and Why We Ask.[4]

History of the ACS

Every 10 years since 1790, Congress has authorized funds to conduct a national census of the U.S. population, as required by the U.S. Constitution. Censuses conducted between 1940 and 2000 consisted of a "short form," which included basic questions about age, sex, race, Hispanic origin, household relationship, and owner/renter status, and a "long form" used for only a sample of households. The long form included not only the basic short-form questions but also detailed questions about social, economic, and housing characteristics.

Data from the census long form provided a detailed snapshot, every 10 years, of America's population and households. However, in today's world, our communities can change very quickly. Between decennial censuses, local governments, organizations, and businesses need timely data to assess and plan for local needs. Costly mistakes can result when planners and policymakers do not have current data on which

to base their decisions. That is one of the key reasons the Census Bureau moved to a new way of gathering data. Rather than taking a snapshot of communities once every 10 years, the ACS was designed to provide a dynamic and timely picture of the nation every year.

The ACS underwent years of extensive testing, including demonstration surveys conducted in parallel with the 2000 Census to evaluate the reliability of survey results. 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. In 2010, the ACS replaced the census long form as the nation's source of social and economic data for population and housing characteristics.

Over time, questions have been added, revised, or removed from the survey, as shown in Table 1.1. For example, in 2008, three new questions on marital history, health insurance coverage, and veteran's service-connected disability were added, while the questions on disability were significantly revised to cause a break in series. The data from these new and revised questions collected in 2008 were first available in the ACS products released in 2009. A new question on bachelor's field of degree was added in 2009—with data available in 2010—while in 2013, three new questions on computer ownership and Internet access were added, with data available in 2014.

When a new question is added to the survey, 1-year estimates are available the following year, but it takes 5 years to accumulate data for small geographic areas. While ACS 1-year estimates of health insurance coverage were first available in 2009, ACS 5-year estimates of coverage (for 2008–2012) were first available in 2013.

In 2014, the Census Bureau conducted a comprehensive assessment of the ACS program, including a review of each ACS question. This ACS Content Review sought to understand which federal programs use the information collected by each question and assess how the Census Bureau might reduce respondent burden.[5] Based on this assessment, the questions on the presence of a flush toilet and whether there is a business or medical office on the property were removed from the ACS, beginning with the 2016 survey.

The sample size of the ACS and the ways data are collected have also changed over time, as described in more detail in the next section.

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[4] U.S. Census Bureau, *Questions on the Form and Why We Ask*, <www.census.gov/acs/www/about/why-we-ask-each-question/>.

[5] U.S. Census Bureau, American Community Survey, 2014 Content Review, <www.census.gov/programs-surveys/acs/operations-and-administration/2014-content-review.html>.

How Are ACS Data Collected?

From 2005 through 2012, the ACS collected data using three sequential methods or "modes:" paper questionnaires through the mail, phone interviews, and personal visits with a Census Bureau interviewer. Starting in 2013, the Census Bureau added a fourth mode—an Internet response option—that simplified data collection and reduced survey costs. Starting in late 2017, based on declining response rates and increasing costs, the Census Bureau discontinued using phone interviews to follow up with nonrespondents. The annual sample size of the ACS has also increased over time, from 2.9 million addresses in 2005 to more than 3.5 million addresses in 2015. This increased sample size has improved the precision of the ACS estimates. Over a 5-year period, the Census Bureau samples approximately 1 in 9 households nationwide, but the sampling rate is higher in areas with small populations and low predicted response rates.

Of the 3.5 million addresses selected for ACS interviews in 2018, about 2.1 million resulted in final interviews. The number of final interviews is smaller than the number of initial addresses selected because the Census Bureau conducts in-person interviews with only a subset of those who do not respond by Internet, mail, or phone. Addresses are also excluded if they are determined to be invalid or commercial.

The Census Bureau calculates survey response rates to help determine the quality of the ACS data.[6] An analysis of survey response from the 2008–2012 ACS 5-year data showed that the response rate for American Indian and Alaska Native areas—at 97.9 percent— was comparable to the national response rate (97.6 percent).[7] For more information about ACS sample size and response rates, visit the Census Bureau's Web page on Sample Size and Data Quality.[8]

The annual ACS sample is smaller than that of the 2000 Census long-form sample, which included about 18 million housing units. As a result, the ACS needs to combine population or housing data from multiple years to produce reliable numbers for small counties, neighborhoods, and other local areas. To provide information for communities each year—including American

Indian areas, Alaska Native areas, and Hawaiian Home Lands—the ACS currently provides 1-year estimates for geographic areas with at least 65,000 people, and 5-year estimates for smaller geographic areas down to the census tract and block group level. 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 populations of 20,000 or more.

One important fact to remember about the ACS is that the request to complete the survey is not mailed to specific people, but rather to specific addresses. The Census Bureau selects a random sample of addresses to be included in the ACS. Each address has about a 1-in-40 chance of being selected in a given year, and no address should be selected more than once every 5 years. Each month, the ACS sample includes approximately 295,000 addresses across the United States. This is a small number of housing units considering there are more than 140 million eligible addresses in the United States.

Until 2015, the Census Bureau sent all selected addresses an advance notification letter informing people living at that address that they had been selected to participate in the ACS. Shortly thereafter (for most U.S. addresses), instructions for completing the survey by Internet were mailed. Beginning in August 2015, the Census Bureau eliminated the advance notification letter and instead included instructions in the initial mail package for completing the survey by Internet or over the phone through a toll-free Telephone Questionnaire Assistance (TQA) line. If households do not respond by Internet or TQA, then a paper questionnaire is mailed to the address. In Puerto Rico and some hard-to-reach areas, only a paper questionnaire is mailed.

Until 2017, if no response was received by Internet, TQA, or mail within a month following the initial mailing, the Census Bureau followed up with a telephone interview when a telephone number was available. However, beginning in October 2017, the Census Bureau discontinued the telephone Nonresponse Followup operation because of declining response rates and increasing costs. Respondent data are still collected via telephone through the TQA operation.

If the Census Bureau is unable to get a response by Internet, mail, or TQA, then the address may be selected for an in-person interview. Because of the high cost per completed interview, the Census Bureau samples about one in three nonrespondent housing units for personal visit interviews. The proportion of nonresponding households selected for in-person

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[6] The survey response rate is the ratio of the estimate of housing units interviewed after data collection is complete to the estimate of all units that should have been interviewed. Interviews include complete and partial interviews with enough information to be processed.

[7] Michael D. Starsinic, "American Community Survey Response and Nonresponse Rates for American Indian and Alaska Native Geographic Areas," (November 2, 2016), accessed online at <www.census.gov /content/dam/Census/library/working-papers/2014/acs/2014 _Starsinic_01.pdf>.

[8] U.S. Census Bureau, American Community Survey, Sample Size and Data Quality, <www.census.gov/acs/www/methodology/sample -size-and-data-quality/>.

interviews is higher in areas with lower predicted response rates. A sample of people living in group quarters facilities—such as college dorms, skilled nursing facilities, or correctional facilities—is also interviewed in person to ensure coverage of people who are not living in housing units.

While the basic method for selecting the ACS sample is the same across the country, the Census Bureau applies different sampling rates in some cases to improve the reliability of estimates. For example, the ACS samples up to 15 percent of housing units in less populated areas, while sampling rates in more populated areas are often much lower. For more information about ACS methods, visit the Census Bureau's Design and Methodology Report Web page.[9]

Racial/Ethnic Classification in the ACS

Figure 1.1 shows the race question that appears on the 2020 ACS questionnaire.[10] Beginning in the 2020 ACS, six examples are provided for the "American Indian or Alaska Native" category. These examples represent some of the largest population groups within the geographically diverse population of the category. A combined "American Indian or Alaska Native" category is designed to collect data on both American Indians and Alaska Natives. The responses to this question provide the information from which the estimates for American Indians and Alaska Natives are derived. The responses are based on self-identification. Respondents are asked to report one or more races for themselves and other members of their households. Respondents who identify themselves as American Indian or Alaska Native are asked to report their enrolled or principal tribe. People can report more than one tribe. The racial and ethnic classifications included on the ACS questionnaire follow OMB guidelines for the classification of federal data on race and ethnicity (see Box 1.2).

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[9] U.S. Census Bureau, *American Community Survey Design and Methodology Report*, (January 2014), <www.census.gov/programs-surveys/acs/methodology/design-and-methodology.html>.

[10] U.S. Census Bureau, 2020 ACS Questionnaire, <www.census.gov/programs-surveys/acs/methodology/questionnaire-archive.2020.html>.

Figure 1.1. **Race Question on 2020 American Community Survey Form**

Source: U.S. Census Bureau, American Community Survey.

People who answer the question on race by marking only the "American Indian or Alaska Native" response box, and/or writing in one or more tribes, are referred to as the "American Indian and Alaska Native alone" population. People who answer the race question by marking the "American Indian or Alaska Native" response box and one or more other races, for example "American Indian and Alaska Native" and "White" or "American Indian and Alaska Native" and "Black or African American," are included in the "American Indian and Alaska Native alone or in combination" population.

Based on responses to the race question, data on American Indians and Alaska Natives can be tabulated or shown in data tables in two broad minimum and maximum categories, namely, the American Indian and Alaska Native alone population and the American Indian and Alaska Native alone or in any combination population.

The Census Bureau also codes responses from the write-in box of the race question to provide statistics for specific:
- American Indian tribes.
- Alaska Native tribes, villages, associations, communities, and corporations.
- Tribal groupings.

When minimum population requirements are met, data are available for two minimum and maximum categories, for example the Hoopa Valley Tribe alone or the Hoopa Valley Tribe alone or in any combination.

Tribal groupings are a Census Bureau convention, which consists of combinations of individual American Indian tribes and Alaska Native tribes, villages, associations, communities, and corporations. For example, the Hoopa tribal grouping consists of three tribes: Trinity, Whilkut, and Hoopa Valley Tribe. To explore the complete list of detailed American Indian and Alaska Native categories and their relationship to tribal groupings, see the ACS Code Lists.[11]

Some American Indians live in federally recognized American Indian and Alaska Native areas, such as the Navajo Nation Reservation and Off-Reservation Trust Land, but the majority of American Indians live outside of these areas (off reservation). For more information about American Indian geographic areas, see the section on the "Geography of American Indian and Alaska Native Areas."

When Are ACS Data Released?

ACS data are very timely because they are released in the year immediately following the year in which they are collected (see Table 1.2). Beginning with data collected in 2005, 1-year estimates have been published for areas with populations of 65,000 or more, including all states, the District of Columbia, and many large counties and cities. In 2010, the Census Bureau released the first ACS 5-year estimates for the nation, states, cities, counties, American Indian and Alaska Native areas, and other geographic areas.

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[11] U.S. Census Bureau, American Community Survey (ACS), Code Lists, Definitions, and Accuracy, <www.census.gov/programs-surveys/acs/technical-documentation/code-lists.html>.

	Data product, population threshold, and year(s) of data collection			
Year of data release	1-year estimates (65,000+)	1-year supplemental estimates (20,000+)	3-year estimates[1] (20,000+)	5-year estimates[2] (all areas)
2006	2005	NA	NA	NA
2007	2006	NA	NA	NA
2008	2007	NA	2005–2007	NA
2009	2008	NA	2006–2008	NA
2010	2009	NA	2007–2009	2005–2009
2011	2010	NA	2008–2010	2006–2010
2012	2011	NA	2009–2011	2007–2011
2013	2012	NA	2010–2012	2008–2012
2014	2013	NA	2011–2013	2009–2013
2015	2014	NA	NA	2010–2014
2016	2015	2014/2015	NA	2011–2015
2017	2016	2016	NA	2012–2016
2018	2017	2017	NA	2013–2017
2019	2018	2018	NA	2014–2018

Table 1.2. Release Schedule for ACS Data

NA Not available.
[1] The Census Bureau produced ACS 3-year estimates starting in 2008, but that series was discontinued in 2015.
[2] Five-year estimates are available for areas as small as census tracts and block groups.
Source: U.S. Census Bureau.

These 5-year estimates have been updated annually by removing the earliest year and replacing it with the latest one, thus providing an unprecedented ability to annually monitor social and economic trends in local communities.

The Census Bureau also produced ACS 3-year estimates, starting in 2008, but that series was discontinued in 2015. However, every community in the nation will continue to receive a detailed statistical portrait of its social, economic, housing, and demographic characteristics through ACS 1-year and 5-year data products.

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.

While data for the total American Indian and Alaska Native population are available through each of the standard ACS releases, characteristics for detailed tribal population groups are primarily available every 5 years through the release of a special set of tables. These tables, known as the Selected Population Tables and American Indian and Alaska Native Tables, are

based on 5 years of ACS data collection. The tables are repeated for over 1,000 tribal groups to provide a detailed statistical portrait for each group.

Data from the ACS 5-year American Indian and Alaska Native Tables are available for tribal groups with populations of 100 or more at the national level. This is a much lower population requirement compared to the 65,000 national-level population minimum for the Selected Population Profiles in the standard ACS 1-year data release.

ACS data collected for earlier years, from 2000 through 2004, are also available for areas with 250,000 people or more, including all states, the District of Columbia, and many large counties and cities. However, few federally recognized tribal governments meet this 250,000 population threshold.

ACS Data Collection for American Indian and Alaska Native Areas

Beginning with the 2011 ACS sample, the Census Bureau made several improvements to their sampling procedures to increase the reliability of the ACS estimates for populations in certain well-defined geographic areas, including American Indian and Alaska Native areas. Since 2011, the Census Bureau has

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conducted in-person interviews for all housing units with unmailable addresses, as well as addresses that did not respond via Internet, mail, or phone in the following areas:[12]

- Hawaiian Home Lands.

- Alaska Native Village Statistical Areas.

- All American Indian areas with at least 10 percent of the population responding to the 2010 Census as American Indian or Alaska Native (alone or in any combination).

From 2011–2020, unmailable addresses were excluded from mail, Internet, and phone interviews. Beginning in 2021, the Census Bureau allows unmailable addresses the option to respond online.

The Census Bureau also conducts interviews in remote Alaska—a set of rural areas in Alaska that are difficult to access and for which all housing unit addresses are treated as unmailable.[13] Interviews were only conducted in-person until 2021 when Internet completion became an option for remote Alaska. Because of the difficulties in field operations during specific months of the year and the extremely seasonal population in these areas, data collection operations in remote Alaska differ from the rest of the country. Previously, all sample addresses were contacted by personal visit to attempt interviews in one of two interview periods of the year—January through April or September through December. Starting in 2021, the Census Bureau extends these two interview periods from 4 to 6 months. By extending these interview periods from January through June and July through December, it allows field staff to travel to these remote locations during a window of time that is safer and less

expensive, as well as a time when they know residents will be present.[14]

Between 2010 and 2012, these new sampling procedures—combined with the increase in the overall ACS sample size, starting in 2011—resulted in a 26 percent increase in the number of housing units in American Indian and Alaska Native areas initially selected for the ACS sample, and an 80 percent increase in the number of final housing unit interviews conducted in these areas (see Table 1.3).

More information about ACS methods, including a description of sampling procedures in remote Alaska, is available in the Census Bureau's chapter on "Sample Design and Selection" in their Design and Methodology Report.[15]

Meeting the Needs of American Indian and Alaska Native Communities

The Census Bureau pledges to consult with tribal leaders and cooperate with them on any activities regarding the decennial census and ACS that might affect their tribes. This policy applies to all activities of the Census Bureau. Since each tribal nation forms its own government, the Census Bureau works with them one-by-one to coordinate data collection. It is imperative that all Census Bureau operations, including the ACS, be conducted with the acknowledgment and cooperation of the tribal authority over those reservation areas. For more information, see the Census Bureau's *Handbook for Consultation With Federally-Recognized Indian Tribes*.[16]

The Census Bureau trains field representatives to conduct interviews on American Indian and Alaska Native Reservations. The Census Bureau strives to respect each individual tribe's own customs, beliefs, and cultural norms, and field interviewers are instructed to follow set procedures to ensure that interviews

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[12] Examples of unmailable addresses include those with only physical descriptions of a housing unit and its location, or with post office (P.O.) box addresses, as well as addresses missing place names and zip codes. P.O. box addresses are considered unmailable because of the unknown location of the housing unit using the P.O. box. Addresses missing zip codes are considered unmailable when the place name is also missing.

[13] The county equivalents identified as totally or partially remote in Alaska include: Aleutians East, Aleutians West, Bristol Bay, Denali, Lake and Peninsula, Northwest Arctic, Southeast Fairbanks, Kusilvak, Yukon-Koyukuk, Bethel, Dillingham, Nome, North Slope, and Valdez-Cordova.

[14] Prior to the 2011 sample year, all remote Alaska sample cases were subsampled for personal interviews at a rate of 2 in 3.

[15] U.S. Census Bureau, *American Community Survey Design and Methodology Report*, Chapter 4: Sample Design and Selection, (January 2014), <https://www2.census.gov/programs-surveys/acs/methodology/design_and_methodology/acs_design_methodology_ch04_2014.pdf>.

[16] U.S. Census Bureau, *Handbook for Consultation With Federally-Recognized Indian Tribes,* <www.census.gov/content/dam/Census/library/publications/2011/dec/2011-handbook-indian-tribes.pdf>.

Table 1.3 **Effect of Sample Design Changes for American Indian and Alaska Native Areas**			
Housing unit	**2010**	**2012**	**Percent increase**
Initially Selected Housing Unit Addresses	80,000	101,000	26%
Final Housing Unit Interviews	47,000	84,000	80%
Source: U.S. Census Bureau.			

are conducted in a culturally sensitive manner. For their first visit to a reservation, the Census Bureau's Regional Office staff contacts the tribal government leadership and establishes a contact person identified as the Tribal Government Liaison, for the initial visit and subsequent visits. The contact person is usually the Tribal Leader.

The Census Bureau also works closely with Native Americans and Alaska Natives to ensure that survey results accurately reflect and meet the needs of these communities. A Native American Data Improvement Working Group was formed to identify and address the common data needs of tribes and federal agencies. The group includes representatives from the Census Bureau, Department of the Interior, and Bureau of Indian Affairs (BIA), and collaborates with tribes and other federal agencies. This working group includes three subgroups:

- A Geospatial Subgroup established to develop a process for integrating BIA's authoritative Indian land boundary data into the Census Bureau's geographic database and products.

- A Federal Data sets and Products Subgroup established to identify and address common data needs and gaps for tribes and federal agencies.

- A Communications Subgroup established to develop an overall systematic communication plan for implementing this agreement through internal and external subgroups, agencies, tribes, and the Federal Geographic Data Committee (FGDC), and act as the point of contact for reporting between groups.

Additional Background Information

What Is the ACS?
<www.census.gov/programs-surveys/acs/about.html>
This Web page includes basic information about the ACS and provides links to additional background materials.

ACS Questionnaire Archive
<www.census.gov/programs-surveys/acs/methodology/questionnaire-archive.html>
Browse archived sample ACS questionnaires for the household and group quarters populations in English and Spanish with instruction guides from 1996 through the present.

Methodology
<www.census.gov/programs-surveys/acs/methodology.html>
This Web page contains links to information on ACS data collection and processing, evaluation reports, and related topics.

Questions on the Form and Why We Ask
<www.census.gov/acs/www/about/why-we-ask-each-question/>
This Web page provides more information about how federal agencies and other data users use the ACS in their work.

ACS Data Releases
<www.census.gov/programs-surveys/acs/news/data-releases.html>
This Web page includes information about the ACS data release schedule, guidance on using the latest ACS data, and technical information about geography and product changes. Users can also browse the notes from previous years.

Table and Geography Changes
<www.census.gov/programs-surveys/acs/technical-documentation/table-and-geography-changes.html>
This Web page provides information about changes to tables and geography for each ACS data release.

2. THE GEOGRAPHY OF AMERICAN INDIAN AND ALASKA NATIVE AREAS

Data from the American Community Survey (ACS) are tabulated for a variety of different geographic areas, including states, counties, cities, towns, census tracts, and block groups, as well as American Indian and Alaska Native legal and statistical areas, such as American Indian Reservations, Alaska Native Village Statistical Areas, or Oklahoma Tribal Statistical Areas.

The availability of data for a specific population group will depend on the size of that population group or the population size of the geographic area of interest.

TIP: *Most American Indian and Alaska Native areas have populations of less than 20,000 and therefore receive only 5-year data products. This means that for many topics, 1-year estimates of the American Indian and Alaska Native population are only available at the national- and state-level.*

Table 2.1 lists the American Indian and Alaska Native areas for which 2018 ACS data are available as 1-year estimates (16 areas) or 1-year supplemental estimates (38 areas). Alaska Native Regional Corporations—unique corporate entities established to conduct business with Alaska Natives—are included as separate geographic areas on this list. Note that the information in this table is based on current geographic boundaries and is expected to change over time. The ACS uses boundaries as of January 1 of the last year of the estimate period. For example, the 2018 ACS 1-year estimates use boundaries as of January 1, 2018, as reported to the U.S. Census Bureau.

Figure 2.1 shows a map of the 38 American Indian and Alaska Native areas that met the 65,000 population threshold for 2018 ACS 1-year estimates, or the 20,000 population threshold for 1-year supplemental estimates. Of these areas, half were located in either Alaska or Oklahoma.

Figure 2.1 **American Indian and Alaska Native Areas for Which ACS 1-Year Estimates or ACS 1-Year Supplemental Estimates Were Released: 2018**
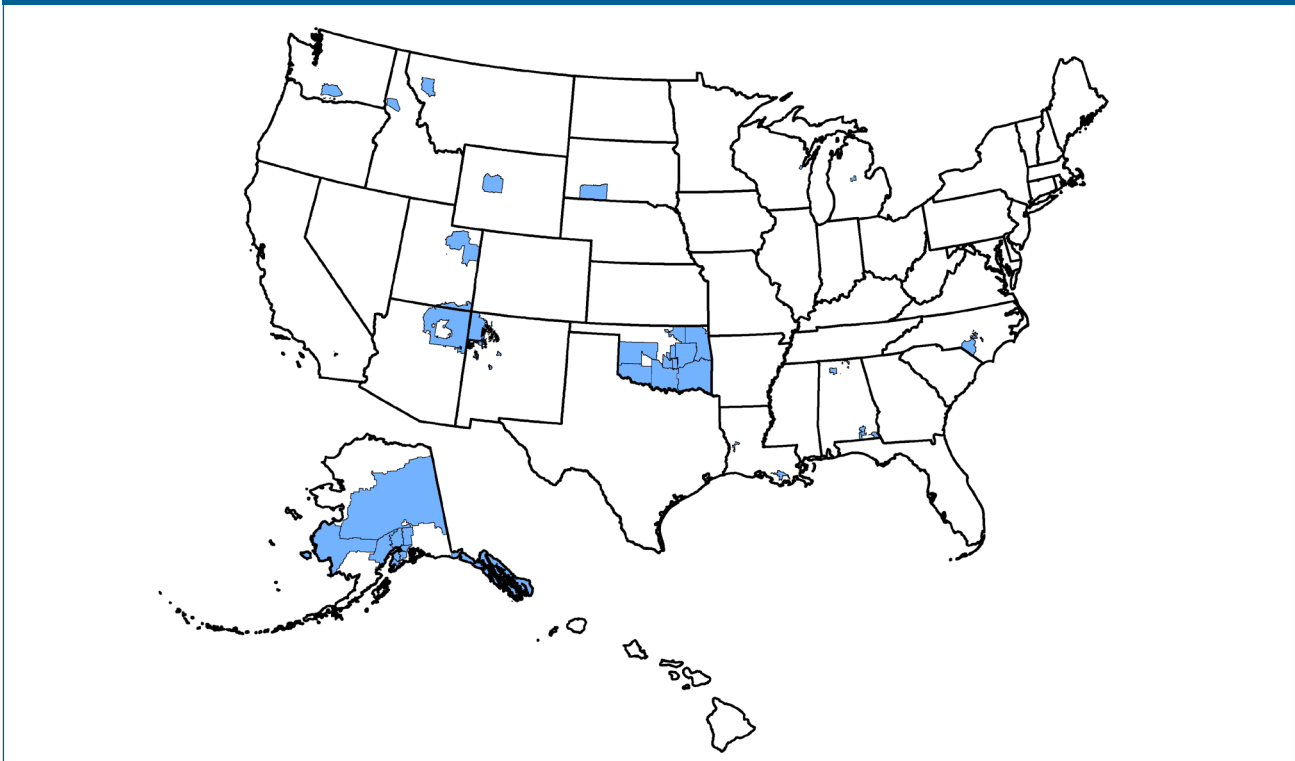
Note: One-year estimates are available for areas with at least 65,000 people, and 1-year supplemental estimates are available for areas with at least 20,000 people.
Source: U.S. Census Bureau, American Community Survey.

Table 2.1. American Indian and Alaska Native Areas for Which ACS 1-Year Estimates and 1-Year Supplemental Estimates Were Released: 2018

American Indian Area/Alaska Native Area	1-year estimates	1-year supplemental estimates	2018 ACS population
Calista Alaska Native Regional Corporation, AK		X	26,343
Cook Inlet Alaska Native Regional Corporation, AK	X	X	453,587
Doyon Alaska Native Regional Corporation, AK	X	X	112,280
Sealaska Alaska Native Regional Corporation, AK	X	X	73,058
Agua Caliente Indian Reservation and Off-Reservation Trust Land, CA		X	27,489
Cher-O-Creek State Designated Tribal Statistical Area, AL	X	X	85,832
Cherokee Oklahoma Tribal Statistical Area, OK	X	X	513,452
Cheyenne-Arapaho Oklahoma Tribal Statistical Area, OK	X	X	184,524
Chickaloon Alaska Native Village Statistical Area, AK		X	29,000
Chickasaw Oklahoma Tribal Statistical Area, OK	X	X	312,820
Choctaw Oklahoma Tribal Statistical Area, OK	X	X	231,617
Citizen Potawatomi Nation-Absentee Shawnee Oklahoma Tribal Statistical Area, OK	X	X	129,548
Coharie State Designated Tribal Statistical Area, NC	X	X	64,285
Creek Oklahoma Tribal Statistical Area, OK	X	X	803,574
Echota Cherokee State Designated Tribal Statistical Area, AL		X	55,921
Flathead Reservation, MT		X	31,617
Four Winds Cherokee State Designated Tribal Statistical Area, LA		X	33,856
Isabella Reservation, MI		X	28,442
Kaw/Ponca joint-use Oklahoma Tribal Statistical Area, OK		X	27,772
Kenaitze Alaska Native Village Statistical Area, AK		X	36,078
Kickapoo Oklahoma Tribal Statistical Area, OK		X	20,203
Kiowa-Comanche-Apache-Fort Sill Apache Oklahoma Tribal Statistical Area, OK	X	X	190,678
Knik Alaska Native Village Statistical Area, AK	X	X	78,521
Lumbee State Designated Tribal Statistical Area, NC	X	X	501,406
MaChis Lower Creek State Designated Tribal Statistical Area, AL		X	23,393
Navajo Nation Reservation and Off-Reservation Trust Land, AZ—NM—UT	X	X	175,151
Nez Perce Reservation, ID		X	21,286
Oneida (WI) Reservation and Off-Reservation Trust Land, WI		X	22,439
Osage Reservation, OK		X	47,014
Pine Ridge Reservation, SD—NE		X	19,422
Puyallup Reservation and Off-Reservation Trust Land, WA		X	53,110
Sac and Fox Oklahoma Tribal Statistical Area, OK		X	59,355
Samish Tribal Designated Statistical Area, WA		X	39,553
Seminole Oklahoma Tribal Statistical Area, OK		X	22,467
Uintah and Ouray Reservation and Off-Reservation Trust Land, UT		X	24,335
United Houma Nation State Designated Tribal Statistical Area, LA	X	X	201,630
Wind River Reservation and Off-Reservation Trust Land, WY		X	25,353
Yakama Nation Reservation and Off-Reservation Trust Land, WA		X	32,879

Note: One-year estimates are available for areas with at least 65,000 people, and 1-year supplemental estimates are available for areas with at least 20,000 people.
Source: U.S. Census Bureau, American Community Survey, 1-year estimates.

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

Some American Indian areas cross state lines, such as the Navajo Nation Reservation and Off-Reservation Trust Land. The Navajo Nation Reservation spans three states in the Mountain West: Arizona, New Mexico, and Utah (see Figure 2.2).

TIP: ACS data users also need to understand that many American Indian and Alaska Native areas have substantial populations that are neither American Indian nor Alaska Native.

Socioeconomic or other characteristics for non-American Indian and non-Alaska Native populations may differ markedly from those for American Indian and Alaska Native populations. When ACS tables are disaggregated by race, differences can be easily noted for these two populations.

Figure 2.2. **Map of the Navajo Nation Reservation and Off-Reservation Trust Land**
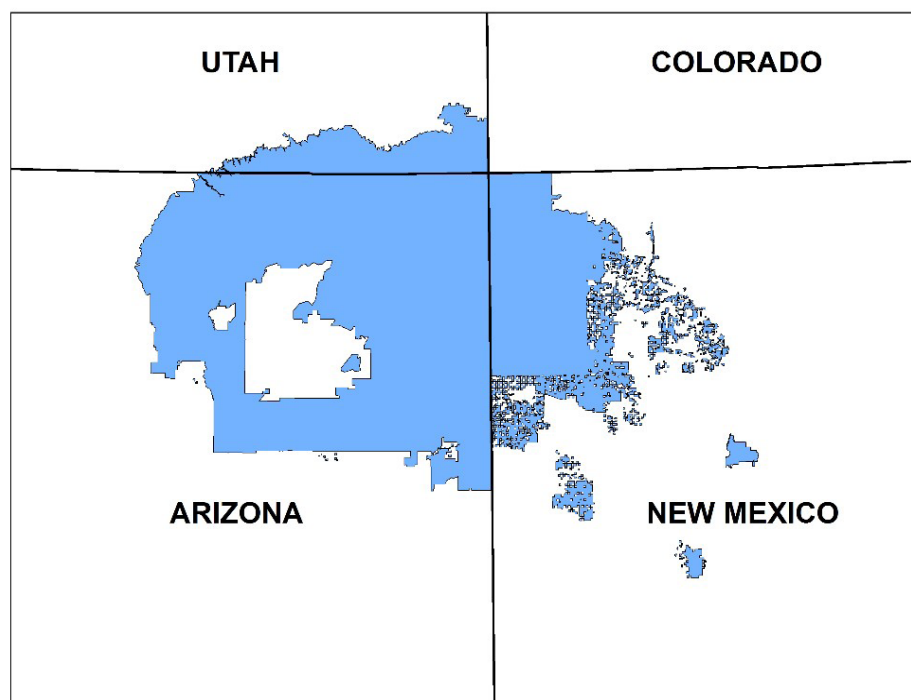
Source: U.S. Census Bureau.

Table 2.2. **Number and Percentage of People in the Cherokee Oklahoma Tribal Statistical Area Living Below the Poverty Level by Race: 2014–2018**				
	Number below poverty level	Margin of error (±)	Percent below poverty level	Margin of error (±)
Total population for whom poverty is determined	94,020	2,100	18.5	0.4
White alone	47,837	1,654	14.8	0.5
Black or African American alone	9,923	605	32.3	1.7
American Indian and Alaska Native alone	19,349	1,115	22.5	1.2
Asian alone	777	240	14.1	4.5
Native Hawaiian and Other Pacific Islander alone	193	105	30.9	12.6
Some other race alone	4,555	659	32.9	3.7
Two or more races	11,386	791	23.3	1.4

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

For example, the Cherokee Oklahoma Tribal Statistical Area (OTSA) has a racially diverse population with different economic characteristics (see Table 2.2).[17] In 2014–2018, the overall poverty rate for people living in the Cherokee OTSA was 18.5 percent, but the rate for whites (14.8 percent) was much lower than the rate for American Indians/Alaska Natives (22.5 percent).

While some ACS tables in the Census Bureau's data.census.gov provide data disaggregated by race/ethnicity, most do not.

> TIP: It would be incorrect to interpret an economic indicator such as poverty rate or a social indicator such as school enrollment rate for an American Indian or Alaska Native area as describing the characteristics of the American Indian or Alaska Native population.

ACS data products for legal entities, such as reservations and incorporated places, reflect the Census Bureau's information about the legal boundaries for those entities as of January 1 of the year of data collection (or, as of January 1 of the last year of data collection for 5-year estimates). The Census Bureau uses the results from an annual Boundary and Annexation Survey to update information about the legal boundaries and names of all governments, including many American Indian and Alaska Native areas.[18]

Boundaries for statistical areas, such as counties and census tracts, are updated by local participants prior to each decennial census as part of the Census Bureau's Participant Statistical Areas Program.[19] A comparable program for tribal governments, the Tribal Statistical Areas Program, has provided for the delineation of tribal statistical areas, such as tribal census tracts, by the Census Bureau in conjunction with tribes.[20]

A description of the American Indian and Alaska Native areas included in ACS data products is provided below.

Legal Entities

Alaska Native Regional Corporations (ANRCs) are corporate entities established to conduct both business (for profit) and nonprofit affairs of Alaska Natives pursuant to the Alaska Native Claims Settlement Act of 1972 (Public Law 92-203). Twelve ANRCs cover the entire state of Alaska except for the area within the Annette Island Reserve—a federally recognized American Indian reservation under the governmental authority of the Metlakatla Indian Community. A 13th ANRC represents Alaska Natives who do not live in Alaska and do not identify with any of the 12 corporations.

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[17] OTSAs include federally recognized American Indian tribes that do not currently have a reservation, but once had a reservation in Oklahoma.

[18] U.S. Census Bureau, Boundary and Annexation Survey, <www.census.gov/programs-surveys/bas.html>.

[19] U.S. Census Bureau, Overview of the 2010 Census Participant Statistical Areas Program (PSAP), <www.census.gov/programs-surveys/geography/about/partnerships/2010-census-partnerships/psap.html>.

[20] U.S. Census Bureau, Overview of the 2010 Census Tribal Statistical Areas Program (TSAP), <www.census.gov/programs-surveys/geography/about/partnerships/2010-census-partnerships/tsap.html>.

American Indian Reservations (AIRs) are areas that have been set aside by the United States for the use of tribes, the exterior boundaries of which are more particularly defined in tribal treaties, agreements, executive orders, federal statutes, secretarial orders, or judicial determinations. The Bureau of Indian Affairs maintains a list of all federally recognized tribal governments and makes final determination of the inventory of federal AIRs.[21] The Census Bureau recognizes federal reservations (and associated off-reservation trust lands) as territory over which American Indian tribes have primary governmental authority. American Indian reservations can be legally described as colonies, communities, Indian colonies, Indian communities, Indian rancherias, Indian reservations, Indian villages, pueblos, rancherias, ranches, reservations, reserves, settlements, or villages. Federal reservations may cross state and all other area boundaries.

ACS data are also provided for **State American Indian Reservations (SAIRs)**, which are established by some state governments for tribes recognized by the state. A governor-appointed state liaison provides the names and boundaries for state-recognized American Indian reservations to the Census Bureau. State reservations must be defined within a single state but may cross county and other types of boundaries.

Lands that are administered jointly or claimed by two tribes, whether federally or state recognized, are called "joint-use areas" and are treated as if they were separate American Indian reservations for data presentation purposes.

American Indian Off-Reservation Trust Lands (ORTLs) are areas for which the United States holds title in trust for the benefit of a tribe or individual Indian. Trust lands may be located on or off of a reservation. The Census Bureau recognizes and tabulates data for off-reservation trust lands, which are always associated with a specific federally recognized reservation and/or tribal government. Off-reservation trust lands associated with tribes that do not have a reservation appear in ACS data tabulations by tribal area name, interspersed alphabetically among reservation names.

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[21] U.S. Department of the Interior, Bureau of Indian Affairs, <www.bia.gov/>.

Statistical Entities

Alaska Native Village Statistical Areas (ANVSAs) represent the more densely settled portion of Alaska Native villages (ANVs). The ANVs constitute associations, bands, clans, communities, groups, tribes, or villages recognized in the Alaska Native Claims Settlement Act of 1971 (Public Law 92-203). Because ANVs do not have boundaries that are easy to locate, the Census Bureau does not delimit ANVs. Instead, the Census Bureau presents statistical data for ANVSAs that represent the settled portion of ANVs. In addition, each ANVSA should include only an area where Alaska Natives, especially members of the defining ANV, represent a substantial proportion of the population during at least one season of the year.

Oklahoma Tribal Statistical Areas (OTSAs) are statistical entities identified and delineated by the Census Bureau in consultation with federally recognized American Indian tribes in Oklahoma that do not currently have a reservation, but once had a reservation in that state. OTSAs primarily represent the former reservation boundaries and are not required to conform to any other geographic entity for which the Census Bureau tabulates data (although they must be located entirely within the state of Oklahoma). Lands that are administered jointly or claimed by two OTSAs are called "joint-use areas" and are treated as if they were separate OTSAs for data presentation purposes.

Tribal Designated Statistical Areas (TDSAs) are statistical entities identified and delineated by the Census Bureau in consultation with federally recognized American Indian tribes that do not currently have a federally recognized land base (that is, a reservation or off-reservation trust land). A TDSA generally encompasses a compact and contiguous area that contains a concentration of people who identify with a federally recognized American Indian tribe and in which there is structured or organized tribal activity. A TDSA may be located in more than one state, and it may not include area within an American Indian reservation, off-reservation trust land, Alaska Native Village Statistical Area, state designated American Indian statistical area, or OTSA. The intent of the TDSA program is to collect and tabulate data analogous to the data provided to tribes with a reservation and/or off-reservation trust land.

State Designated Tribal Statistical Areas (SDTSAs) are statistical entities for state-recognized American Indian tribes that do not have a state-recognized land base, or reservation. SDTSAs are identified and delineated for the Census Bureau by a state liaison identified by the governor's office in each state. SDTSAs generally encompass a compact and contiguous area that contains a concentration of people who identify with a state-recognized American Indian tribe and in which there is structured or organized tribal activity. An SDTSA may not be located in more than one state, and it may not include area within an American Indian reservation, off-reservation trust land, Alaska Native Village Statistical Area, tribal designated statistical area, or OTSA. The intent of the SDTSA program is to collect and tabulate data analogous to the data provided to tribes with a state reservation.

Tribal Tracts and Tribal Block Groups are defined by the Census Bureau in cooperation with tribal officials to provide meaningful and relevant data for small geographic areas within the boundaries of federally recognized reservations and off-reservation trust lands. In the past, census tracts and block groups defined by state and county officials have sometimes had the effect of separating American Indian populations located within a single reservation and/or off-reservation trust land such that statistics for these populations were adversely affected. To address this situation, and create a more effective program to provide small-area data for reservations, the Census Bureau provides tribal officials for federal reservations and off-reservation trust lands the opportunity to define tribal tracts and block groups for federal reservations and off-reservation trust lands.

Tribal tracts and tribal block groups are conceptually identical to census tracts and block groups defined within the standard state-county-tract-block group geographic hierarchy used for tabulating and publishing statistical data. Also, just as is the case with standard census tracts, the Census Bureau emphasizes in its guidelines for defining tribal tracts the need for consistent boundaries to enhance the comparisons of ACS and other data across time.

Additional Background Information

Geography & ACS
<www.census.gov/programs-surveys/acs/geography -acs.html>
This Web page includes information about changes in geographic boundaries in the ACS, key concepts and definitions, and reference maps.

Geographic Terms and Concepts
<https://www2.census.gov/geo/pdfs/reference /GTC_10.pdf>
This Web page summarizes the legal and statistical American Indian, Alaska Native, and Native Hawaiian areas for which the Census Bureau provides data.

16 Understanding and Using American Community Survey Data
What Users of Data for American Indians and Alaska Natives Need to Know

U.S. Census Bureau

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. As shown in Table 2.1 in the section on "Geographic Areas Covered in the ACS," 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 2018 ACS covers the period from January 2018 through December 2018). In the case of ACS multiyear estimates, the period is 5 calendar years (e.g., the 2014–2018 ACS estimates cover the period from January 2014 through December 2018). Therefore, ACS estimates based on data collected from 2014–2018 should not be labeled "2016," 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 2014–2018 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 2013–2017 ACS 5-year estimates share sample data from 2014 through 2017 with the 2014–2018 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 Bay County, Michigan—a county with about 100,000 residents in 2018. 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 23.5 percent to 36.9 percent (13 percentage points) while the interval for the 5-year estimate is narrower, ranging from 22.7 percent to 27.7 percent (5 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.

Year of data release

Data collection period

Source: U.S. Census Bureau, "When to Use 1-year, 3-year, or 5-year Estimates," <www.census.gov/programs-surveys/acs/guidance/estimates.html>.

Figure 3.2. **Child Poverty Rate in Bay County, Michigan: 2018 and 2014–2018**
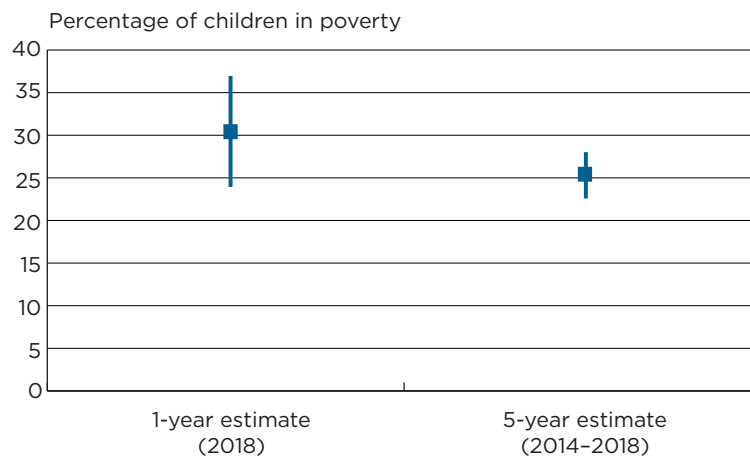
Percentage of children in poverty

Source: U.S. Census Bureau, data.census.gov, 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,

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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.

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., 2016 single year, 2014–2018 multiyear).

For example, suppose a transportation planner in Austin, Texas, is interested in measuring recent trends in telecommuting. Comparing data by release year shows that the 5-year estimates are lagging behind the 1-year estimates (see Figure 3.3). For example, while the 1-year estimates show a recent decline in the share of people working from home, the 5-year estimates show a fairly 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.

Figure 3.3. **Percentage of Workers Aged 16 and Over Who Worked From Home in Austin, Texas: 2010–2018**
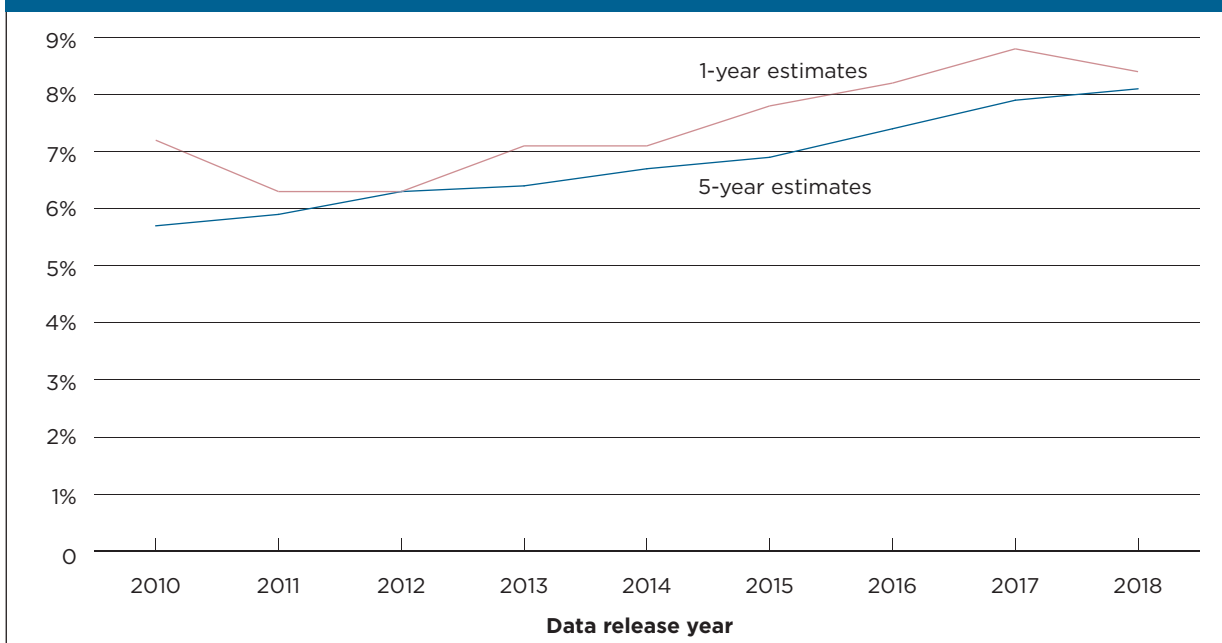
Source: U.S. Census Bureau, data.census.gov, DP02: Selected Social Characteristics in the United States.

Table 3.1. **Distinguishing Features of ACS 1-Year, 1-Year Supplemental, and 5-Year Estimates**[1]

1-year estimates	1-year supplemental estimates	5-year estimates
12 months of collected data Example: 2018 ACS 1-year estimates Dates collected: January 1, 2018, to December 31, 2018	12 months of collected data Example: 2018 ACS 1-year supplemental estimates Dates collected: January 1, 2018, to December 31, 2018	60 months of collected data Example: 2014–2018 ACS 5-year estimates Dates collected: January 1, 2014, to December 31, 2018
Data for areas with populations of 65,000 and more	Data for areas with populations of 20,000 and more	Data for all areas
Smallest sample size	Smallest sample size	Largest sample size
Less reliable than 3-year or 5-year	Less reliable than 5-year	Most reliable
Most current	Most current	Least current
Annually released: 2005 ACS 1-year data to present	Annually released: 2014 ACS 1-year data to present	Annually released: 2005–2009 ACS 5-year data to present
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	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.

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

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

4. MAKING COMPARISONS WITH ACS DATA

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

- Comparing the proportion of people without health insurance in two counties.

- Comparing the child poverty rate with the poverty rate for the working-age population.

- Comparing the proportion of people who are foreign-born in a city in 2018 with the corresponding share in 2017.

- Comparing the proportion of people with college degrees from 2000 to 2018 in a state, based on data from the ACS and the 2000 Census.

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

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

This section describes some of the key considerations for data users making comparisons with ACS data. The U.S. Census Bureau also provides extensive guidance on comparing ACS data on their Web site.[26] The section on "Understanding Error and Determining Statistical Significance" includes guidance on how to calculate and interpret the statistical significance of differences between estimates.

The Census Bureau created a statistical testing tool to help data users test whether ACS estimates are statistically different from one another.[27]

Comparing ACS Data Across Geographic Areas

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

are available, so data users need to choose which estimates to use.[28]

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

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

> TIP: Another option for presenting ACS data for less populated areas is to show single-year estimates for large counties in Texas and then combine the remaining counties into a state "residual" by subtracting the available single-year data from the state total. Alternatively, data users could present ACS estimates for Public Use Microdata Areas, since they meet the 65,000-population threshold required for single-year estimates and are often used as a substitute for county-level data.[29]

Comparing ACS Data Over Time

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

When using ACS 1-year data, these comparisons are generally straightforward. Using multiyear estimates to look at trends for small populations can be challenging because they rely on pooled data for 5 years. For example, comparisons of 5-year estimates from 2013 to 2017 and 2014 to 2018 are unlikely to show much difference because four of the years overlap; both sets of estimates include the same data collected from 2014 through 2017.[30] The Census Bureau suggests

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

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

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

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

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

comparing 5-year estimates that do not overlap—for example, comparing 2009–2013 ACS 5-year estimates with 2014–2018 ACS 5-year estimates.

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

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

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

Changes in Geography

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

ACS data are also regularly updated to reflect local changes in geographic boundaries. For example, the city of Jurupa Valley, California, incorporated in July 2011. Data for this city was first published in 2012, and has been updated each subsequent year, but data are not available for Jurupa Valley for 2011 and earlier years. The Census Bureau does not revise ACS data for previous years to reflect changes in geographic boundaries. For more information, visit the Census Bureau's Web page on Geography & ACS.[31]

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

Changes in Population Controls

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

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

> TIP: Because the 2009 ACS and 2010 ACS 1-year estimates use controls that are based on different decennial census base years, data users need to use caution when making comparisons across these years. Specifically, estimates of the number of people in a given geographic area or population subgroup are not strictly comparable between these 2 years. However, rates and percentages—as well as monetary data, such as median income values—are generally comparable between the two periods.

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

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

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

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

communities with large seasonal populations or those undergoing rapid change. The section on "Differences Between the ACS and the Decennial Census" provides more information about these differences.

The 2010 Census and 2020 Census were short-form only censuses so they do not include all of the detailed social, economic, and housing data available from previous censuses. However, data users can make valid comparisons between ACS estimates and basic characteristics from these censuses, including age, sex, race, Hispanic origin, household relationship, and homeowner status. For basic counts of the U.S. population by age, sex, race, and Hispanic origin between censuses, data users are encouraged to use the Census Bureau's official population estimates, available on the Census Bureau's Population and Housing Unit Estimates Web site.[32]

Using Monetary Data

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

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

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

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

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

Additional Background Information

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

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

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

5. ACCESSING ACS DATA

Data.census.gov is the U.S. Census Bureau's primary tool for accessing population, housing, and economic data from the American Community Survey (ACS), the Puerto Rico Community Survey, the decennial census, and many other Census Bureau data sets.[33] Data.census.gov provides access to ACS data for a wide range of geographic areas, including states, cities, counties, census tracts, and block groups.

The Census Bureau has produced a specialized tool, My Tribal Area, for data users who want to quickly access selected social, economic, housing, and demographic data for American Indian and Alaska Native areas.[34]

For those interested in more detailed tables for tribes and tribal groups, the Census Bureau provides a series of Selected Population Tables and American Indian and Alaska Native Tables.[35] These tables, based on ACS 5-year estimates, provide detailed estimates of characteristics for selected race, Hispanic origin, tribal, and ancestry populations.

Other specialized tools, such as My Congressional District and Census Business Builder, provide users with quick and easy access to statistics for particular geographic areas and topics.[36] More advanced users also have several options to access more detailed ACS data through downloadable Summary Files, the Public Use Microdata Sample Files, or the Census Bureau's Application Programming Interface (API).[37]

With all of these tools, disclosure rules and confidentiality thresholds can sometimes limit the availability of data for small groups and for areas with small populations. For example, for a Selected Population Profile, if fewer than 50 unweighted sample cases are available for an American Indian or Alaska Native tribe in a given geographic area, then data are not presented for that tribe.

People who need help in accessing ACS data can visit Census Academy to learn about workshops, Webinars, and other no-cost training opportunities that may be available.[38] Training may be general or tailored to meet your specific data needs.

Accessing ACS Data Through the My Tribal Area Tool

My Tribal Area is a specialized tool that allows data users to easily access and view population and housing estimates on American Indian and Alaska Native areas from the ACS.[39] The tool displays tables of the latest ACS 5-year estimates for selected characteristics, including:

- People: Demographic measures including sex and age, race, Hispanic or Latino origin, place of birth, ancestry, veteran status, disability status, residence 1 year ago.

- Jobs: Employment status, commuting to work, occupation, industry, class of worker.

- Housing: Housing occupancy, homeownership, year householder moved into unit, value of home, mortgage status, selected monthly owner costs, gross rent.

- Economy: Income and benefits, health insurance, poverty status.

- Education: School enrollment, educational attainment.

To access estimates from My Tribal Area, select a tribal area, or browse tribal areas by state, using the dropdown menus (see Figure 5.1).

[33]U.S. Census Bureau, data.census.gov, <https://data.census.gov/>.

[34] U.S. Census Bureau, My Tribal Area, <www.census.gov/tribal/index.html>.

[35] U.S. Census Bureau, Race/Ethnicity and AIAN Release Documentation, <www.census.gov/programs-surveys/acs/technical-documentation/race-ethnicity-aian.html>.

[36] U.S. Census Bureau, My Congressional District, <www.census.gov/mycd/>; and Census Business Builder (CBB), <www.census.gov/data/data-tools/cbb.html>.

[37] U.S. Census Bureau, American Community Survey (ACS), Summary File Data, <www.census.gov/programs-surveys/acs/data/summary-file.html>; American Community Survey (ACS), Accessing PUMS Data <www.census.gov/programs-surveys/acs/microdata.html>; and Developers, <www.census.gov/developers/>.

[38] U.S. Census Bureau, Census Academy, <www.census.gov/data/academy.html>.

[39] U.S. Census Bureau, My Tribal Area, <www.census.gov/tribal/index.html>.

Figure 5.1. **My Tribal Area Home Page**

Source: U.S. Census Bureau, My Tribal Area, <www.census.gov/tribal/>.

After selecting a tribal area of interest, select one of the five topical areas to browse the data on that topic (see Figure 5.2). A box at the bottom of the table gives you the option of displaying the data with or without accompanying margins of error.

Figure 5.2. **Select a Topical Area**
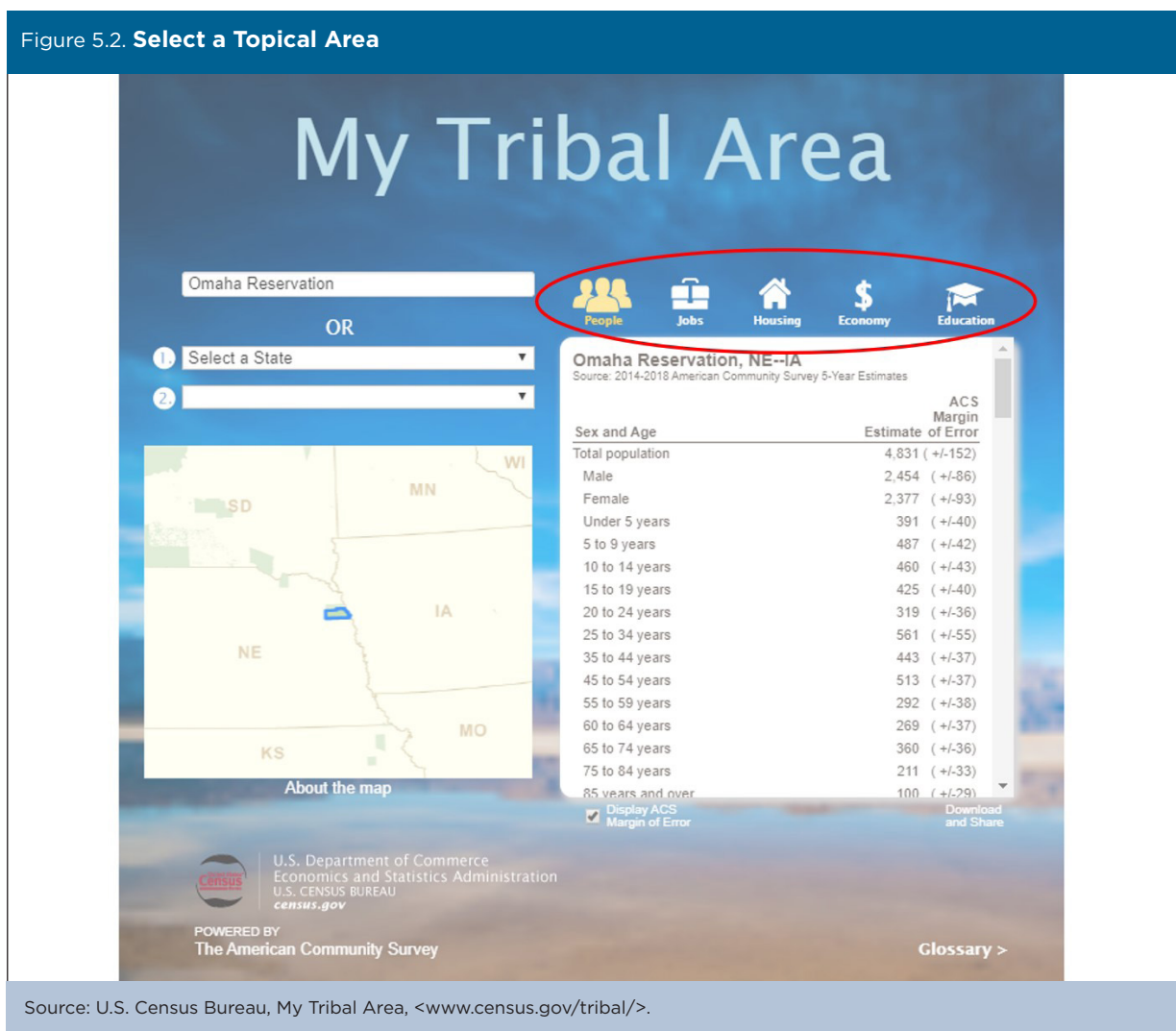
Source: U.S. Census Bureau, My Tribal Area, <www.census.gov/tribal/>.

Why this tool may be right for you	Why you may want to consider another tool
Data are displayed for a large number of American Indian and Alaska Native areas.	Data provide characteristics for the entire population living in the AIAN area (regardless of their race or whether people identify as American Indian or Alaska Native).
The tables contain data on popular social, economic, housing, and demographic topics.	It contains only a subset of all ACS topics.
The data are timely and easy to access.	Data are only displayed for the most recent 5-year period.

6. CASE STUDIES USING ACS DATA

Case Study #1: Employment Data for the Standing Rock Sioux Tribe

Skill Level: Introductory
Subject: Unemployment
Type of Analysis: Understanding employment data for American Indians on reservations
Tools Used: Data.census.gov, spreadsheet
Authors: Cheryl Penny, Employment and Training Director, Standing Rock Sioux

The Employment and Training Director for the Standing Rock Sioux Tribe received two related questions that needed answers. How many American Indian people on the reservation are unemployed? And how many are out of a job but not even counted as unemployed because they have barriers to employment that prevent them from actively looking for work?

The question about the number of unemployed and not working American Indians on the reservation is important because it indicates the need for services provided by the tribal employment and training program. In addition, the count of the American Indian unemployed on the reservation—the service area for the tribe's program—is a key factor determining the amount of funding the tribe receives under the special Native American workforce program administered by the U.S. Department of Labor.

Where can the director look for answers? Who counts unemployed American Indian people in reservation areas? The planner for the reservation has an idea: try the U.S. Census Bureau. It counts people in lots of ways and could be a good place to start.

When she checks around, she finds that the Census Bureau has staff in each regional office called "data dissemination specialists" who are there to help census data users find the information they need.[40] There are also Census Information Centers around the country that specialize in helping those looking for data specifically on the American Indian and Alaska Native population.[41]

The director learns that the Census Bureau's continuously updated American Community Survey (ACS) is the only federal program that publishes detailed information on the American Indian population in reservation areas. She also learns that data from the ACS are available to the public through the Census Bureau's Web site on the data.census.gov platform.[42]

However, the data.census.gov platform presents its own challenges. It has so much data that finding exactly what she wants takes some practice, even with the helpful video tutorials.[43] So the director asks an expert to guide her through the process.

The first step is to clearly specify the information she is looking for. In this case, the director is looking for: (1) the number of persons counted as unemployed and (2) the number counted as being of working age (aged 16 and older) but neither employed nor unemployed—or "not in the labor force" in the language of employment statistics. While unemployment statistics are often calculated based on the ratio of unemployed to the labor force, the U.S. Department of the Interior, Bureau of Indian Affairs includes people who are available for work, but may not be actively looking for work due to barriers to employment. For more information on the challenges of calculating unemployment and labor force statistics for tribal areas, view the U.S. Department of the Interior's 2013 American Indian Population and Labor Force Report.[44]

Then there is geography to consider. The numbers that the director needs are those just for people living on the reservation. Fortunately, the Census Bureau publishes data for reservation areas. Other sources of employment information, such as the Bureau of Labor Statistics, do not.

The director does not want numbers for everyone living on the Standing Rock reservation; roughly 25 percent of persons living on the reservation are not American Indian people. The total numbers of people who are

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[40] U.S. Census Bureau, Census Academy, <www.census.gov/data/academy.html>.
[41] U.S. Census Bureau, Census Information Centers, <www.census.gov/about/partners/cic/network.html>.
[42] U.S. Census Bureau, data.census.gov, <https://data.census.gov>.
[43] U.S. Census Bureau, Data Gems, <www.census.gov/data/academy/data-gems.html>.
[44] U.S. Department of the Interior, Bureau of Indian Affairs, "2013 American Indian Population and Labor Force Report," <www.bia.gov/sites/bia.gov/files/assets/public/pdf/idc1-024782.pdf>.

unemployed and not in the labor force for the area are not sufficient. She needs to consider only those people on the reservation who identify themselves on the ACS questionnaire as American Indian people.

To extract unemployment and not-in-labor-force data from data.census.gov for American Indian people living on the Standing Rock reservation, she begins by navigating to <https://data.census.gov> and clicking on "Advanced Search" (see Figure 6.1).

Figure 6.1. **Selecting Advanced Search in Data.census.gov**

Source: U.S. Census Bureau, data.census.gov, <https://data.census.gov>.
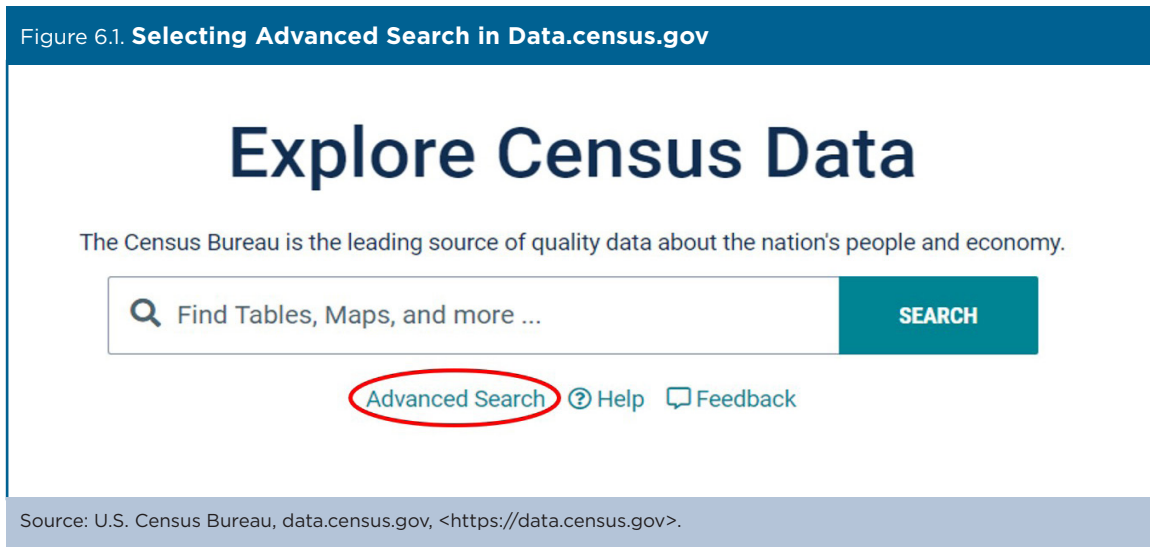
On the Advanced Search page, the director selects "Surveys" and specifies the "ACS 5-Year Estimates Detailed Tables," which include detailed information about the characteristics of people in small geographic areas (see Figure 6.2). She confirms that her selected survey is listed as a "Selected Filter" at the bottom of the page.

Figure 6.2. **Selecting Survey in Data.census.gov**

Source: U.S. Census Bureau, data.census.gov, <https://data.census.gov>.
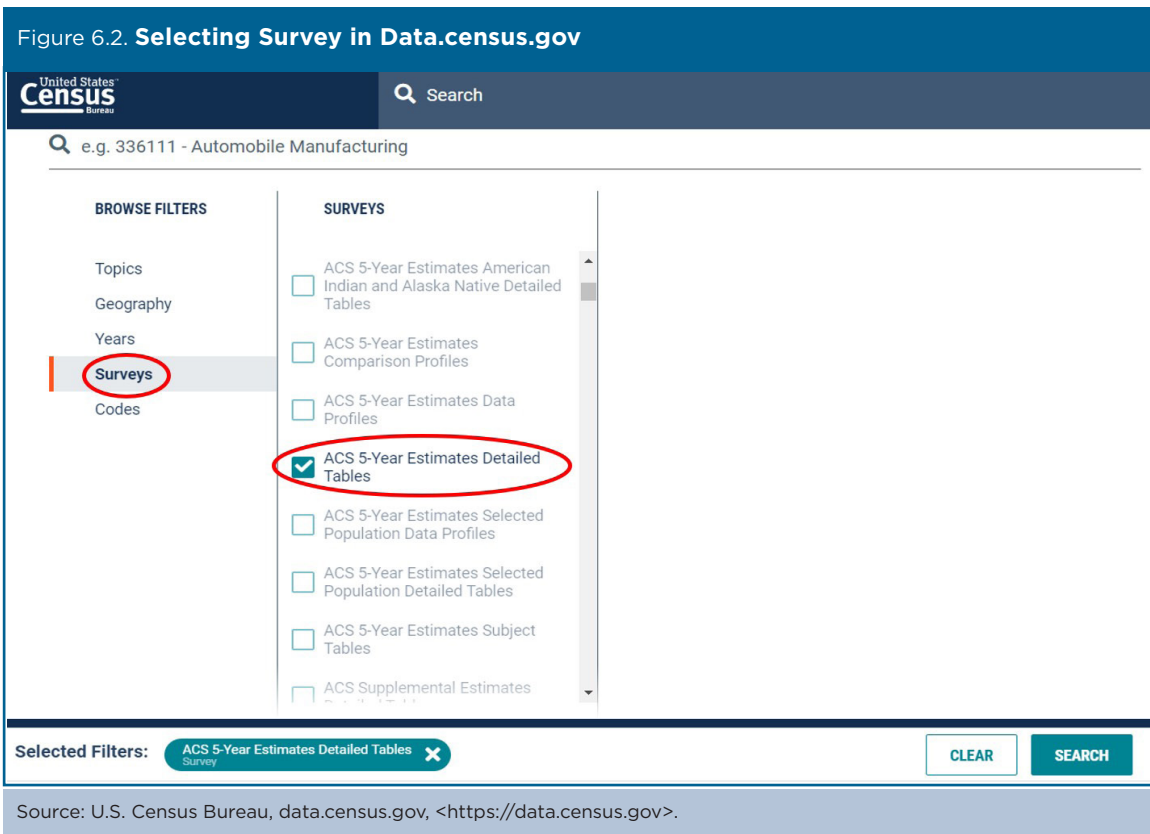
She then clicks the "Geography" filter and scrolls down through the different types of geographic areas—the nation, state, county, etc.—until she finds the line that reads "American Indian Area/Alaska Native Area/Hawaiian Home Land." Clicking on that line brings up a list of these areas, with reservations listed first, alphabetically by reservation name. Here the director could scroll through the list of reservations to find the one she needs, but instead she clicks the magnifying glass and starts to type the name of the reservation into the search box at the top of the list until "Standing Rock Reservation, SD-ND" appears. She clicks on the box to add the Standing Rock Reservation to her selections (see Figures 6.3 and 6.4).

Figure 6.3. **Using the Search Box to Find Geographies in Data.census.gov**

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

Figure 6.4. **Selecting Geographies in Data.census.gov**

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

Finally, she clicks on the "Topics" filter to find the employment table she needs. From the list, she selects "Employment" and then marks the box for "Employment and Labor Force Status" (see Figure 6.5).

Figure 6.5. Selecting Data on Employment in Data.census.gov

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

From the list of Topics, she then clicks on "Race and Ethnicity" and selects "American Indian and Alaska Native" from the list. In the next column, she marks the box for "American Indian and Alaska Native." Next, she clicks on "Search" in the lower right corner of the page (see Figure 6.6).

Figure 6.6. Selecting Data for American Indian and Alaska Natives in Data.census.gov

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

On the results page, the director scrolls down the page and clicks on Table C23002C: "Sex by Age by Employment Status for the Population 16 Years and Over (American Indian and Alaska Native Alone)." That is the table with the employment, unemployment, and not-in-the-labor-force numbers (see Figure 6.7).

Figure 6.7. **Selecting Tables in Data.census.gov**

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

From the table preview page, she clicks on "Customize Table" in the upper right corner (see Figure 6.8).

Figure 6.8. **Previewing Tables in Data.census.gov**

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

A series of filters appear at the top of the screen. She selects the desired survey year by clicking on the current "Product" selection. For the purpose of this case study, she is interested in the "2014 ACS 5-Year Estimates Detailed Tables" (see Figure 6.9).

Figure 6.9. **Selecting the Survey Year in Data.census.gov**

Source: U.S. Census Bureau, data.census.gov, <https://data.census.gov>.
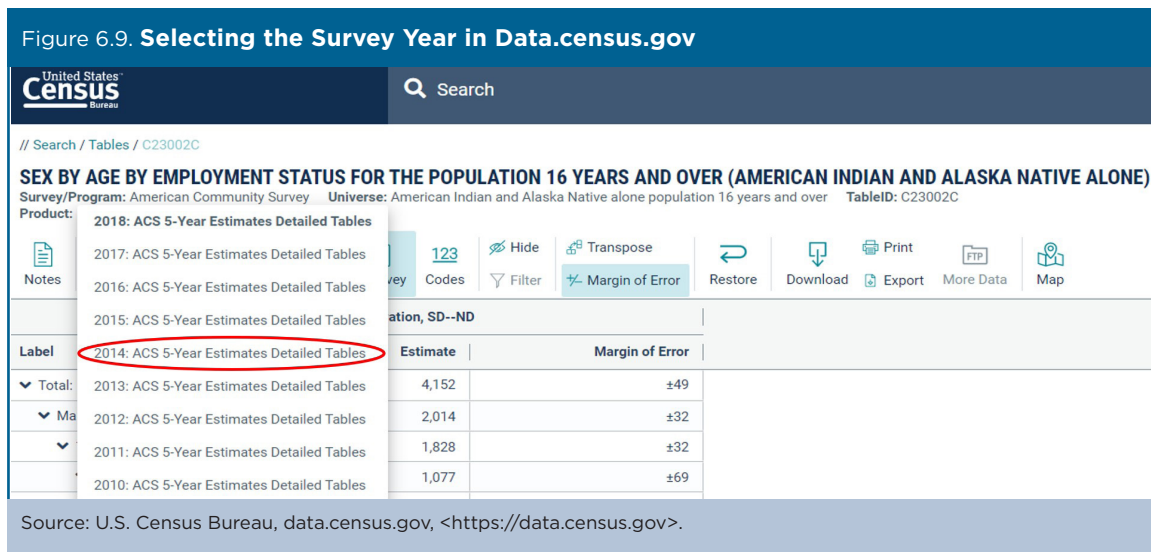
The resulting table is relatively small, so rather than using the "Download" option at the top of the screen, she decides to copy the table directly into her spreadsheet. She clicks on the first cell in the table and then drags her mouse to select all of the data cells. Then she right clicks and selects "Copy with Headers" to copy the data and column headers to her clipboard (see Figure 6.10).

Figure 6.10. **Copying Data Cells From Data.census.gov**

Source: U.S. Census Bureau, data.census.gov, <https://data.census.gov>.
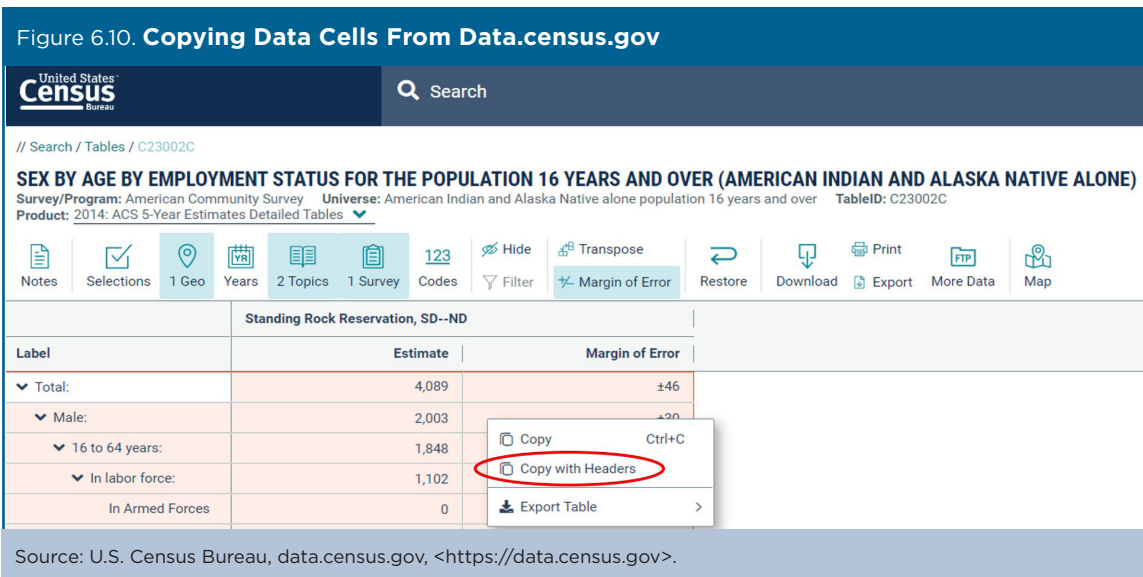
She copies the data into her spreadsheet. The first column includes the variable labels, the second column includes the estimates, and the third column includes the margins of error. In the spreadsheet, she adds up the estimates to find out how many American Indian people on the reservation are unemployed or not in the labor force.

To find out the number of unemployed, she sums the following categories:

- Male: 16 to 64 years: In labor force: Civilian: Unemployed.
- Male: 65 years and over: In labor force: Unemployed.
- Female: 16 to 64 years: In labor force: Civilian: Unemployed.
- Female: 65 years and over: In labor force: Unemployed.
- Total = 443 + 8 + 333 + 0 = 784.

To find out the number of civilians in the labor force, she sums the following categories:

- Male: 16 to 64 years: In labor force: Civilian.
- Male: 65 years and over: In labor force.
- Female: 16 to 64 years: In labor force: Civilian.
- Female: 65 years and over: In labor force.
- Total = 1,102 + 45 + 1,136 + 51 = 2,334.

The resulting estimate of the unemployment rate is 33.6 percent (784 civilian unemployed divided by 2,334 civilians in the labor force). Unfortunately, even at this high level, the unemployment rate does not tell the full story of employment challenges on the reservation. To understand the full magnitude of the problem—including those not working because they may have barriers to searching for employment—she also estimates the number of people not in the labor force.

To find out the number of people not in the labor force, she sums the following categories:

- Male: 16 to 64 years: Not in labor force.
- Male: 65 years and over: Not in labor force.
- Female: 16 to 64 years: Not in labor force.
- Female: 65 years and over: Not in labor force.
- Total = 746 + 110 + 763 + 136 = 1,755.

To find out the total number of civilian adults, sum the number of civilians in the labor force (2,334) and the number not in the labor force (1,775). The total is 4,089.

Dividing the numbers of people who are unemployed and not in the labor force (784 + 1,755 = 2,539) by the total population aged 16 and older (4,089) yields the percentage of people unemployed and not in labor force—62.1 percent—that the director is looking for.

If she wanted to calculate a similar rate for the population aged 16 to 64, she would add the unemployed and not-in-labor-force estimates for men and women aged 16 to 64 (443 + 746 + 333 + 763 = 2,285) and divide that by the population aged 16 to 64 (1,848 + 1,899 = 3,747) to get 2,285 / 3,747 = 61.0 percent.

The Employment and Training director can now answer both of her questions about unemployment among American Indian people on the reservation. The official unemployment rate among American Indian people on the reservation—33.6 percent in 2010–2014—was more than three times the rate for the U.S. population as a whole (9.2 percent). However, this 33.6 percent unemployment rate does not include all of the American Indians on the reservation who need a job but do not have one.[45] Taking into account those who are not in the labor force and cannot look for a job until their barriers to employment are resolved—like needing reliable transportation so that a person living in a remote community on this rural reservation can take a job—the rate jumps to over 60 percent. These results based on ACS data provide a useful starting point for those seeking to improve conditions for American Indians on the Standing Rock Reservation.

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[45] Unemployment rate estimate from Table S2301: "Employment Status," <https://data.census.gov/cedsci/table?q=S2301&hidePreview =true&tid=ACSST5Y2014.S2301&vintage=2018&layer=VT_2018_250_00_PY_D1&g=2500000US3970>.

Case Study #2: American Indian and Alaska Native Retirement Security

Skill Level: Intermediate/advanced
Subject: Retirement security
Type of Analysis: Analysis of retirement income among American Indians and Alaska Natives
Tool Used: ACS Public Use Microdata Sample (PUMS) data
Author: John Murphy, Social Science Research Analyst, Social Security Administration

The American Indian and Alaska Native (AIAN) population faces significant economic challenges, which can play a role in the financial resources available in retirement. These challenges include lower average wages and higher rates of disability, both of which can reduce the amount of future income available through pensions, savings, and Social Security for AIANs. Because there has been little research that has specifically addressed retirement income among AIANs, I wanted to compare retirement income among AIANs with that for the total population.

I previously examined retirement outcomes for AIAN communities and other populations using the Health and Retirement Study (HRS). The HRS is a rich data source for individuals aged 50 and older with information about wealth and retirement for various racial and ethnic groups. However, the HRS sample is far smaller than the ACS Public Use Microdata Sample (PUMS) and is restricted by age. The HRS has about 30,000 respondents, which means there are only 300 to 500 AIAN respondents—far too few to conduct a meaningful subanalysis for the target group. In comparison, the ACS PUMS data has millions of participants with tens of thousands of AIAN respondents.

Because the AIAN community is diverse, with different subgroups exhibiting unique characteristics, I analyzed data for three different categories of AIAN respondents:

- AIAN—A binary (two-category) variable listing a participant as either American Indian/Alaska Native or not, based on self-reporting. This recoded variable was taken directly from the PUMS file (variable RACAIAN) and includes all respondents who selected American Indian or Alaskan Native alone or in combination with one or more other races.

- Single-race AIAN—A binary, self-reported variable indicating that the respondent listed American Indian or Alaskan Native alone for his or her racial identification. This variable is constructed using the RAC1P variable, by combining respondents who identified with the following three groups:

    o American Indian alone.

    o Alaska Native alone.

    o American Indian and Alaska Native tribes specified; or American Indian or Alaska native, not specified and no other races.

- Multiple-race AIAN—A binary, self-reported variable indicating that the respondent listed American Indian or Alaskan Native in combination with one or more other races. This variable is derived from the two variables listed above (AIAN and Single-race AIAN).

The ACS includes data on a variety of sources of income, including earnings, public assistance, Social Security, retirement income, and other sources of income (e.g., dividends, interest, and rental income).

Annual retirement income is a self-reported, continuous variable denoting the amount of retirement income received during the past 12 months, which includes:

1. Retirement pensions and survivor benefits from a former employer; labor union; or federal, state, or local government and the U.S. military.

2. Disability income from companies or unions; or federal, state, or local government and the U.S. military.

3. Periodic receipts from annuities and insurance.

4. Regular income from IRA (individual retirement account) and Keogh plans. This does not include social security income.

Annual social security income is a self-reported, continuous variable of social security income for the past 12 months, which includes benefits received through Social Security's Old-Age and Survivors Insurance (OASI) and Disability Insurance (DI) programs. Definitions for these, and other key concepts, can be found in American Community Survey Subject Definitions.[46]

Accessing and using the PUMS data is pretty simple if you have access to statistical software (e.g., SAS, SPSS, or STATA) that you can use to analyze the data. This case study describes how to get the PUMS data you need if you are using statistical software. Analysts who do not have statistical software can use the U.S. Census Bureau's new microdata access tool on data.census.gov to generate ACS estimates online without the use of statistical software. The Census Bureau created a step-by-step guide on how to use this tool to produce custom estimates from the ACS 1-year PUMS file.[47]

To download PUMS data, go to the Census Bureau's "Accessing PUMS Data" Web page (see Figure 6.11).[48] Click on your desired year of interest from the year 2005 to the present. From here, you can access PUMS data on the FTP site or use the microdata analysis tool on data.census.gov. Data prior to 2005 can be found on the Census Bureau's FTP site.[49]

Figure 6.11. **Accessing ACS PUMS Data**

Source: U.S. Census Bureau, American Community Survey (ACS), Accessing PUMS Data, <www.census.gov/programs -surveys/acs/microdata/access.2018.html>.

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[46] U.S. Census Bureau, American Community Survey Subject Definitions, <www.census.gov/programs-surveys/acs/technical-documentation /code-lists.html>.

[47] U.S. Census Bureau, Using Public Microdata to Create Custom Tables on data.census.gov, <www.census.gov/data/academy/webinars/2020 /using-public-microdata-to-create-custom-tables.html>.

[48] U.S. Census Bureau, American Community Survey (ACS), Accessing PUMS Data, <www.census.gov/programs-surveys/acs/microdata /access.html>.

[49] ACS PUMS data for earlier years are available through the Census Bureau's FTP site at <https://www2.census.gov/programs-surveys/acs /data/pums/>.

For the purposes of this case study, I used 2018 ACS 5-Year PUMS data because they were the most recent 5-year data available at the time. The 5-year data also provide a larger pool of AIANs, thus avoiding problems of too few respondents for subanalysis.

Click on "2018 ACS 5-Year PUMS" to access the ACS 5-year PUMS data (see Figure 6.12).[50]

Figure 6.12. **Selecting ACS PUMS Files of Interest on the Census Bureau's FTP Server**

Source: U.S. Census Bureau, American Community Survey (ACS), Accessing PUMS Data, <www.census.gov/programs -surveys/acs/microdata/access.2018.html>.
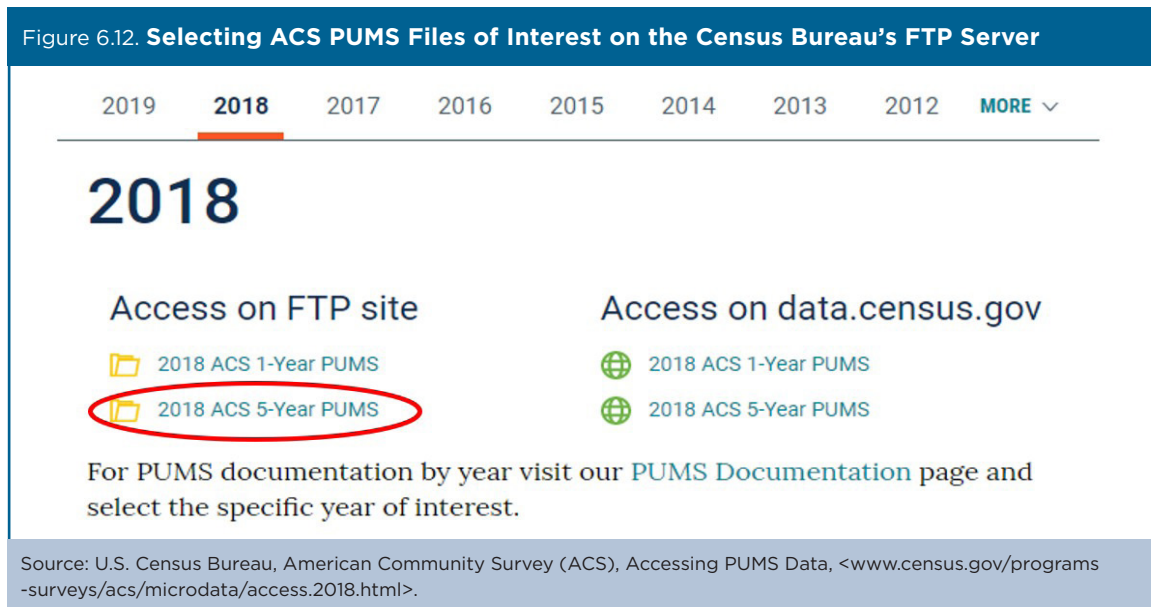
PUMS files on the Census Bureau's FTP site are stored as ZIP files. The naming convention for PUMS files on the FTP server is based on three file features: the file format, the record type, and the state abbreviation.

- File formats are comma separated value files (CSV), SAS data sets for older PC versions of SAS (PC), or SAS datasets for UNIX and recent PC versions of SAS (UNIX) prior to 2010. From 2010 to present, file formats are comma separated value files (CSV) and SAS data sets for UNIX.

- Record types are housing files (h) or person files (p).

- State (or state equivalent) abbreviations are two letter labels such as "tx" for Texas and "dc" for District of Columbia. The abbreviation for the file containing all records in the United States is "us."

For my study, I used total U.S. population records by selecting "csv_pus.zip" (see Figure 6.13).

Figure 6.13. **Downloading ACS 5-Year PUMS Files From the Census Bureau's FTP Server**

Source: U.S. Census Bureau, FTP server, <https://www2.census.gov/programs-surveys/acs/data/pums/2018/5-Year/>.

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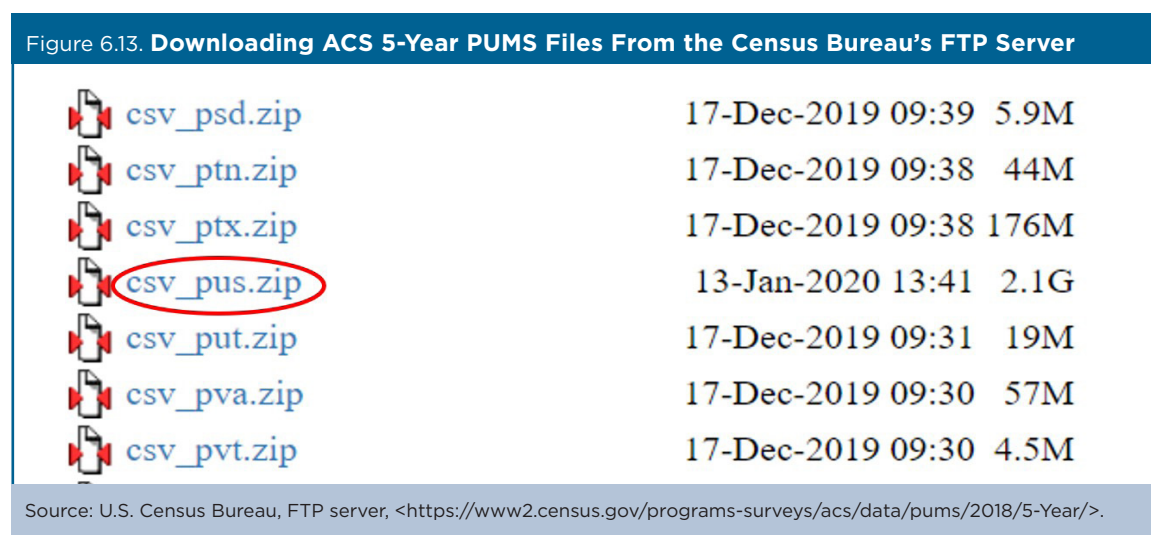
[50] The Census Bureau previously released 3-year estimates based on 36 months of data collection. In 2015, the 3-year products were discontinued. The 2011–2013 ACS 3-year estimates, released in 2014, are the last release of this product.

You will then need to download a zip file of the data. The 5-year PUMS is divided into "a," "b," "c," and "d" files. It may take quite a while to download the file, depending on the size of the file and your Internet connection. (The download for my analysis took about 15 minutes.)

Once I downloaded the file, I used a statistical program to query information about the retirement income for each of the race categories described above. To determine which variables contained the data I needed for this analysis, I used the PUMS Data Dictionary.[51] Using the dictionary, I selected two variables for analysis: (1) Retirement income past 12 months (RETP) and (2) Social Security Income past 12 months (SSP). I then used the adjustment factor for income variable (ADJINC) to adjust income values for these variables to constant dollars.

Combining income from these two sources provided an estimate of total retirement income during the previous 12 months. I also limited the population to adults aged 62 and over using the age variable (AGEP).

The preliminary analysis suggests that AIANs have lower retirement incomes than the overall population and that single-race AIANs may be particularly at risk of economic insecurity (see Table 6.1).[52] However, this research is meant to provide a "jumping off point" for researchers and to inform policy makers. More exploration and research are warranted to investigate the nuances and obstacles of retirement security among AIANs.

Table 6.1. **Comparison of Mean Retirement Income by Race for the Population Aged 62 and Over: 2014-2018**	
Race	Mean retirement income
All races	$21,400
AIAN	$17,900
Single-Race AIAN	$16,000
MultiRace AIAN	$19,700
White alone	$22,400
Black alone	$18,400
Source: Analysis of the 2014–2018 American Community Survey (ACS) 5-year Public Use Microdata Sample.	

An earlier version of this analysis appeared in the report "Retirement Income Among American Indians and Alaska Natives in the American Community Survey." [53]

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[51] U.S. Census Bureau, PUMS Data Dictionary, <www.census.gov/programs-surveys/acs/microdata/documentation.html>.

[52] To learn about data quality in the ACS PUMS and how to test whether differences between estimates are statistically significant, refer to the section on "Data Quality in the ACS PUMS" in Understanding and Using the American Community Survey Public Use Microdata Sample Files: What Data Users Need to Know, <www.census.gov/programs-surveys/acs/guidance/handbooks/pums.html>.

[53] John Murphy and Brent Huggins, "Retirement Income Among American Indians and Alaska Natives in the American Community Survey," Social Security Administration Research and Statistics Note, 2015-01 (2015), <www.ssa.gov/policy/docs/rsnotes/rsn2015-01.html>.

Case Study #3: National Congress of American Indians Regional Profiles

Skill Level: Intermediate
Subject: Earnings
Type of Analysis: Understanding a Demographic Group and Analyses of Trends/Patterns Within a Community
Tools Used: Census Data API, spreadsheet
Author: Malia Villegas, Director, Policy Research Center, National Congress of American Indians; Amber Ebarb, Budget/Policy Analyst and PRC Program Manager, National Congress of American Indians; and Sarah Pytalksi, Policy Research & Evaluation Manager, National Congress of American Indians

The National Congress of American Indians (NCAI) is a nonprofit organization that uses American Community Survey (ACS) data at the national, regional, and local level to provide tribal leaders with the best available knowledge to make strategically proactive policy decisions. For example, we have produced a series of Regional Profiles that combine data from the 2010 Census with more recent information from the ACS to provide information about the American Indian and Alaska Native population for 12 regions across the United States (see Figure 6.14).[54] American Indian areas are shown in red on the map. The Regional Profiles provide demographic data and information about trends in education, household, and economic characteristics for each region and for individual states within those regions.
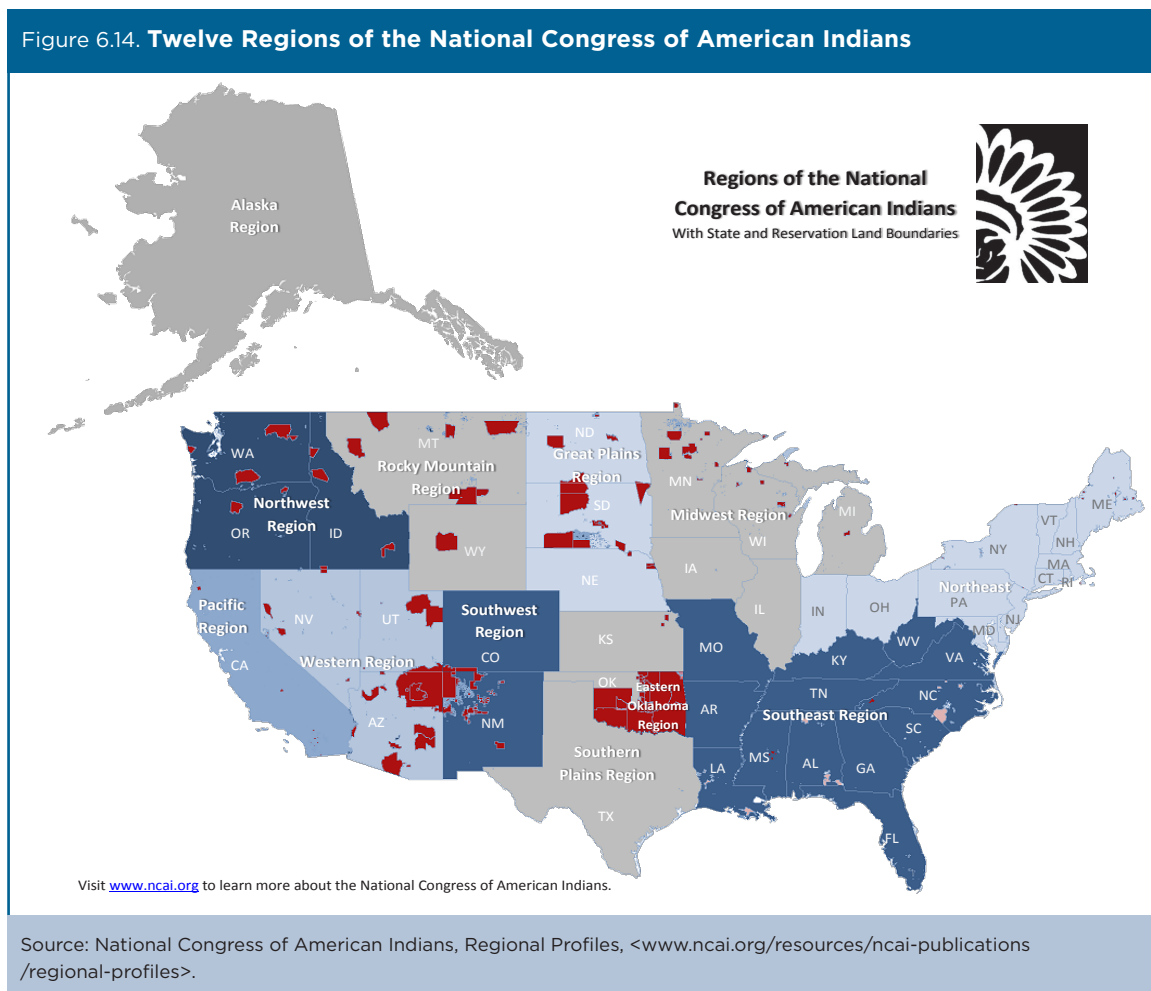
Figure 6.14. **Twelve Regions of the National Congress of American Indians**

Visit www.ncai.org to learn more about the National Congress of American Indians.

Source: National Congress of American Indians, Regional Profiles, <www.ncai.org/resources/ncai-publications/regional-profiles>.

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[54] National Congress of American Indians, Regional Profiles, <www.ncai.org/resources/ncai-publications/regional-profiles>.

We believe that context is important for understanding issues relevant to the American Indian and Alaska Native populations. For example, issues relevant to American Indians living on tribal reservations may or may not be relevant to those living in urban areas, and vice versa. Similarly, we may discover an issue that affects Alaska Natives in a certain age group, but would be missed by looking at the population as a whole. For this reason, we try to disaggregate data whenever possible by tribal nation, geography, demographic characteristics (e.g., gender or age group), or language (e.g., native language speaker or nonspeaker). Accordingly, the Regional Profiles also provide several useful comparisons:

- Comparisons between the American Indian and Alaska Native populations and other groups (e.g., non-Hispanic Whites).
- Comparisons across states within a given region (e.g., Idaho, Oregon, and Washington in the Northwest Region profile).
- Comparisons by place (e.g., on reservation compared with off reservation, urban compared with rural).
- Comparisons by demographic category (e.g., women versus men, families with and without children).

For many of these comparisons, we rely on data from the ACS. For example, in the Southern Plains and Eastern Oklahoma Profile, we used the ACS to compile data on the gender wage gap—the ratio of women's earnings to men's earnings among full-time, year-round workers.[55]

Data on the gender wage gap for American Indian and Alaska Native populations can be accessed through the 2006–2010 ACS Selected Population Tables in the Census Data API.[56]

To find the variables you need, refer to the Census Data API Discovery Tool.[57] Select the HTML format link to view the available API data sets on the Census Bureau's Web site (see Figure 6.15).

Figure 6.15. **Census Data API Discovery Tool**

Source: U.S. Census Bureau, Census Data API Discovery Tool, <www.census.gov/data/developers/updates/new-discovery-tool.html>.

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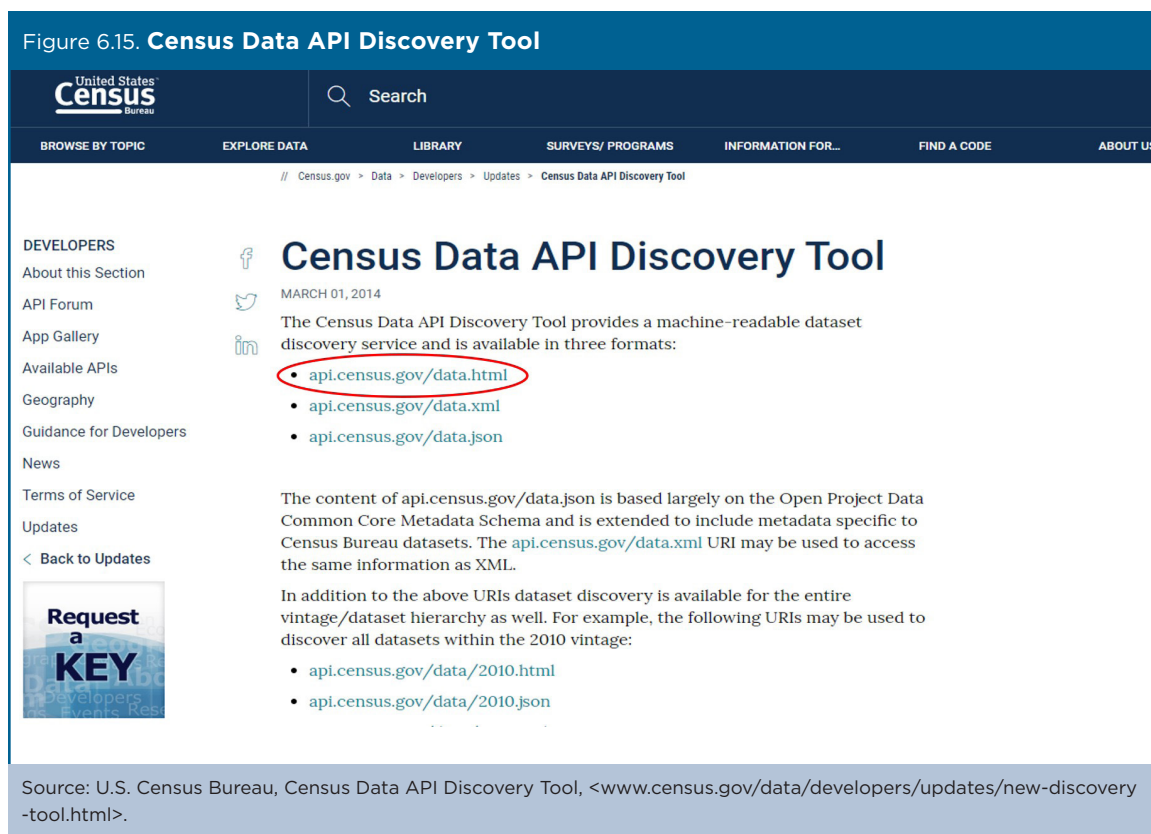
[55] National Congress of American Indians, Regional Profiles, Southern Plains and Eastern Oklahoma Profile, <www.ncai.org/policy-research-center/research-data/prc-publications/Southern_Plains_and_Eastern.pdf>.

[56] U.S. Census Bureau, Race/Ethnicity and American Indian & Alaska Native Data, <www.census.gov/programs-surveys/acs/data/race-aian.2010.html>.

[57] U.S. Census Bureau, Census Data API Discovery Tool, <www.census.gov/data/developers/updates/new-discovery-tool.html>.

To find a data set of interest, scroll through the list or search your Web browser for a specific year or phrase (for example, "2010" or "Selected Population Tables"). Select the link for "variables" to view a list of all the variables available in the data set (see Figure 6.16).

Figure 6.16. Selecting a List of Variables in the Census Data API

ACS 5-Year Data Profiles	economic, demographic, and housing characteristics of the U.S. population. The data profiles include the following geographies: nation, all states (including DC and Puerto Rico), all metropolitan areas, all congressional districts, all counties, all places and all tracts. Data profiles contain broad social, economic, housing, and demographic information. The data are presented as both counts and percentages. There are over 2,400 variables in this dataset.	2010	acs› acs5› profile	Aggregate	geographies	variables	groups	examples
American Community Survey: 5-Year Estimates: Selected Population Detailed Tables 5-Year	The Selected Population Tables (SPT) are released every five years. They are available for selected race, Hispanic origin, tribal, and ancestry populations.	2010	acs› acs5› spt	Aggregate	geographies	variables	groups	examples
American Community Survey: 5-Year Estimates: Selected Population Data Profiles 5-Year	The Selected Population Tables (SPT) are released every five years. They are available for selected race, Hispanic origin, tribal, and ancestry populations.	2010	acs› acs5› sptprofile	Aggregate	geographies	variables	groups	examples
ACS 5-Year Subject Tables	The American Community Survey (ACS) is an ongoing survey that provides data every year -- giving communities the current information they need to plan investments and services. The ACS covers a broad range of topics about social, economic, demographic, and housing characteristics of the U.S. population. The subject tables include the following geographies: nation, all states (including DC and Puerto Rico), all metropolitan areas, all congressional districts, all counties, all places and all tracts. Subject tables provide an overview of the estimates available in a particular topic. The data are presented as both counts and percentages. There are over 66,000 variables in this dataset.	2010	acs› acs5› subject	Aggregate	geographies	variables	groups	examples

Note: Data are only displayed for selected rows.
Source: U.S. Census Bureau, Census API: Datasets, <https://api.census.gov/data.html>.

Scroll through the list of variables to find the desired variables for men's earnings (B20017_003E) and women's earnings (B20017_006E) among full-time, year-round workers. You will use these variables and their associated margins of error, B20017_003M and B20017_006M, to create your API query (see Figure 6.17).

Figure 6.17. Identifying Variables for an API Query

B20005_095E	Estimate!!Total!!Female!!Other!!With earnings!!$100,000 or more	SEX BY WORK EXPERIENCE IN THE PAST 12 MONTHS BY EARNINGS IN THE PAST 12 MONTHS (IN 2010 INFLATION-ADJUSTED DOLLARS) FOR THE POPULATION 16 YEARS AND OVER	not required	B20005_095EA, B20005_095M, B20005_095MA
B20017_001E	Estimate!!Median earnings in the past 12 months (in 2010 inflation-adjusted dollars)!!Total (dollars)	MEDIAN EARNINGS IN THE PAST 12 MONTHS (IN 2010 INFLATION-ADJUSTED DOLLARS) BY SEX BY WORK EXPERIENCE IN THE PAST 12 MONTHS FOR THE POPULATION 16 YEARS AND OVER WITH EARNINGS IN THE PAST 12 MONTHS	not required	B20017_001EA, B20017_001M, B20017_001MA
B20017_002E	Estimate!!Median earnings in the past 12 months (in 2010 inflation-adjusted dollars)!!Male!!Total (dollars)	MEDIAN EARNINGS IN THE PAST 12 MONTHS (IN 2010 INFLATION-ADJUSTED DOLLARS) BY SEX BY WORK EXPERIENCE IN THE PAST 12 MONTHS FOR THE POPULATION 16 YEARS AND OVER WITH EARNINGS IN THE PAST 12 MONTHS	not required	B20017_002EA, B20017_002M, B20017_002MA
B20017_003E	Estimate!!Median earnings in the past 12 months (in 2010 inflation-adjusted dollars)!!Male!!Worked full-time, year-round in the past 12 months (dollars)	MEDIAN EARNINGS IN THE PAST 12 MONTHS (IN 2010 INFLATION-ADJUSTED DOLLARS) BY SEX BY WORK EXPERIENCE IN THE PAST 12 MONTHS FOR THE POPULATION 16 YEARS AND OVER WITH EARNINGS IN THE PAST 12 MONTHS	not required	B20017_003EA, B20017_003M, B20017_003MA
B20017_004E	Estimate!!Median earnings in the past 12 months (in 2010 inflation-adjusted dollars)!!Male!!Other (dollars)	MEDIAN EARNINGS IN THE PAST 12 MONTHS (IN 2010 INFLATION-ADJUSTED DOLLARS) BY SEX BY WORK EXPERIENCE IN THE PAST 12 MONTHS FOR THE POPULATION 16 YEARS AND OVER WITH EARNINGS IN THE PAST 12 MONTHS	not required	B20017_004EA, B20017_004M, B20017_004MA
B20017_005E	Estimate!!Median earnings in the past 12 months (in 2010 inflation-adjusted dollars)!!Female!!Total (dollars)	MEDIAN EARNINGS IN THE PAST 12 MONTHS (IN 2010 INFLATION-ADJUSTED DOLLARS) BY SEX BY WORK EXPERIENCE IN THE PAST 12 MONTHS FOR THE POPULATION 16 YEARS AND OVER WITH EARNINGS IN THE PAST 12 MONTHS	not required	B20017_005EA, B20017_005M, B20017_005MA
B20017_006E	Estimate!!Median earnings in the past 12 months (in 2010 inflation-adjusted dollars)!!Female!!Worked full-time, year-round in the past 12 months (dollars)	MEDIAN EARNINGS IN THE PAST 12 MONTHS (IN 2010 INFLATION-ADJUSTED DOLLARS) BY SEX BY WORK EXPERIENCE IN THE PAST 12 MONTHS FOR THE POPULATION 16 YEARS AND OVER WITH EARNINGS IN THE PAST 12 MONTHS	not required	B20017_006EA, B20017_006M, B20017_006MA
B20017_007E	Estimate!!Median earnings in the past 12 months (in 2010 inflation-adjusted dollars)!!Female!!Other (dollars)	MEDIAN EARNINGS IN THE PAST 12 MONTHS (IN 2010 INFLATION-ADJUSTED DOLLARS) BY SEX BY WORK EXPERIENCE IN THE PAST 12 MONTHS FOR THE POPULATION 16 YEARS AND OVER WITH EARNINGS IN THE PAST 12 MONTHS	not required	B20017_007EA, B20017_007M, B20017_007MA
B21001_001E	Estimate!!Total	SEX BY AGE BY VETERAN STATUS FOR THE CIVILIAN POPULATION 18 YEARS AND OVER	not required	B21001_001EA, B21001_001M, B21001_001MA
B21001_002E	Estimate!!Total!!Veteran	SEX BY AGE BY VETERAN STATUS FOR THE CIVILIAN POPULATION 18 YEARS AND OVER	not required	B21001_002EA, B21001_002M, B21001_002MA

Note: Data are only displayed for selected rows.
Source: U.S. Census Bureau, Census API: Variables, <https://api.census.gov/data/2010/acs/acs5/spt/variables.html>.

Now that you know the required API query variables, revisit the list of data sets available in the Census Data API and select "examples" to view a list of example API queries (see Figure 6.18).

Figure 6.18 **Finding Example Queries in the Census Data API**

ACS 5-Year Data Profiles	economic, demographic, and housing characteristics of the U.S. population. The data profiles include the following geographies: nation, all states (including DC and Puerto Rico), all metropolitan areas, all congressional districts, all counties, all places and all tracts. Data profiles contain broad social, economic, housing, and demographic information. The data are presented as both counts and percentages. There are over 2,400 variables in this dataset.	2010	acs› acs5› profile	Aggregate	geographies	variables	groups	examples
American Community Survey: 5-Year Estimates: Selected Population Detailed Tables 5-Year	The Selected Population Tables (SPT) are released every five years. They are available for selected race, Hispanic origin, tribal, and ancestry populations.	2010	acs› acs5› spt	Aggregate	geographies	variables	groups	examples
American Community Survey: 5-Year Estimates: Selected Population Data Profiles 5-Year	The Selected Population Tables (SPT) are released every five years. They are available for selected race, Hispanic origin, tribal, and ancestry populations.	2010	acs› acs5› sptprofile	Aggregate	geographies	variables	groups	examples
ACS 5-Year Subject Tables	The American Community Survey (ACS) is an ongoing survey that provides data every year -- giving communities the current information they need to plan investments and services. The ACS covers a broad range of topics about social, economic, demographic, and housing characteristics of the U.S. population. The subject tables include the following geographies: nation, all states (including DC and Puerto Rico), all metropolitan areas, all congressional districts, all counties, all places and all tracts. Subject tables provide an overview of the estimates available in a particular topic. The data are presented as both counts and percentages. There are over 66,000 variables in this dataset.	2010	acs› acs5› subject	Aggregate	geographies	variables	groups	examples

Note: Data are only displayed for selected rows.
Source: U.S. Census Bureau, Census API: Datasets, <https://api.census.gov/data.html>.

For this example, data are needed for specific states (Kansas, Oklahoma, and Texas), so you can use the state example URL to start creating a query (see Figure 6.19).

Figure 6.19. **Selecting Example Queries in the Census Data API**

Census API: Examples for /data/2010/acs/acs5/spt

Geography Hierarchy	Geography Level	Example URL
us	010	https://api.census.gov/data/2010/acs/acs5/spt?get=B01001_001E,NAME&for=us:*&key=YOUR_KEY_GOES_HERE
		https://api.census.gov/data/2010/acs/acs5/spt?get=B01001_001E,NAME&for=us:1&key=YOUR_KEY_GOES_HERE
region	020	https://api.census.gov/data/2010/acs/acs5/spt?get=B01001_001E,NAME&for=region:*&key=YOUR_KEY_GOES_HERE
		https://api.census.gov/data/2010/acs/acs5/spt?get=B01001_001E,NAME&for=region:1&key=YOUR_KEY_GOES_HERE
division	030	https://api.census.gov/data/2010/acs/acs5/spt?get=B01001_001E,NAME&for=division:*&key=YOUR_KEY_GOES_HERE
		https://api.census.gov/data/2010/acs/acs5/spt?get=B01001_001E,NAME&for=division:1&key=YOUR_KEY_GOES_HERE
state	040	https://api.census.gov/data/2010/acs/acs5/spt?get=B01001_001E,NAME&for=state:*&key=YOUR_KEY_GOES_HERE
		https://api.census.gov/data/2010/acs/acs5/spt?get=B01001_001E,NAME&for=state:01&key=YOUR_KEY_GOES_HERE
state› county	050	https://api.census.gov/data/2010/acs/acs5/spt?get=B01001_001E,NAME&for=county:*&key=YOUR_KEY_GOES_HERE
		https://api.census.gov/data/2010/acs/acs5/spt?get=B01001_001E,NAME&for=county:*&in=state:*&key=YOUR_KEY_GOES_HERE
		https://api.census.gov/data/2010/acs/acs5/spt?get=B01001_001E,NAME&for=county:003&in=state:01&key=YOUR_KEY_GOES_HERE
state› county› county subdivision	060	https://api.census.gov/data/2010/acs/acs5/spt?get=B01001_001E,NAME&for=county%20subdivision:*&in=state:09&key=YOUR_KEY_GOES_HER
		https://api.census.gov/data/2010/acs/acs5/spt?get=B01001_001E,NAME&for=county%20subdivision:*&in=state:09&in=county:*&key=YOUR_KEY
		https://api.census.gov/data/2010/acs/acs5/spt?get=B01001_001E,NAME&for=county%20subdivision:08070&in=state:09%20county:001&key=YOU
state› county› county subdivision› subminor civil division	067	https://api.census.gov/data/2010/acs/acs5/spt?get=B01001_001E,NAME&for=subminor%20civil%20division:*&in=state:72%20county:003%20coun
		https://api.census.gov/data/2010/acs/acs5/spt?get=B01001_001E,NAME&for=subminor%20civil%20division:72320&in=state:72%20county:003%20
state› county› tract	140	https://api.census.gov/data/2010/acs/acs5/spt?get=B01001_001E,NAME&for=tract:*&in=state:01&key=YOUR_KEY_GOES_HERE
		https://api.census.gov/data/2010/acs/acs5/spt?get=B01001_001E,NAME&for=tract:*&in=state:01&in=county:*&key=YOUR_KEY_GOES_HERE
		https://api.census.gov/data/2010/acs/acs5/spt?get=B01001_001E,NAME&for=tract:020100&in=state:01%20county:001&key=YOUR_KEY_GOES_
state› place› county (or part)	155	https://api.census.gov/data/2010/acs/acs5/spt?get=B01001_001E,NAME&for=county%20(or%20part):*&in=state:01%20place:00124&key=YOUR_I
		https://api.census.gov/data/2010/acs/acs5/spt?get=B01001_001E,NAME&for=county%20(or%20part):067&in=state:01%20place:00124&key=YOUR

Note: Data are only displayed for selected rows.
Source: U.S. Census Bureau, Census API: Examples <https://api.census.gov/data/2010/acs/acs5/spt/examples.html>.

To access a 2006–2010 ACS Selected Population Table on the gender wage gap among American Indian/Alaskan Native and non-Hispanic White subpopulations in Kansas, Oklahoma, and Texas, enter the following query in your Web browser: "https://api.census.gov/data/2010/acs/acs5/spt?get=B20017_003E,B20017_006E,B20017_003M ,B20017_006M,POPGROUP_TTL,NAME&for=state:20,40,48&POPGROUP=451&POPGROUP=455%22" as described in the steps below.

1. Start your query with the host name: "https://api.census.gov/data."

2. Add the data year (2010) to the URL: "https://api.census.gov/data/2010."

3. Add the data set name acronym for the ACS 5-Year Selected Population Tables, and follow this base URL with a question mark: "https://api.census.gov/data/2010/acs/acs5/spt?."

4. Add the required variables, starting with a "get" clause: "https://api.census.gov/data/2010/acs/acs5/spt?get =B20017_003E,B20017_006E,B20017_003M,B20017_006M."

5. To select data for Kansas, Oklahoma, and Texas, you need to specify the codes for these areas in your query. The Census Data API supports Federal Information Processing Series (FIPS) codes and Geographic Names Informational System (GNIS) codes. You can find the FIPS codes for these states on the Census Bureau's Geographies Web page. [58] Then add the state codes for Kansas (20), Oklahoma (40), and Texas (48) to the URL, separated by commas. In this data set, the variable called NAME provides the name of the geographic areas that you are using to limit your search, and the "for" predicate (&for) restricts the data to the state level: "https://api.census.gov/data/2010/acs/acs5/spt?get=B20017_003E,B20017_006E,B20017_003M ,B20017_006M,POPGROUP_TTL,NAME&for=state:20,40,48."

6. Next, you need to specify the required racial/ethnic groups. Use the POPGROUP variable to specify the codes for the population groups and use POPGROUP_TTL to specify the names of the population groups, as shown in the list of variables for the 2010 ACS 5-Year Selected Population Tables.[59] You can find the relevant codes by entering the following API query in your Web browser: "https://api.census.gov/data/2010/acs/acs5 /spt?get=POPGROUP,POPGROUP_TTL,NAME&for=us:*."

By scrolling through the results of this query, you find that the POPGROUP code for White alone, not Hispanic or Latino is "451," and the code for American Indian and Alaska Native alone, not Hispanic or Latino is "455" (see Figure 6.20).

Figure 6.20. **Identifying Racial/Ethnic Codes for an API Query**

```
Z99) or (400-999)","United States","1"],
["79S","Confederated Salish and Kootenai Tribes of the Flathead Nation tribal grouping alone or in any combination
(J35-J38) & (100-299) or (300, A01-Z99) or (400-999)","United States","1"],
["423","Spaniard (200-209)","United States","1"],
["451","White alone, not Hispanic or Latino","United States","1"],
["452","White alone or in combination with one or more other races, not Hispanic or Latino","United States","1"],
["453","Black or African American alone, not Hispanic or Latino","United States","1"],
["454","Black or African American alone or in combination with one or more other races, not Hispanic or
Latino","United States","1"],
["455","American Indian and Alaska Native alone, not Hispanic or Latino","United States","1"],
["456","American Indian and Alaska Native alone or in combination with one or more other races, not Hispanic or
Latino","United States","1"],
["457","Asian alone, not Hispanic or Latino","United States","1"],
["458","Asian alone or in combination with one or more other races, not Hispanic or Latino","United States","1"],
["459","Native Hawaiian and Other Pacific Islander alone, not Hispanic or Latino","United States","1"],
["460","Native Hawaiian and Other Pacific Islander alone or in combination with one or more other races, not
Hispanic or Latino","United States","1"],
["461","Some other race alone, not Hispanic or Latino","United States","1"],
["462","Some other race alone or in combination with one or more other races, not Hispanic or Latino","United
States","1"],
```

Note: Data are only displayed for selected rows.
Source: U.S. Census Bureau, <https://api.census.gov/data/2010/acs/acs5/spt?get=POPGROUP,POPGROUP_TTL,NAME&for=us:*>.

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[58] U.S. Census Bureau, Geographies, Reference Files, <www.census.gov/geographies/reference-files.html>.
[59] U.S. Census Bureau, Census Data API: Variables, <https://api.census.gov/data/2010/acs/acs5/spt/variables.html>.

What Users of Data for American Indians and Alaska Natives Need to Know   U.S. Census Bureau

7. Now that you know the correct racial/ethnic codes, you can complete your query: "https://api.census.gov/data/2010/acs/acs5/spt?get=B20017_003E,B20017_006E,B20017_003M,B20017_006M,POPGROUP_TTL,NAME&for=state:20,40,48&POPGROUP=451&POPGROUP=455."

From your browser, you can then save the query results as a CSV file. Here are the steps to open your query results in a spreadsheet:

1. Right click on the page and select "Save as" (see Figure 6.21).

Figure 6.21. **Saving the API Query Results**

Source: U.S. Census Bureau,
<https://api.census.gov/data/2010/acs/acs5/spt?get=B20017_003E,B20017_006E,B20017_003M,B20017_006M,POPGROUP_TTL,NAME&for=state:20,40,48&POPGROUP=451&POPGROUP=455>.
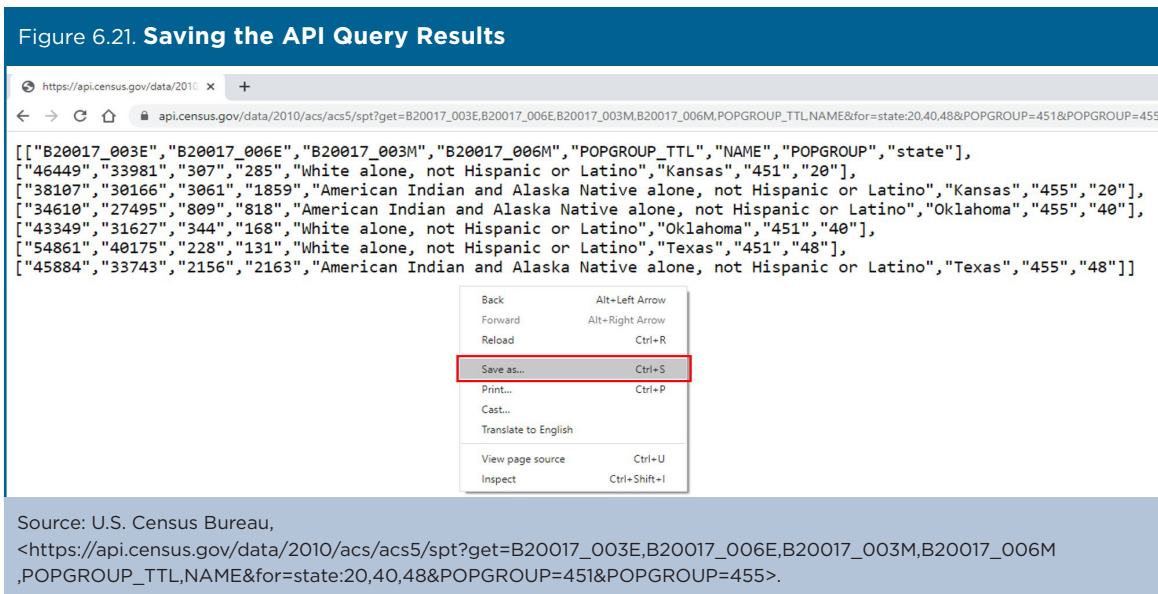
2. Save the page as a CSV file by adding ".csv" at the end of the file name and selecting "All Files" as the file type (see Figure 6.22).

Figure 6.22. **Saving the Results as a CSV File**

Source: U.S. Census Bureau.
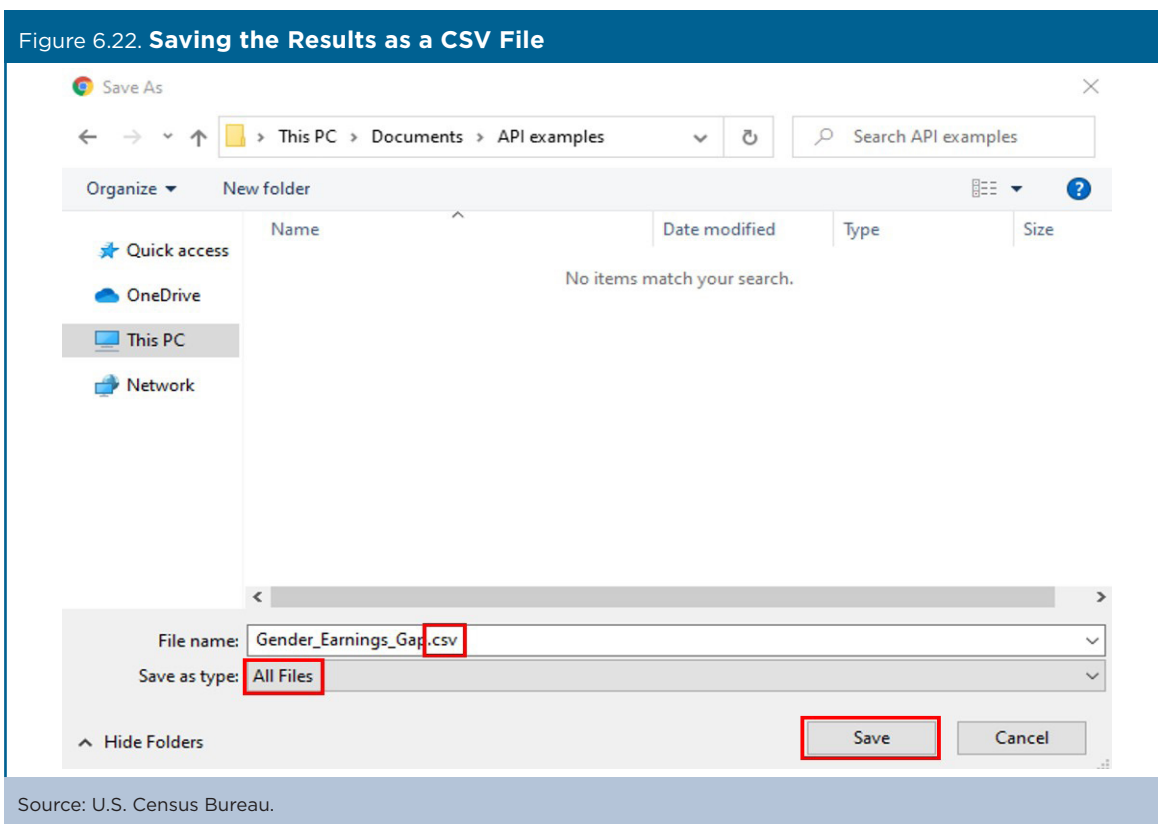
3. Open the CSV file in a spreadsheet for further analysis of the query results (see Figure 6.23).

Figure 6.23. **Opening the API Query Results**

	A	B	C	D	E	F	G	H
1	[["B20017_003E"	B20017_006E	B20017_003M	B20017_006M	POPGROUP_TTL	NAME	POPGROUP	state]
2	["46449"	33981	307	285	White alone, not Hispanic or Latino	Kansas	451	20]
3	["38107"	30166	3061	1859	American Indian and Alaska Native alone, not Hispanic or Latino	Kansas	455	20]
4	["34610"	27495	809	818	American Indian and Alaska Native alone, not Hispanic or Latino	Oklahoma	455	40]
5	["43349"	31627	344	168	White alone, not Hispanic or Latino	Oklahoma	451	40]
6	["54861"	40175	228	131	White alone, not Hispanic or Latino	Texas	451	48]
7	["45884"	33743	2156	2163	American Indian and Alaska Native alone, not Hispanic or Latino	Texas	455	48]]

Source: U.S. Census Bureau.

We took the data and calculated the earnings ratio for each state and for each demographic group, and we used these data to create a chart that compares the 12 categories (three states, two racial/ethnic groups, and two gender groups). On the chart, we also showed the margin of error for each estimate, which is included in each of the tables we downloaded (see Figure 6.24). The margin of error provides a measure of reliability for a given estimate.

Figure 6.24. **Gender Earnings Gap for American Indian and Alaska Natives and Non-Hispanic Whites in Kansas, Oklahoma, and Texas: 2006–2010**

Source: U.S. Census Bureau, 2006–2010 American Community Survey Selected Population Tables, Table B20017.
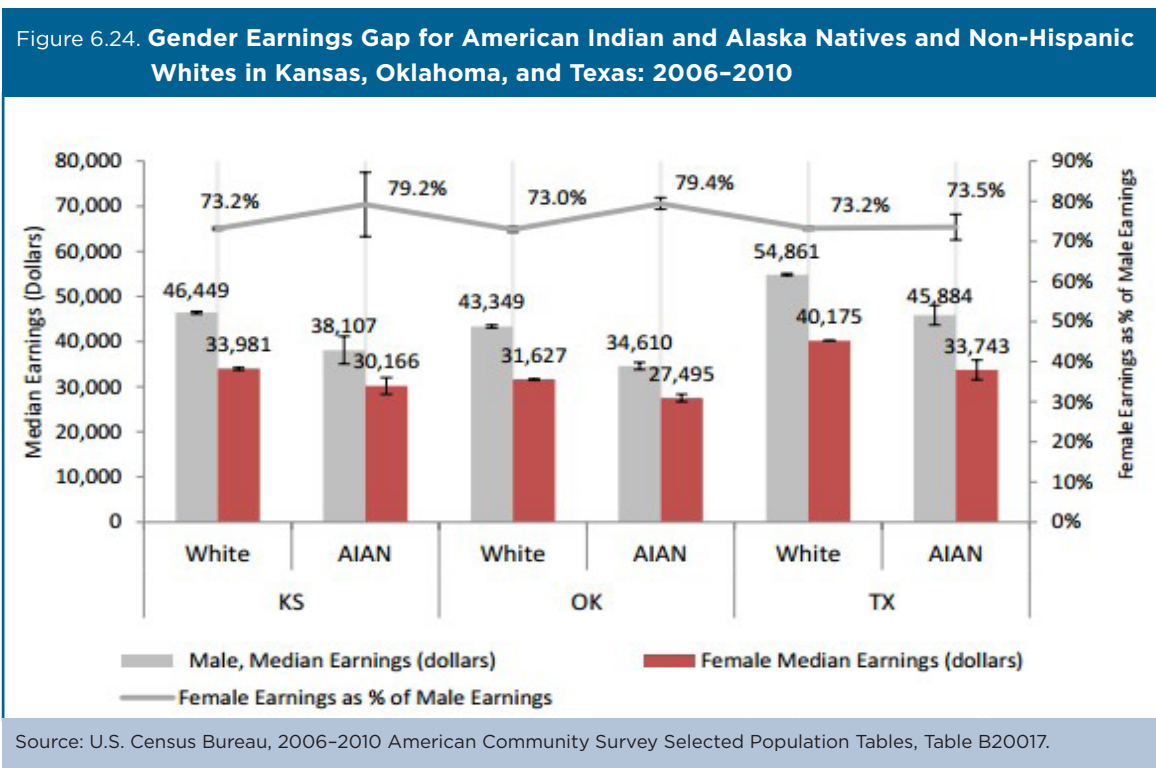
We produced similar analyses for a variety of other topics, including educational attainment, poverty, employment, homeownership, and median home values.

Policy Applications of the Data

This case study demonstrates how ACS data can be used to provide tribal leaders with the data they need for decision-making. The Regional Profiles were developed by the NCAI in response to a request from our Executive Board to provide clearer demographic and economic portraits of the communities and regions beyond their own. These communities are being called upon to testify before Congress as national leaders and as representatives of Indian Country as a whole—not only for their respective tribal communities. Since their release, these Regional Profiles have been used by regional intertribal organizations, tribal Community Development Financial Institutions (CDFI), as well as tribal program administrators engaged with YouthBuild in their efforts to advocate for federal funding, increase data collection, apply for grants, and educate policy makers at state and federal levels.

One of the first explicit data requests the NCAI Policy Research Center received came from the Executive Director of the United Southern and Eastern Tribes, who needed economic data for the entire eastern region. He was amazed that within 5 minutes of his request, we had printed a copy of the Eastern Regional Data Profile with the exact information that he and his staff were seeking. Conveniently, he was heading to testify on Capitol Hill later that afternoon and he quickly amended his prepared comments to include several data points.

Another request came from the Executive Director of the Native CDFI Network, who was eager to incorporate economic data in grant proposals and funding requests to private and federal partners. She knew how critical data would be in telling the story of economic disparity and the lack of access to capital so many of the communities across Indian Country face—and how the Native CDFIs are poised to meet and fill those resource gaps. She was thrilled to realize that the Regional Profiles had been produced and that they covered topics, such as housing and broadband connectivity, in addition to employment and income information. She immediately disseminated the profiles to their respective CDFI regional representatives within her network.

Finally, various tribal program administrators met with NCAI and the U.S. Department of Labor to determine what more could be done to secure access to funding through the YouthBuild program. When they were told how heavily data and evaluation were factored into competitive applications, many administrators expressed frustration that their programs did not have sufficient capacity to collect and analyze data to the extent required. The NCAI Policy Research Center shared the Regional Profiles as a resource, and the representatives took great comfort in having these baseline ACS data about the communities within their state and how they compared to non-Native populations—enabling them to highlight the need for increased investment in workforce development and economic opportunity.

7. UNDERSTANDING ERROR AND DETERMINING STATISTICAL SIGNIFICANCE

Sources of Error

The data in American Community Survey (ACS) products are estimates of the actual figures that would have been obtained if the entire population—rather than the chosen ACS sample—had been interviewed using the same methodology. All estimates produced from sample surveys have uncertainty associated with them as a result of being based on a sample of the population rather than the full population. This uncertainty—called sampling error—means that estimates derived from the ACS will likely differ from the values that would have been obtained if the entire population had been included in the survey, as well as from values that would have been obtained had a different set of sample units been selected for the survey.

Sampling error is the difference between an estimate based on a sample and the corresponding value that would be obtained if the estimate were based on the entire population. Measures of the magnitude of sampling error reflect the variation in the estimates over all possible samples that could have been selected from the population using the same sampling methodology. The margin of error is the measure of the magnitude of sampling error provided with all published ACS estimates.

In addition to sampling error, data users should recognize that other types of error—called nonsampling error—might also be introduced during any of the complex operations used to collect and process ACS data. Nonsampling error can result from problems in the sampling frame or survey questionnaires, mistakes in how the data are reported or coded, issues related to data processing or weighting, or problems related to interviewer bias or nonresponse bias. Nonresponse bias results when survey respondents differ in meaningful ways from nonrespondents. Nonsampling error may affect ACS data by increasing the variability of the estimates or introducing bias into ACS results. The U.S. Census Bureau tries to minimize nonsampling error through extensive research and evaluation of sampling techniques, questionnaire design, and data collection and processing procedures.

Nonsampling error is very difficult to measure directly, but the Census Bureau provides a number of indirect measures to help inform users about the quality of ACS estimates. The section on "Measures of Nonsampling Error" includes a more detailed description of the different types of nonsampling error in the ACS and measures of ACS data quality. More information on ACS data quality measures for the nation and individual states is available on the Census Bureau's Web page on Sample Size and Data Quality.[60]

Measures of Sampling Error

Margins of Error and Confidence Intervals

A margin of error (MOE) describes the precision of an ACS estimate at a given level of confidence. The confidence level associated with the MOE indicates the likelihood that the ACS sample estimate is within a certain range (the MOE) of the population value. The MOEs for published ACS estimates are provided at a 90 percent confidence level. From these MOEs, data users can easily calculate 90 percent confidence intervals that define a range expected to contain the *true* or population value of an estimate 90 percent of the time. For example, in the Data Profile for Selected Social Characteristics (Table DP02) for Colorado, a portion of which is shown in Figure 7.1, data from the 2015 ACS 1-year estimates indicate that there were 564,757 one-person households in the state in 2015 with an MOE of 10,127. By adding and subtracting the MOE from the point estimate, we can calculate the 90 percent confidence interval for that estimate:

564,757 – 10,127 = 554,630 = Lower bound of the interval

564,757 + 10,127 = 574,884 = Upper bound of the interval

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Figure 7.1. **Sample Estimates and Margins of Error in Data.census.gov: 2015**

	Colorado			
	Estimate	**Margin of Error**	**Percent**	**Percent Margin of Error**
HOUSEHOLDS BY TYPE				
Total households	2,074,735	+/-7,548	2,074,735	(X)
Family households (families)	1,331,861	+/-11,075	64.2%	+/-0.5
With own children of the householder under 18 years	597,501	+/-8,075	28.8%	+/-0.4
Married-couple family	1,038,040	+/-9,389	50.0%	+/-0.4
With own children of the householder under 18 years	435,028	+/-7,158	21.0%	+/-0.3
Male householder, no wife present, family	93,024	+/-5,026	4.5%	+/-0.2
With own children of the householder under 18 years	48,969	+/-4,185	2.4%	+/-0.2
Female householder, no husband present, family	200,797	+/-6,582	9.7%	+/-0.3
With own children of the householder under 18 years	113,504	+/-4,699	5.5%	+/-0.2
Nonfamily households	742,874	+/-10,127	35.8%	+/-0.5
Householder living alone	564,757	+/-10,127	27.2%	+/-0.5
65 years and over	182,959	+/-5,249	8.8%	+/-0.3
Households with one or more people under 18 years	657,324	+/-8,777	31.7%	+/-0.4
Households with one or more people 65 years and over	497,903	+/-4,124	24.0%	+/-0.2

Source: U.S. Census Bureau, data.census.gov, Table DP02: "Selected Social Characteristics in the United States."

Therefore, we can be 90 percent confident that the true number of one-person households in Colorado in 2015 falls somewhere between 554,630 and 574,884. Put another way, if the ACS were independently conducted 100 times in 2015, sampling theory suggests that 90 times the estimate of one-person households in Colorado would fall in the given confidence interval. Estimates with smaller MOEs—relative to the value of the estimate—will have narrower confidence intervals indicating that the estimate is more precise and has less sampling error associated with it.

> TIP: When constructing confidence intervals from MOEs, data users should be aware of any "natural" limits on the upper and lower bounds. For example, if a population estimate is near zero, the calculated value of the lower confidence bound may be less than zero. However, a negative number of people does not make sense, so the lower confidence bound should be reported as zero instead.
>
> For other estimates, such as income, negative values may be valid. Another natural limit would be 100 percent for the upper confidence bound of a percent estimate. Data users should always keep the context and meaning of an estimate in mind when creating and interpreting confidence intervals.

Standard Errors and Coefficients of Variation

A standard error (SE) measures the variability of an estimate due to sampling and provides the basis for calculating the MOE. The SE provides a quantitative measure of the extent to which an estimate derived from a sample can be expected to deviate from the value for the full population. SEs are needed to calculate coefficients of

variation and to conduct tests of statistical significance. Data users can easily calculate the SE of an ACS estimate by dividing the positive value of its MOE by 1.645 as shown below:[61]

$$SE = \frac{MOE}{1.645} \qquad (1)$$

Using the data in Table 7.1, the SE for the number of one-person households in Colorado in 2015 would be:

$$\frac{10,127}{1.645} = 6,156$$

The SE for an estimate depends on the underlying variability in the population for that characteristic and the sample size used for the survey. In general, the larger the sample size, the smaller the SE of the estimates produced from the sample data. This relationship between sample size and SE is the reason that ACS estimates for less populous areas are only published using multiple years of data. Combining data from multiple ACS 1-year files increases sample size and helps to reduce SEs.

Coefficients of variation are another useful measure of sampling error. A coefficient of variation (CV) measures the *relative* amount of sampling error that is associated with a sample estimate. The CV is calculated as the ratio of the SE for an estimate to the estimate itself $(\hat{X})$ and is usually expressed as a percent:

$$CV = \frac{SE}{\hat{X}} * 100 \qquad (2)$$

A small CV indicates that the SE is small relative to the estimate, and a data user can be more confident that the estimate is close to the population value. The CV is also an indicator of the reliability of an estimate. When the SE of an estimate is close to the value of the estimate, the CV will be larger, indicating that the estimate has a large amount of sampling error associated with it and is not very reliable. For the example of one-person households in Colorado, the CV would be calculated as:[62]

$$\frac{6,156}{564,757} * 100 = 0.011 * 100 = 1.1\%$$

A CV of 1.1 percent indicates that the ACS estimate of one-person households in Colorado has a relatively small amount of sampling error and is quite reliable. Data users often find it easier to interpret and compare CVs across a series of ACS estimates than to interpret and compare SEs.

There are no hard-and-fast rules for determining an acceptable range of error in ACS estimates. Instead, data users must evaluate each application to determine the level of precision that is needed for an ACS estimate to be useful. For more information, visit the Census Bureau's Web page on *Data Suppression*.[63]

Determining Statistical Significance

One of the most important uses of ACS data is to make comparisons between estimates—across different geographic areas, different time periods, or different population subgroups. Data users may also want to compare ACS estimates with data from past decennial censuses. For any comparisons based on ACS data, it is important to take into account the sampling error associated with each estimate through the use of a statistical test for significance. This test shows whether the observed difference between estimates likely represents a true difference that exists within the full population (is statistically significant) or instead has occurred by chance because

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[61] Data users working with ACS 1-year estimates for 2005 or earlier should divide the MOE by the value 1.65 as that was the value used to derive the published MOE from the SE in those years.

[62] The examples provided in this section use unrounded values in their calculations, but the values displayed are rounded to three decimal places. For percentages that use a numerator or denominator from a prior example, the unrounded value is used, although the rounded value is displayed.

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

of sampling (is not statistically significant). Statistical significance means that there is strong statistical evidence that a true difference exists within the full population. Data users should not rely on overlapping confidence intervals as a test for statistical significance because this method will not always provide an accurate result.

When comparing two ACS estimates, a test for significance can be carried out by making several calculations using the estimates and their corresponding SEs. These calculations are straightforward given the published MOEs available for ACS estimates in data.census.gov and many other Census Bureau data products. The steps to test for a statistically significant difference between two ACS estimates are as follows:

1. Calculate the SEs for the two ACS estimates using formula (1).
2. Square the resulting SE for each estimate.
3. Sum the squared SEs.
4. Calculate the square root of the sum of the squared SEs.
5. Divide the difference between the two ACS estimates by the square root of the sum of the squared SEs.
6. Compare the absolute value of the result from Step 5 with the critical value for the desired level of confidence (1.645 for 90 percent, 1.960 for 95 percent, or 2.576 for 99 percent).
7. If the absolute value of the result from Step 5 is greater than the critical value, then the difference between the two estimates can be considered statistically significant, at the level of confidence corresponding to the critical value selected in Step 6.

Algebraically, the significance test can be expressed as follows:

$$\text{If} \quad \left| \frac{\widehat{X}_1 - \widehat{X}_2}{\sqrt{\left[SE(\widehat{X}_1)\right]^2 + \left[SE(\widehat{X}_2)\right]^2}} \right| > Z_{CL} \tag{3}$$

then the difference between estimates $\widehat{X}_1$ and $\widehat{X}_2$ is statistically significant at the specified confidence level (CL)

where $\widehat{X}_1$ and $\widehat{X}_2$ are the estimates being compared
SE_1 is the SE for estimate $\widehat{X}_1$
SE_2 is the SE for estimate $\widehat{X}_2$

Z_{CL} is the critical value for the desired confidence level (1.645 for 90 percent, 1.960 for 95 percent, and 2.576 for 99 percent).

The example below shows how to determine if the difference in the estimated percentage of householders age 65 or older who live alone between Florida (estimated percentage = 12.6, MOE = 0.2) and Arizona (estimated percentage = 10.5, MOE = 0.3) is statistically significant, based on 2015 ACS data. Using formula (1) above, first calculate the corresponding standard errors for Florida (0.122) and Arizona (0.182) by dividing the MOEs by 1.645. Then, using formula (3) above, calculate the test value as follows:

$$\left| \frac{\widehat{X}_1 - \widehat{X}_2}{\sqrt{\left[SE(\widehat{X}_1)\right]^2 + \left[SE(\widehat{X}_2)\right]^2}} \right| = \left| \frac{12.6 - 10.5}{\sqrt{(0.122)^2 + (0.182)^2}} \right| = \left| \frac{2.1}{\sqrt{0.015 + 0.033}} \right| =$$

$$\left| \frac{2.1}{\sqrt{0.048}} \right| = \left| \frac{2.1}{0.219} \right| = 9.581$$

Since the test value (9.581) is greater than the critical value for a confidence level of 90 percent (1.645), the difference in the percentages is statistically significant at a 90 percent confidence level. A rough interpretation of the result is that the user can be 90 percent certain that a difference exists between the percentage of householders aged 65 or older who live alone in Florida and in Arizona.

By contrast, if the corresponding estimate for Indiana (estimated percentage = 10.8, MOE = 0.2, SE = 0.122) were compared with the estimate for Arizona, formula (3) would yield:

$$\left| \frac{\widehat{X}_1 - \widehat{X}_2}{\sqrt{\left[\text{SE}(\widehat{X}_1)\right]^2 + \left[\text{SE}(\widehat{X}_2)\right]^2}} \right| = \left| \frac{10.8 - 10.5}{\sqrt{(0.122)^2 + (0.182)^2}} \right| = \left| \frac{0.3}{\sqrt{0.015 + 0.033}} \right| =$$

$$\left| \frac{0.3}{\sqrt{0.048}} \right| = \left| \frac{0.3}{0.219} \right| = 1.369$$

Since the test value (1.369) is less than the critical value for a confidence level of 90 percent (1.645), the difference in percentages is not statistically significant. A rough interpretation of the result is that the user cannot be certain to any sufficient degree that the observed difference in the estimates between Indiana and Arizona was not due to chance.

The Census Bureau has produced a *Statistical Testing Tool* to make it easier for ACS data users to conduct tests of statistical significance when comparing ACS estimates.[64] This tool consists of an Excel spreadsheet that will automatically calculate statistical significance when data users are comparing two ACS estimates or multiple estimates. Data users simply need to download ACS data from the Census Bureau's data.census.gov Web site and insert the estimate and MOE into the correct columns and cells in the spreadsheet. The results are calculated automatically. The result "Yes" indicates that estimates are statistically different and the result "No" indicates the estimates are *not* statistically different.[65]

Custom (User-Derived) Estimates

In some cases, data users will need to construct custom ACS estimates by combining data across multiple geographic areas or population subgroups, or it may be necessary to derive a new percentage, proportion, or ratio from published ACS data. For example, one way to address the issue of unreliable estimates for individual census tracts or block groups is to aggregate geographic areas, yielding larger samples and more reliable estimates. In such cases, additional calculations are needed to produce MOEs and SEs, and to conduct tests of statistical significance for the derived estimates. The section on "Calculating Measures of Error for Derived Estimates" provides detailed instructions on how to make these calculations.

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

[65] This tool only conducts statistical testing on the estimates keyed in by the data user for comparison within the spreadsheet, and it does not adjust the MOE when making multiple comparisons, nor incorporate a Bonferroni correction or any other method in the results of the statistical testing.

Advanced users who are aggregating ACS estimates can use the Census Bureau's *Variance Replicate Tables* to produce MOEs for selected ACS 5-year Detailed Tables.[66] Users can calculate MOEs for aggregated data by using the variance replicates. Unlike available approximation formulas, this method results in an exact MOE by incorporating the covariance. More information about the Variance Replicate Tables is available in the section on "Calculating Measures of Error for Derived Estimates."

Some advanced data users will also want to construct custom ACS estimates from the Census Bureau's Public Use Microdata Sample (PUMS) files. Separate instructions for calculating SEs and conducting significance tests for PUMS estimates are available on the Census Bureau's *PUMS Technical Documentation* Web page.[67]

It is important for data users to remember that the error measures and statistical tests described in this section do not tell us about the magnitude of nonsampling errors. More information about those types of errors is available in the section on "Measures of Nonsampling Error."

Additional Background Information and Tools

Sample Size and Data Quality
<www.census.gov/acs/www/methodology/sample-size-and-data-quality/>
This Web page describes the steps the Census Bureau takes to ensure that ACS data are accurate and reliable. It also includes several measures of ACS data quality for the nation and states.

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

Variance Replicate Tables
<www.census.gov/programs-surveys/acs/data/variance-tables.html>
Variance replicate estimate tables include estimates, MOEs, and 80 variance replicates for selected ACS 5-year Detailed Tables. The tables are intended for advanced users who are aggregating ACS data within a table or across geographic areas. Unlike available approximation formulas, this method results in an exact MOE by incorporating the covariance.

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[66] U.S. Census Bureau, American Community Survey (ACS), Variance Replicate Tables, <www.census.gov/programs-surveys/acs/data/variance-tables.html>.

[67] U.S. Census Bureau, American Community Survey (ACS), PUMS Technical Documentation, <www.census.gov/programs-surveys/acs/technical-documentation/pums/documentation.html>.

8. CALCULATING MEASURES OF ERROR FOR DERIVED ESTIMATES

The U.S. Census Bureau publishes a wide range of American Community Survey (ACS) estimates through the data products provided in data.census.gov and the ACS Summary File. However, for some applications, data users may still need to construct custom ACS estimates and their associated margins of error (MOEs). For example, users may want to aggregate data across geographic areas or population subgroups, or may need to derive proportions, ratios, and percent change measures that are not provided in published ACS data products.

> TIP: Data users can also aggregate data across geographic areas—or across population subgroups—to produce more reliable estimates in cases where the underlying component areas have estimates with relatively large standard errors (SEs).

When such derived estimates are generated, the user must calculate the associated MOEs. As described in the section on "Understanding Error and Determining Statistical Significance," MOEs are needed to calculate SEs and coefficients of variation (CVs) and to determine statistical significance. The steps outlined in the sections below illustrate how to calculate the MOEs for derived counts, proportions, percentages, ratios, and percent change, which can then be translated into SEs and CVs.

Calculating Measures of Error for Aggregated Count Data

Aggregating Data Across Geographic Areas

For some applications, data users may want to know the number of people with certain characteristics within a particular geographic region that is not included as a standard geographic area in ACS products. For example, a user may be interested in the number of never-married females within a tri-county area. The example below shows how to calculate the MOE, SE, and CV for such a derived estimate.

To calculate the MOE for aggregated count data:

1. Obtain the MOE of each component estimate.
2. Square the MOE of each component estimate.
3. Sum the squared MOEs.
4. Take the square root of the sum of the squared MOEs.

The result is the MOE for the aggregated count. Algebraically, the MOE for the aggregated count is calculated as:

$$\text{MOE}(\widehat{X}_1 + \widehat{X}_2 + \cdots + \widehat{X}_n) = \pm\sqrt{\left[\text{MOE}(\widehat{X}_1)\right]^2 + \left[\text{MOE}(\widehat{X}_2)\right]^2 + \cdots + \left[\text{MOE}(\widehat{X}_n)\right]^2} \tag{1}$$

The example below shows how to calculate the MOE and SE for the estimated number of never-married females living in the three Virginia counties/independent cities that border Washington, DC (Fairfax and Arlington counties, Alexandria City) from the 2015 ACS 1-year estimates as shown in Table 8.1.

Table 8.1. **Data for Example 1 From Three Virginia Counties/Independent Cities: 2015**		
Characteristic	Estimate	MOE
Never-married females living in Fairfax County (Component 1)	135,173	±3,860
Never-married females living in Arlington County (Component 2).	43,104	±2,642
Never-married females living in Alexandria City (Component 3).	24,842	±1,957

Source: U.S. Census Bureau, data.census.gov, Table B12001: "Sex by Marital Status for the Population 15 Years and Over."

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The aggregate estimate is:

$$\widehat{X} = \widehat{X}_{\text{Fairfax}} + \widehat{X}_{\text{Arlington}} + \widehat{X}_{\text{Alexandria}} =$$
$$135{,}173 + 43{,}104 + 24{,}842 = 203{,}119$$

Obtain MOEs of the component estimates:

$$
\begin{aligned}
\text{MOE (Fairfax)} &= \pm 3{,}860 \\
\text{MOE (Arlington)} &= \pm 2{,}642 \\
\text{MOE (Alexandria)} &= \pm 1{,}957
\end{aligned}
$$

Using formula (1), calculate the MOE for the aggregate estimate:

$$\text{MOE}\left(\widehat{X}_1 + \widehat{X}_2 + \widehat{X}_3\right) = \pm\sqrt{(3{,}860)^2 + (2{,}642)^2 + (1{,}957)^2} =$$
$$\pm\sqrt{25{,}709{,}613} = \pm 5{,}070$$

Thus, the derived estimate of the number of never-married females living in the three Virginia counties/independent cities that border Washington, DC, is 203,119, and the MOE for the estimate is ±5,070.

The SE of this derived estimate can be calculated from the SEs of the component estimates as follows:

1. Calculate the SE of each component estimate from its MOE using:

$$\text{SE} = \frac{\text{MOE}}{1.645} \qquad (2)$$

$$
\begin{aligned}
\text{SE (Fairfax)} &= 3{,}860 \,/\, 1.645 = 2{,}347 \\
\text{SE (Arlington)} &= 2{,}642 \,/\, 1.645 = 1{,}606 \\
\text{SE (Alexandria)} &= 1{,}957 \,/\, 1.645 = 1{,}190
\end{aligned}
$$

2. Calculate the SE of the aggregate estimate:

$$\text{SE}\left(\widehat{X}_1 + \widehat{X}_2 + \cdots + \widehat{X}_n\right) = \sqrt{\left[\text{SE}(\widehat{X}_1)\right]^2 + \left[\text{SE}(\widehat{X}_2)\right]^2 + \cdots + \left[\text{SE}(\widehat{X}_n)\right]^2} \qquad (3)$$

With the three component estimates in this example, this becomes:

$$\text{SE}\left(\widehat{X}_1 + \widehat{X}_2 + \widehat{X}_3\right) = \sqrt{(2{,}347)^2 + (1{,}606)^2 + (1{,}190)^2} =$$
$$\sqrt{9{,}500{,}878} = 3{,}082$$

To assess the reliability of this derived estimate, users may find it helpful to calculate the CV as follows:

$$\text{CV} = \frac{\text{SE}}{\text{Estimate}} * 100 \qquad (4)$$

$$\text{CV} = \frac{3{,}082}{203{,}119} * 100 = 0.015 * 100 = 1.5\%$$

This CV indicates that the sampling error of this estimate is very small relative to the estimate itself, so the number of never-married females residing in the Virginia tri-county area bordering Washington, DC, can be considered a very reliable estimate.

However, users should note that this method for calculating the MOE and SE for aggregated count data is an approximation, and caution is warranted because this method does not consider the correlation or covariance between the component estimates. This method may result in an overestimate or underestimate of the derived estimate's SE depending on whether the component estimates are highly correlated in either a positive or negative direction. As a result, the approximated SE may not match the result from a direct calculation of the SE that does include a measure of covariance, such as the following:

$$SE(\hat{X}_1 \pm \hat{X}_2) = \sqrt{\left[SE(\hat{X}_1)\right]^2 + \left[SE(\hat{X}_2)\right]^2 \pm 2cov(\hat{X}_1, \hat{X}_2)} \tag{5}$$

Data users should also be aware that as the number of estimates involved in a sum or difference increases, the results of the approximation formula become increasingly different from the SE derived directly from the ACS microdata. Users are encouraged to work with the fewest number of estimates possible. If there are estimates involved in a sum that are controlled in the weighting, then the approximate SE can be increasingly different. Several examples are provided to demonstrate issues associated with approximating the SEs when summing large numbers of estimates together in the latest ACS Worked Examples for Approximating Margins of Error document.[68]

Aggregating Data Across Population Subgroups

For some applications, data users may wish to combine data across population subgroups, especially in ACS tables where some groups have low counts and large MOEs. Before aggregating categories in a Detailed Table to create a derived estimate, users should check to make sure there is not a collapsed version of the same table already available in data.census.gov or the ACS Summary File. The MOEs in the published, collapsed tables will be more accurate than those users can approximate using the methods described in this section.

The example below illustrates the results from aggregating household income categories from a Detailed Table in data.census.gov for Loudoun County, Virginia, from the 2015 ACS 1-year estimates. Income categories are organized into three subgroups for the purpose of this example.

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[68] U.S. Census Bureau, American Community Survey (ACS), Worked Examples for Approximating Margins of Error, <www.census.gov/programs-surveys/acs/technical-documentation/code-lists.html>.

Table 8.2. **Data for Example 2 From Loudoun County, Virginia: 2015**					
Household income category	Subgroup #	Estimate	MOE	SE	CV
Less than $10,000	–	2,163	±812	494	22.8
$10,000 to $14,999	–	1,178	±504	306	26.0
$15,000 to $19,999	1	1,502	±743	452	30.1
$20,000 to $24,999	1	1,995	±722	439	22.0
$25,000 to $29,999	2	1,756	±685	416	23.7
$30,000 to $34,999	2	1,781	±631	384	21.5
$35,000 to $39,999	3	2,708	±1,007	612	22.6
$40,000 to $44,999	3	1,981	±647	393	19.9
$45,000 to $49,999	3	2,581	±996	605	23.5
$50,000 to $59,999	–	6,590	±1,109	674	10.2
$60,000 to $74,999	–	6,861	±1,288	783	11.4
$75,000 to $99,999	–	14,391	±1,810	1,100	7.6
$100,000 to $124,999	–	14,790	±1,944	1,182	8.0
$125,000 to $149,999	–	12,735	±1,341	815	6.4
$150,000 to $199,999	–	18,167	±1,890	1,149	6.3
$200,000 or more	–	29,380	±2,053	1,248	4.2

Source: U.S. Census Bureau, data.census.gov, Table B19001: "Household Income in the Past 12 Months (In 2015 Inflation-Adjusted Dollars)."

After calculating the SEs and CVs shown in Table 8.2, a data user might want to combine some of the household income categories in the lower end of the income distribution to reduce the CVs and create more reliable estimates. For example, the income categories in Subgroup 1 ($15,000 to $19,999 and $20,000 to $24,999) could be combined to form the first new subgroup, the two in Subgroup 2 ($25,000 to $29,999 and $30,000 to $34,999) to form a second new subgroup, and the three in Subgroup 3 ($35,000 to $39,999, $40,000 to $44,999, and $45,000 to $49,999) to form a third new subgroup. Following the same steps used to combine data across three geographic areas in Example 1, derived estimates and MOEs for the three new subgroups could be calculated as follows:

1. Aggregate counts to form new subgroup estimates:

    - Subgroup 1 ($15,000 to $24,999) = 1,502 + 1,995 = 3,497
    - Subgroup 2 ($25,000 to $34,999) = 1,756 + 1,781 = 3,537
    - Subgroup 3 ($35,000 to $49,999) = 2,708 + 1,981 + 2,581 = 7,270

2. Using formula (1), calculate MOEs for each new subgroup estimate:

$$\text{MOE (Subgroup 1)} = \pm\sqrt{(743)^2 + (722)^2} = \pm\sqrt{1{,}073{,}333} = \pm1{,}036$$

$$\text{MOE (Subgroup 2)} = \pm\sqrt{(685)^2 + (631)^2} = \pm\sqrt{867{,}386} = \pm931$$

$$\text{MOE (Subgroup 3)} = \pm\sqrt{(1{,}007)^2 + (647)^2 + (996)^2} =$$
$$\pm\sqrt{2{,}424{,}674} = \pm1{,}557$$

3. Calculate the SE of each new subgroup estimate using formula (2):

   - SE (Subgroup 1) = 1,036 / 1.645 = 630
   - SE (Subgroup 2) = 931 / 1.645 = 566
   - SE (Subgroup 3) = 1,557 / 1.645 = 947

4. Using formula (4), calculate the CV for each new subgroup estimate:

   - CV (Subgroup 1) = (630 / 3,497) * 100 = (0.180) * 100 = 18.0 percent
   - CV (Subgroup 2) = (566 / 3,537) * 100 = (0.160) * 100 = 16.0 percent
   - CV (Subgroup 3) = (947 / 7,270) * 100 = (0.130) * 100 = 13.0 percent

Aggregating across income categories increases the reliability of the new subgroup estimates relative to the original component estimates. For example, the CV for the $15,000 to $19,999 category is 30 percent. When this category is combined with the $20,000 to $24,999 category, the CV for the derived estimate for the new Subgroup 1 drops to 18 percent—lower than the original CV for this category by itself. Similarly, the CVs for the component estimates of Subgroup 3 range from 20 percent to 24 percent, while the CV for the derived estimate for Subgroup 3 ($35,000 to $49,999) is only 13 percent.

Data.census.gov includes a collapsed income distribution within Demographic Profile DP03 that makes it possible to assess the difference in results from the approximation method illustrated above versus a direct estimation method that accounts for covariance between the component estimates of the subgroups. The relevant portion of this data.census.gov table, from the 2015 ACS 1-year estimates, is shown in Table 8.3 below.

Table 8.3. **Data From Demographic Profile DP03 for Loudoun County, Virginia: 2015**					
Household income category	Subgroup #	Estimate	MOE	SE	CV
$15,000 to $24,999	1	3,497	±1,037	630	18.0
$25,000 to $34,999	2	3,537	±973	591	16.7
$35,000 to $49,999	3	7,270	±1,554	945	13.0

Source: U.S. Census Bureau, data.census.gov, Table DP03: "Selected Economic Characteristics."

While the MOEs, SEs, and CVs for new Subgroup 1 and Subgroup 3 are almost identical to those derived from the approximation method, this is not the case for new Subgroup 2. The user-derived MOE is ±931 compared with the published MOE of ±973, and the derived CV is only 16.0 percent compared with a CV of 16.7 percent based on the published MOE for Subgroup 2. The approximation method slightly underestimates the MOE and SE for Subgroup 2 because it does not account for some covariance between the two component estimates. Although the differences between the user-derived and published MOE's are small in this example, they can vary substantially in other cases, particularly for linear combinations of multiple estimates. Examples illustrating this problem are provided in the ACS Worked Examples for Approximating Margins of Error document (see section on "Issues with Approximating the Standard Error of Linear Combinations of Multiple Estimates").[69]

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[69] U.S. Census Bureau, American Community Survey (ACS), Worked Examples for Approximating Margins of Error, <www.census.gov /programs-surveys/acs/technical-documentation/code-lists.html>.

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

Calculating Measures of Error for User-Derived Proportions and Percentages

When data users create derived estimates for aggregated count data, they are often interested in calculating additional measures such as proportions and percentages. For example, the user who calculated the *number* of never-married females in the tri-county area in northern Virginia might also want to know what *proportion* of all females in this region have never been married. With proportions, the numerator is a subset of the denominator. In this case, the number of never-married females is a subset of all females. This derived proportion would be calculated as the number of never-married females aged 15 and older divided by the total number of females aged 15 and older. This proportion could also be converted to a percentage by multiplying by 100. The 2015 ACS 1-year estimates of the total number of females aged 15 and older in Fairfax County, Arlington County, and Alexandria City and their respective MOEs are shown in Table 8.4.

Table 8.4. **Data for Example 3 From Three Virginia Counties/Independent Cities: 2015**		
Characteristic	Estimate	MOE
Total females aged 15 and older living in Fairfax County (Component 1)...................	466,037	±391
Total females aged 15 and older living in Arlington County (Component 2)	97,360	±572
Total females aged 15 and older living in Alexandria City (Component 3)	67,101	±459

Source: U.S. Census Bureau, data.census.gov, Table B12001: "Sex by Marital Status for the Population 15 Years and Over."

Using the data for never-married females from Example 1 in this section with the data in Table 8.4 yields the following:

Proportion = (Never-married females / Total females)

(203,119 / (466,037 + 97,360 + 67,101)) = (203,119 / 630,498) = 0.322

To calculate the MOE of this proportion, we need the MOEs of the numerator (203,119) and the denominator (630,498). We already calculated the MOE of the number of never-married females in Example 1 in this section as ±5,070. Using formula (1), the MOE of the denominator is calculated as:

$$\text{MOE}(\hat{X}_1 + \hat{X}_2 + \hat{X}_3) = \pm\sqrt{(391)^2 + (572)^2 + (459)^2} = \pm\sqrt{690{,}746} = \pm831$$

If we define the proportion as $\hat{P} = \hat{X}/\hat{Y}$, then the MOE of this proportion is approximated as:

$$\text{MOE}(\hat{P}) = \frac{1}{\hat{Y}}\sqrt{\left[\text{MOE}(\hat{X})\right]^2 - \left(\hat{P}^2 * \left[\text{MOE}(\hat{Y})\right]^2\right)} \tag{6}$$

However, the Census Bureau provides ACS estimates as percentages rather than proportions in data.census.gov. For this example, the proportion of never-married females (0.322) can be converted to the percentage of never-married females (32.2%) by multiplying by 100. If we define this percentage as $\hat{Q}$, then the

$$\text{MOE}(\hat{Q}) = 100\% \times \text{MOE}(\hat{P}).$$

Substituting the estimates for the numerator and denominator, and their respective MOEs in formula (6), and multiplying by 100 yields:

$$\text{MOE}(\hat{Q}) = 100 * \left[\frac{1}{630{,}498}\sqrt{(5{,}070)^2 - \left[(0.322)^2 * (831)^2\right]}\right] = 0.8\%$$

Users should note that if the value under the square root is negative, then substitute a "plus" for the "minus" sign under the square root in formula (6). This modified formula is the same as the formula for the MOE of a ratio, which will be discussed in the next section.

Using formula (2), the SE of the percentage estimate of never-married females is 0.80 / 1.645 = 0.488. CVs can also be calculated for derived percentages using formula (4) and are interpreted in the same way as for derived count estimates. In this example, the CV for the percentage of never-married females is (0.488 / 32.2) * 100 = 1.5 percent, indicating that this is a very reliable estimate with a standard error that is much smaller than the estimated percentage.

Calculating Measures of Error for Derived Ratios

Ratios are used to compare two estimates where the numerator is not a subset of the denominator. For example, the data user in Example 1 may want to compare the number of never-married males in the tri-county area to the number of never-married females. To do this, the user must first obtain the component estimates and MOEs for males, and calculate the derived estimate and MOE of the number of never-married males in the tri-county area. These data, from the 2015 ACS 1-year estimates, are shown in Table 8.5 below.

Table 8.5. **Data for Example 4 From Three Virginia Counties/Independent Cities: 2015**		
Characteristic	Estimate	MOE
Never-married males living in Fairfax County (Component 1)...................................	156,720	±4,222
Never-married males living in Arlington County (Component 2)...................................	44,613	±2,819
Never-married males living in Alexandria City (Component 3)...................................	25,507	±2,259
Source: U.S. Census Bureau, data.census.gov, Table B12001: "Sex by Marital Status for the Population 15 Years and Over."		

Using the derived estimate and MOE calculated in Example 1 in this section, and the data from Table 8.5, the ratio would be calculated as:

Ratio = (Never-married males / Never-married females)

Ratio = ((156,720 + 44,613 + 25,507) / 203,119) = (226,840 / 203,119) = 1.117

This means that there were approximately 112 never-married men for every 100 never-married women living in the three Virginia counties in 2015.

Using formula (1), the MOE of the derived estimate of never-married males is calculated as:

$$\text{MOE}(\widehat{X}_1 + \widehat{X}_2 + \widehat{X}_3) = \pm\sqrt{(4{,}222)^2 + (2{,}819)^2 + (2{,}259)^2} = \pm 5{,}557$$

A ratio has a slightly different estimator for the MOE than a proportion. If $\widehat{R} = \widehat{X}/\widehat{Y}$, where $\widehat{X}$ = the number of never-married males and $\widehat{Y}$ = the number of never-married females, then the MOE of this ratio is approximated as:

$$\text{MOE}(\widehat{R}) = \frac{1}{\widehat{Y}}\sqrt{\left[\text{MOE}(\widehat{X})\right]^2 + \left(\widehat{R}^2 * \left[\text{MOE}(\widehat{Y})\right]^2\right)} \qquad (7)$$

Substituting the estimates for the numerator and denominator, and their respective MOEs in this formula yields:

$$\text{MOE}(\widehat{R}) = \frac{1}{203{,}119}\sqrt{(5{,}557)^2 + [(1.117)^2 * (5{,}070)^2]} = 0.039$$

Using formula (2), the SE of the ratio is 0.039 / 1.645 = 0.024. Using formula (4), the CV for the ratio of never-married males to never-married females is (0.024 / 1.117) * 100 = 2.1 percent, indicating that this is a very reliable estimate with an SE that is much smaller than the value of the estimated ratio.

Calculating Measures of Error for Derived Estimates of Percent Change

One of the most important benefits of annual releases of ACS estimates is the ability it provides for data users to analyze change over time. A frequent application is to calculate the percent change from one time period to another. For example, users may want to calculate the percent change from a 2009–2013 ACS 5-year estimate to a 2014–2018 ACS 5-year estimate. Normally, the current estimate is compared with the older estimate.

If the current estimate = $\widehat{X}$ and the earlier estimate = $\widehat{Y}$, then the MOE for percent change is calculated as follows:

$$\text{MOE}\left(\frac{\widehat{X}-\widehat{Y}}{\widehat{Y}} * 100\right) = 100 * \text{MOE}\left(\frac{\widehat{X}}{\widehat{Y}} - 1\right) = 100 * \text{MOE}\left(\frac{\widehat{X}}{\widehat{Y}}\right) \tag{8}$$

Formula (8) reduces to a ratio, so the ratio formula (7) described in the section above should be used to calculate the MOE. As a caveat, users should be aware that this formula does not take into account the correlation when calculating a change between two overlapping time periods. To calculate standard errors for overlapping ACS multiyear estimates see the section on "Understanding Error and Determining Statistical Significance."

Calculating Measures of Error for the Product of Two Estimates

In some instances, data users may need to derive an estimate by multiplying a published count by a published percentage. For example, a data user might be interested in the number of 1-unit detached owner-occupied housing units in a geographic area. In 2015, the number of owner-occupied housing units in the United States was 74,506,512 with an MOE of 228,238, and the percent of 1-unit detached owner-occupied housing units was 82.4 (0.824) with an MOE of 0.1 percent (0.001).[70] So, the number of 1-unit detached owner-occupied housing units was 74,506,512 * 0.824 = 61,393,366. The formula to calculate the MOE of a product is:

$$\text{MOE}(\widehat{X} * \widehat{Y}) = \sqrt{\left(\widehat{X}^2 * \left[\text{MOE}(\widehat{Y})\right]^2\right) + \left(\widehat{Y}^2 * \left[\text{MOE}(\widehat{X})\right]^2\right)} \tag{9}$$

Substituting the estimates and their respective MOEs in formula (9) yields:

$$\text{MOE}(\widehat{X} * \widehat{Y})$$
$$\sqrt{[(74,506,512)^2 * (0.001)^2] + [(0.824)^2 * (228,238)^2]} = 202,289$$

To obtain the lower and upper bounds of the 90 percent confidence interval around 61,393,366, add and subtract the MOE from 61,393,366. Thus, the 90 percent confidence interval for this estimate is [61,393,366 – 202,289] to [61,393,366 + 202,289] or 61,191,077 to 61,595,655. Using formula (2), the SE of the product is 202,289 / 1.645 = 122,972. Using formula (4), the coefficient of variation for this derived estimate is (122,972 / 61,393,366) * 100 = 0.2 percent, indicating that the derived estimate is very reliable.

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[70] U.S. Census Bureau, ACS 1-year estimates in data.census.gov, Table S2504: "Physical Housing Characteristics for Occupied Housing Units."

Calculating Measures of Error Using Variance Replicate Tables

Advanced users may be interested in the *Variance Replicate Tables*, first released for the 2010–2014 ACS 5-year data in July 2016.[71] These augmented ACS Detailed Tables include sets of 80 replicate estimates, which allow users to calculate measures of error for derived estimates using the same methods that are used to produce the published MOEs in data.census.gov. These methods incorporate the covariance between estimates that the approximation formulas in this document leave out.

The Variance Replicate Tables are available for a subset of the 5-year Detailed Tables for 11 geographic summary levels, including the nation, states, counties, census tracts, and block groups. These tables will be released on an annual basis, shortly after the release of the standard 5-year data products.

Variance Replicate Documentation, including lists of tables and summary levels, is available on the Census Bureau's Web site.[72]

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[71] U.S. Census Bureau, American Community Survey (ACS), Variance Replicate Tables, <www.census.gov/programs-surveys/acs/data/variance-tables.html>.

[72] U.S. Census Bureau, American Community Survey (ACS), Variance Replicate Tables Documentation, <www.census.gov/programs-surveys/acs/technical-documentation/variance-tables.html>.

9. DIFFERENCES BETWEEN THE ACS AND THE DECENNIAL CENSUS

While the main function of the U.S. decennial census is to provide counts of people for the purpose of congressional apportionment, the primary purpose of the American Community Survey (ACS) is to measure the changing social and economic characteristics of the U.S. population—our education, housing, jobs, and more.

Every 10 years since 1790, Congress has authorized the government to conduct a national census of the U.S. population, as required by the U.S. Constitution. In every decennial census from 1940 through 2000, two questionnaires were used to collect information: a "short form" with only basic questions such as age, sex, race, and Hispanic origin; and a "long form" with the basic short-form questions plus additional questions on social, economic, and housing characteristics. Only a subset of households received the long-form questionnaire—about one in every six in 2000.

After the 2000 Census, the long form was replaced by the ACS, which continued to collect long-form type information throughout the decade. The ACS includes not only the basic short-form questions, but also detailed questions about population and housing characteristics. It is a nationwide, continuous survey designed to provide communities with reliable and timely social, economic, housing, and demographic data every year. Since its start, the ACS has been providing a continuous stream of updated information for states and local areas, and is revolutionizing the way we use statistics to understand our communities.

There are many similarities between the ACS and the 2000 Census long form. Both data sources are based on information from samples of the population, and while there are some differences in the question wording between the ACS and the 2000 Census long form, many questions in the two forms are very similar. However, there are also important differences in residence rules, reference periods, definitions, and methods between the two data sources that can impact comparability between ACS and 2000 Census data. For detailed guidance on comparing ACS and 2000 Census data, visit the Census Bureau's Web page on *Comparing ACS Data.*[73]

Residence Rules and Reference Periods

The fundamentally different purposes of the ACS and the decennial census and their timing led to important differences in the choice of data collection methods. The decennial census residence rules, which determine where people should be counted, are based on the principle of "usual residence" on April 1, in keeping with the focus of the census on the requirements of congressional apportionment and state redistricting. To accomplish this, the decennial census attempts to restrict and determine a principal place of residence on one specific date for everyone enumerated.

The ACS uses a "current residence" rule to interview people who are currently living or staying in the sample housing unit as long as their stay at that address will exceed 2 months (see Box 9.1 for more information). This method is consistent with the goal that the Census Bureau produce ACS estimates based on data collected over a period of time, rather than a single point in time. ACS 1-year estimates represent data that have been collected over a 12-month period, and 5-year estimates represent data collected over a period of 60 months.

Therefore, a key difference between the ACS and the decennial census is the overall time frame in which they are conducted. The distribution of census enumeration dates are highly clustered in March and April (when most census mail returns are received) with additional, smaller clusters seen in May and June (when nonresponse follow-up activities take place). This means that the data from the decennial census tend to describe the characteristics of the population and housing in the March through June time period (with an overrepresentation of March and April), while ACS data describe the characteristics nearly every day over the full calendar year.

The differences in the ACS and census data as a consequence of the different residence rules are most likely minimal for most areas and most characteristics. However, for certain segments of the population, the usual and current residence concepts could result in different residence decisions. Appreciable differences may occur in areas where large proportions of the total population spend several months of the year in areas that would not be considered their residence under decennial census rules. In particular, data for areas that include large beach, lake, or mountain vacation areas, or large migrant worker communities may differ appreciably between the decennial census and the ACS if populations live there for more than 2 months.

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

Box 9.1. **Who Counts as a "Resident" in the ACS?**

The ACS uses the concept of "current residence" to determine who should be considered residents of sample housing units. The basic idea behind this concept is that everyone who is currently living or staying at an address for more than 2 months is considered a current resident of that address.

This means that their expected length of stay is more than 2 months, not that they have been staying in the housing unit for more than 2 months at the time when the survey is conducted. A person away from their residence for 2 months or less, whether in the United States or overseas, on a vacation or on a business trip, is considered to be a "resident" at the address, and the unit is classified as occupied and eligible for inclusion in the survey. A person away from their residence for more than 2 months is considered not to be a resident. For the ACS, if no one is determined to be a current resident in the sampled housing unit, it is classified as "vacant."

There are a few exceptions to the "2-month" rule:

> **People Without Another Place to Stay:** Anyone staying at a residence who does not have another place to stay, even if they are at the residence for 2 months or less, are always considered current residents of the residence.

> **Children Away at School:** Children (under college age) who are away at boarding school or summer camp for more than 2 months are always considered current residents of their parents' homes. College students' current residency is established by the 2-month rule.

> **Children in Joint Custody:** Children who live under joint custody agreements and move between residences are always considered current residents of the sampled housing unit where they are staying at the time of the interview.

> **"Commuter Workers":** People who stay at a residence close to work and return regularly to another residence to be with their family are always considered current residents of the family residence, not the work-related residence.

Residency in group quarters facilities is determined differently. All people residing in the selected facility at the time of interview, regardless of the length of stay, are eligible to be selected to be interviewed in the ACS.

Some of the specific differences in reference periods between the ACS and 2000 Census are described on the next page. Data users should consider the potential impact of these differences when comparing ACS with 2000 Census estimates.

Employment Status (Compare With Caution)

The reference periods are different because of year-round ACS data collection. The ACS reference period is the week before the respondent completed the survey or the field representative conducted the interview. Because questionnaires are mailed and field interviews are conducted throughout the year, there is a revolving reference period. For the 2000 Census, the reference period was the week before Census Day (April 1, 2000).

Income and Earnings Data (Compare With Caution)

The ACS asks for a respondent's income over the "past 12 months." For example, the 2018 ACS 1-year data reflect incomes over 2017–2018, and the 2014–2018 ACS 5-year data reflect incomes over 2013–2018. The 2000 Census, however, collected the income data for a fixed period of time—"during 1999" (the last calendar year). In a comparison study between the 2000 Census income data and the 2000 ACS, income collected in the 2000 Census was found to be about 4 percent higher than that in the 2000 ACS. For more information on the differences of income in the ACS and the 2000 Census, visit the Census Bureau's Web page on Income in the American Community Survey: Comparison to Census 2000.[74]

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[74] U.S. Census Bureau, Income in the American Community Survey: Comparisons to Census 2000, <www.census.gov/library/working-papers/2003/acs/2003_Nelson_01.html>.

School Enrollment (Compare)

The ACS reference period was 3 months preceding the date of interview, while the 2000 Census reference period was any time since February 1, 2000.

Definitions

Many data items collected in both the ACS and the 2000 Census long form have slightly different definitions that could affect the comparability of the estimates for these items. Some of the specific differences in subject or variable definitions between the ACS and the 2000 Census are described below. For a comprehensive list, visit the Census Bureau's Web page on Subject Definitions.[75]

Group Quarters

The total group quarters (GQ) population in the ACS may not be comparable with decennial census counts because there are some GQ types that are out of scope in the ACS. These include domestic violence shelters, soup kitchens, regularly scheduled mobile food vans, targeted nonsheltered outdoor locations, crews on maritime vessels, and living quarters for victims of natural disasters. The exclusion of these GQ types from the ACS may result in a small bias in some ACS estimates to the extent that the excluded population is different from the included population. Furthermore, only a sample of GQ facilities throughout the United States and Puerto Rico are selected for the ACS. The ACS controls the GQ sample at the state level only. Therefore, for lower levels of geography, particularly when there are relatively few GQs in a geographic area, the ACS estimate of the GQ population may vary from the count from the decennial census.

Aggregate Gross Rent

Data on gross rent in the ACS should not be compared with 2000 Census gross rent data. For the 2000 Census, tables were not released for total renter-occupied units. The universe in the 2000 Census was "specified renter-occupied housing units," which excluded one-family houses on 10 acres or more, whereas the universe in the ACS is "renter-occupied housing units," thus, comparisons cannot be made between these two data sets.

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[75] U.S. Census Bureau, American Community Survey (ACS), Code Lists, Definitions, and Accuracy, <www.census.gov/programs-surveys /acs/technical-documentation/code-lists.html>.

Occupants Per Room

Data on occupants per room in the ACS should be compared with the 2000 Census with caution. This is due to: (1) differences in residence rules, (2) the absence of population controls used to adjust for undercoverage in the reported number of current residents in the ACS used in this measure, and (3) differences in the reported number of rooms because of changes in the rooms question between the 2007 and 2008 ACS.

Data Collection Modes

Until 2015, the Census Bureau sent all selected addresses an advance notification letter informing people living at that address that they had been selected to participate in the ACS. Shortly thereafter (for most U.S. addresses), instructions for completing the survey by Internet were mailed. Beginning in August 2015, the Census Bureau eliminated the advance notification letter and instead included instructions in the initial mail package for completing the survey by Internet or over the phone through a toll-free Telephone Questionnaire Assistance (TQA) line. If households do not respond by Internet or TQA, then a paper questionnaire is mailed to the address. In Puerto Rico and some hard-to-reach areas, only a paper questionnaire is mailed.

Until 2017, if no response was received by Internet, TQA, or mail within a month following the initial mailing, the Census Bureau followed up with a telephone interview when a telephone number was available. However, beginning in October 2017, the Census Bureau discontinued the telephone Nonresponse Followup operation because of declining response rates and increasing costs. Respondent data are still collected via telephone through the TQA operation.

If the Census Bureau is unable to get a response by Internet, mail, or TQA, then the address may be selected for an in-person interview. Because of the high cost per completed interview, the Census Bureau samples about one in three nonrespondent housing units for personal visit interviews. The proportion of nonresponding households selected for in-person interviews is higher in areas with lower predicted response rates. A sample of people living in group quarters facilities—such as college dorms, skilled nursing facilities, or correctional facilities—is also

interviewed in person to ensure coverage of people who are not living in housing units.

Like the ACS, the primary modes of data collection in the 2000 Census and the 2010 Census were mail-out/mail-back questionnaires, telephone, and in-person visits. Unlike the ACS, enumerators for the decennial census attempted to follow up with all nonresponding households through telephone or personal interviews. Data for those who could not be contacted or who refused to participate were collected through "proxy" interviews, which means interviewers attempted to find and get a response from a knowledgeable respondent who was not a member of the household. Neither the 2000 Census nor the 2010 Census included an Internet response option, although the Census Bureau is providing this option in the 2020 Census.

Sampling and Nonsampling Error

ACS data, like the data from the 2000 Census long form, are derived from a sample of the population and are therefore subject to sampling error. The 2000 Census sample—consisting of about one in six households nationwide—is larger than the 5-year aggregated ACS sample designed to replace it. Therefore, there is more sampling error associated with the ACS 5-year estimates, compared with estimates from the 2000 Census long form. However, compared with the 2000 Census, the ACS has lower levels of nonresponse error—as measured through survey response rates and item nonresponse rates. Visit the sections on "Understanding Error and Determining Statistical Significance" and "Measures of Nonsampling Error" for more information.

Additional Background Information

Design and Methodology Report
<www.census.gov/programs-surveys/acs/methodology/design-and-methodology.html>
The 2014 Design and Methodology Report contains descriptions of the basic design of the ACS and details of the full set of methods and procedures.

American Community Survey and Puerto Rico Community Survey Subject Definitions
<www.census.gov/programs-surveys/acs/technical-documentation/code-lists.html>
This document provides detailed definitions of population and housing variables in the ACS, as well as guidance on making comparisons with ACS data.

Comparing ACS Data
<www.census.gov/programs-surveys/acs/guidance/comparing-acs-data.html>
This Web page provides guidance on making comparisons with ACS data. It includes a link to an ACS/Census Table Comparison Tool to match ACS 5-year tables with corresponding tables from the 2000 Census.

10. USING DOLLAR-DENOMINATED DATA

Dollar-denominated data refer to any characteristics for which inflation adjustments are used when producing annual estimates or comparing estimates across time periods. For example, income, rent, home value, and energy costs across time periods are all dollar-denominated data.

Inflation will affect the comparability of dollar-denominated data across time periods. When American Community Survey (ACS) multiyear estimates for dollar-denominated data are generated, amounts are adjusted using national Consumer Price Index (CPI) annual averages, since a regional-based CPI is not available for the entire country.

Given the potential impact of inflation on observed differences of dollar-denominated data across time periods, ACS data users should adjust for the effects of inflation. Such an adjustment will provide comparable estimates accounting for inflation. In making adjustments, the U.S. Census Bureau recommends using factors based on the All-Items CPI-U-RS (CPI Research Series).[76] Explanations follow.

Creating Single-Year Income Values

ACS income values are reported based on the amount of income received during the 12 months preceding the interview month. This is the income reference period. Since there are 12 different income reference periods throughout an interview year, 12 different income inflation adjustments are made. Monthly CPI-U-RSs are used to inflation-adjust the 12 reference period incomes to a single reference period of January through December of the interview year. Note that there are no inflation adjustments for 1-year estimates of rent, home value, or energy cost values.

Adjusting Single-Year Estimates Over Time

When comparing 1-year income, rent, home value, and energy cost value estimates from two different years, adjustments should be made as follows:

1. Obtain the All Items CPI-U-RS Annual Averages for the 2 years being compared.
2. Calculate the inflation adjustment factor as the ratio of the CPI-U-RS from the more recent year to the CPI-U-RS from the earlier year.
3. Multiply the dollar-denominated data estimated for the earlier year by the inflation adjustment factor. You can also follow this same process to calculate the corresponding margin of error of the inflation-adjusted estimate.

The inflation-adjusted estimate for the earlier year can be expressed as:

$$\widehat{X}_{Y1,Adj} = \frac{CPI_{Y2}}{CPI_{Y1}} \widehat{X}_{Y1} \tag{1}$$

where CPI_{Y1} is the All Items CPI-U-RS Annual Average for the earlier year (Y1); CPI_{Y2} is the All Items CPI-U-RS Annual Average for the more recent year (Y2); and $\widehat{X}_{Y1}$ is the published ACS estimate for the earlier year (Y1).

The example below compares the national median value for owner-occupied mobile homes in 2014 ($38,400) and 2015 ($44,000). First adjust the 2014 median value using the 2014 All Items CPI-U-RS Annual Average (348.3) and the 2015 All Items CPI-U-RS Annual Average (348.9) as follows:

$$\widehat{X}_{2014,Adj} = \frac{348.9}{348.3} * \$38,400 = \$38,466$$

Thus, the comparison of the national median value for owner-occupied mobile homes in 2014 and 2015, in 2015 dollars, would be $38,466 (2014 inflation-adjusted to 2015 dollars) versus $44,000 (2015 dollars).

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[76] U.S. Bureau of Labor Statistics, Consumer Price Index, CPI Research Series Using Current Methods (CPI-U-RS), <www.bls.gov/cpi/research-series/home.htm>.

Creating Values Used in Multiyear Estimates

Multiyear income, rent, home value, and energy cost values are created with inflation adjustments. The Census Bureau uses the All Items CPI-U-RS Annual Averages for each year in the multiyear time period to calculate a set of inflation adjustment factors. Adjustment factors for a time period are calculated as ratios of the CPI-U-RS Annual Average from the most recent year to the CPI-U-RS Annual Averages from each of the earlier years. The ACS values for each of the earlier years in the multiyear period are multiplied by the appropriate inflation adjustment factors to produce the inflation-adjusted values. These values are then used to create the multiyear estimates.

As an illustration, consider the time period 2014–2018, with hypothetical individual reference-year income values ranging from $15,000 in 2014 to $30,000 in 2018 (see Table 10.1).

Table 10.1. **Hypothetical Income Values Adjusted for Inflation: 2014–2018**			
Reference year	Income	CPI-U-RS annual averages	Inflation-adjusted income
2018	$30,000	369.8	$30,000
2017	$30,000	361.0	$30,731
2016	$25,000	353.4	$26,160
2015	$20,000	348.9	$21,198
2014	$15,000	348.3	$15,926

In this example, the multiyear income components are created from inflation-adjusted income values using the CPI-U-RS Annual Averages shown in the third column of the table. The inflation-adjusted 2017 value is the ratio of 369.8 to 361.0 applied to $30,000, which equals $30,731. The same calculation is applied to the income values from 2014 through 2016 to produce inflation-adjusted values for those years. These individual values are then used to create the multiyear estimate for the 2014–2018 time period.

Adjusting Multiyear Estimates Over Time

When comparing multiyear estimates from two different time periods, adjustments should be made as follows:

1. Obtain the latest available All Items CPI-U-RS Annual Averages for the two periods being compared.

2. Calculate the inflation adjustment factor as the ratio of the CPI-U-RS Annual Average in formula (1) from the most recent year to the CPI-U-RS in formula (1) from the earlier year.

3. Multiply the dollar-denominated estimate for the earlier time period by the inflation adjustment factor. You can also follow this same process to calculate the corresponding margin of error of the inflation-adjusted estimate.

The inflation-adjusted estimate for the earlier year can be expressed as:

$$\widehat{X}_{P1,Adj} = \frac{CPI_{P2}}{CPI_{P1}} \widehat{X}_{P1} \tag{2}$$

where CPI_{P1} is the All Items CPI-U-RS Annual Average for the last year in the earlier time period (P1).

CPI_{P2} is the All Items CPI-U-RS Annual Average for the last year in the most current time period (P2).

$\widehat{X}_{P1}$ is the published ACS estimate for the earlier time period (P1).

As an illustration, consider ACS multiyear estimates for the two time periods of 2005–2009 and 2010–2014. To compare the median household income for owner-occupied mobile homes in 2005–2009 ($40,800) and 2010–2014 ($39,000), first adjust the 2005–2009 median value using the 2009 All Items CPI-U-RS Annual Averages (315.2) and the 2014 All Items CPI-U-RS Annual Averages (348.3) as follows:

$$\widehat{X}_{2005-2009,Adj} = \frac{348.3}{315.2} * \$40{,}800 = \$45{,}085$$

Thus, the comparison of the national median value for owner-occupied mobile homes in 2005–2009 and 2010–2014, in 2014 dollars, would be $45,085 (2005–2009 inflation-adjusted to 2014 dollars) versus $39,000 (2010–2014, already in 2014 dollars).

Issues Associated With Inflation Adjustment

The recommended inflation adjustment uses a national-level CPI and, thus, will not reflect inflation differences that may exist across different geographic areas. In addition, since the inflation adjustment uses the All Items CPI, it will not reflect differences that may exist across characteristics such as energy and housing costs.

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

11. MEASURES OF NONSAMPLING ERROR

All survey estimates are subject to both sampling and nonsampling error. In the section on "Understanding Error and Determining Statistical Significance," the topic of sampling error and the various measures available for understanding the uncertainty in the estimates due to their being based on estimates derived from a sample, rather than from an entire population, are discussed. The margins of error published with American Community Survey (ACS) estimates measure only the effect of sampling error. Other errors that affect the overall accuracy of the survey estimates may occur in the course of collecting and processing the ACS and are referred to collectively as nonsampling errors.

Broadly speaking, nonsampling error refers to any error affecting a survey estimate outside of sampling error. Nonsampling error can occur in complete censuses as well as in sample surveys, and is commonly recognized as including coverage error, unit nonresponse, item nonresponse, response error, and processing error. The U.S. Census Bureau has many procedures in place designed to reduce these sources of nonsampling error and thus improve the quality of the data. More information about these procedures is available in the section on "Improving Data Quality by Reducing Nonsampling Error" on the Census Bureau's Design and Methodology Report Web page.[77]

Types of Nonsampling Error

Nonsampling error can result in both random errors and systematic errors. Of greatest concern are systematic errors. Random errors are less critical since they tend to cancel out at higher geographic levels in large samples such as the ACS.

On the other hand, systematic errors tend to accumulate over the entire sample. For example, if there is an error in the questionnaire design that negatively affects the accurate capture of respondents' answers, processing errors are created. Systematic errors often lead to a bias in the final results. Unlike sampling error and random error resulting from nonsampling error, bias caused by systematic errors cannot be reduced by increasing the sample size.

Coverage error occurs when a housing unit or person does not have a chance of selection in the sample (undercoverage), or when a housing unit or person has more than one chance of selection in the sample or is included in the sample when they should not have been (overcoverage). For example, if the frame used for the ACS did not allow the selection of

newly-constructed housing units; the estimates would suffer from errors because of housing undercoverage.

The final ACS estimates are adjusted for undercoverage and overcoverage by controlling county-level estimates to independent total housing unit controls and to independent population controls by sex, age, race, and Hispanic origin, produced by the Census Bureau's Population Estimates Program. However, it is important to measure the extent of coverage adjustment by comparing the precontrolled ACS estimates to the final controlled estimates. If the extent of coverage adjustments is large, there is a greater chance that differences in characteristics of undercovered or overcovered housing units or individuals differ from those eligible to be selected. When this occurs, the ACS may not provide an accurate picture of the population before the coverage adjustment, and the population controls may not eliminate or minimize that coverage error. For more information about coverage error visit the Census Bureau's Coverage Rates Definitions Web page.[78]

However, the process of controlling ACS estimates to the official population estimates may lead to additional errors in the ACS data. The population controls used in the ACS are midyear, point-in-time population estimates based on the decennial census, which has different residence rules than the monthly samples on which ACS estimates are based. See the section on "Residence Rules and Reference Periods" for more information.

Unit nonresponse is the failure to obtain the minimum required information from a housing unit or a resident of group quarters in order for it to be considered a completed interview. Unit nonresponse means that no survey data are available for a particular sampled unit or person. For example, if no one in a sampled housing unit is available during the time frame for data collection, unit nonresponse will result.

It is important to measure unit nonresponse because it has a direct effect on the quality of the data. If the unit nonresponse rate is high, it increases the chance that the final survey estimates may contain bias, even though the ACS estimation methodology includes a nonresponse adjustment intended to control potential unit nonresponse bias. This will happen if the characteristics of nonresponding units differ from the characteristics of responding units. For more information about unit nonresponse, visit the Census Bureau's *Response Rates Definitions* Web page.[79]

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[77] U.S. Census Bureau, "Chapter 15: Improving Data Coverage by Reducing Non-Sampling Error," American Community Survey Design and Methodology Report, 2014, <www.census.gov/programs-surveys /acs/methodology/design-and-methodology.html>.

[78] U.S. Census Bureau, American Community Survey (ACS), Coverage Rate Definitions, <www.census.gov/programs-surveys /acs/methodology/sample-size-and-data-quality/coverage-rates -definitions.html>.

[79] U.S. Census Bureau, American Community Survey (ACS), Response Rate Definitions, <www.census.gov/programs-surveys/acs /methodology/sample-size-and-data-quality/response-rates -definitions.html>.

Item nonresponse occurs when a respondent fails to provide an answer to a required item or when the answer given is inconsistent with other information. With item nonresponse, while some responses to the survey questionnaire for the unit are provided, responses to other questions are not obtained. For example, a respondent may be unwilling to respond to a question about income, resulting in item nonresponse for that question. Another reason for item nonresponse may be a lack of understanding of a particular question by a respondent.

Information on item nonresponse allows users to judge the completeness of the data on which the survey estimates are based. Final estimates can be adversely impacted when item nonresponse is high, because bias can be introduced if the actual characteristics of the people who do not respond to a question differ from those people who do respond to it. The ACS estimation methodology includes imputations for item nonresponse, intended to reduce the potential for item nonresponse bias. For more information about item nonresponse, visit the Census Bureau's Item Allocation Rates Definitions Web page.[80]

Response error occurs when data are reported or recorded incorrectly. Response errors may be due to the respondent, the interviewer, the questionnaire, or the survey process itself. For example, if an interviewer conducting a telephone interview incorrectly records a respondent's answer, response error results. In the same way, if the respondent fails to provide a correct response to a question, response error results. Another potential source of response error is a survey process that allows proxy responses to be obtained, wherein a knowledgeable person within the household provides responses for another person within the household who is unavailable for the interview. Even more error prone is allowing neighbors to respond.

Processing error can occur during the preparation of the final data files. For example, errors may occur if data entry of questionnaire information is incomplete or inaccurate. Coding of responses incorrectly also results in processing error. Critical reviews of edits and tabulations by subject matter experts are conducted to keep errors of this kind to a minimum.

ACS Quality Measures

Nonsampling error is extremely difficult, if not impossible, to measure directly. However, the Census Bureau has developed a number of indirect measures of nonsampling error to help inform users of the quality of the ACS estimates: sample size, coverage rates, unit response rates and nonresponse rates by reason,

and item allocation rates. These measures are available on the Census Bureau's *Sample Size and Data Quality* Web page.[81]

Sample size measures for the ACS summarize information for the housing unit and group quarters (GQ) samples. The measures available at the state level are:[82]

- Housing Units
  · Number of initial addresses selected.
  · Number of final survey interviews.

- Group Quarters People (beginning with the 2006 ACS)
  · Number of initial persons selected.
  · Number of final survey interviews.

Sample size measures may be useful in special circumstances when determining whether to use 1-year or 5-year estimates in conjunction with estimates of the population of interest. While the coefficient of variation (CV) can be used to determine usability, as explained in the section on "Understanding Error and Determining Statistical Significance," there may be some situations where the CV is small but the user has reason to believe the sample size for a subgroup is very small and the robustness of the estimate is in question.

Coverage rates measure the ratio of ACS population or housing estimates of geographic areas or groups to the independent estimates for those areas or groups, multiplied by 100. National coverage rates are available for the total population by six race/ethnicity categories and the GQ population. Coverage rates are also available for housing units and total population by sex at both the state and national level. Low coverage rates are an indication of greater potential for coverage error in the estimates.

Unit response and nonresponse rates for housing units are available at the county, state, and national level by reason for nonresponse: refusal, unable to locate, no one home, temporarily absent, language problem, insufficient data, maximum contact attempts reached, and other.

A low unit response rate is an indication that there is potential for bias in the survey estimates.

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[80] U.S. Census Bureau, American Community Survey (ACS), Item Allocation Rates Definitions, <www.census.gov/programs-surveys /acs/methodology/sample-size-and-data-quality/item-allocation -rates-definitions.html>.

[81] U.S. Census Bureau, American Community Survey, Sample Size and Data Quality, <www.census.gov/acs/www/methodology/sample -size-and-data-quality/>.

[82] The sample size measures for housing units (number of initial addresses selected and number of final survey interviews) and for persons in group quarters cannot be used to calculate response rates. For the housing unit sample, the number of initial addresses selected includes addresses that were determined not to identify housing units, as well as initial addresses that are subsequently subsampled out in preparation for personal visit Nonresponse Followup. Similarly, the initial sample of people in group quarters represents the expected sample size within selected group quarters prior to visiting and sampling of residents.

Missing data for a particular question or item is called **item nonresponse**. **Item allocation** involves the use of statistical procedures to impute the values for these missing data. **Item allocation rates**—the proportions of responses allocated for an item in a given geographic area—are determined by the content edits performed on the individual raw responses and closely correspond to item nonresponse rates. Overall housing unit and person characteristic allocation rates are available at the state and national levels, which combine many different characteristics. Allocation rates for individual items are published at the state and national levels. Allocation rates for other summary levels may be calculated from the B99 series of Detailed Tables in data.census.gov.

Item allocation rates differ by state, so data users are advised to examine the allocation rates for characteristics of interest before drawing conclusions from the published estimates.

Additional Background Information

Sample Size and Data Quality
<www.census.gov/acs/www/methodology/sample-size-and-data-quality/>
The quality measures provided on this Web page illustrate the steps the Census Bureau takes to ensure that ACS data are accurate and reliable.

Design and Methodology Report
<www.census.gov/programs-surveys/acs/methodology/design-and-methodology.html>
The 2014 Design and Methodology Report contains descriptions of the basic design of the ACS and details of the full set of methods and procedures.

12. GLOSSARY

Accuracy. One of four key dimensions of survey quality. Accuracy refers to the difference between the survey estimate and the true (unknown) value. Attributes are measured in terms of sources of error (for example, coverage, sampling, nonresponse, measurement, and processing).

Allocation. 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. Certain values, such as a person's educational attainment, are more accurate when provided from another housing unit or from a person with similar characteristics. Allocation rates measure the proportion of values that required hot-deck allocation and are an important measure of data quality.

American Community Survey (ACS). The ACS is a nationwide survey designed to provide communities a fresh look at how they are changing. The ACS replaced the decennial census long form in 2010 and thereafter by collecting long-form type information throughout the decade rather than only once every 10 years. Full national implementation of the ACS began in 2005. Questionnaires are mailed to a sample of addresses to obtain information about household residents and the housing unit itself.

The U.S. Census Bureau produces social, economic, housing, and demographic estimates from the ACS in the form of 1-year and 5-year estimates based on population thresholds. The strength of the ACS is in estimating population and housing characteristics. It produces estimates for small areas, including census tracts and block groups and population subgroups.

Although the ACS provides population and housing unit estimates, the Census Bureau's Population Estimates Program produces and disseminates the official estimates of the population for the nation, states, counties, cities and towns, and estimates of housing units for states and counties. For 2010 and other decennial census years, the decennial census provides the official counts of population and housing units.

Application Programming Interface (API). API is a set of programs that allows an application to interact with other applications. The Census Bureau has developed the Census API, enabling developers to design Web and mobile apps to provide quick and easy access from sets of Census Bureau statistics.

Assignment. A type of imputation (a statistical procedure to fill in missing responses), assignment involves looking at other data, as reported by the respondent, to fill in missing responses. For example, when determining sex, if a person reports giving birth to children in the past 12 months, the Census Bureau verifies that the person is female. This approach also uses data as reported by other people in the household to fill in a blank or inconsistent field. For example, if the reference person is a U.S. citizen, a biological child with a blank response to citizenship is also assumed to be a citizen.

Block Group. A statistical subdivision of a census tract, generally defined to contain between 600 and 3,000 people and between 240 and 1,200 housing units, and the smallest geographic unit for which the Census Bureau tabulates sample data. A subdivision of a census tract (or, before 2000, a block numbering area), a block group is a cluster of blocks having the same first digit of their four-digit identifying number within a census tract.

Census Geography. A collective term referring to the types of geographic areas used by the Census Bureau in its data collection and tabulation operations. This Web page shows the geographic entities for which data are available from the ACS, which provides information down to the block group level.[83]

With connecting lines, the diagram in the "Geographic Hierarchy" section shows the hierarchical relationships between geographic types. For example, a line extends from states to counties because a state is comprised of many counties, and a county can never cross a state boundary.

If no line joins two geographic types, then an absolute and predictable relationship does not exist between them. For example, many places do not cross a county boundary (that is, only one county). However, some places extend over more than one county like New York City. Therefore, an absolute hierarchical relationship does not exist between counties and places, and any tabulation involving both of these geographic types may represent only a part of one county or one place.

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[83] U.S. Census Bureau, American Community Survey (ACS), Concept & Definitions <www.census.gov/programs-surveys/acs /geography-acs/concepts-definitions.html>.

Census Tract. A small, relatively permanent statistical subdivision of a county delineated by a local committee of census data users for presenting data. Census tracts nest within counties and their boundaries normally follow visible features, but may follow legal geography boundaries and other nonvisible features in some instances. Census tracts ideally contain about 4,000 people and 1,600 housing units.

Coefficient of Variation (CV). The ratio of the standard error (square root of the variance) to the value being estimated, usually expressed in terms of a percentage (also known as the relative standard deviation). The lower the CV, the higher the relative reliability of the estimate.

Comparison Profiles (CP). The Comparison Profiles show ACS data side-by-side from different data releases, indicating where there is a statistically significant difference between estimates. Comparison Profiles are currently available for 1-year estimates and 5-year estimates starting with the release of the 2011–2015 ACS 5-year data. The 5-year Comparison Profiles will compare data between two nonoverlapping 5-year periods. ACS Comparison Profiles begin with the letters "CP."

Confidence Interval. The sample estimate and its margin of error permit the construction of a confidence interval that represents the degree of uncertainty about the estimate. A 90 percent confidence interval can be constructed by adding and subtracting the published margin of error from the ACS estimate. A 90 percent confidence interval can be interpreted roughly as providing 90 percent certainty that the true number falls between the upper and lower bounds.

Confidentiality. The guarantee made by law (Title 13, U.S. Code) to individuals who provide census information regarding nondisclosure of that information to others. By law, the Census Bureau cannot disclose any private information that identifies a person or a business. Under federal law, the penalty for unlawful disclosure is a federal prison sentence of up to 5 years, a fine of up to $250,000, or both.

Consumer Price Index (CPI). The CPI program of the Bureau of Labor Statistics produces monthly data on changes in the prices paid by urban consumers for a representative basket of goods and services.

Controls. During the ACS weighting process, the official county-level population and housing unit estimates are used as controls. Weights are adjusted so that ACS estimates conform to these controls (but do not necessarily exactly match). This is done to improve person and housing unit coverage and to reduce the variability of the ACS estimates.

Certain published estimates, such as total population estimates for states, do exactly match the controls. These estimates, which have five asterisks (*****) in the Margin of Error column in data.census.gov, are by definition fixed, and can be considered to have no sampling error.

Current Residence. The ACS uses a "current residence" concept to determine who should be considered a resident of a sample household. Everyone who is currently living or staying at a sample address is considered a resident of that address, except people staying there for 2 months or less. People who have established residence at the sample unit and are away for only a short period of time are also considered to be current residents.

Custom Tabulations. The Census Bureau offers a wide variety of general purpose data products from the ACS. These products are designed to meet the needs of the majority of data users and contain predefined sets of data for standard census geographic areas, including both political and statistical geographic areas. These products are available through data.census.gov and the ACS Web site.

For users with data needs not met through the general purpose products, the Census Bureau offers Custom Tables on a cost-reimbursable basis, through the ACS Custom Tabulation program.[84] Custom tables are created by tabulating data from ACS microdata files. They vary in size, complexity, and cost depending on the needs of the sponsoring client.

Data.census.gov. 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. Data.census.gov provides access to ACS data for a wide range of geographic areas, including states, cities, counties, census tracts, and block groups.

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[84] U.S. Census Bureau, American Community Survey (ACS), Custom Tables, <www.census.gov/programs-surveys/acs/data/custom-tables .html>.

Data Profiles (DP). Data Profiles provide summaries of ACS data for various social, economic, housing, and demographic characteristics for the United States, regions, divisions, states, counties, county subdivisions, places, metropolitan areas, American Indian and Alaska Native areas, and other geographic areas. These profiles are similar in content to the demographic profiles from the decennial censuses. ACS Data Profiles begin with the letters "DP."

Decennial Census. The census of population and housing, taken by the Census Bureau in years ending in 0 (zero). Article I of the Constitution requires that a census be taken every 10 years for the purpose of reapportioning the U.S. House of Representatives. Title 13 of the U.S. Code provides the authorization for conducting the census in Puerto Rico and the Island Areas.

Derived Estimates. One of the benefits of working with ACS data is the ability to develop unique estimates called derived estimates. These derived estimates are usually based on aggregating estimates across geographic areas or population subgroups for which combined estimates are not published in data.census.gov tables (e.g., aggregate estimates for a three-county area or for four age groups not collapsed).

Detailed Tables. Detailed Tables provide access to the most comprehensive ACS data tables on all topics and geographic areas. Tables include totals and subtotals. Users may choose more than one geographic area and more than one table that display in a scrolling list, but only what displays on the width of the screen will print.

ACS Detailed Tables begin with the letters "B" for base tables and "C" for collapsed tables. The "collapsed" tables cover the same topics as the base table, but with fewer categories.

Disclosure Avoidance. Statistical methods used before releasing data products to ensure the confidentiality of responses.

Estimates. Data for the ACS are collected from a sample of housing units and used to produce estimates of the actual figures that would have been obtained by interviewing the entire population using the same methodology.

Five-Year Estimates. Estimates based on 5 years of ACS data. These estimates are meant to reflect the characteristics of a geographic area over the entire 5-year period. These estimates are published for geographic areas down to the census block group level.

File Transfer Protocol (FTP). A process that allows a user to download large census and survey files and data sets from the Census Bureau's Web site.[85]

Geographic Comparison Tables (GCT). Allow users to compare ACS data across geographic areas in the same table (e.g., all counties in a state). ACS Geographic Comparison Tables begin with the letters "GCT."

Group Quarters (GQ) Facilities. A GQ facility is a place where people live or stay that is normally owned or managed by an entity or organization providing housing and/or services for the residents. These services may include custodial or medical care, as well as other types of assistance. Residency is commonly restricted to those receiving these services. People living in GQ facilities are usually not related to one another. The ACS collects data from people living in both housing units and GQ facilities.

Group Quarters (GQ) Population. Includes all people living in group quarters instead of housing units. Group quarters are places where people live or stay, in a group living arrangement that is owned or managed by an entity or organization providing housing and/or services for the residents. The group quarters population lives in group quarters, of which there are two general categories:

Institutional group quarters are facilities that house those who are primarily ineligible, unable, or unlikely to participate in the labor force while resident. The institutionalized population is the population residing in institutional group quarters, such as adult correctional facilities, juvenile facilities, skilled-nursing facilities, and other institutional facilities such as mental (psychiatric) hospitals and in-patient hospice facilities.

Noninstitutional group quarters are facilities that house those who are primarily eligible, able, or likely to participate in the labor force while resident. The noninstitutionalized population lives in noninstitutional group quarters such as college/university student housing, military quarters, and other noninstitutional group quarters such as emergency and transitional shelters for people experiencing homelessness and group homes.

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[85] U.S. Census Bureau, American Community Survey (ACS), Data via FTP (File Transfer Protocol), <www.census.gov/programs-surveys/acs/data/data-via-ftp.html>.

Housing Unit. A housing unit is a house, an apartment, a mobile home or trailer, a group of rooms, or a single room occupied as separate living quarters, or if vacant, intended for occupancy as separate living quarters. Separate living quarters are those in which the occupants live separately from any other individuals in the building and which have direct access from outside the building or through a common hall. For vacant units, the criteria of separateness and direct access are applied to the intended occupants whenever possible.

Imputation. When data are missing, it is standard practice to use a statistical procedure called imputation to fill in missing responses. Imputation is the placement of one or more estimated answers into a field of data records that previously had no data or had incorrect or implausible data. There are two principal imputation methods to deal with missing or inconsistent data—assignment and allocation.

Margin of Error (MOE). The margin of error is the measure of sampling error published with each ACS estimate. A margin of error is the difference between an estimate and its upper or lower confidence bounds. Confidence bounds can be created by adding the margin of error to the estimate (for an upper bound) and subtracting the margin of error from the estimate (for a lower bound). All published margins of error for the ACS are based on a 90 percent confidence level.

Measurement Error. Also referred to as "response error," measurement error occurs when the response received differs from the "true" value as a result of the respondent, the interviewer, the questionnaire, the mode of collection, the respondent's record-keeping system(s), or other similar factors.

Multiyear Estimates. Three-year and five-year estimates based on multiple years of ACS data. ACS 5-year estimates are published for geographic areas down to the census block group level. ACS 3-year estimates have been discontinued, but are available for 2013 and earlier years for geographic areas with populations of 20,000 or more.

Narrative Profiles. Narrative profiles are short, analytic reports derived from recent ACS 5-year estimates. Each narrative profile covers 15 different topic areas and provides text and bar charts to display highlights of selected social, economic, housing, and demographic estimates for a selected geographic area.

Nonsampling Error. Total survey error can be classified into two categories—sampling error and nonsampling error. Errors that occur during data collection (for example, nonresponse error, response error, and interviewer error) or data capture fall under the category of nonsampling error.

Overcoverage. Overcoverage exists when housing units or people have more than one chance of selection in the sample, or are included in the sample when they should not have been.

Period Estimates. An estimate based on information collected over a period of time. For ACS estimates, the period is either 1 year or 5 years. ACS 3-year estimates have been discontinued, but are available for 2013 and earlier years for geographic areas with populations of 20,000 or more.

Point-in-Time Estimates. An estimate based on one point in time. The decennial census long-form estimates for the 2000 Census were based on information collected as of April 1, 2000.

Population Estimates Program. The Census Bureau's Population Estimates Program (PEP) produces July 1 estimates for years after the last published decennial census (2010), as well as for past decades. Existing data series—such as births, deaths, federal tax returns, Medicare enrollment, and immigration—are used to update the decennial census base counts. Population estimates are used in federal funding allocations, in setting the levels of national surveys, and in monitoring recent demographic changes.

Public Use Microdata Area (PUMA). A statistical area defined to contain a population of 100,000 or greater for which the Census Bureau tabulates Public Use Microdata Sample (PUMS) data. ACS and decennial census population and housing microdata are disseminated using these defined areas.

Public Use Microdata Sample (PUMS) Files. Computerized files containing a sample of individual records of people and households that responded to the ACS (stripped of all identifying information). The PUMS files permit analysis of specific population groups and custom variables that are not available through other ACS data products.

Puerto Rico Community Survey (PRCS). The counterpart to the ACS that is conducted in Puerto Rico.

Quality Measures. Statistics that provide information about the quality of the data from the ACS. Four different measures are provided with the annual data release: 1) initial sample size and final interviews, 2) coverage rates, 3) response rates, and 4) item allocation rates for all collected variables. Details are available in the technical documentation for the ACS products.

QuickFacts. A Census Bureau Web site that provides quick, easy access to facts about people, businesses, and geographic areas for all states, counties, and cities and towns with more than 5,000 people.

Ranking Tables. A table or product type that orders the states according to the numeric value of the data displayed. ACS Ranking Tables begin with the letter "R."

Reference Week. The calendar week preceding the date on which the respondents completed their questionnaires or were enumerated. This calendar week may not be the same for all people since the enumeration may not be completed in 1 week.

Reference Period. Time interval to which survey responses refer. For example, many ACS questions refer to the day of the interview; others refer to "the past 12 months" or "last week."

Residence Rules. The ACS uses a "current residence" rule to interview people who are currently living or staying in the sample housing unit as long as their stay at that address will exceed 2 months. See the entry on "Usual Residence" for information about residence rules in the decennial census.

Respondent. The person supplying survey or census information about his or her living quarters and its occupants.

Respondent Errors. The respondents' failure to provide the correct answer to a survey question for any reason, such as poor comprehension of the question meaning, low motivation to answer the question, inability to retrieve the necessary information, or an unwillingness to answer the question truthfully.

Sample. Entities selected for a specific survey.

Sample Data. Population and housing information collected on a continuous basis for selected areas in the ACS and other surveys where data are gathered from a selected group of respondents. No sample data were collected in the 2010 Census.

Sample Survey. A data collection activity involving observations or questionnaires for a sample of a population. These data are used to produce estimates for the entire population.

Sampling Error. Errors that occur because only part of the population is directly contacted. With any sample, differences are likely to exist between the characteristics of the sampled population and the larger group from which the sample was chosen.

Sampling Rate. Proportion of the addresses in a geographic area, or residents of a GQ facility, who are selected for interview in a particular time period.

Sampling Variability. Variation that occurs by chance because a sample of the population is surveyed rather than the entire population.

Selected Population Profiles. Selected Population Profiles can be used to show ACS data for a specific racial or ethnic group (for example, Alaska Natives), ancestry groups, or country of birth.

Single-Year (1-Year) Estimates. Estimates based on 1 year of ACS data. They are meant to reflect the characteristics of a geographic area over an entire 12-month period. ACS 1-year estimates are published for geographic areas with populations of 65,000 or more. Starting with the 2014 ACS, the Census Bureau is also publishing 1-year supplemental estimates—simplified versions of popular ACS tables for areas with at least 20,000 people.

Standard Error. The standard error is a measure of the deviation of a sample estimate from the average of all possible samples.

Statistical Significance, Test of. A test of statistical significance provides statistical evidence that indicates whether an observed difference between two estimates is likely due to chance ("not statistically significant"), or likely represents a true difference that exists in the population as a whole ("statistically significant").

Statistical significance in census data products is usually reported at the 90 percent confidence level.

Note that some statistical significance results displayed in data.census.gov may be based on unrounded estimates and standard errors and users may not be able to duplicate the results using the rounded estimates and measures of error as displayed in data.census.gov.

Subject Tables. Subject Tables include ACS data organized by subject area, providing an overview of the information that analysts most often receive requests for from data users. ACS Subject Tables begin with the letter "S."

Summary File. The ACS Summary File is a comma-delimited text file that contains all of the Detailed Tables for the ACS data releases.

Summary Level. Summary levels specify the content and hierarchical relationships of the geographic elements that are required to tabulate and summarize data. Each summary level has an assigned 3-digit summary level code to help programmers link each specific summary level to its appropriate use in a table, map, or other data summarization format. Some examples of summary levels are:

- 040: State
- 050: State-County
- 060: State-County-County Subdivision
- 150: State-County-Census Tract-Block Group
- 160: State-Place
- 314: Metropolitan Statistical Area-Metropolitan Division
- 430: Urban Area-State-County

It is important to distinguish between a summary level and a geographic area. A summary level represents the concept of a geographic level. For example, summary level 050, State-County, represents the concept of a county within a state. By comparison, a geographic area covers territory "on the ground," such as Madison County, Indiana.

Supplemental Estimates. Simplified Detailed Tables that provide access to the most recent ACS data at a lower population threshold than the standard 1-year tables. Available for selected geographic areas with 20,000 people or more. ACS supplemental estimates begin with the letter "K."

Undercoverage. The extent to which a sample does not include members of the target population thus preventing those members from having any chance of selection into the sample.

Unit Nonresponse. The failure to obtain the minimum required data from a unit in the sample.

Universe. The total number of units (e.g., individuals, households, or businesses) in the population of interest.

Usual Residence. Usual residence is a concept used in the decennial census to determine where a person should be counted in the census. Usual residence is defined as the place where a person lives and sleeps most of the time. This place is not necessarily the same as a person's voting residence or legal residence.

Variance Replicate Tables. These augmented ACS Detailed Tables include sets of 80 replicate estimates, which allow advanced users to calculate measures of error for estimates using the same methods that are used to produce the published margins of error (MOEs) in data.census.gov. These methods incorporate the covariance between estimates that approximate MOE formulas do not. They are published for a subset of the 5-year Detailed Tables and at selected summary levels. The 2010–2014 ACS 5-year estimates were the first for which these were available. We started by selecting "Block Group," then "Louisiana," "Orleans Parish, Louisiana," and "All Block Groups within Orleans Parish, Louisiana" (see Figure 6.2).