

Understanding and Using American Community Survey Data

What Federal Agencies Need to Know

Issued March 2021



U.S. Department of Commerce
U.S. CENSUS BUREAU
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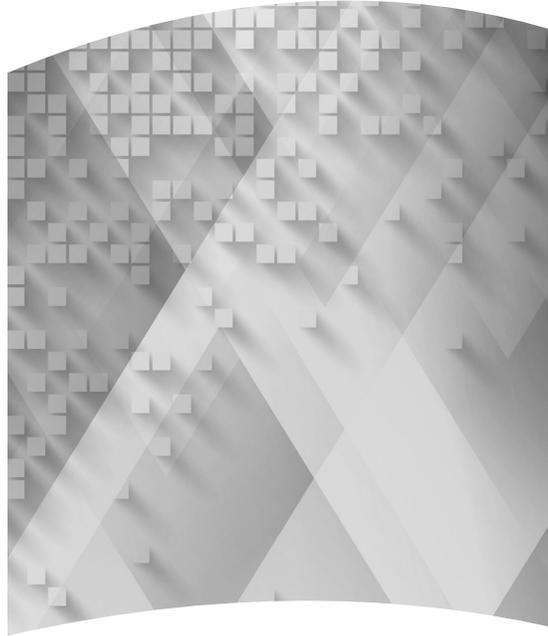
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UNDERSTANDING AND USING AMERICAN COMMUNITY SURVEY DATA: WHAT FEDERAL AGENCIES NEED TO KNOW

The American Community Survey (ACS) is the nation's premier source of detailed social, economic, housing, and demographic characteristics for local communities. The ACS is unique among U.S. household surveys because of its size, breadth of measurement, provision of annual estimates for small geographic areas, and extensive use by a wide range of government and nongovernmental organizations. The U.S. Census Bureau estimates that 132 programs used census data—including data from the ACS—to distribute more than \$675 billion in funds during fiscal year 2015.¹ Federal agencies rely on the ACS to help them make operational decisions, including managing and evaluating programs, determining eligibility for programs, and benchmarking other statistics.

This handbook describes how analysts, program administrators, and policymakers within federal agencies can use the ACS in carrying out the business of their agencies.

What Is the American Community Survey?

The 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.

¹ U.S. Census Bureau, *Uses of Census Bureau Data in Federal Funds Distribution*, 2017, <<https://www2.census.gov/programs-surveys/decennial/2020/program-management/working-papers/Uses-of-Census-Bureau-Data-in-Federal-Funds-Distribution.pdf>>.

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.

For more detailed information about the ACS—how to judge the accuracy of ACS estimates, understanding multiyear estimates, knowing which geographic areas are covered in the ACS, and how to access ACS data on the Census Bureau's Web site—see the Census Bureau's handbook on *Understanding and Using American Community Survey Data: What All Data Users Need to Know*.²

² U.S. Census Bureau, *Understanding and Using American Community Survey Data: What All Data Users Need to Know*, <www.census.gov/programs-surveys/acs/guidance/handbooks/general.html>.

1. TOPICS COVERED IN THE ACS

The primary purpose of the American Community Survey (ACS) is to help Congress determine funding and policies for a wide variety of federal programs. Because of this, the topics covered by the ACS are diverse (see Table 1.1).

- Examples of social characteristics include disability, educational attainment, language spoken at home, and veteran status.
- Examples of economic characteristics include employment status, health insurance, income, and earnings.
- Examples of housing characteristics include computer and Internet use, selected monthly owner costs, rent, and the year the structure was built.
- Demographic characteristics include age, sex, race, Hispanic origin, and relationship to householder.

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 U.S. Census Bureau's Population and Housing Unit Estimates Web page.³

³ U.S. Census Bureau, Population and Housing Unit Estimates, <www.census.gov/programs-surveys/popest.html>.

A good way to learn about the topics covered in the ACS is to explore the information available through the U.S. Census Bureau's data.census.gov Web site.⁴ The Data Profiles in data.census.gov, which include the most frequently requested social, economic, housing, and demographic data, are useful for novice users who want to explore the range of topics available.⁵ Copies of ACS questionnaires for different years are also available on the Census Bureau's Web site.⁶ For more detailed information about the topics in the ACS, see the section on *Understanding the ACS: The Basics* in the Census Bureau's handbook on *Understanding and Using American Community Survey Data: What All Data Users Need to Know*.⁷

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

⁵ U.S. Census Bureau, data.census.gov, Data Profiles, <<https://data.census.gov/cedsci/table?text=DP>>.

⁶ U.S. Census Bureau, Questionnaire Archive, <www.census.gov/programs-surveys/acs/methodology/questionnaire-archive.html>.

⁷ U.S. Census Bureau, *Understanding and Using American Community Survey Data: What All Data Users Need to Know*, <www.census.gov/programs-surveys/acs/guidance/handbooks/general.html>.

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.

2. HOW FEDERAL AGENCIES USE ACS DATA

As the successor to the decennial census long form, response to the American Community Survey (ACS) is required by law. The U.S. Census Bureau considers the ACS to be a component of the decennial census program; all the statutory language in Census Bureau legislation that applies to the decennial census also applies to the ACS. The Census Bureau is also bound to protect responses to the ACS in the same way that it protects responses to the decennial census.

While the Census Bureau considers the ACS to be part of the decennial census program, it is up to each federal agency to interpret the agency's legislation and to decide how ACS data should be used. The Census Bureau's *ACS Handbook of Questions and Current Federal Uses* provides an overview of why specific questions on the ACS are asked, which estimates are created from the answers to these questions, and how federal agencies and other organizations use these estimates.⁸ The Census Bureau has also developed a series of interactive Web pages that explain why each question is asked on the ACS. Each page shows the question as it appears on the form and allows users to explore some of the most popular statistics that come from the question at the local level. The pages also explain the origin of each question, privacy concerns, and how the statistics are used to help communities.⁹

Many laws require the use of ACS or decennial census data as the basis for establishing program or grant eligibility and for allocating federal program funds. For example, ACS data on veteran status and period of military service are used to allocate funds to states and local areas for employment and job training programs for veterans. Income data from the ACS are used to determine poverty status, measure economic well-being, and assess the need for assistance.

Many federal programs (including Low-Income Home Energy Assistance, Community Development Block Grant, Older Americans Act, Every Student Succeeds Act, Head Start, and Women, Infants, and Children) use ACS income data to allocate formula grants (see Box 2.1).

⁸ U.S. Census Bureau, *American Community Survey (ACS) Handbook of Questions and Current Federal Uses*, <www.census.gov/programs-surveys/acs/operations-and-administration/2014-content-review/federal-uses.html>.

⁹ U.S. Census Bureau, *Questions on the Form and Why We Ask*, <www.census.gov/acs/www/about/why-we-ask-each-question/>.

Box 2.1. Low-Income Home Energy Assistance Program (LIHEAP) 42 U.S. Code, 8629(a) & (b) (2), and 8622(11)

Enacted as part of the Omnibus Budget Reconciliation Act of 1981, the Low-Income Home Energy Assistance Program (LIHEAP) is a mandatory block grant program for the states.

The mission of LIHEAP is to help low-income households pay their home energy bills.

Congress established the law's block grant distribution formula based on each state's weather and low-income population. The income question on the ACS is essential to determining the low-income population in each state. Implementation of the LIHEAP program also relies on data from other ACS questions, including age, sex, Hispanic origin, relationship, disability status, units in structure, and occupants per room. LIHEAP program administrators also use data from the ACS question on selected monthly owner costs to analyze current residential energy supply and consumption and to forecast future energy needs.

ACS data are also used to monitor compliance with federal laws. For example:

- ACS data on age, housing, employment, and education are used to help the government and communities enforce laws, regulations, and policies against discrimination based on age such as the Age Discrimination in Employment Act.
- Data on age, sex, race/ethnicity, labor force status, and work status last year are used to monitor compliance with the Civil Rights Act.
- ACS data on housing characteristics, such as units in structure, kitchen and plumbing facilities, rent, tenure, and selected monthly owner costs, are used to implement and assess compliance with the National Affordable Housing Act.

The following four figures show a few examples of ACS questions, and how federal agencies use the results from these questions in program eligibility determinations, allocation of funds, and planning.

Figure 2.1. Question on Race and Federal Uses of the Data

6 What is Person 1's race?
 Mark (X) one or more boxes **AND** print origins.

White – Print, for example, German, Irish, English, Italian, Lebanese, Egyptian, etc. ↴

Black or African Am. – Print, for example, African American, Jamaican, Haitian, Nigerian, Ethiopian, Somali, etc. ↴

American Indian or Alaska Native – Print name of enrolled or principal tribe(s), for example, Navajo Nation, Blackfeet Tribe, Mayan, Aztec, Native Village of Barrow Inupiat Traditional Government, Nome Eskimo Community, etc. ↴

Chinese Vietnamese Native Hawaiian

Filipino Korean Samoan

Asian Indian Japanese Chamorro

Other Asian – Print, for example, Pakistani, Cambodian, Hmong, etc. ↴

Other Pacific Islander – Print, for example, Tongan, Fijian, Marshallese, etc. ↴

Source: U.S. Census Bureau, *ACS Handbook of Questions and Current Federal Uses*, <www.census.gov/programs-surveys/acs/operations-and-administration/2014-content-review/federal-uses.html>.

Examples of Federal Uses

- Required to identify vulnerable populations that may be at disproportionate risk of experiencing limitations in health care access, poor health quality, and suboptimal health outcomes.
- Required to enforce against discrimination in education, employment, voting, financial assistance, and housing.
- Used in many reporting and research tasks to investigate whether there are race differences in education, employment, home ownership, health, income and many other areas of interest to policymakers.

Figure 2.2. Question on Health Insurance and Federal Uses of the Data

16 Is this person CURRENTLY covered by any of the following types of health insurance or health coverage plans? Mark "Yes" or "No" for EACH type of coverage in items a – h.

	Yes	No
a. Insurance through a current or former employer or union (of this person or another family member)	<input type="checkbox"/>	<input type="checkbox"/>
b. Insurance purchased directly from an insurance company (by this person or another family member)	<input type="checkbox"/>	<input type="checkbox"/>
c. Medicare, for people 65 and older, or people with certain disabilities	<input type="checkbox"/>	<input type="checkbox"/>
d. Medicaid, Medical Assistance, or any kind of government-assistance plan for those with low incomes or a disability	<input type="checkbox"/>	<input type="checkbox"/>
e. TRICARE or other military health care	<input type="checkbox"/>	<input type="checkbox"/>
f. VA (enrolled for VA health care)	<input type="checkbox"/>	<input type="checkbox"/>
g. Indian Health Service	<input type="checkbox"/>	<input type="checkbox"/>
h. Any other type of health insurance or health coverage plan – <i>Specify</i> ↴	<input type="checkbox"/>	<input type="checkbox"/>

Source: U.S. Census Bureau, *ACS Handbook of Questions and Current Federal Uses*, <www.census.gov/programs-surveys/acs/operations-and-administration/2014-content-review/federal-uses.html>.

Examples of Federal Uses

- Required to identify vulnerable populations that may be at disproportionate risk of experiencing limitations in health care access, poor health quality, and suboptimal health outcomes.
- Used to project the demand for VA extended health care services.
- Used to review and analyze the unmet needs of people with disabilities and to identify the characteristics of the target service population.

Figure 2.3. **Question on Vehicles Available and Federal Uses of the Data**

12 How many automobiles, vans, and trucks of one-ton capacity or less are kept at home for use by members of this household?

- None
- 1
- 2
- 3
- 4
- 5
- 6 or more

Source: U.S. Census Bureau, *ACS Handbook of Questions and Current Federal Uses*, <www.census.gov/programs-surveys/acs/operations-and-administration/2014-content-review/federal-uses.html>.

Examples of Federal Uses

- Required in the enforcement responsibilities under the Voting Rights Act to determine disparities in voter participation rates for analysis and for presentation in federal litigation.
- Required in mass transportation and metropolitan planning to ensure compliance with the Clean Air Act and implementing regulations, particularly with respect to coordination and conformity.
- Used to summarize the conditions and performance of the nation's highways, bridges, and transit.

Figure 2.4. **Question on School Enrollment and Federal Uses of the Data**

10 a. At any time IN THE LAST 3 MONTHS, has this person attended school or college? Include only nursery or preschool, kindergarten, elementary school, home school, and schooling which leads to a high school diploma or a college degree.

- No, has not attended in the last 3 months → SKIP to question 11
- Yes, public school, public college
- Yes, private school, private college, home school

b. What grade or level was this person attending? Mark (X) ONE box.

- Nursery school, preschool
- Kindergarten
- Grade 1 through 12 – Specify grade 1 – 12
- College undergraduate years (freshman to senior)
- Graduate or professional school beyond a bachelor's degree (for example: MA or PhD program, or medical or law school)

Source: U.S. Census Bureau, *ACS Handbook of Questions and Current Federal Uses*, <www.census.gov/programs-surveys/acs/operations-and-administration/2014-content-review/federal-uses.html>.

Examples of Federal Uses

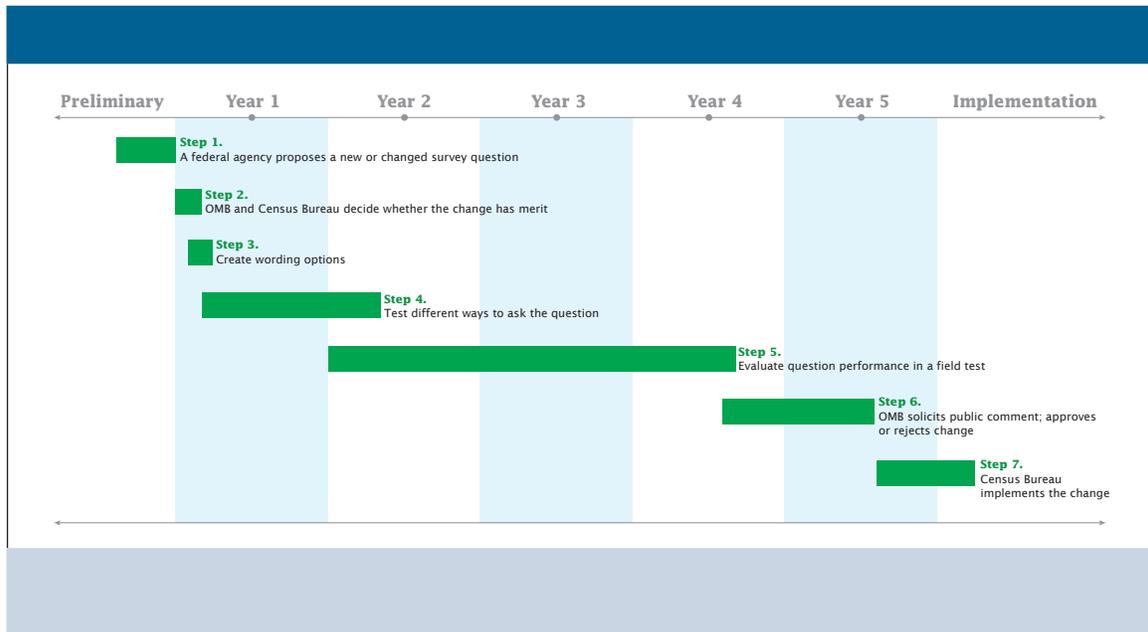
- Used in the enforcement of nondiscrimination in education by state and local governments, including ensuring appropriate action to assist English language learners in overcoming language barriers and monitoring desegregation.
- Used to allocate funds to states based on the number of adults beyond the age of compulsory school attendance without a secondary school diploma.

3. HOW A QUESTION BECOMES PART OF THE ACS

The U.S. Census Bureau must balance the information needs of a growing, changing nation with respect for the privacy and time of the American public. Adding a question or making a change to the American Community Survey (ACS) involves extensive testing, review, and evaluation over a 5-year period. This ensures the change is necessary and will produce quality, useful information for the nation. The Census Bureau requests authorization from the Office of

Management and Budget (OMB) for any revisions to the ACS questionnaire.

Although the timing may vary depending on improvements in testing methods, availability of resources, and urgency of the request, the process generally follows the evaluation and testing timeline shown in Figure 3.1.



Each step in the process is described in more detail below:

- **A federal agency proposes a new or changed survey question.**
The requesting agency must show that it needs frequent data for small geographic areas, that no other sources of information are available, and that its mission would be compromised if the question was not added or changed.
- **OMB and Census Bureau decide whether the change has merit.**
In consultation with federal agencies, OMB and the Census Bureau decide whether the request merits further consideration.
- **Create wording options.**
Subject-matter experts identify ways to ask each question using different words and phrases.
- **Test different ways to ask the question.**
The Census Bureau conducts cognitive interviews to gauge which wording is best understood and produces the most accurate results. Subject-matter experts review the cognitive testing results and recommend the version for field testing.
- **Evaluate question performance in a field test.**
Census Bureau staff finalize the wording for the test, create instruments to field the test, develop the systems to process the data collected, and conduct the test. Then, they tabulate and analyze the results and provide them to the federal agency that requested the change.
- **Census Bureau solicits public comment; approves or rejects change.**
The Census Bureau and requesting federal agency review the research results and decide whether to recommend implementation of the new or changed survey question. The Census Bureau solicits public comment through a Federal Register Notice to inform a final decision in consultation with the OMB and the Interagency Council on Statistical Policy Subcommittee on the ACS.
- **Census Bureau implements the change.**
If approved by the OMB, the Census Bureau prepares to implement the change by updating systems, questionnaires, and materials. Implementation takes effect at the start of a calendar year.

Changes to ACS Questions

Over time, questions have been added, revised, or removed from the ACS questionnaire as shown in Table 1.1. For example, in 2008 new questions on marital history, health insurance coverage, and military service-connected disability status were added to the form, while the questions on disability were significantly revised. Because of the changes to the questions, the ACS disability estimates for 2008 and later years should not be compared with 2007 and prior ACS disability estimates. 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. 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.

The Census Bureau conducts periodic reviews of the ACS to consider any deletion or addition of questions. 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.¹⁰ 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.

¹⁰ U.S. Census Bureau, American Community Survey, 2014 Content Review, <www.census.gov/programs-surveys/acs/operations-and-administration/2014-content-review.html>.

4. CONSIDERATIONS WHEN WORKING WITH ACS DATA

The greatest strength of the ACS is that it provides access to estimates on an annual basis, but this also results in an array of options that affect how data can be used effectively by federal agencies.

Many agencies require data for relatively small geographic areas that must rely on ACS 5-year estimates. Of the approximately 69,000 states, counties, cities, towns, townships, villages, other minor civil divisions, and census designated places, more than 90 percent rely exclusively on 5-year estimates. About 8 percent of these small geographic areas have populations of 20,000 or more and receive 1-year Supplemental Estimates.

Among counties and county equivalents, 41 percent rely on 5-year estimates exclusively, while 59 percent receive 1-year Supplemental Estimates and 26 percent meet the 65,000-population threshold needed to receive 1-year estimates.¹¹ Data users interested in ACS 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 (MOEs)—indicating less reliability or precision—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 MOEs 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.¹²

¹¹ Percentages include data for municipios in Puerto Rico. For more information, see the Census Bureau's ACS Web page on Areas Published, available at <www.census.gov/programs-surveys/acs/geography-acs/areas-published.html>.

¹² U.S. Census Bureau, *When to Use 1-year, 3-year, or 5-year Estimates*, <www.census.gov/programs-surveys/acs/guidance/estimates.html>.

In the end, what makes the most sense is a matter of judgment regarding the balance between the period covered by an estimate and its level of reliability or precision. The key is to strive to use the most reliable estimates, where the period covered best suits the question at hand.

Using ACS Estimates as Building Blocks for Larger Geographic Areas

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. 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 estimates that are more reliable. In such cases, additional calculations are needed to produce MOEs and standard errors, and to conduct tests of statistical significance for the derived estimates. For more information, see the section on “Calculating Measures of Error for Derived Estimates” in the Census Bureau's handbook on *Understanding and Using American Community Survey Data: What All Data Users Need to Know*.¹³

Measuring Change Over Time With ACS Data

Finally, there is the issue of how to use multiyear characterizations of an area to measure change over time. As the ACS program has moved forward, a whole series of multiyear estimates for various time intervals has become available. Data users now have access to nonoverlapping ACS 5-year estimates that have increased the value and utility of the data for monitoring trends in local communities. However, it is more challenging to capture rapid change in areas where only ACS 5-year estimates are available.

¹³ U.S. Census Bureau, *Understanding and Using American Community Survey Data: What All Data Users Need to Know*, <www.census.gov/programs-surveys/acs/guidance/handbooks/general.html>.

Consider the example of a natural disaster, like Hurricane Harvey that caused major flooding in Texas in 2018. Because data collection is ongoing, the ACS can provide essential information about population and housing characteristics in Texas both before and after the storm. The 1-year ACS estimates are particularly useful in this case because they are based on data from the past year. 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 areas experiencing major changes over a given time period, the 5-year estimates may be quite different from the 1-year estimates for any of the individual years.

For more information about ACS multiyear estimates and sampling error, see the sections on “Understanding and Using ACS Single-Year and Multiyear Estimates” and “Understanding Error and Determining Statistical Significance” in the Census Bureau’s handbook on *Understanding and Using American Community Survey Data: What All Data Users Need to Know*.¹⁴

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

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.¹⁵

Data.census.gov provides access to ACS data for a wide range of geographic areas, including states, cities, counties, census tracts, and block groups. For more information about data.census.gov, view the Census Bureau's data.census.gov Resources page.¹⁶

More advanced users within federal agencies also have several options to access ACS data that are more detailed through the downloadable Summary File, the Public Use Microdata Sample (PUMS) files, the Census Bureau's Application Programming Interface, or through special tabulations of ACS data.¹⁷

Special Tabulations of ACS Data

Most of the data required by federal agencies are accessible through published tables available through data.census.gov.¹⁸ However, several federal agencies require special tabulations of ACS data to obtain the information they need. For example:

- The Census Transportation Planning Products (CTPP) program produces special tabulations of ACS data that have enhanced value for transportation planning, analysis, and strategic direction.¹⁹
- The Equal Employment Opportunity (EEO) Tabulation serves as the primary external benchmark for comparing the race, ethnicity, and sex composition of an organization's internal workforce and the analogous external labor market, within a specified geography and job category.²⁰
- The ACS Special Tabulation on Aging serves as a component in the allocation formulas for Older Americans Act funding and for planning programs and services for older adults.²¹

- U.S. Department of Housing and Urban Development's Special Tabulations of Households provide the most detailed data available for analysis of housing demand based on income and age of householder. These data are used in allocation formulas for rental assistance programs and evaluations of program applications and multifamily mortgage insurance applications submitted to the Federal Housing Administration.²²

The minimum cost of a custom tabulation by Census Bureau staff is \$3,000, and the minimum timeframe for compiling the data is 8 weeks. The Census Bureau's Disclosure Review Board must review and approve all requests before work is started. For more information, see the Census Bureau's Web page on Custom Tables.²³

Federal Statistical Research Data Centers

Federal agencies can also access ACS data through the Federal Statistical Research Data Centers (FSRDCs)—partnerships between federal statistical agencies and leading research institutions.²⁴ FSRDCs are secure facilities managed by the Census Bureau to provide secure access to a range of restricted-use microdata, including ACS microdata. Compared to the ACS PUMS, which includes a representative subset of records from the ACS sample, the restricted data files contain many additional sample records along with additional variables. Note that FSRDC projects must be designed to produce model-based output. Only tabular output supporting the model sample(s) may be released to researchers.

FSRDC researchers have access to computing capacity to handle large data sets and complex calculations. Standard statistical, econometric, and programming software, including R, Stata, SAS, MATLAB, and Gauss, are available in a Linux environment. FSRDC researchers can collaborate with other research data center researchers across the United States through the secure FSRDC computing environment.

Data access via an FSRDC requires a proposal and approval process including background checks on researchers. The approval process, while straightforward, can take several months. Inquiries about

¹⁵ U.S. Census Bureau, data.census.gov, <<https://data.census.gov>>.

¹⁶ U.S. Census Bureau, data.census.gov Resources, <www.census.gov/data/what-is-data-census-gov.html>.

¹⁷ 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), PUMS Data, <www.census.gov/programs-surveys/acs/microdata.html>; Developers, <www.census.gov/developers/>.

¹⁸ U.S. Census Bureau, data.census.gov, <<https://data.census.gov>>.

¹⁹ AASHTO, CTPP Program, <<https://ctpp.transportation.org/>>.

²⁰ U.S. Census Bureau, EEO Tabulation, <www.census.gov/topics/employment/equal-employment-opportunity-tabulation/about.html>.

²¹ Administration for Community Living, Aging, Independence, and Disability (AGID) Program Data Portal, American Community Survey (ACS) Special Tabulations, <<https://agid.acl.gov/DataFiles/SpecialTabulations.aspx>>.

²² U.S. Department of Housing and Urban Development, Office of Policy Development and Research, Special Tabulations of Households, <www.huduser.gov/portal/datasets/spectabs.html>.

²³ U.S. Census Bureau, American Community Survey (ACS), Custom Tables, <www.census.gov/programs-surveys/acs/data/custom-tables.html>.

²⁴ U.S. Census Bureau, Federal Statistical Research Data Centers, <www.census.gov/fsrdc>.

accessing ACS or other restricted-use data can be made through the ResearchDataGov application portal.²⁵

The Census Bureau's Center for Enterprise Dissemination and the FSRDCs consider proposals from qualified researchers in social science disciplines consistent with the subject matter of the surveys and censuses collected by the Census Bureau.²⁶ Proposals may be submitted at any time and must:

- Provide benefit to Census Bureau programs.
- Demonstrate scientific merit.
- Require nonpublic data.
- Be feasible given the data.
- Pose no risk of disclosure.

All FSRDC researchers must obtain Census Bureau Special Sworn Status—passing a moderate-risk background check and swearing to protect respondent confidentiality for life, facing significant financial and legal penalties under Title 13 and Title 26 of the U.S. Code for failure to do so.²⁷

When researchers need to remove aggregated output, tables, or model coefficients from the secure environment, the output must be reviewed to ensure the confidentiality of survey respondents and that the output is consistent with the original proposal. Once the results pass disclosure review, the approved aggregated data are provided to the researcher or team outside of the secure computing environment, usually via e-mail. The researcher(s) can then produce reports, presentations, and other products outside of the secure environment.

²⁵ The ResearchDataGov portal is a joint project between the Census Bureau and the University of Michigan, <www.icpsr.umich.edu/web/pages/appfed/index.html>.

²⁶ U.S. Census Bureau, Federal Statistical Research Data Centers, Apply for Access, <www.census.gov/programs-surveys/ces/data/restricted-use-data/apply-for-access.html>.

²⁷ U.S. Census Bureau, Privacy & Confidentiality, <www.census.gov/history/www/reference/privacy_confidentiality/>.

Information about how to apply for FSRDC access is available on the Census Bureau's Web site.²⁸

Combining ACS Data With Administrative Data

Researchers at federal agencies with approved FSRDC projects can link individual or housing unit records from the ACS with administrative records based on personal identifiers. For example, Census Bureau staff linked the records of children in the ACS with records from the Internal Revenue Service, Department of Housing and Urban Development, Centers for Medicare and Medicaid Services, Department of Health and Human Services, and other sources to investigate the undercount of young children in the decennial census.²⁹ ACS records were linked to administrative data using protected identification keys—anonymous identifiers that can be used to link records across different data sets.

The Census Bureau conducts a variety of research projects that combine administrative records and survey data to lower costs, increase efficiency, reduce respondent burden, and improve data quality. Some of these projects generate new social and economic statistics—such as the Small Area Income and Poverty Estimates Program.³⁰ Other projects investigate ways to use linked data to better measure family relationships, evaluate program participation, and improve coverage of hard-to-reach populations.³¹

More information is available through the FSRDC Web site.³²

²⁸ U.S. Census Bureau, Federal Statistical Research Data Centers, Apply for Access, <www.census.gov/programs-surveys/ces/data/restricted-use-data/apply-for-access.html>.

²⁹ Leticia Fernandez, Rachel Shattuck, and James Noon, "The Use of Administrative Records and the American Community Survey to Study the Characteristics of Undercounted Young Children in the 2010 Census," CARRA Working Paper Series, CARRA-WP-2018-05, 2018.

³⁰ U.S. Census Bureau, Small Area Income and Poverty Estimates (SAIPE) Program, <www.census.gov/programs-surveys/saipe.html>.

³¹ Amy O'Hara, Rachel M. Shattuck, and Robert M. Goerge, "Linking Federal Surveys with Administrative Data to Improve Research on Families," *The ANNALS of the American Academy of Political and Social Science*, Volume 669, Issue 1, 2016, pp. 63–74.

³² U.S. Census Bureau, Federal Statistical Research Data Centers, <www.census.gov/fsrdc>.

6. CASE STUDIES USING ACS DATA

Case Study 1: Community Resilience Indicators

Skill Level: Novice/Intermediate

Subject: Assessing county characteristics that contribute to disaster resilience

Type of Analysis: Analysis of American Community Survey (ACS) indicators at the county level

Tools Used: Data.census.gov, mapping software

As disasters continue to increase in frequency and cost, researchers have attempted to identify and quantify features that make communities more resilient to disasters. The Federal Emergency Management Agency (FEMA) National Integration Center (NIC) Technical Assistance (TA) Branch asked Argonne National Laboratory (Argonne) to review this body of research and provide a data-driven approach to prioritize locations for TA. FEMA included project management, research support, peer-to-peer learning, in-person and distance learning, coaching from subject-matter experts, and other topics as factors to be considered during the review.³³

Most of the data for this analysis came from the U.S. Census Bureau's 2013–2017 ACS 5-year estimates. The primary advantage of using the ACS 5-year estimates is the increased statistical reliability compared with the ACS 1-year estimates, especially for small geographic areas and small population subgroups. The 5-year data also enabled Argonne to display maps that included estimates for every county in the country.

Methods

Argonne's first step was to conduct a literature review to identify previous methods used to assess community resilience. Argonne focused on county-level analyses that involved multiple hazards, had a predisaster focus, used quantitative measures, and incorporated publicly available data and methods.

Based on this review, Argonne selected 20 key indicators for their analysis, including 11 population-focused measures and 9 community-focused measures:

Population-Focused Indicators

- Educational Attainment
- Unemployment Rate
- Disability
- English Language Proficiency
- Home Ownership
- Mobility
- Age
- Household Income
- Income Inequality
- Health Insurance
- Single-Parent Household

Community-Focused Indicators

- Connection to Civic and Social Organizations
- Hospital Capacity
- Medical Professional Capacity
- Affiliation With a Religion
- Presence of Mobile Homes

³³ U.S. Federal Emergency Management Agency and Argonne National Laboratory, "Community Resilience Indicator Analysis: County-Level Analysis of Commonly Used Indicators From Peer-Reviewed Research," 2019, <www.fema.gov/sites/default/files/2020-11/fema_community-resilience-indicator-analysis.pdf>, 2020 update.

- Public School Capacity
- Population Change
- Hotel/Motel Capacity
- Rental Property Capacity

The percentage of people with disabilities was identified as one of the 20 key indicators of disaster resilience. Here are steps to access disability estimates for every county in the country (including Puerto Rico):

Navigate to <<https://data.census.gov>> and type “disability” into the search bar. Then click “Search” (see Figure 6.1).

Figure 6.1. Searching for Disability Tables in Data.census.gov



Click on the first table on the results page: Table S1810: "Disability Characteristics" (see Figure 6.2).

Figure 6.2. **Selecting a Table in Data.census.gov**

The screenshot shows the Data.census.gov search results for the query 'disability'. The page features a dark blue header with the United States Census Bureau logo, a search bar containing 'disability', and a 'SEARCH' button. Below the header, there are navigation tabs for 'ALL', 'TABLES', 'MAPS', and 'PAGES', with 'TABLES' selected. The main content area displays 'About 13,456 results | Filter' and a prominent 'EXPLORE DATA' box for '12.7% +/- 0.1% Disabled Population in United States'. Below this, a 'Tables' section lists three results, with the first one, 'DISABILITY CHARACTERISTICS', circled in red. To the right, a 'Related Searches' sidebar lists various categories like Health, Populations and People, and Veterans. At the bottom right, there is a 'Public Use Microdata' box. The footer of the page includes the source: 'Source: U.S. Census Bureau, data.census.gov <https://data.census.gov>.'

United States
Census
Bureau

Q disability X SEARCH

ALL TABLES MAPS PAGES

About 13,456 results | Filter

EXPLORE DATA

12.7% +/- 0.1% Disabled Population in United States
Source 2019 American Community Survey 1-Year Estimates
<https://www.census.gov/programs-surveys/acs/>

Tables

DISABILITY CHARACTERISTICS
Survey/Program: American Community Survey
Years: 2019,2018,2017,2016,2015,2014,2013,2012,2011,2010 Table: S1810

SELECTED ECONOMIC CHARACTERISTICS FOR THE CIVILIAN NONINSTITUTIONALIZED POPULATION BY DISABILITY STATUS
Survey/Program: American Community Survey
Years: 2019,2018,2017,2016,2015,2014,2013,2012,2011,2010 Table: S1811

DISABILITY STATUS OF GRANDPARENTS LIVING WITH OWN GRANDCHILDREN UNDER 18 YEARS BY RESPONSIBILITY FOR OWN GRANDCHILDREN AND AGE OF GRANDPARENT
Survey/Program: American Community Survey
Years: 2019,2018,2017,2016,2015,2014,2013,2012,2011,2010 Table: B10052

Related Searches

- Health
- Populations and People
- Age and Sex
- Race and Ethnicity
- Employment
- Counts, Estimates, and Projections
- Income and Poverty
- Civilian Population
- Veterans

ACS & CPS 2004-2018

Public Use Microdata
Create record level custom tables

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

This will bring you to a preview of Table S1810 with the United States as the default geography. Select “Customize Table” in the upper right corner (see Figure 6.3).

Figure 6.3. Previewing and Customizing a Table in Data.census.gov

The screenshot shows the Data.census.gov interface. At the top, there is a search bar with 'disability' entered. Below the search bar, there are navigation tabs: ALL, TABLES, MAPS, and PAGES. The 'TABLES' tab is selected. On the right side, there is a 'CUSTOMIZE TABLE' button circled in red. The main content area displays the 'DISABILITY CHARACTERISTICS' table for the United States. The table has columns for 'Total' and 'With a disability', each with sub-columns for 'Estimate' and 'Margin of Error'. The data rows include 'Total civilian noninstitu...', 'SEX' (Male, Female), and 'RACE AND HISPANIC ...' (White alone, Black or African Amer...). A sidebar on the left provides additional information about the table, including the survey program (American Community Survey) and years (2018, 2017, 2016, 2015, 2014, 2013, 2012, 2011, 2010).

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

To access data for all counties in the United States, first select the “Geographies” filter (see Figure 6.4).

Figure 6.4. Selecting Geographic Areas Using the Geography Filter in Data.census.gov

The screenshot shows the Data.census.gov interface with the 'Geographies' filter button circled in red. The table now includes an additional column for 'Percent with a disability'. The data rows are the same as in Figure 6.3, but with the percentage values added. For example, the 'Total civilian noninstitu...' row shows 12.6% for 'Percent with a disability'. The 'SEX' rows show 12.5% for Male and 12.7% for Female. The 'RACE AND HISPANIC ...' rows show 12.6% for White alone and 12.7% for Black or African Amer... The top navigation bar includes buttons for 'Data Notes', 'Selections', 'Geographies', 'Years', '1 Topic', 'Survey', 'Code', 'Hide', 'Filter', 'Sort', 'Transpose Table', 'Margin of Error', 'Restore Layout', 'Download', and 'More'.

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

Next:

- Select “County.”
- Then check the box for “All counties in United States.” This selection will appear at the bottom of the page next to “Selected Geographies.”
- Click “Close” in the lower right corner (see Figure 6.5).

Figure 6.5. Selecting All Counties in the United States in Data.census.gov

The screenshot shows the Data.census.gov interface for the table 'DISABILITY CHARACTERISTICS' (TableID: S1810). The 'GEOGRAPHY' sidebar on the left has 'County' selected and circled in red. The 'WITHIN (STATE)' dropdown menu is open, showing 'All counties in United States' selected with a checkmark and circled in red. Other options include 'Within Other Geographies', 'Alabama', 'Alaska', 'Arizona', 'Arkansas', 'California', and 'Colorado'. At the bottom right, the 'CLOSE' button is circled in red. The 'Selected Geographies' section at the bottom left shows 'All counties in United States' with a close icon.

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

This table is too large to display in the preview window, so select “Download Table” (see Figure 6.6).

Figure 6.6. Downloading a Table in Data.census.gov

The screenshot shows the Data.census.gov interface for the table 'DISABILITY CHARACTERISTICS' (TableID: S1810). A message in the center of the page reads 'Sorry, that table is too large to display.' Below the message, the 'DOWNLOAD TABLE' button is circled in red. The 'FILTER RESULTS' button is also visible to the right of the 'DOWNLOAD TABLE' button.

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

For this case study, select the 2017 ACS 5-year data. After checking that the other default download specifications in the “Download/Print/Share” window are correct, select “Download” again (see Figure 6.7).

Figure 6.7. Using the Download/Print/Share Window in Data.census.gov

Download / Print / Share

Select Table Vintages

	All	2018	2017	2016	2015	2014	2013	2012	2011	2010
S1810										
1-Year	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5-Year	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>						

File Type

CSV

PDF

What You're Getting

- 1 .csv files (metadata)
- 1 .csv files (data)
- 1 .txt files (table title)

Uncompressed Estimated Size: 13.5 MB

DOWNLOAD

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

Select “Download Now” after the file is prepared (see Figure 6.8).

Figure 6.8. Downloading a Compressed (ZIP) File in Data.census.gov

We're preparing your files.

Cancelling this window will end the download.

100%

Download Now

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

This download yields a compressed folder with three files: metadata, data, and table title. These data can be used to access the percentage of the population with a disability in each U.S. county. The research team created county-level choropleth maps for each key indicator. Counties were shaded based on a five-color scale (see Figure 6.9). The scale used cooler colors to indicate potentially higher relative levels of resilience, with blue at the top of the scale, and warmer colors to indicate potentially lower relative levels of resilience, with red at the bottom.

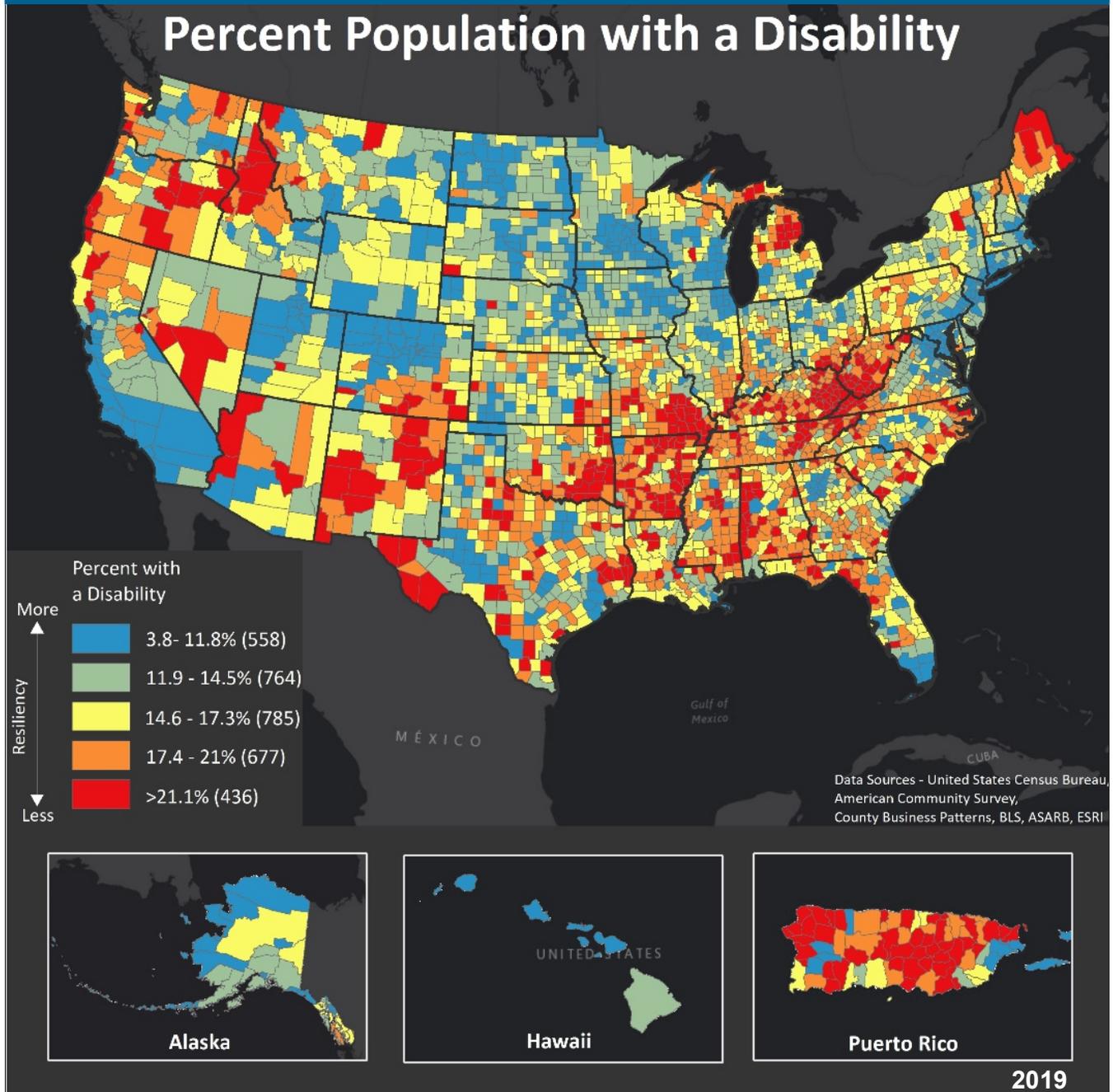
Figure 6.9. Color Scale for Choropleth Maps

Blue	Potentially high disaster resilience
Green	
Yellow	
Orange	
Red	Potentially low disaster resilience

Source: U.S. Federal Emergency Management Agency and Argonne National Laboratory, Community Resilience Indicator Analysis, <www.fema.gov/sites/default/files/2020-11/fema_community-resilience-indicator-analysis.pdf>, 2020 update.

Figure 6.10 shows a sample map of disaster resilience based on disability rates. The map shows relatively high concentrations of disability in parts of Alabama, Arkansas, Kentucky, Mississippi, New Mexico, Oklahoma, Oregon, Tennessee, Puerto Rico, and West Virginia.

Figure 6.10. Percentage of the Population With a Disability by County



Source: U.S. Federal Emergency Management Agency and Argonne National Laboratory, Community Resilience Indicator Analysis, <www.fema.gov/sites/default/files/2020-11/fema_community-resilience-indicator-analysis.pdf>, 2020 update.

Next, the research team developed a method to aggregate county-level data from all 20 indicators and sort each U.S. county into one of five bins. The research team used the same color scale for the aggregate maps as for the individual indicator maps, with blue indicating higher relative resilience levels and red indicating lower relative resilience levels (see Figure 6.11). This aggregate map provides a data-driven basis for identifying areas where FEMA should offer community resilience Collaborative TA.

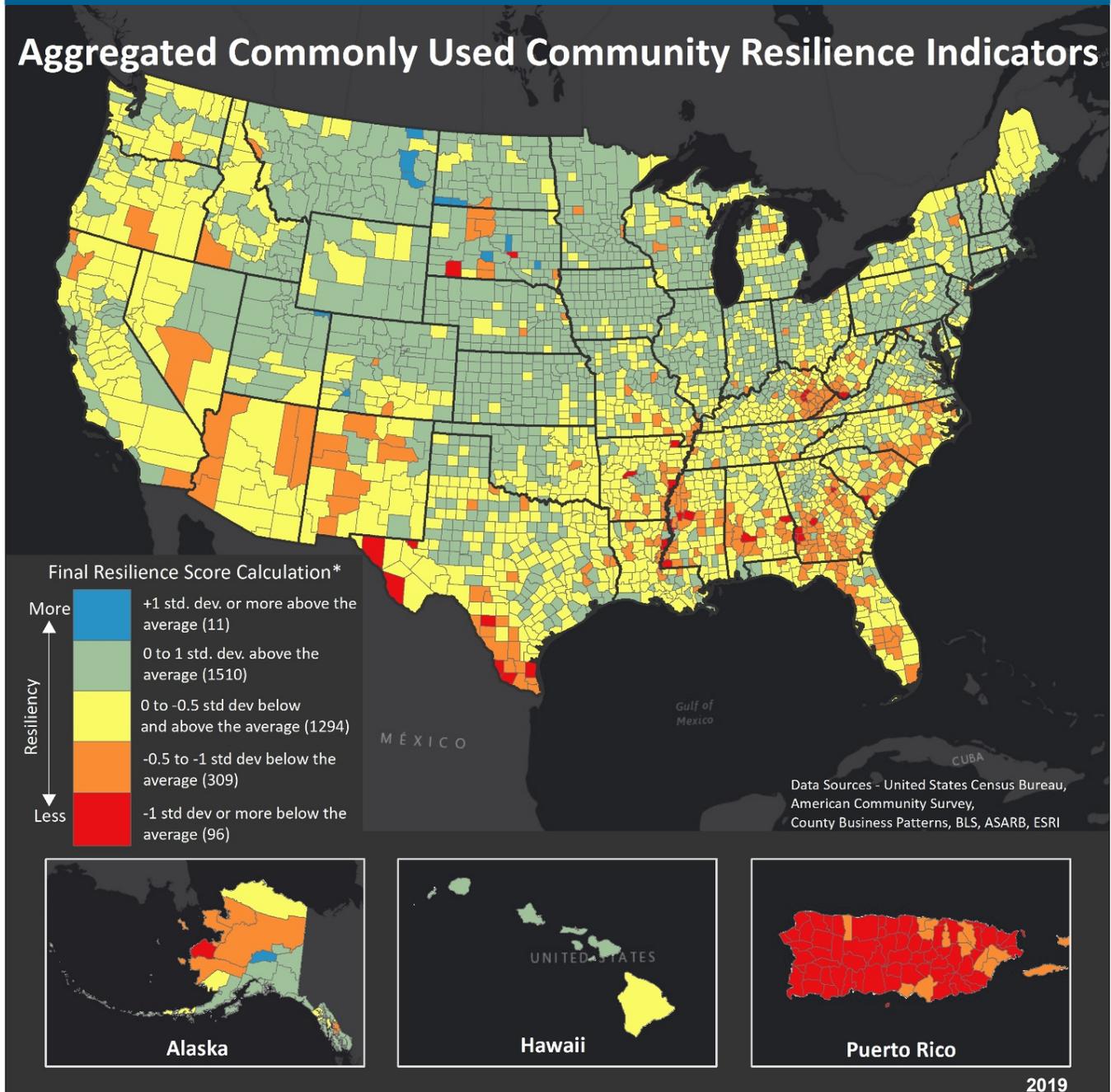
Figure 6.11. **Color Scale for Aggregated Resilience Indicators Map**

Blue	+1 standard deviation or more above the average
Green	Above 0 but <+1.0 standard deviation above average
Yellow	Below 0, but >-0.5 standard deviation below average
Orange	↓ Between -0.5 and -1.0 standard deviation below average
Red	-1.0 standard deviation or more below the average

Source: U.S. Federal Emergency Management Agency and Argonne National Laboratory, Community Resilience Indicator Analysis, <www.fema.gov/sites/default/files/2020-11/fema_community-resilience-indicator-analysis.pdf>, 2020 update.

Using these aggregated data, Argonne created an “Aggregated Commonly Used Community Resilience Indicators” choropleth map (see Figure 6.12). This analysis identified 96 counties in the lowest bin that are facing the greatest challenges to resilience, with 63 of these counties in Puerto Rico. A total of 309 counties sorted into the next bin. Many counties in this category are also within Puerto Rico, while others are primarily within the southeast and southwest regions of the United States and in Alaska.

Figure 6.12. Aggregated Commonly Used Resilience Indicators



Source: U.S. Federal Emergency Management Agency and Argonne National Laboratory, Community Resilience Indicator Analysis, <www.fema.gov/sites/default/files/2020-11/fema_community-resilience-indicator-analysis.pdf>, 2020 update.

Although this analysis was conducted for the FEMA NIC TA Branch, the findings have relevance for many FEMA program areas, as well as for state, local, territorial, and tribal emergency managers and other partners. By reviewing county data for these 20 indicators, emergency managers can gain insights for targeted outreach strategies and for adapting emergency operations plans to community characteristics.

All of the maps and data can be found within an interactive map viewer on FEMA's geospatial portal at <www.fema.gov/sites/default/files/2020-11/fema_community-resilience-indicator-analysis.pdf>, 2020 update.

Case Study #2: Exploring Social Determinants of Health Using ACS-CMS Linked Data

Skill Level: Intermediate/Advanced

Subject: Social determinants of health

Type of Analysis: Linking administrative data to American Community Survey (ACS) data

Tools Used: Data.census.gov, Chronic Conditions Data Warehouse, spreadsheet, statistical software

Authors: Shondelle Wilson-Frederick, Statistician, Centers for Medicare & Medicaid Services; and Sharon R. Ennis, Statistician, Department of Veterans Affairs

The Centers for Medicare & Medicaid Services (CMS) is an operating division within the U.S. Department of Health and Human Services. CMS oversees the two largest federal health care programs—Medicare and Medicaid—as well as the Children’s Health Insurance Program and the exchanges. CMS programs will touch the lives of over 145 million beneficiaries and consumers in FY 2020.³⁴

The CMS Chronic Conditions Data Warehouse (CCW) is a research database designed to make Medicare, Medicaid, Assessments, and Part D Prescription Drug Event data more readily available to support research designed to improve the quality of care and reduce costs and utilization.³⁵ The Medicare Master Beneficiary Summary File (MBSF), which is stored in the CCW, includes Medicare enrollment status, demographic, and eligibility information for all beneficiaries.

While the MBSF can be used to study racial, ethnic, and geographic disparities among Medicare Fee-for-Service (FFS) beneficiaries, data on the social determinants of health are limited. The MBSF contains individual level characteristics; however, it does not include any personal identifiable information. The American Community Survey (ACS) is a rich source of demographic, socioeconomic, and housing estimates that can be combined with claims data by linking at the geographical level of ZIP codes to enhance our understanding of Medicare FFS beneficiaries. This aggregated linked file can be analyzed to learn more about the social determinants of health among Medicare FFS beneficiaries.

This case study summarizes the steps to compile and analyze data for one of the key ACS variables—language spoken at home. Communication and language barriers are associated with structural and clinical challenges and poorer health outcomes.³⁶ Limited English proficiency may contribute to a lower quality of care, patient satisfaction, post-care adherence, patient safety, and lack of equity in the provision of healthcare.³⁷

³⁴ U.S. Department of Health and Human Services, Fiscal Year 2020: Centers for Medicare & Medicaid Services, Justification of Estimates for Appropriations Committees, <www.cms.gov/files/document/fy2020-cms-congressional-justification-estimates-appropriations-committees.pdf>.

³⁵ Centers for Medicare & Medicaid Services, “Chronic Conditions Warehouse,” <<https://www2.ccwdata.org/web/guest/home/>>.

³⁶ Centers for Medicare & Medicaid Services, Office of Minority Health, “Building an Organizational Response to Health Disparities: Guide to Developing a Language Access Plan,” <www.cms.gov/About-CMS/Agency-Information/OMH/Downloads/Language-Access-Plan-508.pdf>.

³⁷ Kimberly Proctor, Shondelle M. Wilson-Frederick, and Samuel C. Haffer, “The Limited English Proficient Population: Describing Medicare, Medicaid, and Dual Beneficiaries,” *Health Equity*, 2(1): 82–89, Baltimore, MD, 2018.

To access ACS data on language spoken at home:

We start by navigating to <https://data.census.gov>. Since we already know which table we would like to access, we type C16001 into the search bar and click the first result C16001: “Language Spoken at Home for the Population 5 Years and Over” (See Figure 6.13).

Figure 6.13. Searching for a Table in Data.census.gov

The screenshot shows the top of the Data.census.gov website. The United States Census Bureau logo is at the top right. The main heading is 'Explore Census Data'. Below this is a sub-heading: 'The Census Bureau is the leading source of quality data about the nation's people and economy.' A search bar contains the text 'C16001' and a 'SEARCH' button. Below the search bar, a dropdown menu shows the search results, with the first result 'C16001: LANGUAGE SPOKEN AT HOME FOR THE POPULATION 5 YEAR...' highlighted in red. There is also an 'Advanced Search' link below the search results.

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

Select the desired survey year by clicking on the current “Product” selection. For the purposes of this case study, we are using 2012-2016 ACS 5-year estimates. The product selection should read “2016 ACS 5-Year Estimates Detailed Tables” (see Figure 6.14). Data.census.gov automatically defaults geography to the national level unless otherwise specified. Since we would like to study Medicare beneficiaries across ZIP Code Tabulation Areas (ZCTAs), we click on “Geos” to view the geography filters. ZCTAs are generalized areal representations of United States Postal Service ZIP code service areas.

Figure 6.14. Changing the Data Product Year and Selecting Geographic Areas Using the Geography Filter in Data.census.gov

The screenshot shows the Data.census.gov interface for the table 'C16001'. The search bar contains 'ACSDT1Y2019.C16001'. The table title is 'LANGUAGE SPOKEN AT HOME FOR THE POPULATION 5 YEARS AND OVER'. The survey/program is 'American Community Survey', the universe is 'Population 5 years and over', and the table ID is 'C16001'. The product is currently set to '2019: ACS 1-Year Estimates Detailed Tables'. A dropdown menu is open, showing a list of product options. The option '2016: ACS 5-Year Estimates Detailed Tables' is highlighted in red. The 'Geos' filter is selected, and the 'United States' geography is chosen. The table shows the following data:

Label	Estimate	Margi
▼ Total:	308,834,688	
Speak only English	241,032,343	
▼ Spanish:	41,757,391	
Speak English "very well"	25,626,084	
Speak English less than "very well"	16,131,307	
▼ French, Haitian, or Cajun:	2,096,592	±48,027

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

Next:

- Turn on the “Show Summary Levels” toggle switch.
- Select “860 - 5-Digit ZCTA.”
- Check the box for “All ZCTAs in the United States.” This selection will appear at the bottom of the page next to “Selected Geographies.”
- Click “Close” in the bottom right corner (see Figure 6.15).

Figure 6.15. **Selecting All ZCTAs in the United States in Data.census.gov**

The screenshot shows the Data.census.gov interface for the table 'LANGUAGE SPOKEN AT HOME FOR THE POPULATION 5 YEARS AND OVER'. The search path is // Search / Tables / C16001. The table ID is C16001 and the product is 2016: ACS 5-Year Estimates Detailed Tables. The interface includes a navigation bar with icons for Notes, Selections, 1 Geo, Years, Topics, Surveys, Codes, Filter, Margin of Error, Restore, Download, Export, More Data, and Map. The 'GEOGRAPHY' section on the left lists various levels, with '860 - 5-Digit ZCTA' selected and highlighted. The '860 - 5-DIGIT ZCTA (STATE)' list on the right shows 'All ZCTAs in United States' selected with a checkmark. The 'Selected Geographies' section at the bottom shows 'All ZCTAs in United States' with a close button. A 'CLOSE' button is circled in red in the bottom right corner.

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

Typically, the table would update to show the geographies selected. However, since there are over 33,000 ZCTAs in the United States, the table is too large to display. Therefore, we need to select “Download Table” (See Figure 6.16).

Figure 6.16. Downloading a Table in Data.census.gov

The screenshot shows the Data.census.gov interface for the table 'LANGUAGE SPOKEN AT HOME FOR THE POPULATION 5 YEARS AND OVER'. The search bar contains 'ACSDT1Y2019.C16001'. The table ID is 'C16001'. The product is '2016: ACS 5-Year Estimates Detailed Tables'. The interface includes various navigation and action buttons such as 'Notes', 'Selections', '1 Geo', 'Years', 'Topics', 'Surveys', 'Codes', '123', 'Hide', 'Transpose', 'Margin of Error', 'Restore', 'Download', 'Export', 'Print', 'FTP', 'More Data', and 'Map'. A message in the center states 'Sorry, that table is too large to display.' Below this message, there are two buttons: 'DOWNLOAD TABLE' and 'FILTER RESULTS'. The 'DOWNLOAD TABLE' button is circled in red.

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

For this case study, we select the 2016 ACS 5-year data. After making sure that the download specifications in the “Download/Print/Share” window are correct, we select “Download” again (see Figure 6.17).

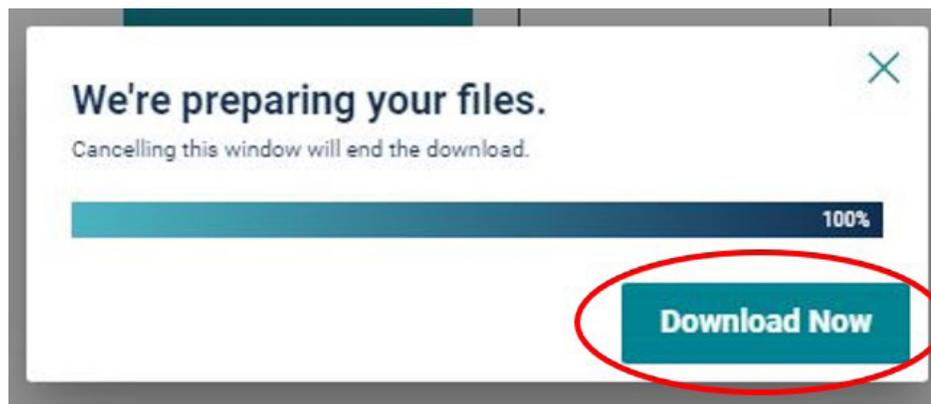
Figure 6.17. Using the Download/Print/Share Window in Data.census.gov

The screenshot shows the 'Download / Print / Share' window. The 'DOWNLOAD' tab is selected. Below the tabs, there is a table for 'Select Table Vintages' with columns for 'All', '2018', '2017', and '2016'. The '2016' column has a checked checkbox. Below the table, there is a 'File Type' section with radio buttons for 'CSV' and 'PDF'. The 'CSV' radio button is selected. To the right, there is a 'What You're Getting' section with a list of files: '1 .csv files (metadata)', '1 .csv files (data)', and '1 .txt files (table title)'. The 'Uncompressed Estimated Size' is '25.8 MB'. A 'DOWNLOAD' button is circled in red.

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

Select “Download Now” after the file is prepared (see Figure 6.18).

Figure 6.18. **Downloading a Compressed (ZIP) File in Data.census.gov**



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

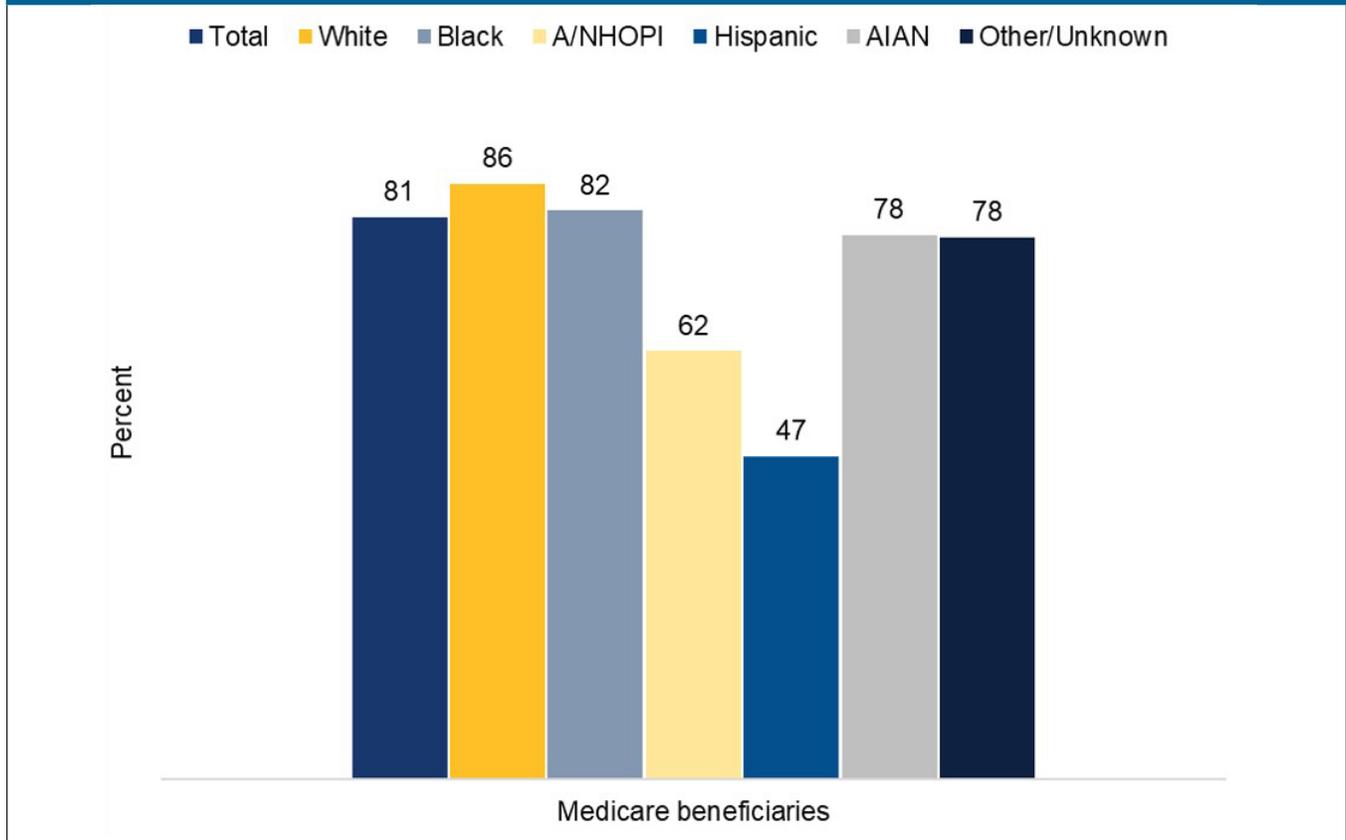
A compressed folder that includes three files; metadata, data, and table title will be available. We, generally, can use these data to combine beneficiary data with ACS data by ZCTA. To complete the analysis, we:

- Upload the ACS data to the CCW.
- Import the data as statistical software data sets.
- Recode the ACS variables and create percentages.
- Merge individual ACS data sets by ZCTA and sort by ZCTA.
- Merge Medicare beneficiary health information by a CMS unique identifier.
- Sort Medicare beneficiary data sets by ZCTA.
- Link the ACS and Medicare by ZCTA/ZIP code.
- Omit all unmatched ZCTA/ZIP codes pairs or ZIP codes with less 10,000 ZIP codes.

Findings/Summary of Case Study on Using ACS Data

The combined ACS/MBSF results show that compared to all beneficiaries, a higher percentage of White and Black Medicare beneficiaries resided in communities with a higher mean English-only speaking population, relative to Asian, Native Hawaiian or Other Pacific Islander, and Hispanic beneficiaries (see Figure 6.19). By linking the MBSF to the ACS, it was possible to examine the language needs for Medicare beneficiaries. This analysis would not have been possible by using the MBSF only.

Figure 6.19. Percentage of Medicare Beneficiaries in ZIP Codes That Speak English Only (Mean)



Note: A/NHOPI = Asian/Native Hawaiian and Other Pacific Islander. AIAN = American Indian/Alaska Native.

Source: Authors' analysis of data from the U.S. Census Bureau, American Community Survey; and Centers for Medicare and Medicaid Services.

CMS provides free publicly accessible resources in 18 languages to help people make informed health care decisions and be active partners in their health care and the health care of their families.³⁸ Additionally, the CMS Office of Minority Health has designed several initiatives to eliminate disparities in health care quality and access, so that all CMS beneficiaries can achieve their highest level of health.³⁹ To learn more about CMS' equity resources to assist with understanding the communication needs of diverse populations of Medicare beneficiaries, please visit <www.cms.gov/About-CMS/Agency-Information/OMH/research-and-data/information-products/issue-briefs>.

Linking the MBSF with the ACS strengthened the utility of CMS administrative data to explore how social determinants of health may contribute to racial, ethnic, and geographic disparities. These study findings highlight the diversity of the Medicare population and supports identification of appropriate targets to develop effective interventions aimed at promoting equity for all Americans.

³⁸ Centers for Medicare & Medicaid Services, "Resources by Language," <www.cms.gov/About-CMS/Agency-Information/OMH/resource-center/resources-by-language>.

³⁹ Centers for Medicare & Medicaid Services, "Equity Initiatives," <www.cms.gov/About-CMS/Agency-Information/OMH/equity-initiatives>.

Case Study #3: Learning More About HUD-Assisted Households Through Data Linkage

Skill Level: Advanced

Subject: Analyzing characteristics of households receiving U.S. Department of Housing and Urban Development rental assistance with American Community Survey (ACS) data

Type of Analysis: Administrative record linkage and analysis using ACS data

Tool Used: Statistical software

Authors: Shawn Bucholtz, Federal Housing Finance Agency (formerly U.S. Department of Housing and Urban Development); Emily Molfino, U.S. Census Bureau; and Quentin Brummet, National Opinion Research Center (NORC) at the University of Chicago

The U.S. Department of Housing and Urban Development (HUD) administers several rental assistance programs that help low-income households afford their rental units, including those housing seniors, disabled persons, and veterans. The largest of these programs is the Housing Choice Voucher (HCV) program with approximately 2.3 million households receiving rental assistance. The second largest of these programs is project-based rental assistance (PBRA) with approximately 1.3 million households receiving rental assistance, while the third largest program, Public Housing (PH), currently provides housing for approximately 950,000 households. These three programs, as well as a myriad of much smaller HUD programs, provide rental assistance for more than 4.6 million households, or about 3.8 percent of all households in the United States.

To administer rental assistance programs in a manner consistent with statutory, regulatory, and program-specific requirements, HUD must collect information from the beneficiaries. However, like many federal programs, HUD's data collection is generally limited only to the information necessary to implement the program. This shortcoming limits HUD's ability to fully monitor ongoing program performance or evaluate longer-term program effects. As a result, evaluating program effects often requires additional surveys, which are expensive.

This shortcoming in the ability to evaluate programmatic impact is also well known to policymakers and members of research and advocacy communities. It is partially addressed by the Foundations for Evidence-Based Policymaking Act of 2019, which requires agencies to develop written evaluation plans and establish evaluation officers. One promising method for low-cost evaluation of program performance and effects is linking administrative records to data from existing surveys, like the U.S. Census Bureau's American Community Survey (ACS). The ACS contains a wealth of household and demographic information that is not currently collected by HUD including:

- Type of occupation and commuting mode.
- Veteran status.
- Health insurance status.
- Expanded racial categories and household relationship types.
- Internet access.

Linking ACS data to HUD-assisted housing units and households allows HUD to gain insights that would otherwise not be possible with current rental assistance administrative records, potentially leading to more robust program evaluation. For example, the HUD/ACS linked data set can be used to create summary statistics of characteristics of the HUD-assisted housing units or households present in the ACS sample, such as the percentage of HUD-assisted housing units that have high-speed Internet—a characteristic available in the ACS.

In this case study, we describe how we linked HUD-assisted housing unit and household administrative records to ACS housing unit records to identify ACS households receiving HUD rental assistance.

Access to the ACS/HUD linked data is available to researchers through a Federal Statistical Research Data Center, after obtaining Special Sworn Status and approval for their project.⁴⁰

⁴⁰ U.S. Census Bureau, Federal Statistical Research Data Centers, <www.census.gov/fsrdc>.

Record Linkage Process

HUD-assisted housing units were first linked to ACS housing units based on housing unit addresses using the Census Bureau’s Master Address File (MAF), which is the source of addresses for the ACS, other Census Bureau demographic surveys, and the decennial census. Then, HUD-assisted housing units were linked to ACS units if a household member (person) within the ACS household roster matched a person in a HUD-assisted household roster. We refer to this roster-based linking process as “Protected Identification Key (PIK) matching.” Any ACS housing unit that linked to a HUD administrative record by either a MAF match or PIK match was considered a HUD-assisted housing unit. A complete description of the record linkage process, as well as potential problems with the linkage process, is available in Bucholtz, Molfino, and Brummet’s technical report.⁴¹

Record Linkage Quality Assessment

Table 6.1 shows the number of ACS records linked to a HUD administrative record by the type of link. Although not the subject of this article, we speculate that the downward trend in the total number of ACS records linked to a HUD administrative record reflects a general downward trend in response rates for HUD-assisted households. The authors have observed a similar trend in another household survey, the American Housing Survey.⁴²

Table 6.1. Breakdown of HUD/ACS Links Made by Address (MAF) and Person (PIK)

Breakdown		Year						
		2011	2012	2013	2014	2015	2016	2017
MAF-matched	Count	60,000	63,500	55,500	58,000	57,000	54,500	51,500
	Percent	81.6	81.9	82.2	82.9	82.6	83.8	84.4
PIO-matched	Count	13,500	14,000	12,000	12,000	12,000	10,500	9,500
	Percent	18.4	18.1	17.8	17.1	17.4	16.2	15.6
Total	Count	73,500	77,500	67,500	70,000	69,000	65,000	61,000

Notes: MAF = Master Address File. PIK = Protected Identification Key. Numbers are rounded to comply with U.S. Census Bureau disclosure guidelines.
Source: Authors’ analysis of American Community Survey (ACS) and U.S. Department of Housing and Urban Development (HUD) data.

To determine whether the linking process performed well, we compared the “prelinking” count of HUD rental assistance administrative records with the “post-linking” ACS weighted estimate of ACS housing units identified as HUD-assisted. All else being equal, if the linking process performs well, the post-link ACS weighted estimate of HUD-assisted units should be very similar to the prelink known record count.

Table 6.2 below presents linking quality metrics for 2015 through 2017. The table shows that HUD provided the Census Bureau with 4.74 million rental assistance administrative records and housing unit records in 2017. When these records were linked to ACS housing units, the weighted estimate of HUD-assisted housing units was 4.62 million, or 97.3 percent of the real total. Across all years of the data linkage (2011–2017), the ACS-weighted estimate of HUD-assisted housing units ranges from 97.0 to 99.4 percent. There is some variation in linkage rate across the three categories of HUD programs, however, with the PBRA program consistently performing worse than PH or HCV. Reasons for this difference are explored in the technical report, but are generally due to variations in the quality of HUD addresses.

⁴¹ Shawn Bucholtz, Emily Molfino, and Quentin Brummet, “Identifying Subsidized Housing Units Within the American Community Survey Through Administrative Record Linkage: A Technical Report,” U.S. Department of Housing and Urban Development, Washington, DC, 2020, <www.huduser.gov/portal/publications/Identifying-Subsidized-Housing-Units.html>.

⁴² Based on unpublished analysis of 2015, 2017, and 2019 American Housing Survey internal use files.

Given the results in Table 6.2, it's reasonable to conclude that the linking process performed well enough to ensure that the ACS housing units flagged as HUD-assisted units are a representative cross-section of all possible ACS housing units that are truly HUD-assisted units. In statistical terms, although there are false negatives (positives), they appear to be limited in quantity, and we feel their omission (inclusion) should not result in biased estimates of housing or household characteristics of HUD-assisted households. Regardless of the extent to which our linking process introduced any bias, a method for overcoming this bias is described in the technical report.⁴³

Table 6.2. Results of HUD/ACS Administrative Linking

		All	PH	HCV	PBRA
2015	HUD records provided to Census.	4,757,000	998,200	2,265,000	1,494,000
	ACS estimate of HUD-assisted households	4,678,000	1,021,000	2,256,000	1,400,000
	ACS estimate as share of HUD records.	98.3%	102.3%	99.6%	93.7%
	ACS 90 percent margin of error.	0.7%	1.4%	1.2%	1.3%
2016	HUD records provided to Census.	4,760,000	1,014,000	2,300,000	1,446,000
	ACS estimate of HUD-assisted households	4,623,000	1,001,000	2,248,000	1,374,000
	ACS estimate as share of HUD records.	97.1%	98.7%	97.7%	95.0%
	ACS 90 percent margin of error.	0.7%	1.5%	1.1%	1.1%
2017	HUD records provided to Census.	4,744,000	977,100	2,313,000	1,453,000
	ACS estimate of HUD-assisted households	4,615,000	979,700	2,268,000	1,367,000
	ACS estimate as share of HUD records.	97.3%	100.3%	98.1%	94.1%
	ACS 90 percent margin of error.	0.80%	1.50%	1.10%	1.30%

Note: ACS = American Community Survey. HCV = Housing Choice Voucher program. PBRA = project-based rental assistance. PH = public housing.
Source: Authors' analysis of American Community Survey (ACS) and U.S. Department of Housing and Urban Development (HUD) data.

Uses of the Linked Data

In this section, we illustrate two uses of the linked data to produce estimates that are otherwise not feasible to derive using HUD rental assistance administrative records alone.

On HUD forms 50058 and 50059, current and prospective HUD-assisted renters supply a host of demographic information including age, sex, race, and ethnicity. Consistent with federal guidelines governing the collection of race and ethnicity data, HUD collects race information using five standard categories: White, Black or African American, Asian, American Indian or Alaska Native, and Native Hawaiian or Other Pacific Islander. ACS follows the same federal guidelines but expands the number of categories for Asians from one to six detailed Asian race categories and offers respondents a write-in option.⁴⁴

The linked HUD/ACS data can be used to estimate the number of HUD-assisted householders reporting their race as Asian by detailed Asian race category. Table 6.3 presents these results from the 2013–2017 ACS 5-year data. The results reveal significant variation within the Asian race groups in the share of households receiving HUD assistance relative to those eligible for HUD assistance. While it is beyond the scope of this case study to explain these differences further, this analysis illustrates the potential value of the data linkage for better understanding who is served by HUD rental assistance programs.

⁴³ Shawn Bucholtz, Emily Molfino, and Quentin Brummet, "Identifying Subsidized Housing Units Within the American Community Survey Through Administrative Record Linkage: A Technical Report," U.S. Department of Housing and Urban Development, Washington, DC, 2020, <www.huduser.gov/portal/publications/Identifying-Subsidized-Housing-Units.html>.

⁴⁴ At the time of this analysis, the ACS questionnaire included write-in fields for "Other Asian," "Other Pacific Islander," and "Some other race." Starting with the 2020 ACS questionnaire, there are now write-in fields for "White" and "Black or African American." For more information, see <www.census.gov/programs-surveys/acs/methodology/questionnaire-archive.html>.

Table 6.3. Detailed Asian Race for HUD-Assisted Households: 2013–2017

Householder race	HUD-assisted households	Households eligible for HUD assistance	Share of eligible households receiving HUD assistance (in percent)
Asian Indian	5,973	105,533	6
Cambodian	5,480	16,640	33
Chinese	53,810	259,710	21
Filipino	12,340	82,330	15
Hmong	4,515	14,389	31
Japanese	3,117	34,187	9
Korean	24,000	116,480	21
Laotian	2,289	9,847	23
Other Asian or Two Groups	9,879	116,379	8
Vietnamese	32,370	89,910	36

Source: Authors' analysis of 2013–2017 American Community Survey, 5-Year Estimates.

As another example, HUD and the U.S. Department of Veterans Affairs (VA) partner to implement the VA Supportive Housing (VASH) program, which provides housing vouchers to homeless veterans. As of 2017, the HUD-VASH program provided housing to nearly 88,000 households with a veteran.⁴⁵ HUD leaders long suspected that other HUD rental assistance programs provided housing to many additional veterans that were not part of the VASH program. As is the case with detailed race and ethnicity data, however, HUD forms 50058 and 50059 do not collect information on veteran's status.

The linked HUD/ACS data can be used to estimate the number of HUD-assisted households with a veteran to inform this program. Table 6.4 below presents these results by year from the ACS 1-year estimates for 2011 through 2017. The results reveal that HUD is serving between 285,000 and 324,000 households with a veteran.

Table 6.4. Number of HUD-Assisted Households With Veterans by Year: 2011–2017

Year	HUD-assisted households with a veteran
2011	302,000
2012	314,200
2013	289,900
2014	288,200
2015	286,000
2016	285,600
2017	291,900

Source: Author's analysis of 2011–2017 American Community Surveys, 1-Year Estimates.

Conclusion

Using a multifaceted approach, we have linked administrative data from HUD's rental housing assistance programs to ACS housing units for years 2011 through 2017. In each year of the ACS, we identify 61,000 to 78,000 ACS households as being HUD-assisted. Our analysis of the data linkage quality suggests that false-positive links and false-negative links are minimal, enabling high-quality analysis of the linked data. By linking the two data sources, we can learn more about HUD-assisted households without having to conduct an expensive, one-off survey. In the future, this work will continue, and we plan to link HUD administrative records to future years of the ACS as they become available.

Our goal with this project was to develop the linkage process and build the linked data sets so researchers at HUD and elsewhere can further explore the data.

⁴⁵ Ann Elizabeth Montgomery and Meagan Cusack, "HUD-VASH Exit Study: Final Report," U.S. Department of Housing and Urban Development, Washington, DC, 2017, <www.huduser.gov/portal/publications/HUD-VASH-Exit-Study.html>.

7. ADDITIONAL RESOURCES

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

<www.census.gov/programs-surveys/acs/about.html>

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

<www.census.gov/programs-surveys/acs/guidance/handbooks/general.html>

U.S. Census Bureau, American Community Survey, 2014 Content Review

<www.census.gov/programs-surveys/acs/operations-and-administration/2014-content-review.html>

U.S. Census Bureau, Questions on the Form and Why We Ask

<www.census.gov/acs/www/about/why-we-ask-each-question/>

U.S. Census Bureau, ACS Handbook of Questions and Current Federal Uses

<www.census.gov/programs-surveys/acs/operations-and-administration/2014-content-review/federal-uses.html>

U.S. Census Bureau, Library, Uses of Census Bureau Data in Federal Funds Distribution

<www.census.gov/library/working-papers/2017/decennial/census-data-federal-funds.html>

U.S. Census Bureau, ACS Data Releases

<www.census.gov/programs-surveys/acs/news/data-releases.html>

U.S. Census Bureau, Geography and ACS

<www.census.gov/programs-surveys/acs/geography-acs.html>

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

<www.census.gov/acs/www/data/data-tables-and-tools/>

U.S. Census Bureau, Census Business Builder (CBB)

<www.census.gov/data/data-tools/cbb.html>

U.S. Census Bureau, Data.census.gov Resources

<www.census.gov/data/what-is-data-census.gov.html>

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

<www.census.gov/about/partners/sdc.html>

U.S. Census Bureau, American Community Survey (ACS), Custom Tables

<www.census.gov/programs-surveys/acs/data/custom-tables.html>

U.S. Census Bureau, Federal Statistical Research Data Centers

<www.census.gov/fsrdc>

U.S. Census Bureau, Center for Economic Studies (CES), Apply for Access

<www.census.gov/programs-surveys/ces/data/restricted-use-data/apply-for-access.html>

ACS Online Community

<<https://acsdatacommunity.prb.org/>>