6. CASE STUDIES USING ACS DATA

Case Study #1: New Orleans Smoke Alarm Outreach Program

Skill Level: Intermediate
Subject: Age, Income, Poverty, Year Structure Built, Year Householder Moved Into Unit
Type of Analysis: Analyses of trends/patterns within a community
Tools Used: data.census.gov, statistical software, and mapping software
Author: Oliver Wise, Director of the Office of Performance and Accountability, City of New Orleans

As a component of its fire prevention effort, the New Orleans Fire Department (NOFD) offers free smoke alarm installation to all city residents. Initially the program was fairly passive—requiring individuals to contact the fire department to request a smoke alarm, but local leaders wondered if the program was as effective as it could be.

To answer that question, and to help guide the city's efforts in reducing fire fatalities, the Office of Performance and Accountability teamed up with the NOFD to pilot a more targeted approach to smoke alarm installation. The team developed a model to identify neighborhoods most at risk for fire fatalities. That model then helped NOFD prioritize a door-to-door effort to install free smoke alarms in homes across New Orleans.

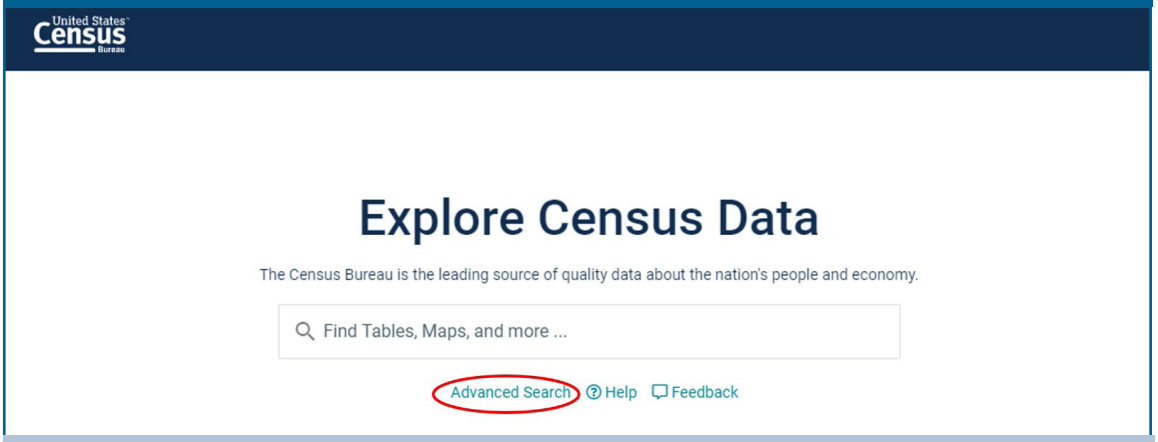
This analysis combined data from multiple sources, but would not have been possible without the American Community Survey (ACS).

The first step was to estimate the likelihood that homes in a neighborhood were missing smoke alarms. From the American Housing Survey (AHS), the research team identified three key factors associated with lack of a smoke alarm: the age of the structure, the length of time the householder has lived in the structure, and the household's ratio of income to the poverty level. However, AHS data are only available for relatively large areas. (Parishes, the equivalent of counties in other states, are the smallest reported geographies in Louisiana.) NOFD needed a smaller spatial scale for targeted outreach. The ACS filled that local data requirement because ACS data are available at a small neighborhood scale. For this project, we used block group data from the 2009–2013 ACS 5-year estimates to identify neighborhoods most at risk for lack of smoke alarms.

To produce the block-group-level analysis of smoke alarm risk, we downloaded three ACS tables from data.census.gov: B25034 (Year Structure Built), C17002 (Ratio of Income to Poverty Level in the Past 12 Months), and B25038 (Tenure by Year Householder Moved Into Unit).

- First, we went to the data.census.gov site: <https://data.census.gov>.
- To access the estimates from data.census.gov, we chose the "Advanced Search" option (see Figure 6.1).

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

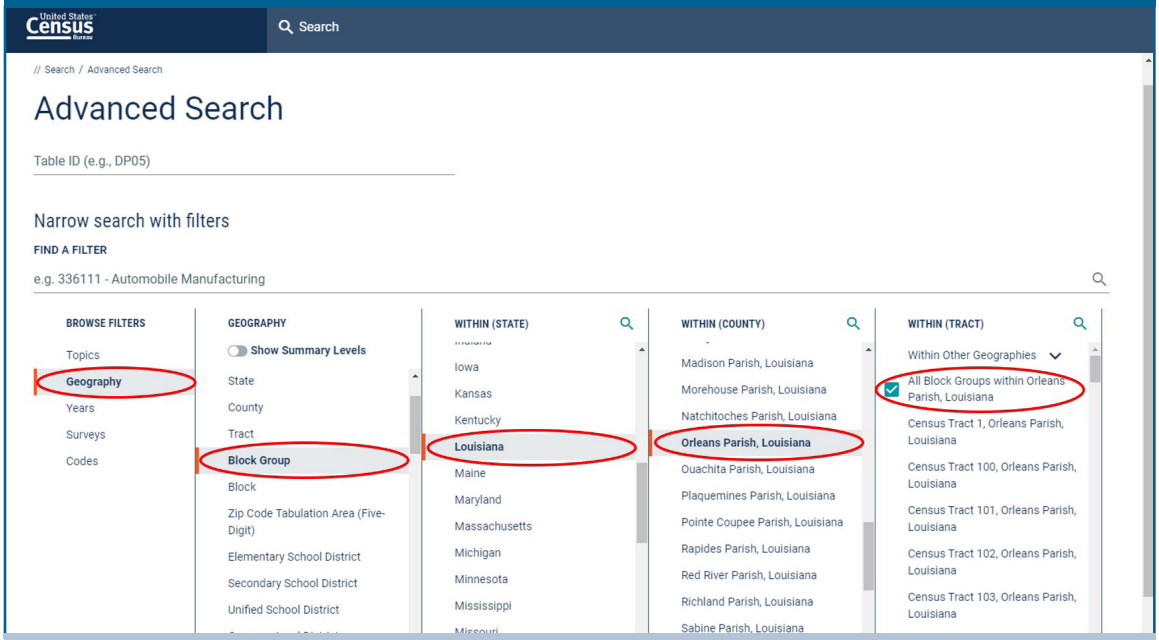


Source: U.S. Census Bureau, data.census.gov, <https://data.census.gov>.

- On the Advanced Search page, we began with the Geography filter. We selected "Geography" in the navigation pane on the left side of the screen to display a list of available geographies.

- We started by selecting “Block Group,” then “Louisiana,” “Orleans Parish, Louisiana,” and “All Block Groups within Orleans Parish, Louisiana” (see Figure 6.2).

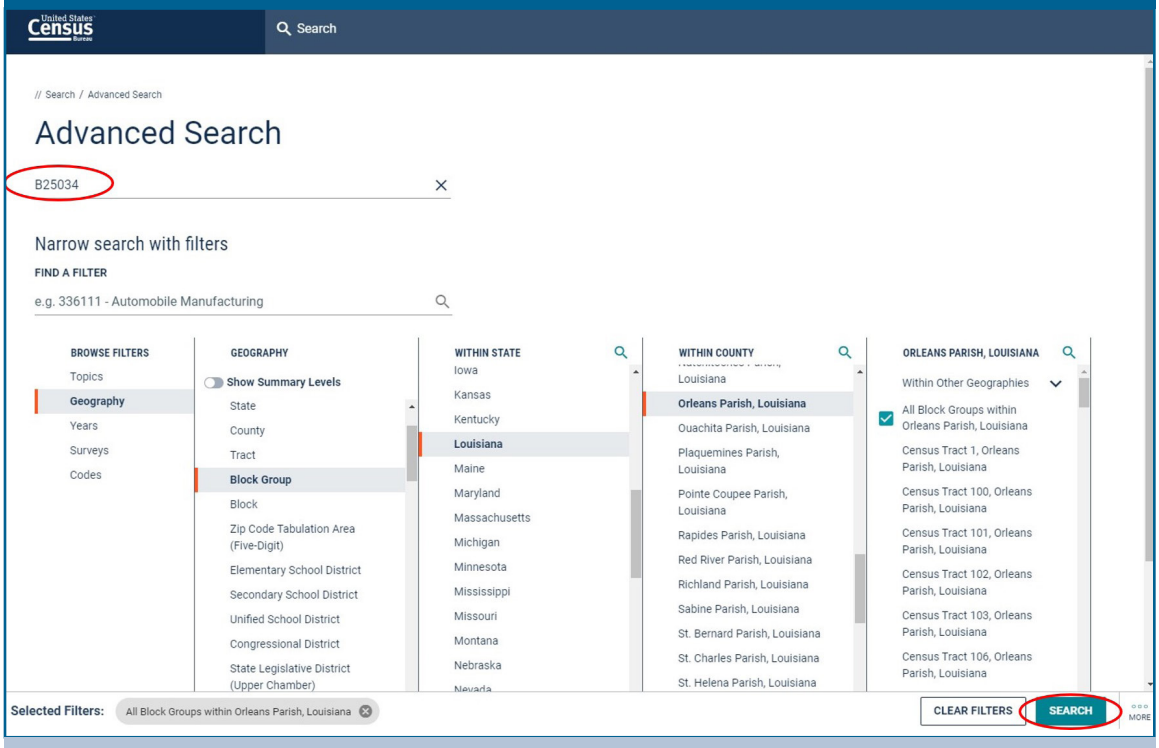
Figure 6.2. **Selecting Geographies in Data.census.gov**



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

- Because we knew which tables we wanted to extract for the analysis, we typed the table ID “B25034” into the first search bar under the Advanced Search heading and clicked “Search” in the lower right corner (see Figure 6.3).

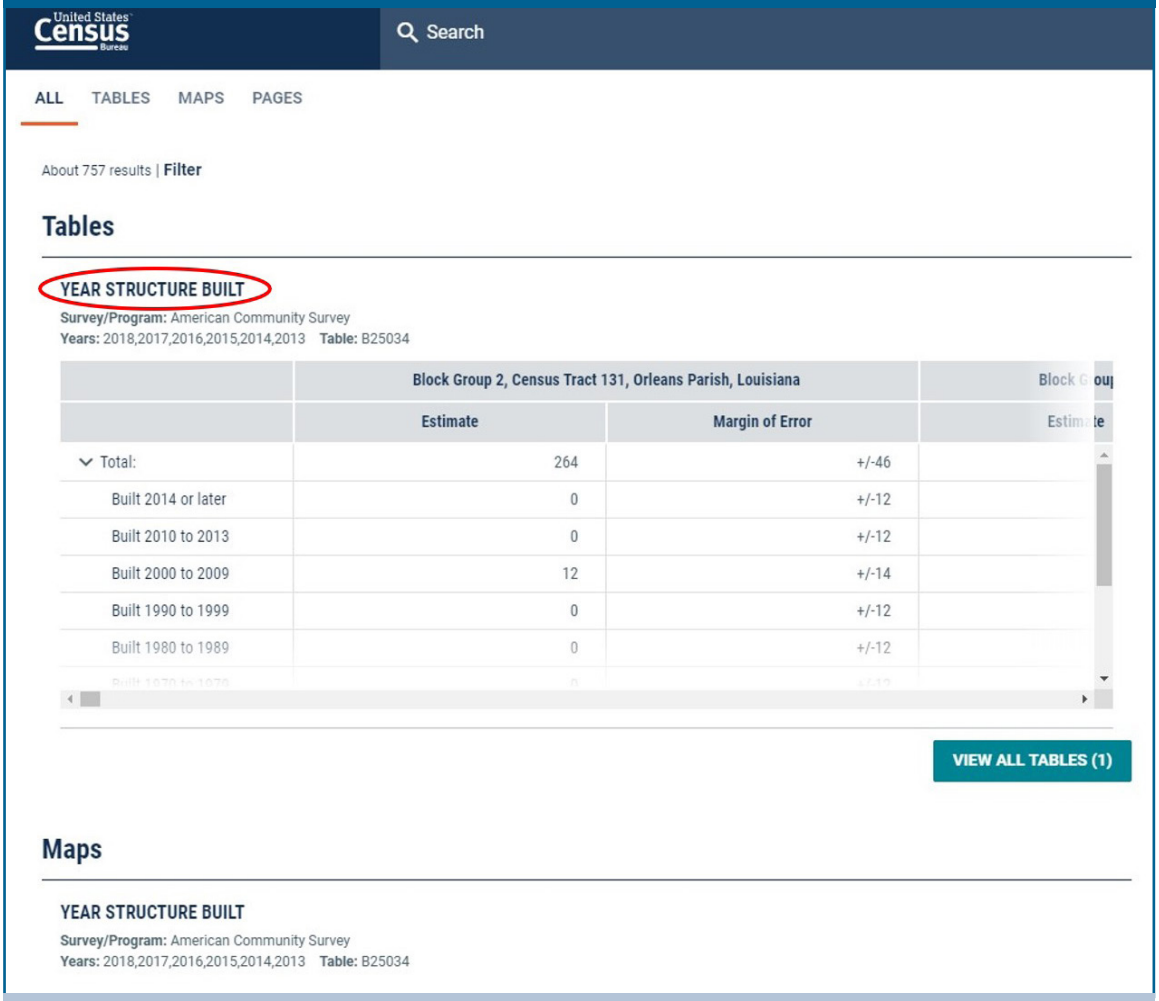
Figure 6.3. **Using the Search Bar in Data.census.gov**



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

- Then we clicked on the table, “Year Structure Built” (see Figure 6.4).

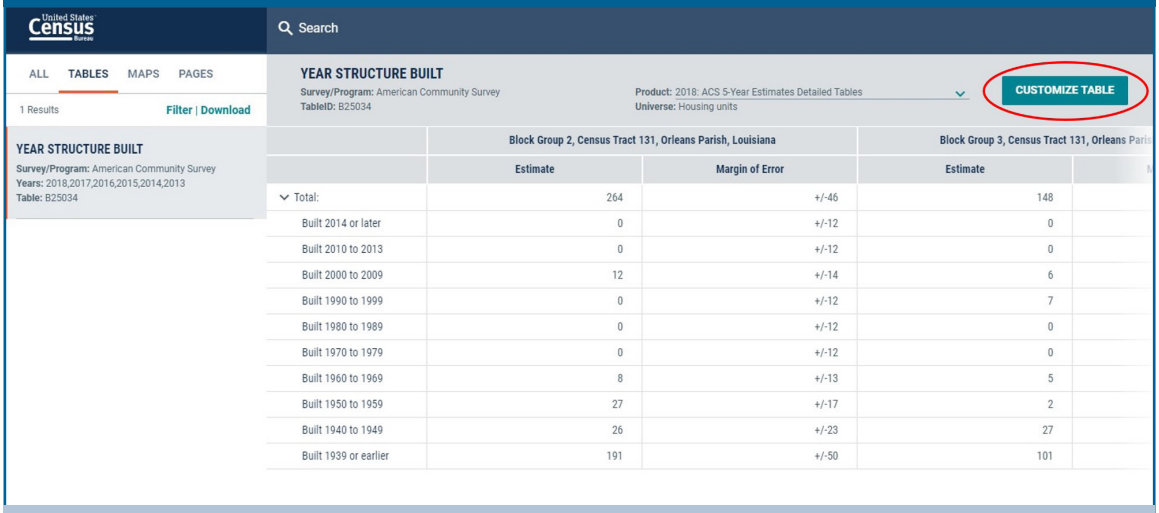
Figure 6.4. **Selecting a Table in Data.census.gov**



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

- Next, we selected “Customize Table” (see Figure 6.5).

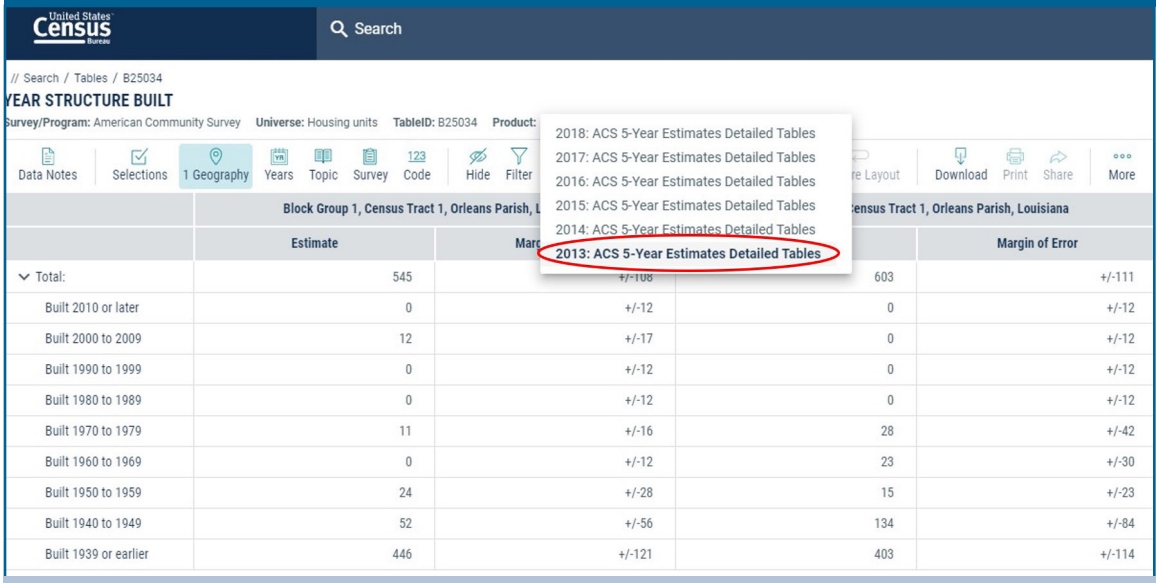
Figure 6.5. **Customizing a Table in Data.census.gov**



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

- We then selected the desired survey year by clicking on the current “Product” selection. The header should read “2013: ACS 5-Year Estimates Detailed Tables” (see Figure 6.6). (For the purposes of this case study, we used 2009–2013 ACS 5-year estimates because they were the most recent data available at the time.)

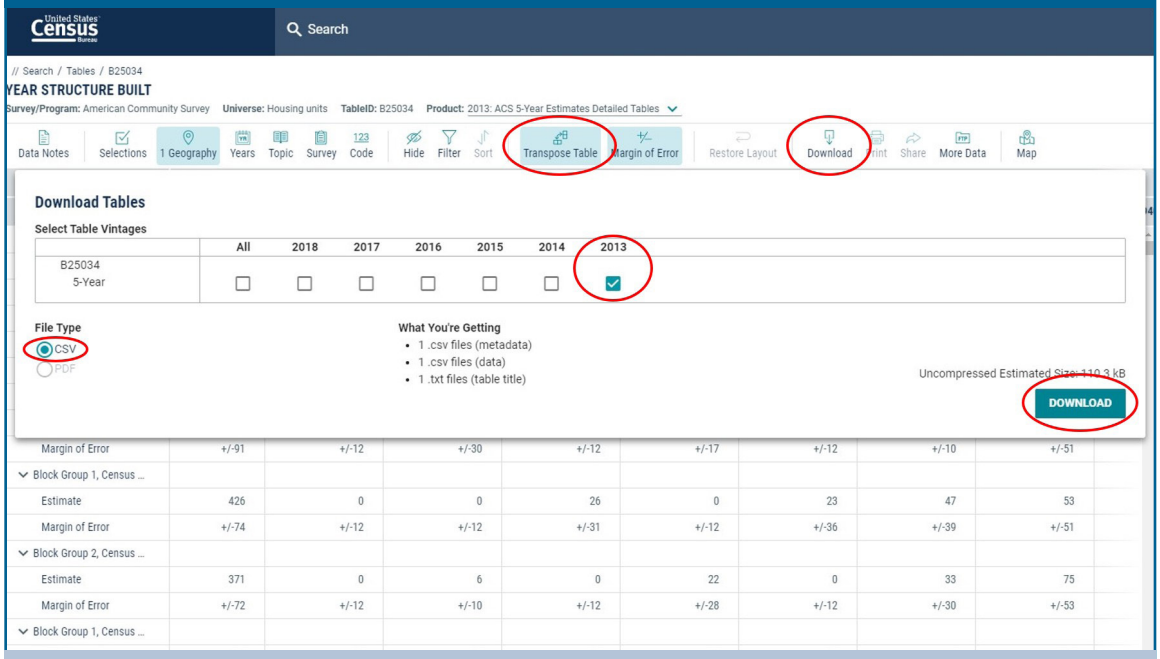
Figure 6.6. **Selecting the Survey Year in Data.census.gov**



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

- To format the data for downloading, we used the "Transpose Table" option to transpose the rows/columns. Next, we clicked "Download" and used the Download Tables window to check the box for the 2013 ACS 5-year data. We selected "CSV" as the file type and clicked on "Download" in the lower right corner (see Figure 6.7).

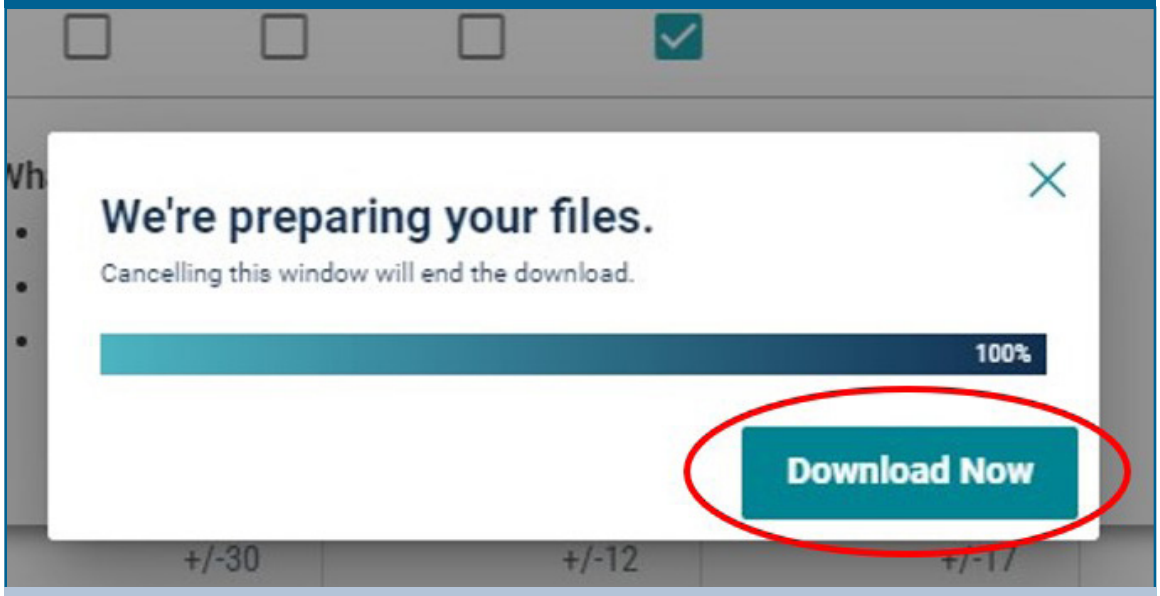
Figure 6.7. **Transposing a Table and Selecting the Survey Year and File Type in Data.census.gov**



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

- After the files were prepared, we clicked the "Download Now" button (see Figure 6.8).

Figure 6.8. **Downloading Files in Data.census.gov**



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

Clicking on the downloaded zip file opened a folder containing three files. We selected the file with the prefix "ACSDT5Y2013.B25034_data_with_overlays" to open the data table in a spreadsheet. We repeated this process in data.census.gov for the two other tables (C17002 and B25038).

The research team then used a statistical program to aggregate the data from each table into relevant risk categories. We used data from Table C17002 to calculate the percentage of households in each block group with income below 200 percent of the federal poverty level, data from Table B25034 to identify the percentage of housing structures built before 1949, and data from Table B25038 to identify the percentage of householders who moved into their home before 2000. We then used these three indicators to assign a risk score to each block group.

It is important to note that some block groups are sparsely populated, and some have no population at all. For example, Lake Pontchartrain is probably not a relevant block group for smoke alarm outreach. To account for this, we removed large, sparsely populated (or completely unpopulated) block groups from the analysis.

The second step of the analysis was to estimate fire fatality risk. Since young children and older adults are most at risk of death in a fire, we used 2010 Census data to identify block groups with high proportions of people under the age of 5 or age 65 or older. In addition, we added fire frequency data from NOFD records for March 2009 to March 2015. Using these three pieces of information, we compiled a fire fatality risk map.

Overlaying the smoke alarm risk map—based on ACS data—with the fire fatality risk map, we were able to highlight neighborhoods where fire mortality risk was high and where homes were unlikely to have smoke alarms. NOFD used that map to begin a door-to-door campaign in high-risk neighborhoods to install smoke alarms. We estimated that the program was twice as effective as random assignment would have been for contacting households in need of smoke alarms.

Shortly after the program began, a fire occurred in one of the homes in which a smoke alarm had been installed based on the targeted installation outreach. Eleven people survived that fire because they had an early warning from the alarm.

Because the model is based on ACS data available nationwide, the analysis could be replicated—and fire safety improved—for other communities around the nation. The code for this analysis can be found online.[48] You can also view the Census Bureau's *Stats in Action* video to learn more about this project.[49]

[48] See <https://github.com/cno-opa/smoke-alarm-outreach>.

[49] U.S. Census Bureau, Stats in Action: New Orleans, LA: Smoke Alarm Outreach Program, 2016, <www.census.gov/library/video/2016/sia-nola-saop.html>.

Case Study #2: Atlanta Region 20-County Data Dashboard

Skill Level: Introductory/intermediate
Subject: County-level demographic and socioeconomic data
Type of Analysis: Analysis and visualization of ACS data across the 20-county metro Atlanta region
Tools Used: Data.census.gov, Excel, and data visualization tools
Authors: Taylor Tyger, Senior Planner, Atlanta Regional Commission
Jim Skinner, Senior Principal Planner, Atlanta Regional Commission
Mike Carnathan, Division Manager, Atlanta Regional Commission

The Atlanta Regional Commission's (ARC) Research and Analytics Division uses various databases, analysis tools, and visualization programs to improve data outreach in metro Atlanta. One of those tools is the Atlanta Region 20-County Data Dashboard.[50] This data dashboard was created to provide an interactive platform for users seeking demographic and socioeconomic information at the county level. The dashboard consolidates data from various data sources into eight categorical "bins": population, employment, housing, education, health, crime, income, and forecasts. The designated "bins" were identified based on common data requests ARC receives.

We used the U.S. Census Bureau's County Population Estimates and American Community Survey (ACS) 5-year estimates to "feed" parts of the dashboard (see Table 6.1). Some of the counties for which populations are included in the dashboard are fairly small. As a result, ACS 5-year estimates must be used instead of ACS 1-year estimates. Other data sources used in the dashboard include U.S. Bureau of Labor Statistics, U.S. Department of Housing and Urban Development, Georgia Department of Public Health, Georgia Department of Education, Federal Bureau of Investigation, and Atlanta Regional Commission forecasts.

Table 6.1. **List of Variables Downloaded Through Data.census.gov and Census.gov**

Variable	Data set
Population	County Population Estimates
Race and ethnicity	County Population Estimates
Age	County Population Estimates
Housing tenure	ACS 5-Year Estimates
Vacancy rate	ACS 5-Year Estimates
Household composition	ACS 5-Year Estimates
School enrollment	ACS 5-Year Estimates
Educational attainment	ACS 5-Year Estimates
Median household income	ACS 5-Year Estimates
Population below poverty level	ACS 5-Year Estimates

While we recognize that there is a level of uncertainty associated with ACS estimates, the margins of error are not included in the dashboard. We considered two factors in the decision not to show margins of error. First, we wanted to present the information in a concise format for data users. Second, we wanted to present information in a consistent way across measures, and several measures in the dashboard from other sources do not have margins of sampling error.

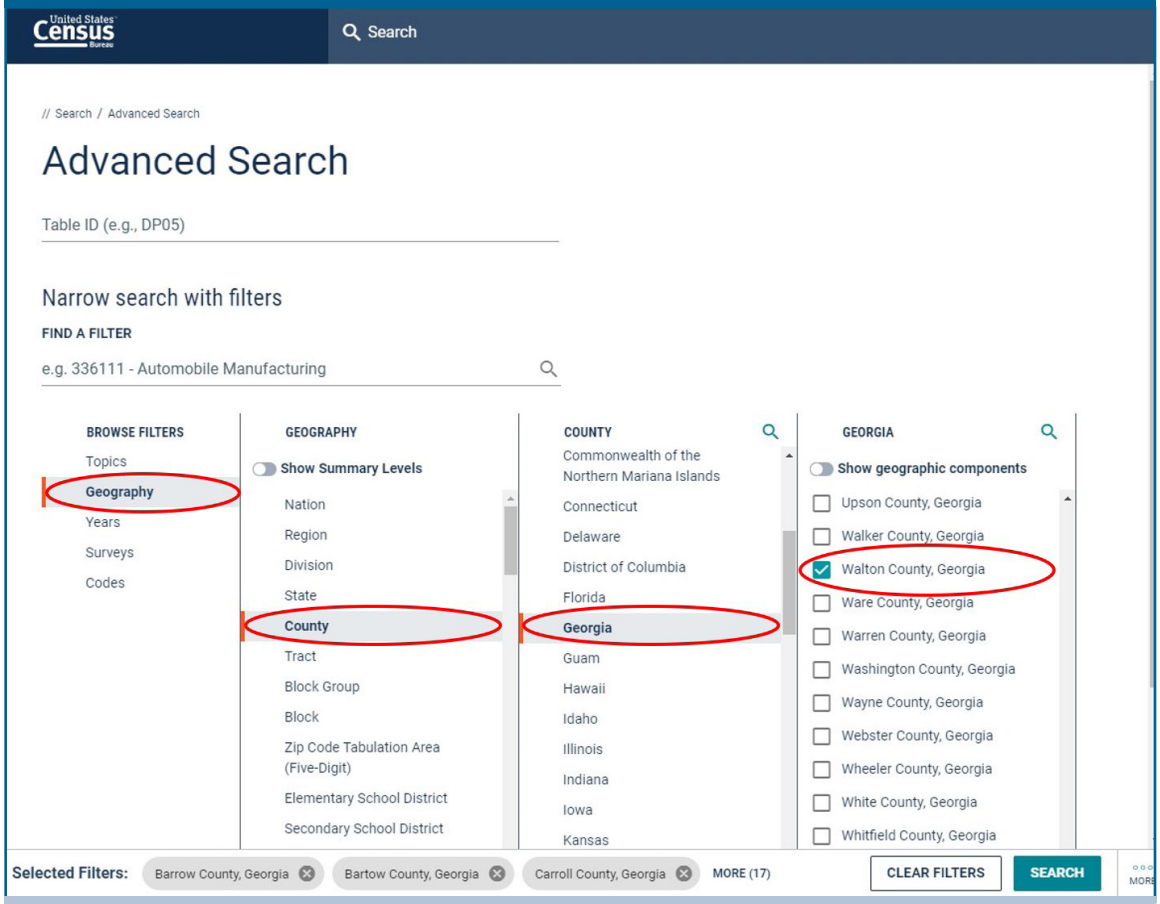
To download the data, we used the data.census.gov Advanced Search option, as follows:

- Go to the data.census.gov Web site at <https://data.census.gov>.
- Click on "Advanced Search" under the search bar. This will bring you to the Advanced Search page.
- Begin with the Geography filter. Select "Geography" in the navigation pane on the left side of the screen to display a list of available geographies.

[50] Atlanta Regional Commission, 20-County Data Dashboard, <http://33n.atlantaregional.com/20-county-data-dashboard>.

- Select “County,” then select “Georgia” from the “State” filter, and then select each of the ARC’s 20 counties (see Figure 6.9).

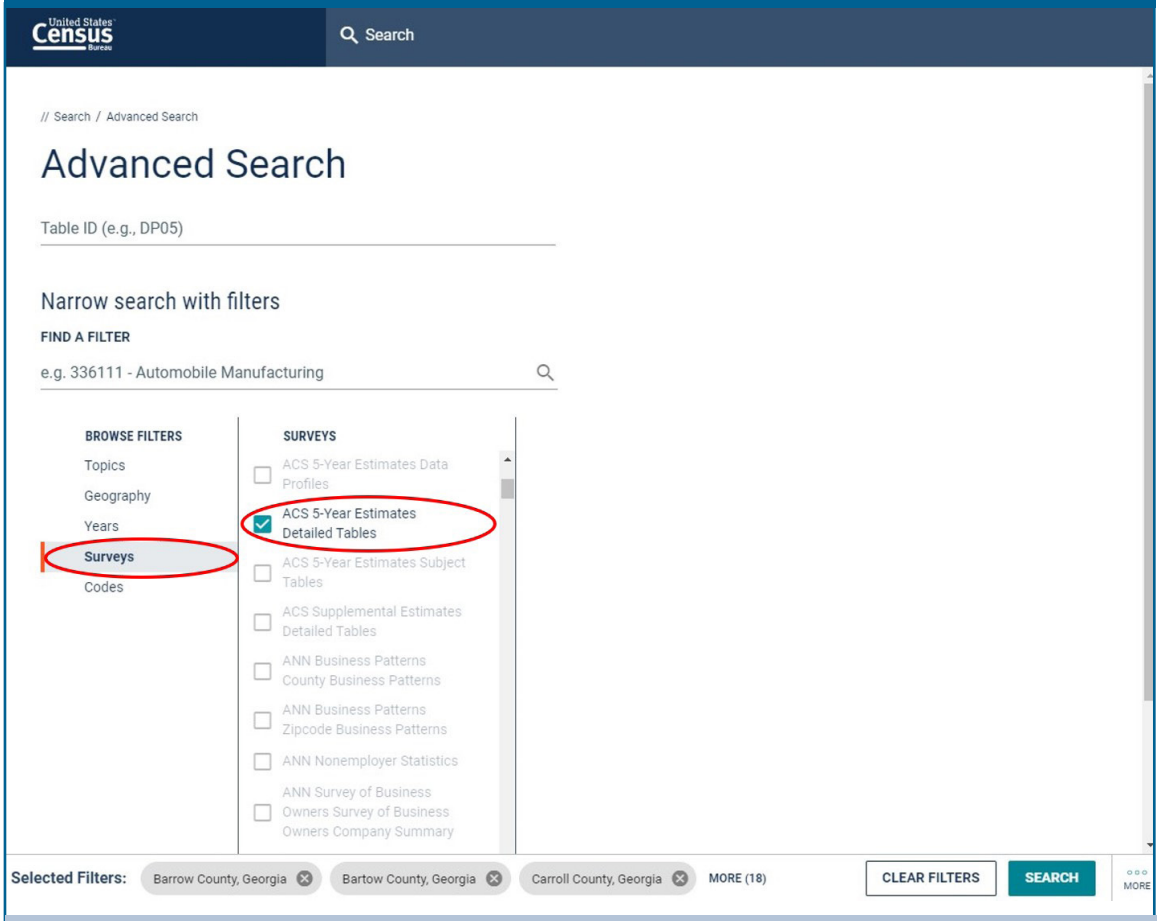
Figure 6.9 **Selecting a Geography in Data.census.gov**



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

- Next, choose the “Surveys” filter and select “ACS 5-Year Estimates Detailed Tables” (see Figure 6.10).

Figure 6.10. **Selecting a Survey in Data.census.gov**

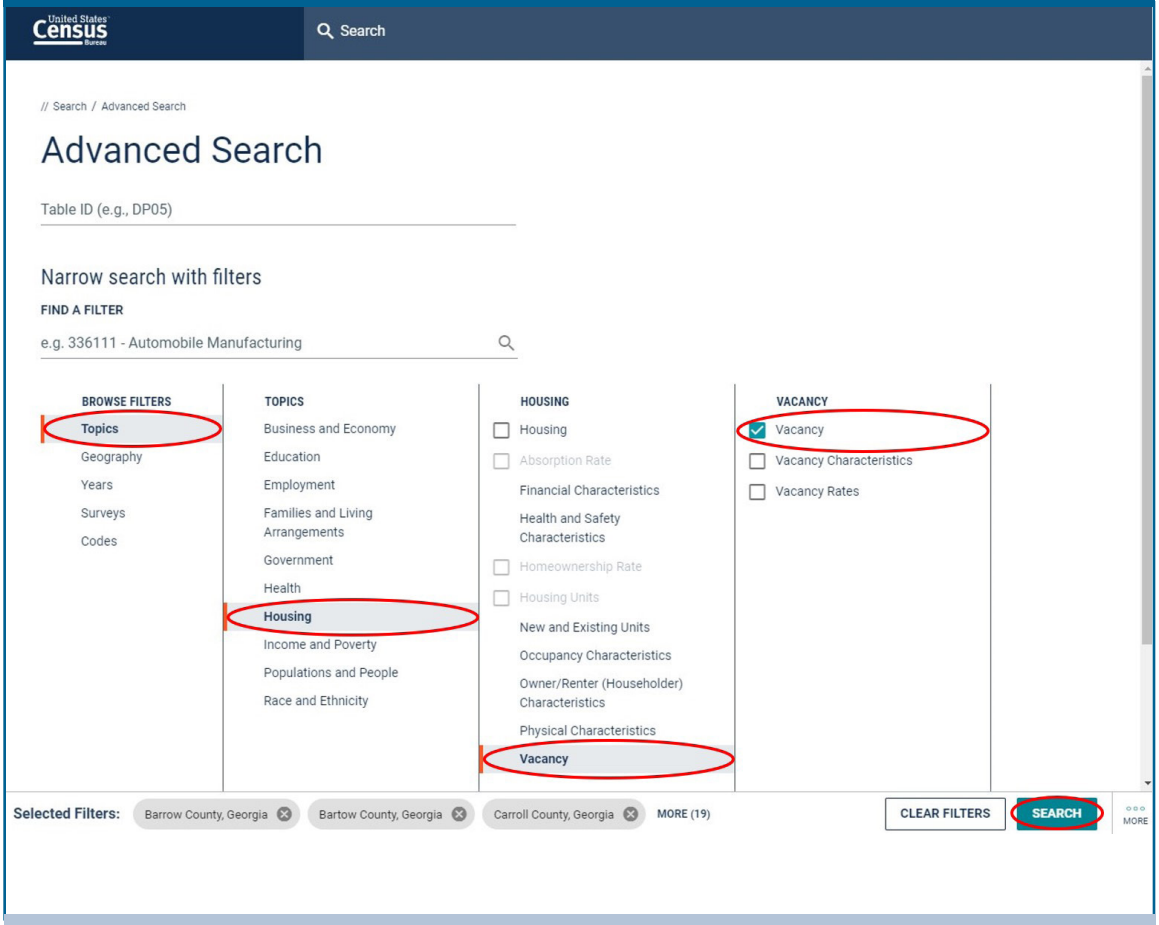


Source: U.S. Census Bureau, data.census.gov, <https://data.census.gov>.

- Then, choose the “Topics” filter, select “Housing,” select “Vacancy,” and mark the check box for “Vacancy.”
- All 22 filters should appear in the “Selected Filters” at the bottom of the page.

- Next, click on “Search” in the lower right corner of the page (see Figure 6.11).

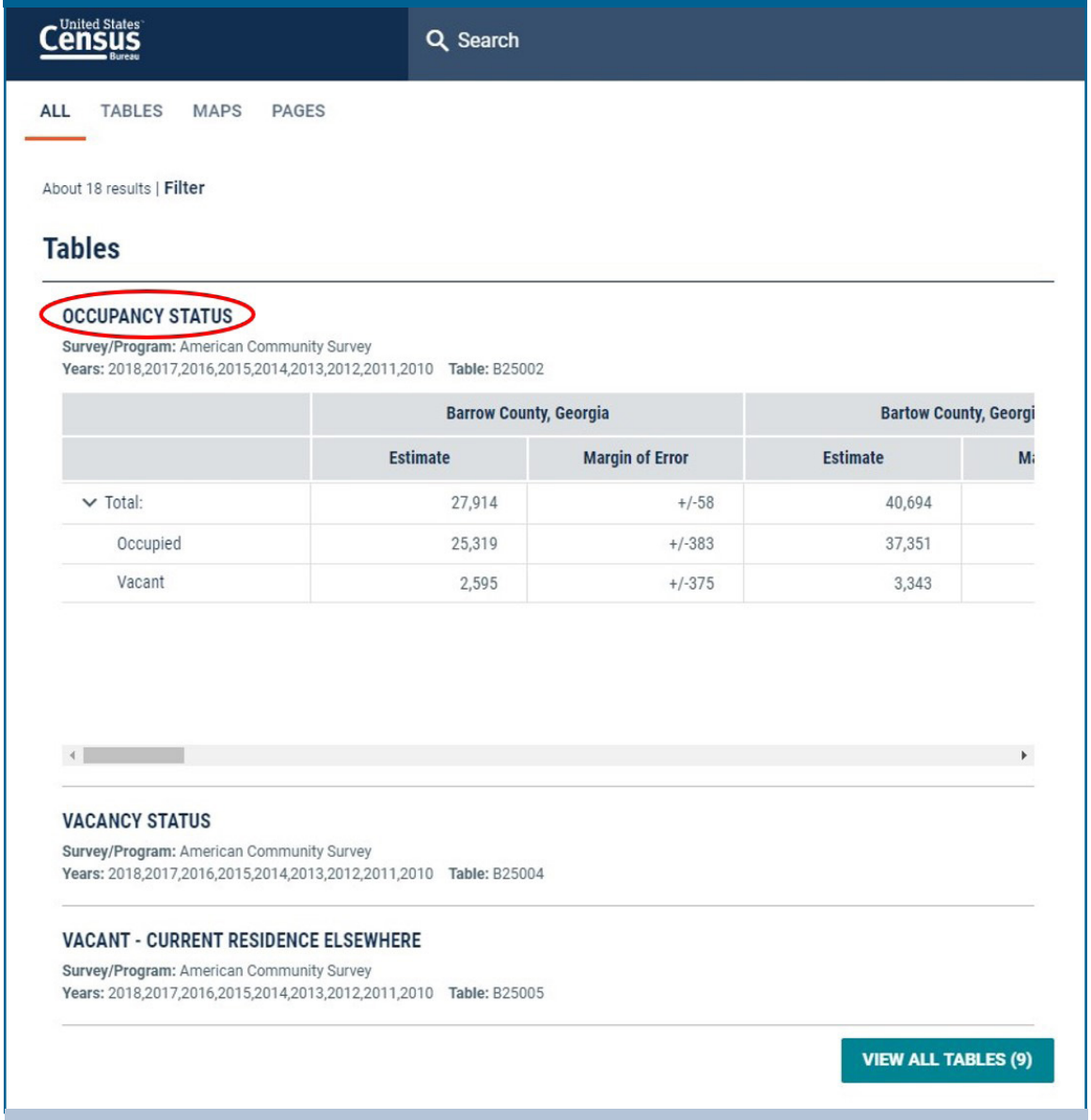
Figure 6.11. **Accessing Vacancy Data in Data.census.gov**



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

- On the results page, click on “Occupancy Status” (see Figure 6.12).

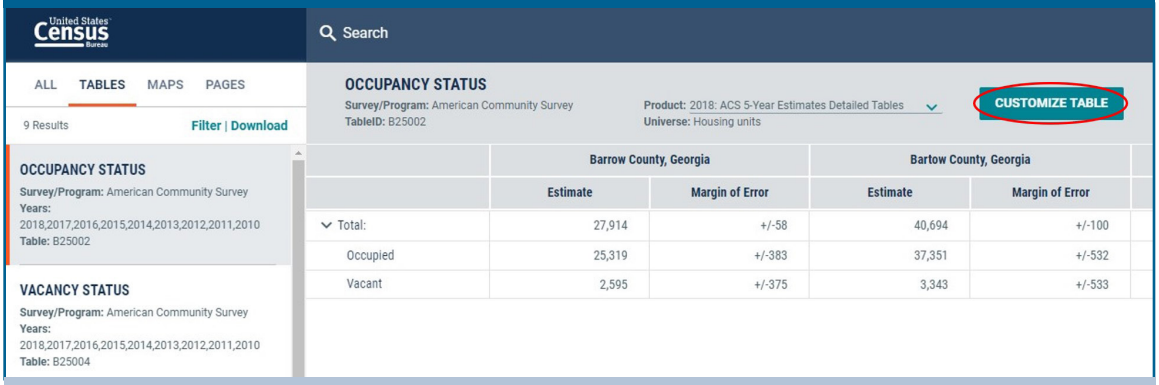
Figure 6.12. **Selecting a Table in Data.census.gov**



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

- On the table results page, select “Customize Table” in the upper-right corner (see Figure 6.13).

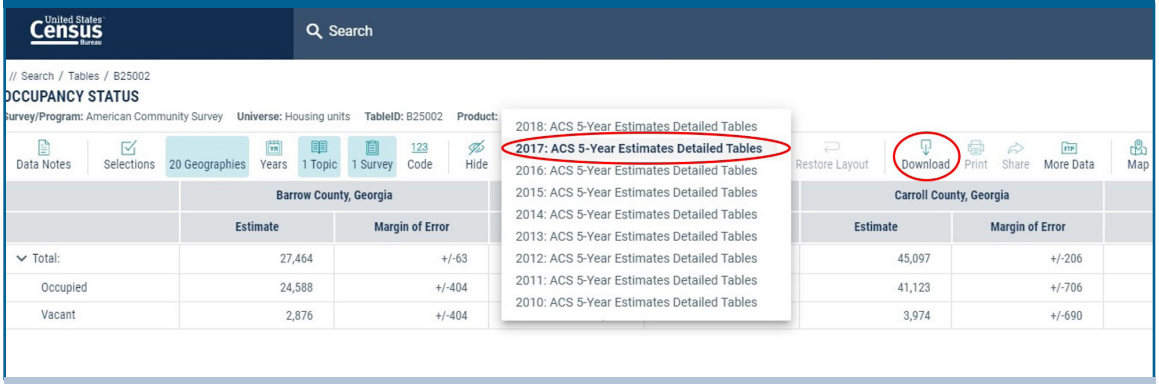
Figure 6.13. **Customizing a Table in Data.census.gov**



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 2013–2017 ACS 5-year estimates because they were the most recent data available at the time. The header should read “2017: ACS 5-Year Estimates Detailed Tables.” Then select “Download” from the menu at the top of the screen (see Figure 6.14).

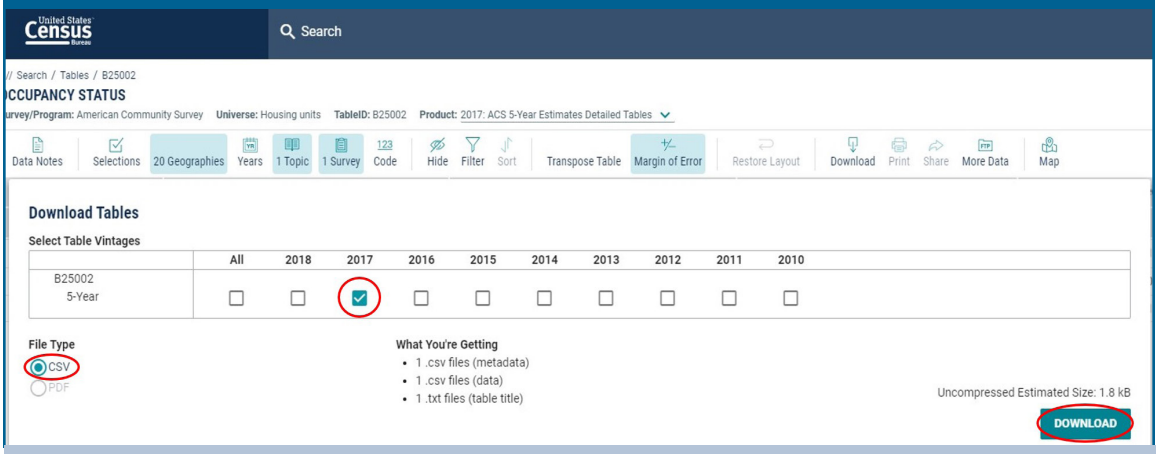
Figure 6.14. **Selecting the Survey Year in Data.census.gov**



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

- In the “Download Tables” window, check the box under “2017,” choose “CSV” as the file type, and select “Download” (see Figure 6.15).

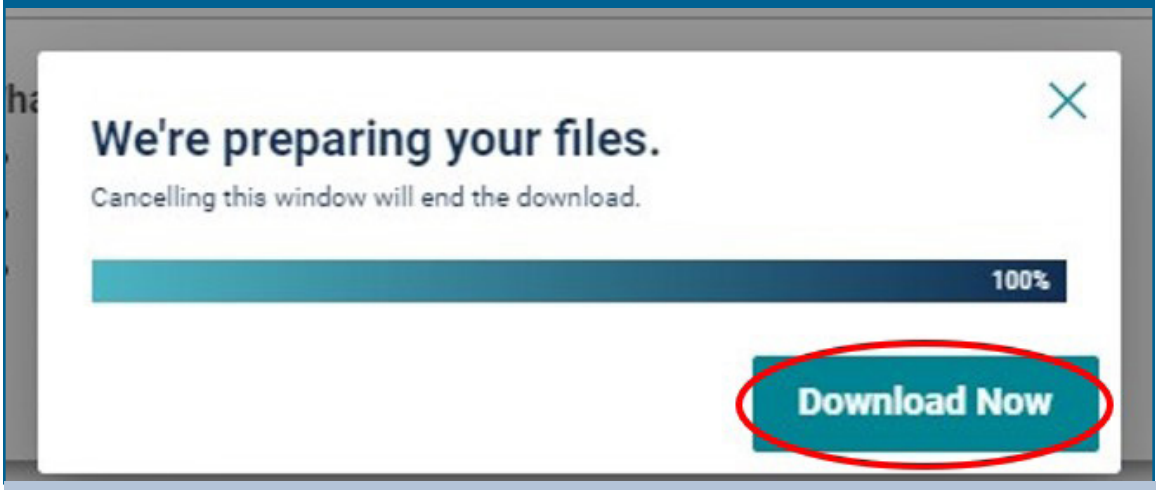
Figure 6.15. **Downloading Table: Selecting the Survey Year and File Type in Data.census.gov**



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

- Select “Download Now” after the file is prepared (see Figure 6.16).

Figure 6.16. **Downloading Files in Data.census.gov**



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

- Clicking on the downloaded zip file opens a folder containing three files. Select the file with prefix "ACSDT5Y2017.B25002_data_with_overlays" to open the data table in a spreadsheet (see Figure 6.17).

Figure 6.17. **Portion of Table B25002 Displayed in a Spreadsheet**

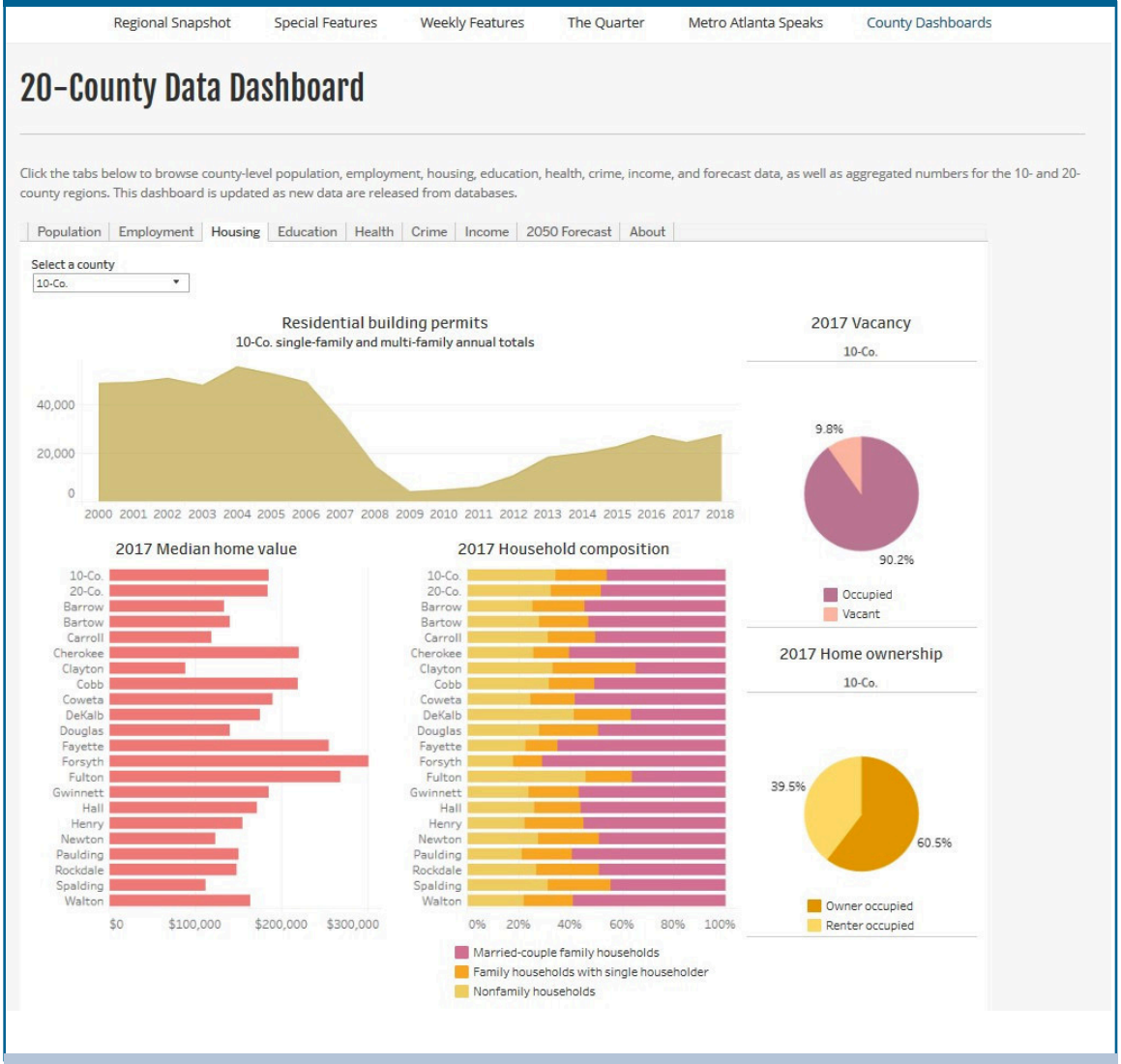
1	GEO_ID	NAME	B25002_001E	B25002_001M	B25002_002E	B25002_002M	B25002_003E	B25002_003M
2	id	Geographic Area Name	Estimate!!Total	Margin of Error!!Total	Estimate!!Total!!Occupied	Margin of Error!!Total!!Occupied	Estimate!!Total!!Vacant	Margin of Error!!Total!!Vacant
3	0500000US13013	Barrow County, Georgia	27464	63	24588	404	2876	404
4	0500000US13015	Bartow County, Georgia	40380	114	37120	507	3260	507
5	0500000US13045	Carroll County, Georgia	45097	206	41123	706	3974	690
6	0500000US13057	Cherokee County, Georgia	87941	132	83150	674	4791	650
7	0500000US13063	Clayton County, Georgia	105058	162	91604	778	13454	779
8	0500000US13067	Cobb County, Georgia	295227	224	274361	1401	20866	1366
9	0500000US13077	Coweta County, Georgia	52929	115	50531	436	2398	429
10	0500000US13089	DeKalb County, Georgia	307776	298	273614	1559	34162	1499
11	0500000US13097	Douglas County, Georgia	52184	127	48426	562	3758	538
12	0500000US13113	Fayette County, Georgia	41747	97	39604	368	2143	366
13	0500000US13117	Forsyth County, Georgia	74692	90	70468	452	4224	449
14	0500000US13121	Fulton County, Georgia	456265	535	391850	1896	64415	1984
15	0500000US13135	Gwinnett County, Georgia	302157	215	283256	1465	18901	1408
16	0500000US13139	Hall County, Georgia	70877	120	63095	676	7782	651
17	0500000US13151	Henry County, Georgia	78971	152	72697	935	6274	902
18	0500000US13217	Newton County, Georgia	38713	124	35823	562	2890	537
19	0500000US13223	Paulding County, Georgia	54395	75	51397	569	2998	561
20	0500000US13247	Rockdale County, Georgia	33421	100	29937	442	3484	439
21	0500000US13255	Spalding County, Georgia	27178	106	23475	411	3703	398
22	0500000US13297	Walton County, Georgia	33041	71	30488	438	2553	429

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

- We repeat this process for all ACS topics in the dashboard.
- After variables are downloaded from data.census.gov as tables, we process the data in a spreadsheet. In the default format, each variable table is downloaded with each of the 20 counties' identifiers in rows and then the data variables (including values and margins of error) in columns. In processing, two rows are added: a "10-county" and "20-county" summary geography. We use the 10- and 20-county definitions as references for comparing individual counties to the broader region.
- When needed, additional columns are added in order to aggregate or refine the data as downloaded. For example, we combined individual columns of age data to create an age range for the population aged 20 to 34. We also calculated percentages by downloading the "universe" of data for selected variables.
- Columns that are not needed are deleted, and the labels are edited for clarity.

An initial analysis can be done in a spreadsheet, by sorting results from highest to lowest and comparing county-level values to the 10- and 20-county reference points. However, most of the analysis and trend identification occurs in the visualization software, rather than in a spreadsheet. Figure 6.18 shows how the data are visualized in the final product.

Figure 6.18. **Atlanta Region 20-County Data Dashboard**



Source: Atlanta Regional Commission, Atlanta Region 20-County Data Dashboard, <https://atlantaregional.org/atlanta-region/regional-data-resources/atlanta-region-20-county>.

The data dashboard is updated throughout the year as updated data become available. The dashboard can be found on the Atlanta Regional Commission Web site.[51]

The dashboard has been viewed more than 3,000 times and is used as a resource by internal agency coworkers, external partners, nonprofits, elected officials, and the general public. For example, within ARC, the Aging Services division uses the 20-County Data Dashboard to quickly access and summarize demographic information for clients. It has even served as a model for Aging Services to develop their own data dashboards. Local media partners have used the 20-County Data Dashboard to quickly pull data that informs their stories. In addition, Tableau showcased the 20-County Data Dashboard as a best practice example for using data visualization to improve data outreach in their Webinar "Data Driven Government."

[51] Atlanta Regional Commission, Atlanta Region 20-County Data Dashboard, <http://atlantaregional.org/atlanta-region-20-county-data-dashboard/>.

Case Study #3: USDA 515 Rental Housing Maturation

Skill Level: Introductory/Intermediate
Subject: County-level rental housing data
Type of Analysis: Analysis and visualization of counties' affordable rental housing
Tools Used: Data.census.gov, spreadsheet, and mapping software
Author: Keith Wiley, Research Associate, Housing Assistance Council

The 2010–2014 American Community Survey (ACS) 5-year data show that there are 5 million occupied rental housing units in rural areas.[52] Since its inception in 1963, the U.S. Department of Agriculture (USDA) Section 515 Rural Rental Housing loan program has financed the construction of more than 533,000 affordable rental units, and it represents an important part of this housing stock. The program has received attention recently because a growing number of these loans will begin reaching maturity and will be paid off; an estimated 6,684 loans are expected to reach maturity over the next 20 years.[53] After a loan is paid off, owners are under no obligation to maintain their properties as affordable housing and some fear many owners may no longer choose to do so.[54]

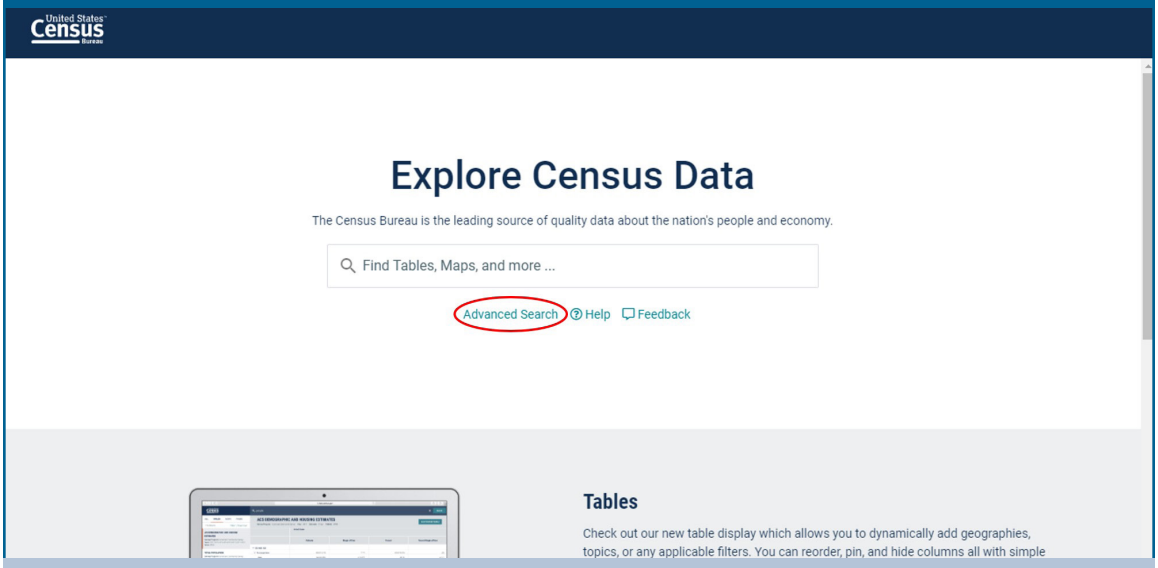
Given that the distribution of Section 515 units is not uniform across rural areas, the risk to affordable housing stocks associated with maturing loans will be greater for some areas than others. The following approach uses the 2010–2014 ACS 5-year data to identify those counties where the USDA Section 515 properties represent a relatively large portion of the overall rental housing stock. These are the areas where policymakers may want to concentrate efforts to ameliorate the potential loss of this important affordable housing option.

The U.S. Census Bureau's data.census.gov Web site provides easy access to 2010–2014 ACS 5-year occupied-rental housing unit estimates. With these data, one can assess the role of the Section 515 program.

Steps:

- Go to the data.census.gov Web site at <https://data.census.gov>.
- Click on "Advanced Search" under the search bar. This brings you to the Advanced Search page (see Figure 6.19).

Figure 6.19. **Selecting Advanced Search in Data.census.gov**



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

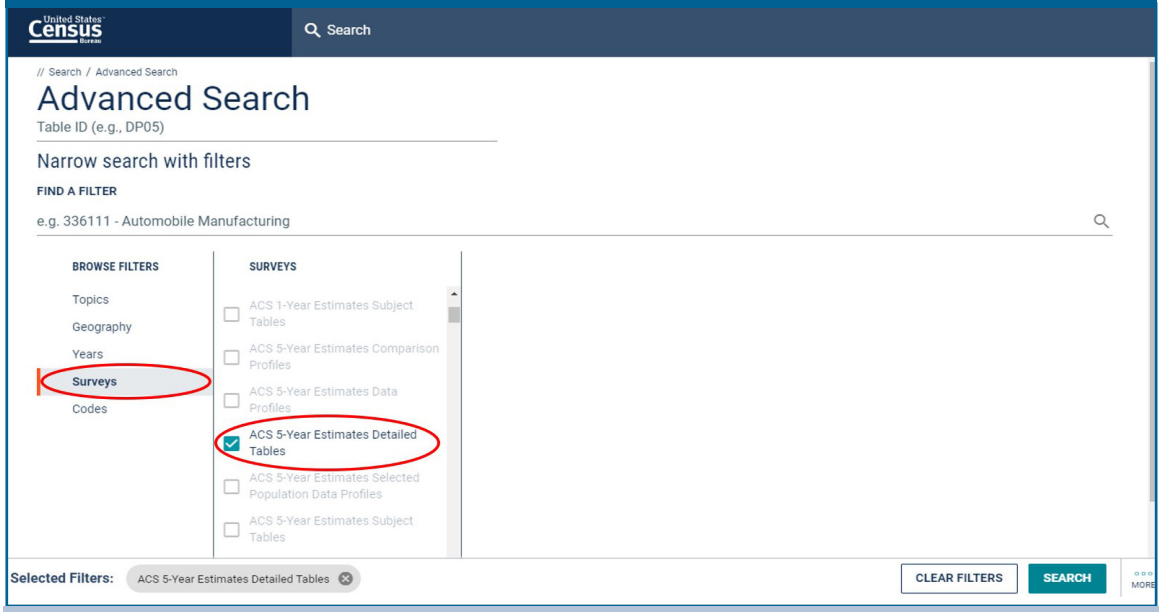
[52] In this case study, rural refers to all counties that are not part of an Office of Management and Budget defined metropolitan statistical area using the 2013 classification.

[53] Housing Assistance Council, Rural Policy Note: Maturing USDA Rural Rental Housing Loans: An Update, 2016, <www.ruralhome.org/storage/documents/policy-notes/rpn_maturing-mortgages-usda-2016.pdf>.

[54] The New England Housing Network's June 30, 2015, letter to the U.S. Senate Appropriations Subcommittee on Agriculture, Rural Development, Food and Drug Administration, and Related Agencies exemplifies the concern raised by local housing advocates about the potential loss of Section 515 housing units. The letter, as accessed on August 28, 2016, can be found at <http://housingactionnh.org/wp-content/uploads/2015/07/RD515LETTER2015.pdf>.

- Select “Surveys” in the navigation pane on the left side of the screen to display a list of available surveys.
- Select “ACS 5-Year Estimates Detailed Tables” (see Figure 6.20).

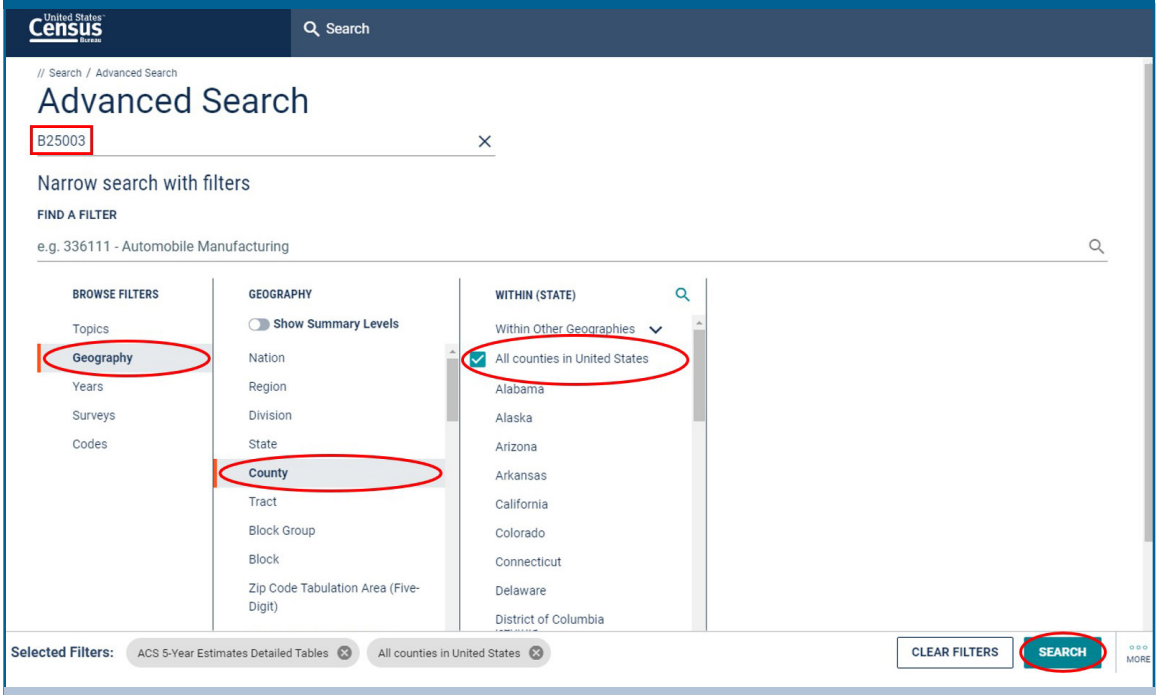
Figure 6.20. **Selecting a Survey in Data.census.gov**



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

- Select “Geography” in the navigation pane on the left side of the screen to display a list of available geographies.
- Select “County” and then select “All counties in United States” from the “Within (State)” filter.
- Next, since we already know the desired table ID, type “B25003” into the top search bar on the Advanced Search page and click “Search” in the lower right corner (see Figure 6.21).

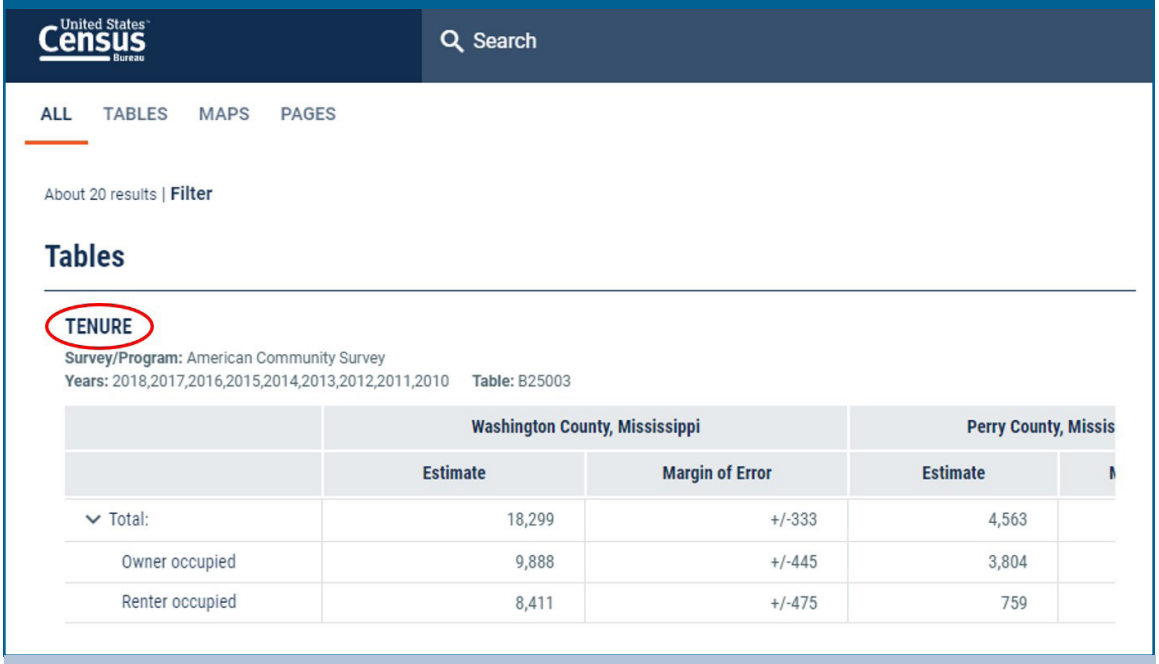
Figure 6.21. **Selecting a Geography and Table ID in Data.census.gov**



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

- On the search results page, select the "Tenure" table (see Figure 6.22).

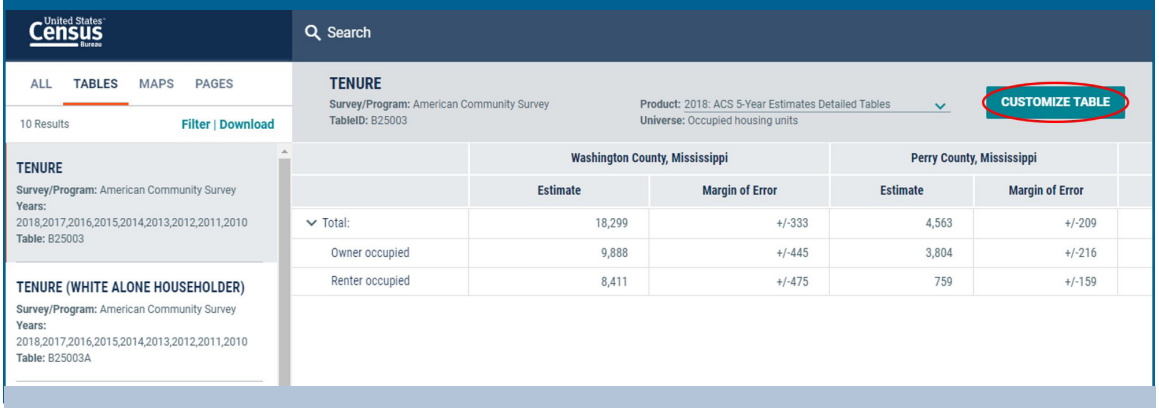
Figure 6.22. **Selecting a Table in Data.census.gov**



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

- With the "Tenure" table selected, click "Customize Table" in the upper-right corner (see Figure 6.23).

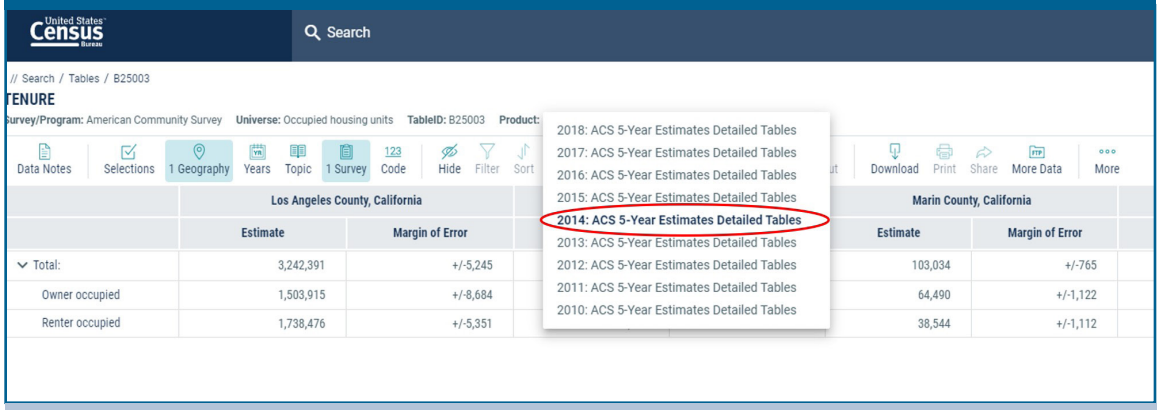
Figure 6.23. **Customizing a Table in Data.census.gov**



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 2014 ACS 5-year estimates.
- The header should read "2014: ACS 5-Year Estimates Detailed Tables" (see Figure 6.24).

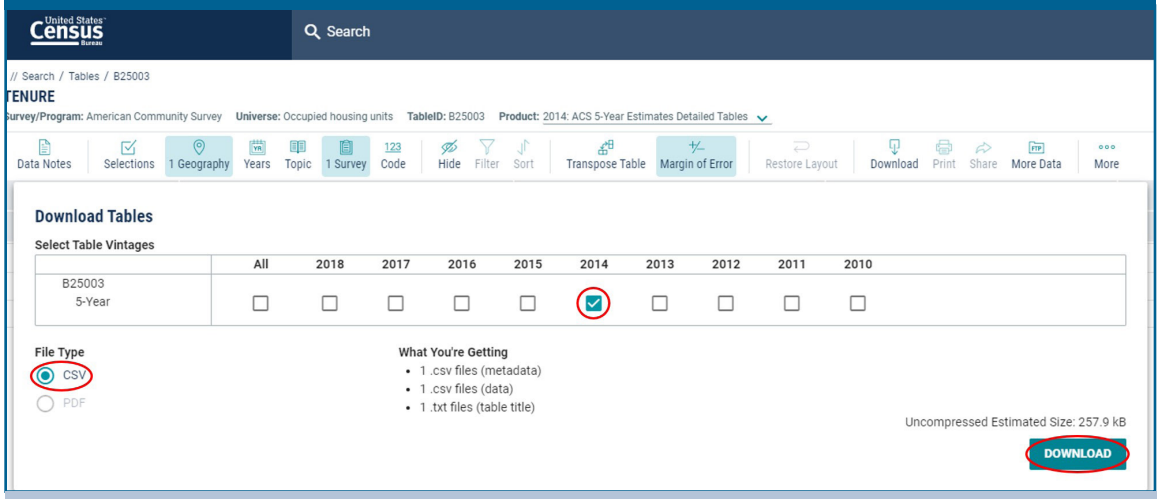
Figure 6.24. **Selecting the Survey Year in Data.census.gov**



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

- Then, select "Download" from the menu at the top of the screen. In the "Download Tables" window, check that the box under "2014" is selected. Choose the "CSV" file type and click "Download" in the lower-right corner (see Figure 6.25).

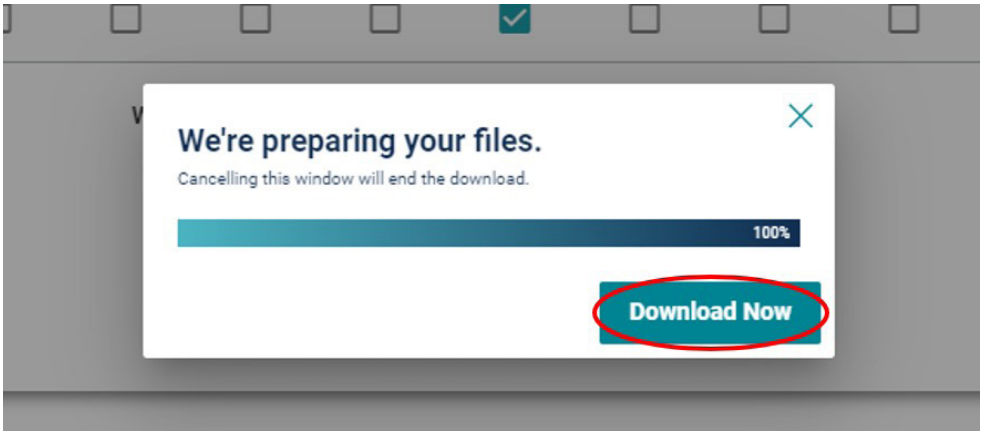
Figure 6.25. **Downloading Table: Selecting Survey Year and File Type in Data.census.gov**



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

- Then, select "Download Now" after the file is prepared (see Figure 6.26).

Figure 6.26. **Downloading Files in Data.census.gov**

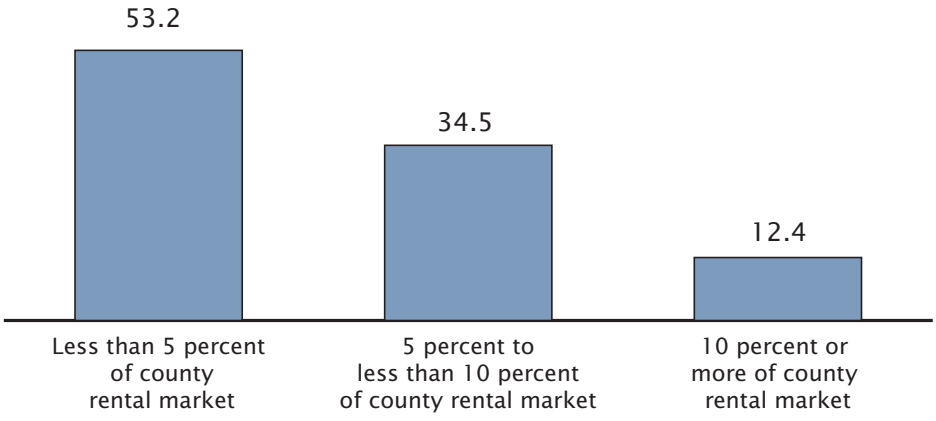


Source: U.S. Census Bureau, data.census.gov, <https://data.census.gov>.

- Clicking on the downloaded zip file opens a folder containing four files. Select the file with prefix "ACSDT5Y2014.B25003_data_with_overlays" to open the "Tenure" table in a spreadsheet. The initial row can be deleted since the variables are already labeled. The data provide the user with estimates of the number of rental units in all counties.

The next step is to join the 2010–2014 ACS 5-year data with Section 515 property data using a spreadsheet, and calculate the percentage of occupied rental units that are in the Section 515 program for each county.[55] Counties where Section 515 occupied units make up 10 percent or more of the entire occupied rental housing stock are considered most at risk as these loans mature. The potential loss of 10 percent or more of all rental housing units would be problematic for most counties. These at-risk counties are home to approximately 13 percent of USDA Section 515 properties containing 48,378 occupied units (see Figure 6.27).

Figure 6.27. **Percentage of USDA Section 515 Properties by Share of County Rental Housing Market**



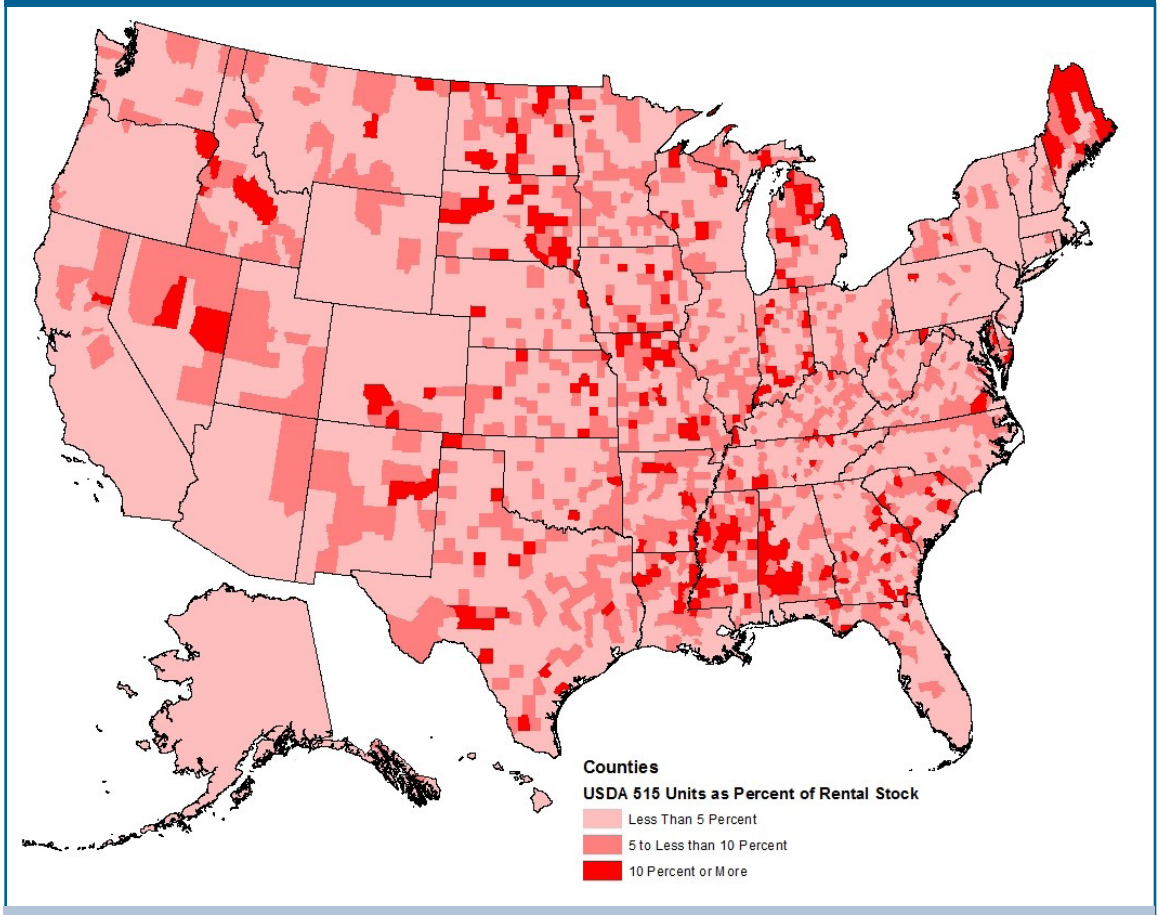
Source: U.S. Census Bureau, 2010–2014 American Community Survey, 5-Year Estimates, and the author's analysis of publicly available USDA Multi-Family Housing 515 property data (2014).

[55] The USDA property data are publicly available at <www.sc.egov.usda.gov/data/MFH.html>. This analysis involved aggregating these property data to the county level. The county-level USDA data were then linked to the ACS data using state/county FIPS codes.

The final step is to use the data to create a map of at-risk counties across the nation (see Figure 6.28). Certain states, such as Alabama, Maine, Mississippi, and South Dakota, contain many of these counties.

Policymakers may want to monitor what occurs with these maturing loans over the next 10 to 15 years, particularly in those counties where USDA Section 515 units represent at least one in every 10 rental units. If there is a considerable amount of attrition in these affordable housing units, it would most likely be in areas with higher concentrations of Section 515 housing units. Knowing where the loss would have the greatest impact can also help policymakers decide how best to use limited resources to address any problems. This issue is difficult to address, however, because it will unfold over many years.

Figure 6.28 **USDA Section 515 Properties by Share of County Rental Housing Market**



Source: U.S. Census Bureau, 2010–2014 American Community Survey, 5-Year Estimates, and the author's analysis of publicly available USDA Multi-Family Housing 515 property data (2014).