

# 3. CASE STUDIES USING ACS DATA

## Case Study #1: San Diego Region: City Data Profile

**Skill Level:** Introductory/Intermediate

**Subject:** County- and city-level demographic and socioeconomic data

**Type of Analysis:** Analysis and visualization of American Community Survey (ACS) data trends across the nation, state, county, and subcounty areas

**Tools Used:** Data.census.gov, spreadsheet, data visualization tools

**Authors:** Marcela Alvarez, Research Coordinator, San Diego Regional Economic Development Center (EDC); and Kirby Brady, Research Director, San Diego Regional EDC

San Diego Regional Economic Development Corporation (EDC) uses a multitude of publicly available data sets coupled with visualization software to create powerful economic development tools that provide clarity and insight into the region’s demographic and economic landscape. As part of a greater initiative to uncover and highlight subregional trends within the county, EDC produced a demographic and socioeconomic profile for the City of San Marcos, California. This profile and accompanying online interactive dashboard were created to better inform business leaders, other decision makers, and the public about the city’s social, economic, and demographic characteristics. City-level data can be compared with data for the county, state, and nation to provide additional context.

We used data from the U.S. Census Bureau’s American Community Survey (ACS) and Longitudinal Employer-Household Dynamics (LEHD) program to inform parts of the profile (see Table 3.1). The Census Bureau releases single-year ACS data for geographic areas with 65,000 people or more. Since the City of San Marcos—the smallest geographic area under consideration—meets this threshold, we were able to use 1-year estimates throughout the analysis. EDC recognizes that all estimates have an associated level of uncertainty. However, after careful consideration, margins of error were not included in the profile.

Other data sources used in the profile include the San Diego Association of Governments, Emsi (a labor market analytics firm), the State of California Employment Development Department, and ReferenceUSA.

Table 3.1. List of Key Variables and Data Sources

Variable	Data Set
Median household income	ACS 1-Year Estimates
Population below poverty level	ACS 1-Year Estimates
Educational attainment	ACS 1-Year Estimates
Field of bachelor’s degree	ACS 1-Year Estimates
Median income by industry	ACS 1-Year Estimates
Work destination	LEHD OnTheMap
Distance to work	LEHD OnTheMap

To obtain the desired data, use the data.census.gov “Advanced Search” option, as follows:

- Go to the data.census.gov Web site at <https://data.census.gov>.
- Select “Advanced Search” below the search bar (see Figure 3.1).

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



- Select “Geography” in the navigation pane on the left side of the screen to display a list of available geographies (see Figure 3.2).
- Select “Place,” then “California.” From here, you can scroll to select “San Marcos city, California” or you can use the magnifying glass icon to search for places within California. This geography will appear in the “Selected Filters” at the bottom of the page.

Figure 3.2. Selecting Geographic Areas in Data.census.gov

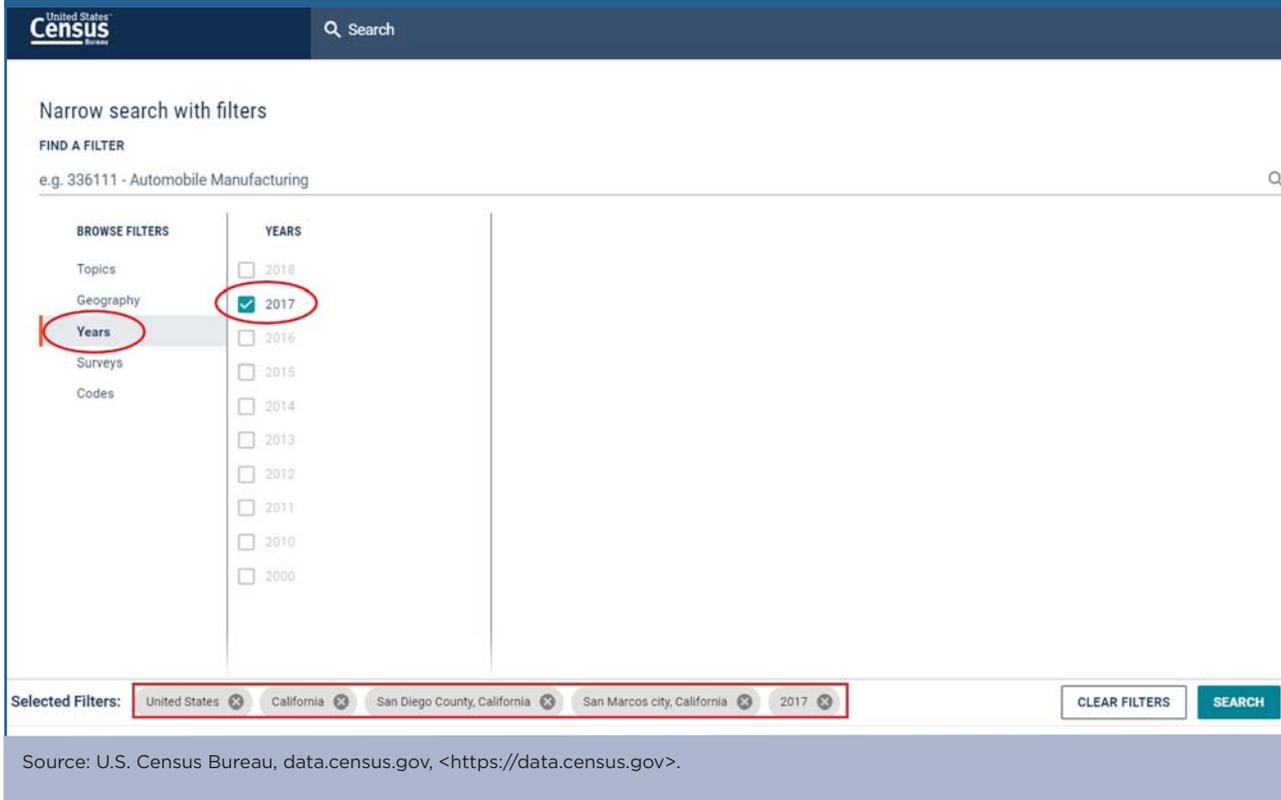
The screenshot shows the 'Advanced Search' page on data.census.gov. The interface is divided into several sections:

- Top Navigation:** Includes the 'United States Census Bureau' logo and a search bar.
- Breadcrumbs:** Shows the current path as '// Search / Advanced Search'.
- Advanced Search Header:** Features the title 'Advanced Search' and a field for 'Table ID (e.g., DP05)'.
- Narrow search with filters:** Includes a 'FIND A FILTER' section with an example search 'e.g. 336111 - Automobile Manufacturing'.
- Filter Panels:**
  - BROWSE FILTERS:** A vertical list on the left with 'Geography' highlighted by a red circle.
  - GEOGRAPHY:** A list of geographic levels including 'Place', which is highlighted by a red circle.
  - WITHIN (STATE):** A list of states including 'California', which is highlighted by a red circle.
  - CALIFORNIA:** A list of cities in California, with 'San Marcos city, California' checked and highlighted by a red circle.
- Selected Filters:** A bar at the bottom left showing 'San Marcos city, California' as the active filter.
- Actions:** Buttons for 'CLEAR FILTERS', 'SEARCH', and 'MORE' are located at the bottom right.

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

- Use the Geography filter to add the United States, California, and San Diego County to your selections. At the end of this step, you should have four geographic areas specified in your “Selected Filters” (see Figure 3.3).
- Then click on the “Years” filter and select “2017.” The year “2017” should appear next to the previously selected geographic areas in “Selected Filters.” For the purposes of this case study, we used 2017 because they were the most recent data available at the time.)

Figure 3.3. **Selecting Years and Verifying Selected Filters in Data.census.gov**



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

- Since we are interested in the city's socioeconomic characteristics, we begin by searching for information about educational attainment. Select “Topics,” “Education,” and “Educational Attainment.” Then, click “Search” in the lower right corner (see Figure 3.4).

Figure 3.4. Selecting the Educational Attainment Topic in Data.census.gov

The screenshot displays the 'Advanced Search' page on Data.census.gov. At the top, there is a search bar with a magnifying glass icon and the text 'Search'. Below the search bar, the page title 'Advanced Search' is prominently displayed. Underneath, there is a field for 'Table ID (e.g., DP05)'. The main section is titled 'Narrow search with filters' and includes a 'FIND A FILTER' search bar with the example text 'e.g. 336111 - Automobile Manufacturing' and a magnifying glass icon. The interface is divided into three columns: 'BROWSE FILTERS', 'TOPICS', and 'EDUCATION'. In the 'BROWSE FILTERS' column, 'Topics' is selected and circled in red. In the 'TOPICS' column, 'Education' is selected and circled in red. In the 'EDUCATION' column, 'Educational Attainment' is selected with a checkmark and circled in red. At the bottom of the page, there is a 'Selected Filters' section showing 'United States', 'California', 'San Diego County, California', and 'San Marcos city, California', each with a close icon. To the right of this section are 'CLEAR FILTERS' and 'SEARCH' buttons, with the 'SEARCH' button circled in red. A 'MORE (2)' link is also visible next to the filters.

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

- Use the descriptive table titles to make your selection. We know we are searching for a summary table, so we select the first result, S1501: “Educational Attainment” (see Figure 3.5).<sup>20</sup>

<sup>20</sup> Tables beginning with “S” are Subject Tables that focus on particular ACS subjects and include both estimates and percentages. More information about Table IDs is available on the Census Bureau’s Web site, <[www.census.gov/programs-surveys/acs/guidance/which-data-tool/table-ids-explained.html](http://www.census.gov/programs-surveys/acs/guidance/which-data-tool/table-ids-explained.html)>.

Figure 3.5. **Selecting an Educational Attainment Table in Data.census.gov**

The screenshot shows the Data.census.gov interface. At the top, there is a search bar with the text 'Search' and a magnifying glass icon. Below the search bar, there are navigation tabs: 'ALL', 'TABLES', 'MAPS', and 'PAGES'. The 'TABLES' tab is selected. Below the tabs, it says 'About 39,531 results | Filter'. The main section is titled 'Tables'. The first table result is 'EDUCATIONAL ATTAINMENT', which is circled in red. Below this title, it says 'Survey/Program: American Community Survey' and 'Years: 2017 Table: S1501'. A table is displayed with the following structure:

	Total		
	Estimate	Margin of Error	Estimate
AGE BY EDUCATIONAL A...			
Population 18 to 24 yea...	30,820,412	+/-44,795	
Less than high school g...	3,919,137	+/-36,638	
High school graduate (i...	9,772,204	+/-45,539	
Some college or associ...	13,755,643	+/-57,729	

Below the first table, there are two more table results: 'FIELD OF BACHELOR'S DEGREE FOR FIRST MAJOR' and 'SCHOOL ENROLLMENT'. At the bottom right of the page, there is a button that says 'VIEW ALL TABLES (63)'.

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

- Next, select “Customize Table” (see Figure 3.6).

Figure 3.6. Customizing a Table in Data.census.gov

The screenshot shows the Data.census.gov interface for the 'EDUCATIONAL ATTAINMENT' table. The table title is 'EDUCATIONAL ATTAINMENT' with Survey/Program: American Community Survey, Product: 2017: ACS 1-Year Estimates Sul, and TableID: S1501. A red circle highlights the 'CUSTOMIZE TABLE' button in the top right corner. The table content is as follows:

	Total		Percent
	Estimate	Margin of Error	Estimate
AGE BY EDUCATIONAL A...			
Population 18 to 24 yea...	30,820,412	+/-44,795	(X)
Less than high school g...	3,919,137	+/-36,638	12.7%
High school graduate (i...	9,772,204	+/-45,539	31.7%
Some college or associ...	13,755,643	+/-57,729	44.6%
Bachelor's degree or hi...	3,373,428	+/-35,768	10.9%
Population 25 years an...	221,250,083	+/-75,372	(X)
Less than 9th grade	11,267,058	+/-78,313	5.1%
9th to 12th grade, no di...	15,315,153	+/-69,792	6.9%

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

- Select “Download” at the top of the window. Then, use the Download Tables window to check the box for the 2017 ACS 1-year data. Select “CSV” as the file type and click on “Download” (see Figure 3.7).

Figure 3.7. Selecting the Survey Year(s) and File Type in Data.census.gov

The screenshot shows the 'Download Tables' dialog box in Data.census.gov. A red circle highlights the 'Download' button in the top toolbar. The dialog box has the following content:

**Download Tables**

Select Table Vintages

	All	2017
S1501	<input type="checkbox"/>	<input checked="" type="checkbox"/>
1-Year	<input type="checkbox"/>	<input checked="" type="checkbox"/>
5-Year	<input 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: 109.9 kB

**DOWNLOAD**

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

- After the files are prepared, click the “Download Now” button (see Figure 3.8).

Figure 3.8. **Downloading Tables in Data.census.gov**



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

- This produces a ZIP file. Open the ZIP file to extract your table. The data are located in a file with prefix “ACSST1Y2017.S1501\_data\_with\_overlays” (see Figure 3.9).
- We repeat this process for all data.census.gov topics in the profile.

Figure 3.9. **Portion of Data Table S1501 Downloaded From Data.census.gov**

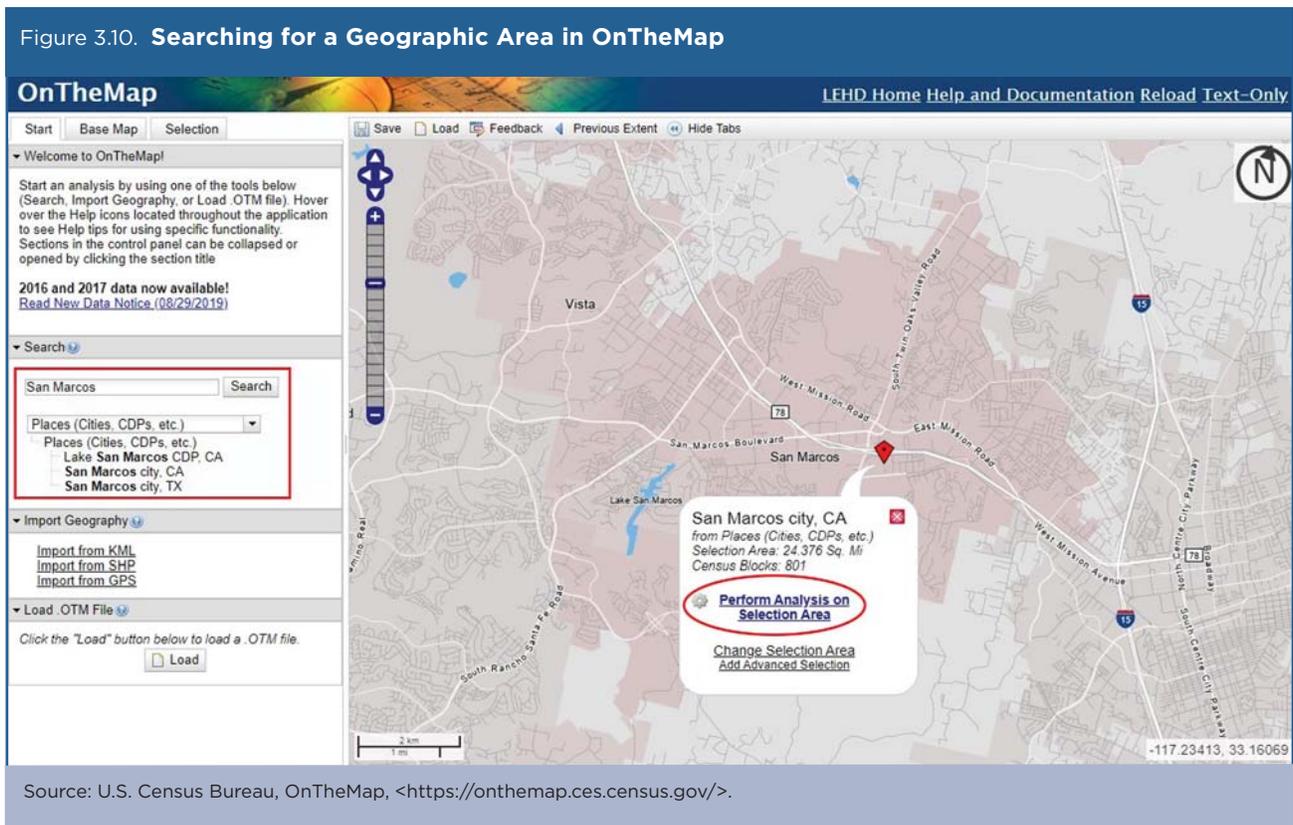
	A	B	C	D
1	GEO_ID	NAME	S1501_C01_001E	S1501_C01_001M
2	id	Geographic Area Name	Total!!Estimate!!Population 18 to 24 years	Total!!Margin of Error!!Population 18 to 24 years
3	0100000US	United States	30820412	44795
4	0400000US06	California	3799994	5436
5	0500000US06073	San Diego County, California	346417	273
6	1600000US0668196	San Marcos city, California	8528	1958
7				
8				

Source: U.S. Census Bureau, data.census.gov, Table S1501: “Educational Attainment,” <<https://data.census.gov>>.

For data on commuting patterns, we access LEHD data, as follows:

- Go to the LEHD Web site at <<https://lehd.ces.census.gov/research/>>.
- Click “OnTheMap” on the left sidebar. This action will open a new window.
- Under the “Search” box, type “San Marcos” in the search bar, using the dropdown menu to select “Places” as the geography type. Then click “Search.” Be sure to select San Marcos, California, rather than San Marcos, Texas. Our selection refreshes the map view and zooms in to San Marcos (see Figure 3.10).
- Use the information bubble next to the location pin to select “Perform Analysis on Selection Area.”

Figure 3.10. Searching for a Geographic Area in OnTheMap



Source: U.S. Census Bureau, OnTheMap, <<https://onthemap.ces.census.gov/>>.

- The “Analysis Settings” window opens, allowing us to refine our search.
  - Home/Work Area: Since we are interested in understanding commuting patterns, we select “Home.” This yields data based on San Marcos’ residents, rather than workers.
  - Analysis Type: We are interested in understanding where residents work. We select “Destination” and “Places” as our destination type.
  - Year: We select the most recently available data.
  - Job Type: Select “Primary Jobs.”
- Once all selections have been made, we click on “Go!” (see Figure 3.11).

Figure 3.11. **Selecting Variables for Analysis in OnTheMap**

**Analysis Settings**

Destination Analysis in 2015 by Primary Jobs

**Home/Work Area**  
Determines whether the selection area is analyzed on where workers live ("Home") or where workers are employed ("Work").  
 Home  
 Work

**Analysis Type**  
Determines the type of results that will be generated for the selected area.  
 Area Profile  
Labor Market Segment: All Workers  
 Area Comparison  
Areas to Compare: Places (Cities, CDPs, etc.)  
Labor Market Segment: All Workers  
 Distance/Direction  
 Destination  
Destination Type: Places (Cities, CDPs, etc.)  
 Inflow/Outflow  
Note: Home/Work choice does not affect results

**Year**  
Determines the year(s) of data that will be processed in the analysis.  
 2017  
 2016  
 2015  
 2014  
 2013  
 2012  
 2011  
 2010  
 2009  
 2008  
 2007  
 2006  
 2005  
 2004  
 2003  
 2002

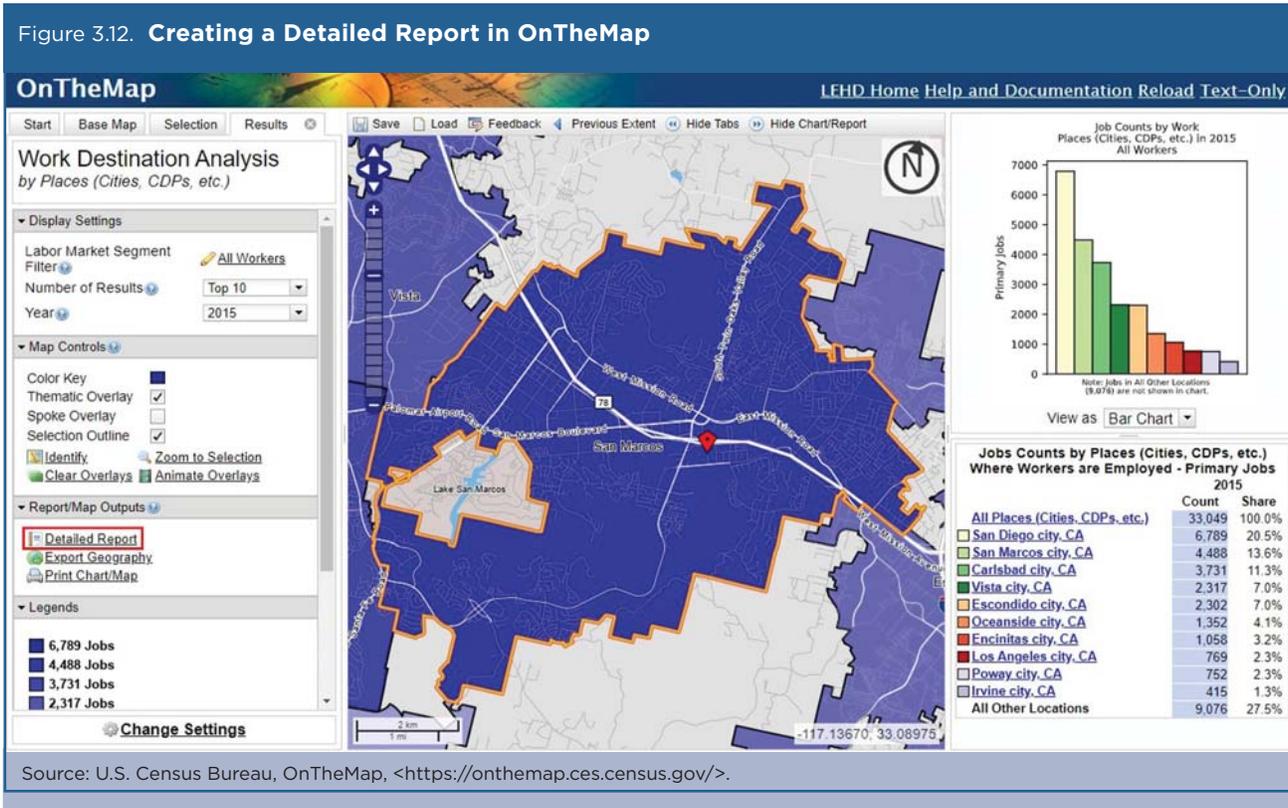
**Job Type**  
Determines the scope of jobs that will be processed in the analysis.  
 All Jobs  
 Primary Jobs  
 All Private Jobs  
 Private Primary Jobs

Cancel **Go!**

Source: U.S. Census Bureau, OnTheMap, <<https://onthemap.ces.census.gov/>>.

- The page refreshes and populates our search results. We export the results by selecting “Detailed Report” under the left sidebar’s “Report/Map Outputs” bin and export the data in spreadsheet format (see Figure 3.12).

Figure 3.12. **Creating a Detailed Report in OnTheMap**



Initial analysis was conducted in a spreadsheet, by sorting results from highest to lowest and comparing the city of San Marcos to the county, state, and nation. The resulting charts were created using a mixture of spreadsheets and visualization software. Figure 3.13 illustrates how poverty data were visualized in the dashboard.

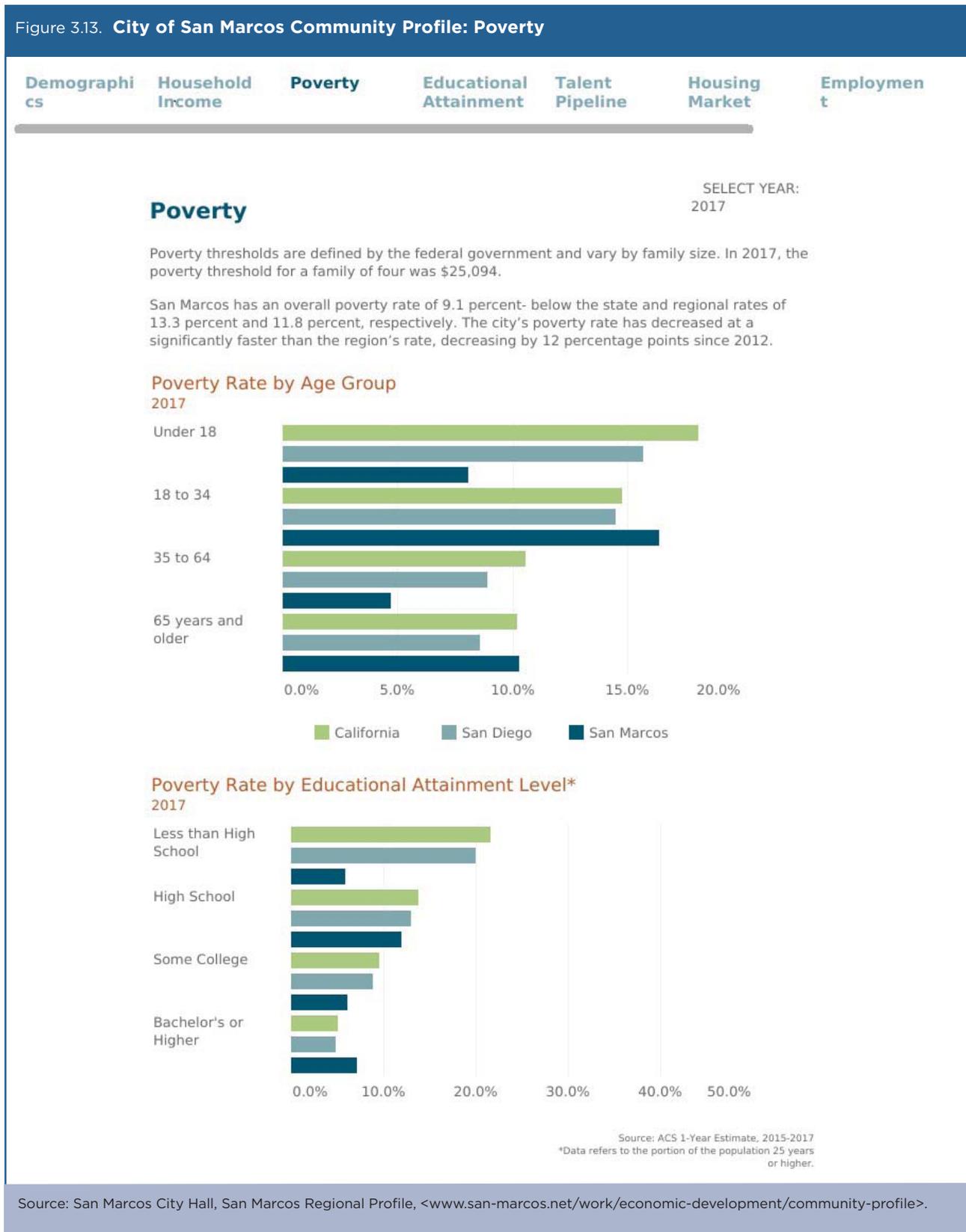
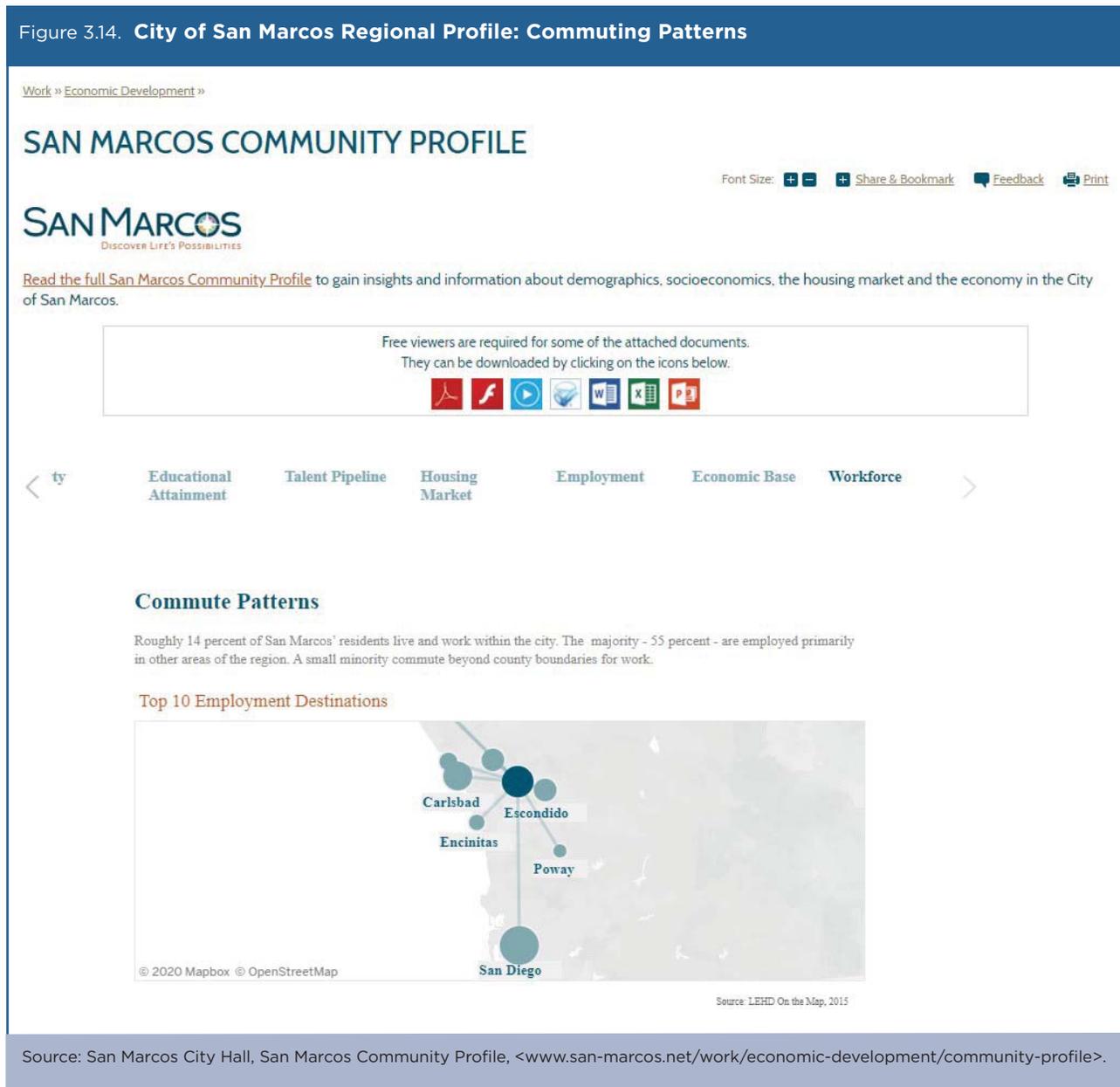


Figure 3.14 shows an interactive flow map that was created to visualize the city's commuting patterns.

The City of San Marcos Community Profile and interactive dashboard were launched in the fall of 2017. Since then, the dashboard has been actively used by the city and its partners to better inform the region's business community. In partnership with the city of San Marcos, the EDC plans on updating the profile and dashboard on an annual basis as data become available. Both products can be found on the city of San Marcos Web site.<sup>21</sup>

<sup>21</sup> San Marcos City Hall, San Marcos Community Profile, <[www.san-marcos.net/work/economic-development/community-profile](http://www.san-marcos.net/work/economic-development/community-profile)>.



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## Case Study #2: Housing Affordability Gap

**Skill Level:** Intermediate

**Subject:** Median household income, housing affordability

**Type of Analysis:** Analysis of national housing trends, combining American Community Survey (ACS) data with other sources

**Tools Used:** ACS Public Use Microdata Sample, [data.census.gov](http://data.census.gov), and spreadsheet

**Authors:** Svenja Gudell, Chief Economist, Zillow; and Aaron Terrazas, Senior Economist, Zillow

In the years since the 2007–2009 Financial Crisis, there has been a boom in housing market data available to the public. Each month, Zillow—an online resource for home buyers and renters—produces and publishes over 100 housing market data series—including median home values and median rents—aggregated at the national, state, metro, county, ZIP code, and neighborhood levels.<sup>22</sup>

Zillow data provide a comprehensive view into the state of the U.S. housing stock, but Zillow’s economic research and data science teams also rely on critical data inputs from the U.S. Census Bureau to analyze the full implications of changing home values and rents for American households. One prominent example is how Zillow combines proprietary data on home values with household income data from the Census Bureau’s American Community Survey (ACS) to explore the share of income that the typical household spends on a monthly mortgage payment. (Zillow also produces a similar statistic for the share of income spent on rent.)

By the middle of 2016—the most recent data available at the time of this writing—the typical American household earning the country’s national median income and buying the median-valued U.S. home could expect to pay 15.5 percent of their income on a mortgage. In the nation’s priciest markets—such as San Jose, Los Angeles, and San Francisco—these shares exceed 40 percent.

However, calculating housing affordability estimates based on median income and median home values by themselves does not provide a complete picture of affordability. Home values and incomes have consistently grown more at the top of the housing market and at the top of the labor market than at the bottom. Increasingly, affordability varies dramatically depending on a given buyer’s income level and the type of home they are trying to buy.

To illustrate these diverging trends between more affluent and less affluent Americans, Zillow also computes mortgage affordability—the share of income spent on a mortgage—for the bottom, middle, and top one-third of households by income. This more granular (and, some would argue, more powerful) tier analysis is conducted by combining Zillow’s property-level data with ACS microdata.

### Calculating Mortgage Affordability

To calculate mortgage affordability, Zillow first estimates the mortgage payment for the median-valued home in a metropolitan statistical area (based on the Zillow Home Value Index for a given quarter) and the 30-year, fixed mortgage interest rate during that quarter (from the Freddie Mac Primary Mortgage Market Survey), assuming a 20 percent down payment. Zillow uses their internal property-level data to estimate mortgage payments, but data users can also access housing data—including home value and mortgage payment estimates—from the ACS.

Data on median household income are from the Census Bureau’s ACS Public Use Microdata Sample (PUMS). The PUMS files allow data users to conduct a custom analysis of the ACS data using a sample of actual responses to the survey. They are much more flexible than the aggregate data available on [data.census.gov](http://data.census.gov), though the PUMS files also require familiarity with statistical analysis software.

With access to appropriate software—the most common are SAS, SPSS, STATA, R, and Python—using the ACS PUMS data is straightforward. Analysts without statistical software can create detailed cross tabulations using the microdata access tool on [data.census.gov](http://data.census.gov).<sup>23</sup> The Census Bureau created a step-by-step guide on how to use this tool to produce custom estimates from the ACS 1-year PUMS file.<sup>24</sup>

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<sup>22</sup> Data are published at [www.zillow.com/data](http://www.zillow.com/data).

<sup>23</sup> This tool is still under development and is available in beta form on the Census Bureau’s Web site: <https://data.census.gov/mdat/>.

<sup>24</sup> U.S. Census Bureau, Using Microdata Access, <https://www2.census.gov/data/api-documentation/using-microdata-access/microdata-access-1-year-acs-pums.pdf>.

To download PUMS data, go to the Census Bureau’s ACS PUMS Data “Accessing PUMS Data” Web page and select the desired timeframe for the PUMS data (see Figure 3.15). Data are available from the year 2005 to the present. You can select single-year or multiyear data. The example below uses data from the 2014 ACS 1-year file.

Figure 3.15. ACS PUMS Data Repository

The screenshot shows the 'Accessing PUMS Data' page on the U.S. Census Bureau website. The page features a dark blue header with the 'United States Census Bureau' logo and a search bar. Below the header is a navigation menu with options like 'BROWSE BY TOPIC', 'EXPLORE DATA', 'LIBRARY', 'SURVEYS/ PROGRAMS', 'INFORMATION FOR...', 'FIND A CODE', and 'ABOUT US'. The main content area is titled 'Accessing PUMS Data' and includes a breadcrumb trail: 'Census.gov > Our Surveys & Programs > American Community Survey (ACS) > Microdata > Accessing PUMS Data'. The page provides information about the American Community Survey (ACS) Public Use Microdata Sample (PUMS) files, explaining that they are untabulated records about individual people or housing units. It also mentions that supporting documentation is available on the PUMS Documentation page and that PUMS files are available in CSV and SAS formats. A year selector at the bottom of the main content area shows years from 2018 to 2011, with 2014 circled in red. Below the year selector, there are two columns of links for 'Access on FTP site' and 'Access on data.census.gov', each listing '2018 ACS 1-Year PUMS' and '2018 ACS 5-Year PUMS'. A footer note at the bottom of the screenshot states: 'Source: U.S. Census Bureau, American Community Survey (ACS), Accessing PUMS Data, <www.census.gov/programs-surveys/acs/microdata/access.html>.'

On the FTP site, click on “1-Year” to access the 2014 ACS 1-year PUMS files (see Figure 3.16).

Figure 3.16. **Selecting ACS PUMS File on the Census Bureau’s FTP Server**

The screenshot shows the 'Accessing PUMS Data' page on the Census Bureau's website. The page is titled 'Accessing PUMS Data' and includes a navigation menu with options like 'BROWSE BY TOPIC', 'EXPLORE DATA', 'LIBRARY', 'SURVEYS/ PROGRAMS', 'INFORMATION FOR...', 'FIND A CODE', and 'ABOUT US'. The main content area features a breadcrumb trail: 'Census.gov > Our Surveys & Programs > American Community Survey (ACS) > Microdata > Accessing PUMS Data'. Below this, there is a section for 'AMERICAN COMMUNITY SURVEY (ACS)' with a sub-section for 'Accessing PUMS Data'. The page provides information about the American Community Survey (ACS) Public Use Microdata Sample (PUMS) files, including a link to the 'PUMS Handbook'. A year selector shows '2014' as the selected year. Under the '2014' heading, there are two columns of links: 'Access on FTP site' and 'Access on data.census.gov'. The '2014 ACS 1-Year PUMS' link under 'Access on FTP site' is highlighted with a red box. The 'Access on data.census.gov' column contains links for '2014 ACS 1-Year PUMS' and '2014 ACS 5-Year PUMS'. A footer note states: 'For PUMS documentation by year visit our PUMS Documentation page and select the specific year of interest.'

Source: U.S. Census Bureau, American Community Survey (ACS), Accessing PUMS Data, <www.census.gov/programs-surveys/acs/microdata/access.2014.html>.

The next step is to download the data set by selecting “csv\_hus.zip” (see Figure 3.17). PUMS files on the Census Bureau’s FTP site are stored as ZIP files. The naming convention for PUMS files on the FTP server is based on three file features: the file format, the record type, and the state abbreviation.

Figure 3.17. ACS PUMS Downloads by Geography (Nation and States) and File (Population and Housing)

 csv_htn.zip	06-Oct-2015 16:02	5.6M
 csv_htx.zip	06-Oct-2015 16:02	20M
 csv_hus.zip	27-Oct-2015 08:15	251M
 csv_hut.zip	06-Oct-2015 16:00	2.2M
 csv_hva.zip	06-Oct-2015 16:00	6.8M

Source: U.S. Census Bureau, FTP server, <<https://www2.census.gov/programs-surveys/acs/data/pums/2014/1-Year/>>.

- File formats are comma-separated value (CSV) files and SAS data sets for UNIX.
- Record types are housing files (h) or person files (p). Zillow uses the housing file.
- State (or state equivalent) abbreviations are two letter labels such as “tx” for Texas and “dc” for District of Columbia. The abbreviation for the file containing all records in the United States is “us.” Zillow uses the United States file.

After downloading the file, Zillow loads the ACS data into R (software for statistical computing) to produce estimates of monthly owner costs as a percentage of household income for households at different income levels. The PUMS Data Dictionary can help you find the variable needed for this analysis: HINCP (Household income in the past 12 months).<sup>25</sup>

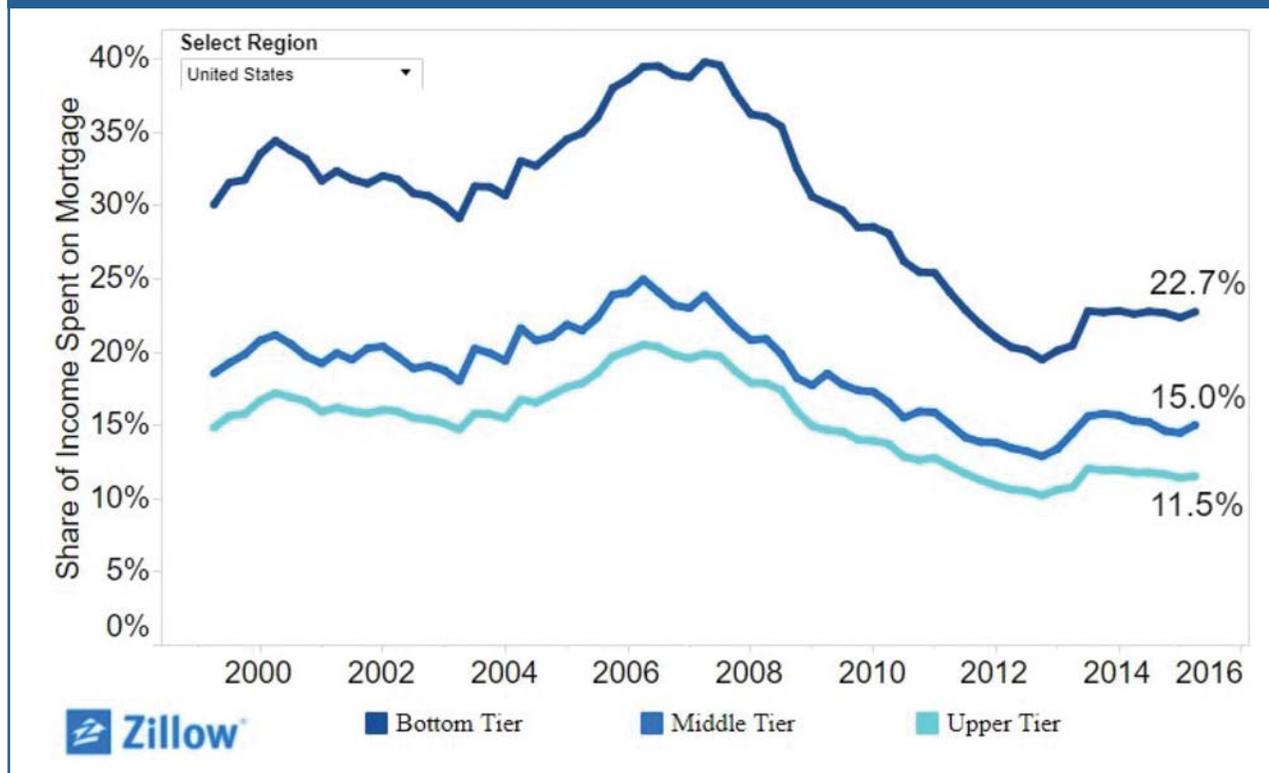
Using the HINCP variable to estimate median household income for households in the bottom one-third of the income distribution, Zillow then assumes that these households purchase a median bottom-tier home (i.e., 16.7th percentile of homes in a metro area) and then calculates the percentage of monthly income that household would have to spend to pay the mortgage.<sup>26</sup>

<sup>25</sup> U.S. Census Bureau, PUMS Data Dictionary, <[www.census.gov/programs-surveys/acs/microdata/documentation.html](http://www.census.gov/programs-surveys/acs/microdata/documentation.html)>.

<sup>26</sup> For median income used in the overall affordability analysis, Zillow chains the ACS income data forward using the Employment Cost Index (ECI), which is updated quarterly with a one-quarter lag. Income tier data are not directly published in the ECI, so to calculate tiers, Zillow relies on the Consumer Expenditure Survey (CES), which is published with a 1-year lag. For this reason, tier data are only available through Q2 2016, but overall affordability data are available through Q2 2017.

The key results from Zillow’s analysis are shown in Figure 3.18. Depending on a given buyer’s household income level and the kind of home they are trying to buy, affordability can vary dramatically. Nationwide, a buyer at the median household income in the bottom one-third of all incomes and who wants to buy a home valued in the bottom one-third of all homes would need to spend 23 percent of their household income on a mortgage as of Q2 2016, the latest quarter for which data were available at the time of this writing. A buyer in the top one-third of household incomes and who wants to buy a more expensive home in the top one-third of homes by value would only spend 11.5 percent of their income on a mortgage.

Figure 3.18. **Mortgage Affordability by Income Tier**



Source: Svenja Gudell, “Housing Highs & Lows: How the Home Affordability Gap Between the Rich and Poor is Widening,” <[www.zillow.com/research/affordability-2016q1-12763/](http://www.zillow.com/research/affordability-2016q1-12763/)>.

A decade after the 2007–2009 Financial Crisis and associated housing market bust, there has been a proliferation of housing market data available to consumers and researchers. Census Bureau data, particularly from the ACS, are a critical complement to Zillow’s housing market data.

In an era when the gap in net worth between higher- and lower-wealth households is increasing, medians or averages cannot tell the full story of the American housing market.<sup>27</sup> Exploring within the distribution of home values and household incomes—analysis that is possible with Zillow’s property-level home values and the Census Bureau’s ACS PUMS data—allows for a much richer and more complete perspective on what is, for most Americans, their largest single asset.<sup>28</sup>

<sup>27</sup> U.S. Census Bureau, Gap Between Higher- and Lower-Wealth Households Widens, Census Bureau Reports, <[www.census.gov/newsroom/press-releases/2014/cb14-156.html](http://www.census.gov/newsroom/press-releases/2014/cb14-156.html)>.

<sup>28</sup> Zillow updates this analysis periodically. For the most recent data and analysis, see <[www.zillow.com/research/](http://www.zillow.com/research/)>.

## Case Study #3: USAA Potential Market Size Estimation

**Skill Level:** Introductory/Intermediate

**Subject:** Housing

**Type of Analysis:** Comparisons of American Community Survey (ACS) data over time, across demographic groups, and across states; identifying business market(s)

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

**Author:** Rob Galbraith, Director of Underwriting Research, Property & Casualty Insurance Group, USAA

Rob Galbraith is a director of underwriting research with the Property & Casualty Insurance Company at USAA, a large financial services member-owned association that focuses on serving active duty military, veterans, and their families. The underwriting area is challenged with providing insurance to as many eligible members as possible while not taking on excessive exposure to natural hazards that could put the company at risk of bankruptcy. American Community Survey (ACS) data are used at USAA in conjunction with advanced analytics and predictive modeling to identify segments to target for marketing three of its major lines of business: homeowners insurance, sold to those with owner-occupied homes; renters insurance, sold to those who are renting a dwelling from a landlord who owns the property; and rental property insurance, sold to those who are landlords renting their property to one or more tenants. ACS data are also used to track trends in owner- and renter-occupied housing to target marketing expenditures to achieve profitable growth.

Rob scans the documentation available for the ACS and learns that while single-year data are available for states and many large geographic areas, data for smaller areas with fewer than 65,000 people are only available in 5-year tabulations (e.g., 2012–2016). He also learns that there is uncertainty—margin of error—associated with ACS estimates, particularly for smaller geographic areas and small population groups. For this example, Rob is interested in accessing ACS housing data at the state level.

- Rob navigates to the U.S. Census Bureau’s ACS home page at <[www.census.gov/programs-surveys/acs](http://www.census.gov/programs-surveys/acs)> and clicks on the “Data” link on the left side of the page (see Figure 3.19).

Figure 3.19 Selecting Data From the ACS Home Page

The screenshot shows the U.S. Census Bureau's American Community Survey (ACS) home page. At the top, there is a search bar and navigation links: BROWSE BY TOPIC, EXPLORE DATA, LIBRARY, SURVEYS/ PROGRAMS, INFORMATION FOR..., FIND A CODE, and ABOUT US. The breadcrumb trail indicates the current location: // Census.gov > Our Surveys & Programs > American Community Survey (ACS). The main heading is "American Community Survey (ACS)". Below the heading, there is a description: "The American Community Survey (ACS) helps local officials, community leaders, and businesses understand the changes taking place in their communities. It is the premier source for detailed population and housing information about our nation." On the left side, there is a navigation menu with the following items: AMERICAN COMMUNITY SURVEY (ACS), About the Survey, Respond to the Survey, News & Updates, Data (highlighted with a red box), Guidance for Data Users, Geography & ACS, Technical Documentation, Methodology, Library, Operations and Administration, and Contact Us. Below the description, there are three featured articles: "How do I respond to the ACS?", "ACS data help with COVID-19 response efforts", and "Should I respond to both the ACS and 2020 Census?". A video player is also visible on the right side of the page.

Source: U.S. Census Bureau, American Community Survey (ACS), <[www.census.gov/programs-surveys/acs/](http://www.census.gov/programs-surveys/acs/)>.

- Under the subheading “Data Tables and Tools,” he clicks on “Subject Tables” (see Figure 3.20).

Figure 3.20. **Selecting ACS Subject Tables**

The screenshot shows the American Community Survey Data page on the U.S. Census Bureau website. The page has a dark blue header with the 'United States Census Bureau' logo and a search bar. Below the header is a navigation bar with links: BROWSE BY TOPIC, EXPLORE DATA, LIBRARY, SURVEYS/ PROGRAMS, INFORMATION FOR..., FIND A CODE, and ABOUT US. The main content area has a breadcrumb trail: // Census.gov > Our Surveys & Programs > American Community Survey (ACS) > American Community Survey Data. On the left is a sidebar with various data categories. The main heading is 'American Community Survey Data' with social media icons. Below it is a section titled 'Data Tables and Tools' which contains a list of links: 'Data Profiles', 'Narrative Profiles', and 'Subject Tables'. The 'Subject Tables' link is circled in red. At the bottom right of this section is a teal button that says 'VIEW ALL TABLES AND TOOLS'. On the right side of the page, there are sections for 'Related Information' and 'You May Be Interested In' with various links.

Source: U.S. Census Bureau, American Community Survey (ACS), <www.census.gov/acs/www/data/data-tables-and-tools/subject-tables/>.

- In the search box near the top right corner of the page, he types in “housing,” navigates to the second page of results, and then selects Table S2504: “Physical Housing Characteristics for Occupied Housing Units” (see Figure 3.21). When he clicks on this link, he is redirected to data.census.gov, the Census Bureau’s primary tool for accessing data from the ACS and many other Census Bureau data sets.

Figure 3.21. Searching for ACS Housing Tables

The screenshot shows the 'American Community Survey' search results page. At the top, there is a search bar with 'housing' entered. Below the search bar, there are navigation tabs: BROWSE BY TOPIC, EXPLORE DATA, LIBRARY, SURVEYS/ PROGRAMS, INFORMATION FOR..., FIND A CODE, and ABOUT US. The main content area is titled 'Subject Tables' and shows a table with two columns: 'Table Title' and 'Table ID'. The first row is highlighted with a red box and contains 'Physical Housing Characteristics for Occupied Housing Units' and 'S2504'. Below the table, it says 'Showing 11 to 11 of 11 entries (filtered from 84 total entries)'. There are 'Previous' and 'Next' buttons, with the number '2' circled in red, indicating the current page. A 'Share Your ACS Data Story!' button is also visible.

Source: U.S. Census Bureau, American Community Survey (ACS), <www.census.gov/acs/www/data/data-tables-and-tools/subject-tables/>.

- Next, he clicks on “Customize Table” (see Figure 3.22).
- The resulting table shows the United States as the default geography, so he selects “Geographies” to change the geography filter.

Figure 3.22. Customizing a Table in Data.census.gov

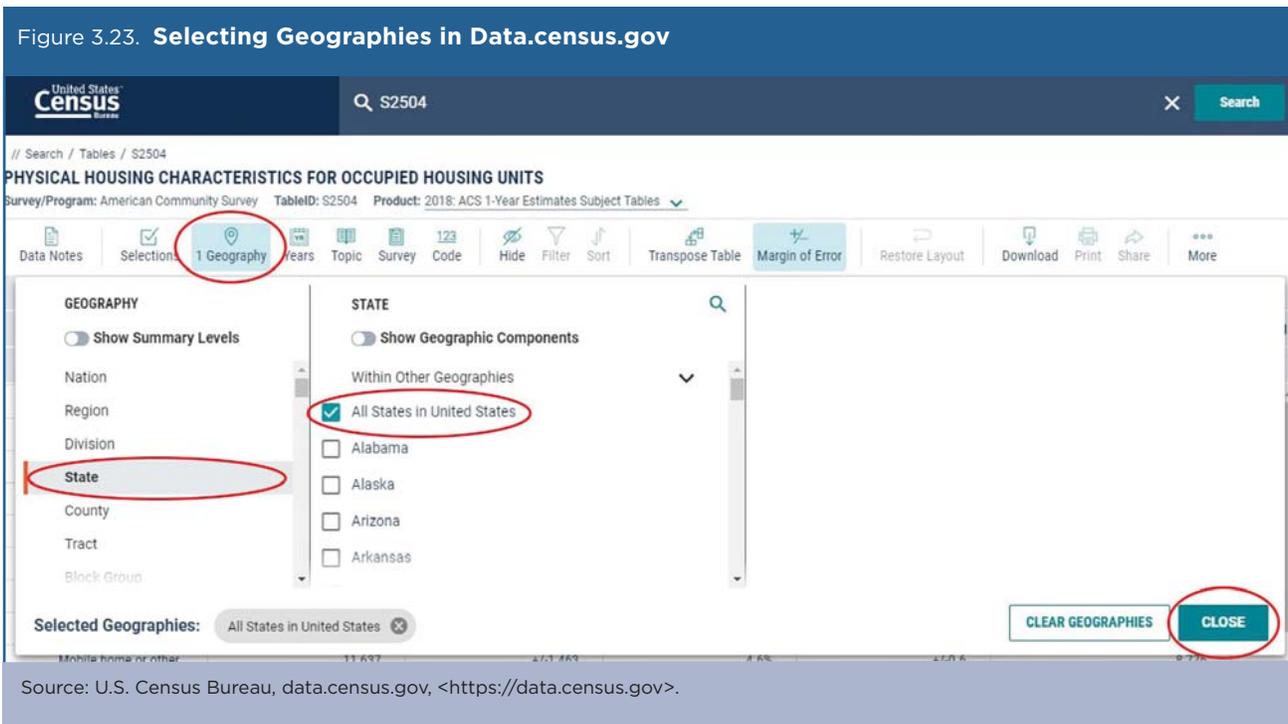
The screenshot shows the 'Physical Housing Characteristics for Occupied Housing Units' table. At the top, there is a search bar with 'S2504' entered. Below the search bar, there are navigation tabs: ALL, TABLES, MAPS, and PAGES. The main content area is titled 'PHYSICAL HOUSING CHARACTERISTICS FOR OCCUPIED HOUSING UNITS' and shows a table with four columns: 'Estimate', 'Margin of Error', 'Estimate', and 'Margin of Error'. The first row is 'Occupied housing units' with an estimate of 121,520,180 and a margin of error of +/-153,217. Below this, there is a section for 'UNITS IN STRUCTURE' with various categories like '1, detached', '1, attached', '2 apartments', etc. The 'CUSTOMIZE TABLE' button is circled in red.

	Occupied housing units		Percent occupied housing units	
	Estimate	Margin of Error	Estimate	Margin of Error
Occupied housing units	121,520,180	+/-153,217	121,520,180	+/-153,217
UNITS IN STRUCTURE				
1, detached	75,972,088	+/-191,857	62.5%	+/-
1, attached	7,333,647	+/-41,757	6.0%	+/-
2 apartments	4,138,677	+/-29,488	3.4%	+/-
3 or 4 apartments	5,127,776	+/-38,981	4.2%	+/-
5 to 9 apartments	5,659,599	+/-43,039	4.7%	+/-
10 or more apartments	16,486,881	+/-64,137	13.6%	+/-
Mobile home or other ...	6,801,512	+/-37,380	5.6%	+/-
YEAR STRUCTURE BU...				

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

- Next, he selects “State,” “All States in United States,” and then closes the window to view the results (see Figure 3.23).

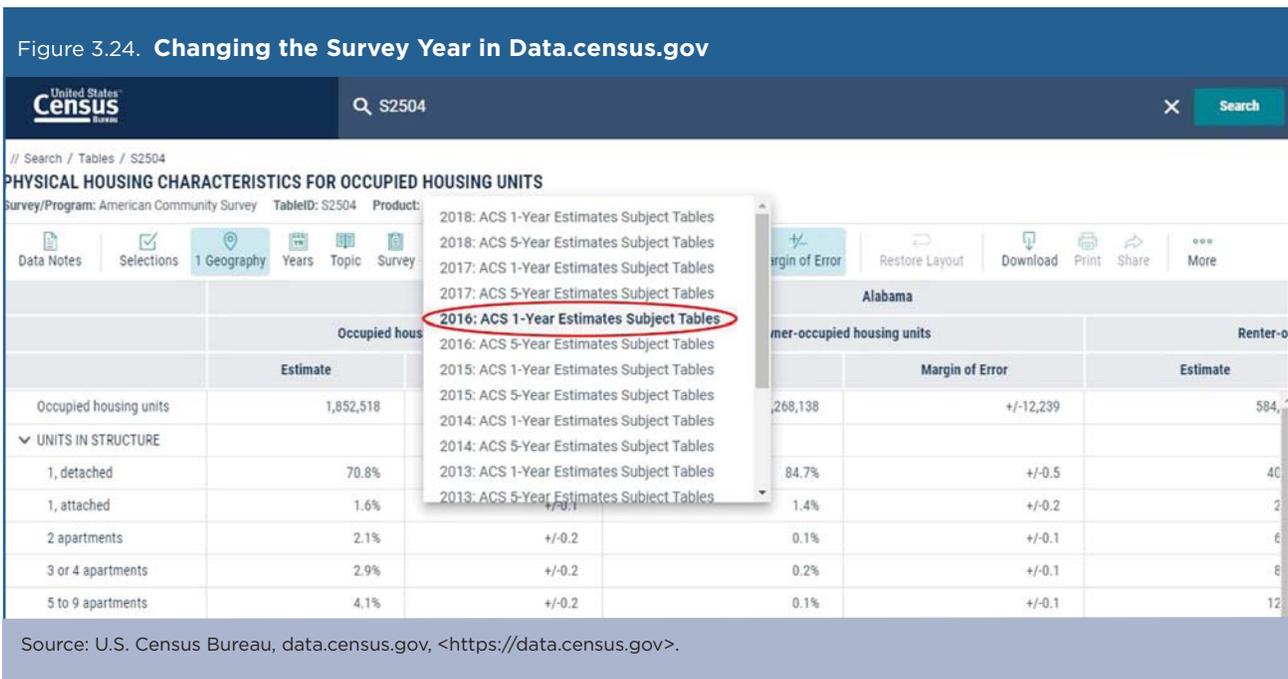
Figure 3.23. **Selecting Geographies in Data.census.gov**



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

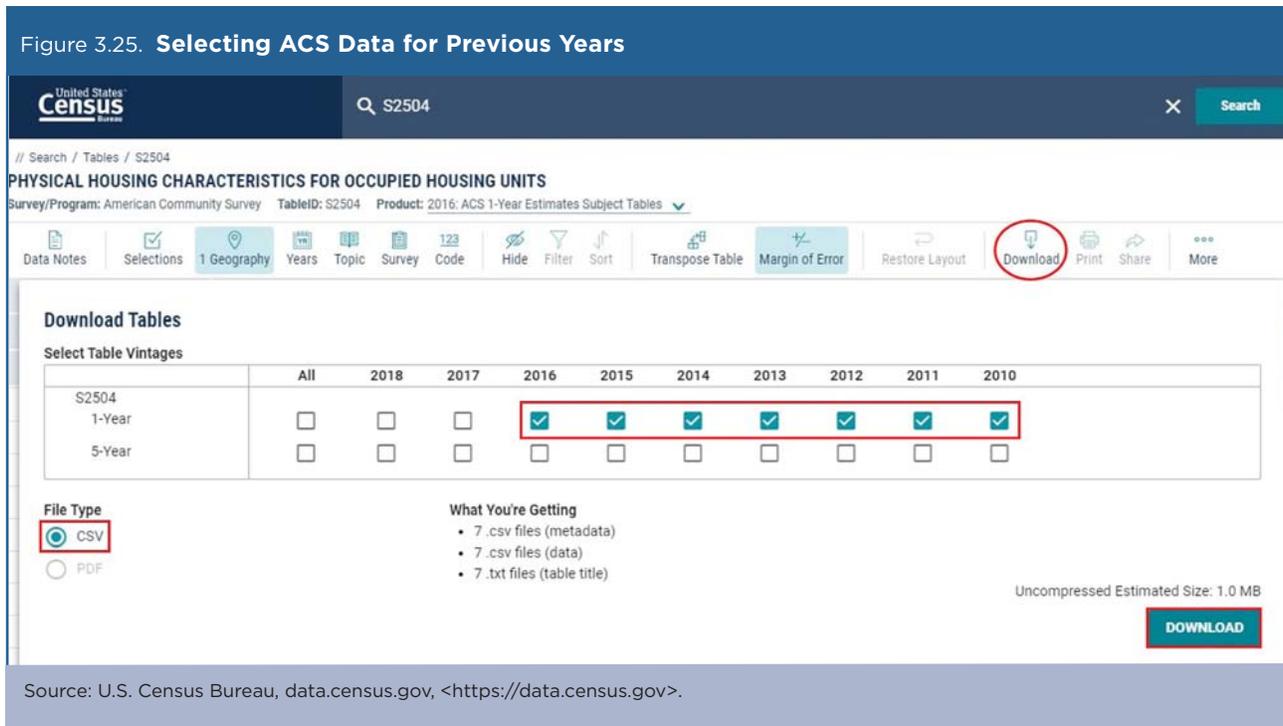
- He selects the desired survey year by clicking on the current “Product” selection. For the purposes of this case study, he is using 2016 ACS 1-year estimates. The header should read “2016 ACS 1-Year Estimates Subject Tables” (see Figure 3.24).

Figure 3.24. **Changing the Survey Year in Data.census.gov**



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

- He selects “Download” at the top of the window.
- Then, he uses the Download Tables window to check the boxes for the 2016 through 2010 1-year data. Rob downloads data for multiple years to assist with the selection of target markets to recommend.
- He selects “CSV” as the file type and clicks on “Download” (see Figure 3.25).



Rob opens the CSV file and copies and pastes the owner-occupied and renter-occupied data for each state into a new table showing the data for the last 5 to 10 years (see Table 3.2). He can then use this table, compare it with internal USAA data showing the number of policies in force for each of the three lines of business, and compare the two tables to determine potential market size by state. Since the purpose of this analysis is to identify target market opportunities, the margin of error is not considered as a critical factor, as the goal is merely to gain reasonable estimates of potential market size.

If desired, this process can be replicated at a county level for further refinement of market segmentation.

Table 3.2. **Owner-Occupied Housing Units by State and Year**

State	2012	2013	2014	2015
Alabama	1,268,565	1,240,017	1,246,080	1,253,595
Alaska	159,427	156,107	156,006	159,922
Arizona	1,496,650	1,490,031	1,484,857	1,524,828
Arkansas	757,722	739,987	744,318	746,000
California	6,781,817	6,804,639	6,855,688	6,910,823
Colorado	1,278,158	1,291,945	1,302,533	1,322,618
Connecticut	908,452	888,478	900,039	889,035
Delaware	241,050	243,047	245,808	249,681
District of Columbia	110,681	110,513	112,492	112,555
Florida	4,724,428	4,672,482	4,693,821	4,760,071

Source: U.S. Census Bureau, data.census.gov, Table S2504: “Physical Housing Characteristics for Occupied Housing Units.”