

# Using the Census Data API With the American Community Survey

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*What Data Users Need to Know*

Issued February 2020

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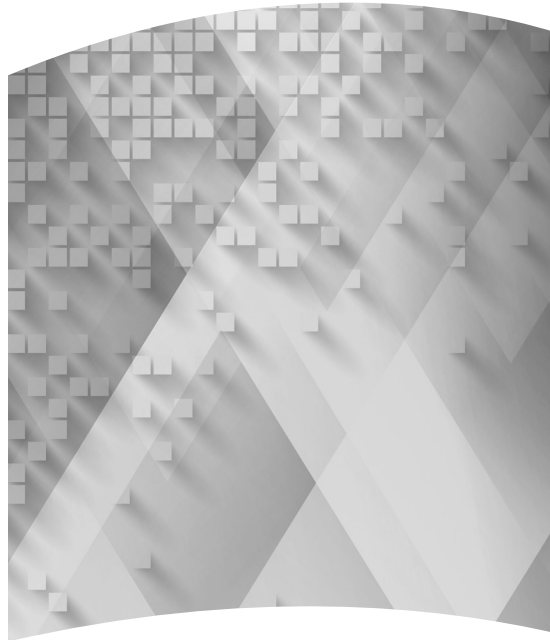
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# USING THE CENSUS DATA API WITH THE AMERICAN COMMUNITY SURVEY: WHAT DATA USERS NEED TO KNOW

An API, or “Application Programming Interface,” is a tool that programmers can use to access data more efficiently. It reduces the need for data storage and provides software developers, data scientists, and others with a set of standard commands to easily access statistics that can be incorporated into their programs and applications.

This guide provides an overview of the Census Data API and how it can be used to access data from the U.S. Census Bureau’s American Community Survey (ACS), a source of up-to-date statistics on the social, economic, housing, and demographic characteristics of America’s communities.

The guide is intended for software developers and researchers who want to access ACS data to create mobile- or Web-based apps, as well as nonprogrammers who want to create simple queries to access ACS data through an Internet browser.

More detailed instructions on how to use the Census Data API are available in the Census Bureau’s Census Data API User Guide.<sup>1</sup>

## 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.

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.<sup>2</sup>

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<sup>1</sup> U.S. Census Bureau, Developers, Census Data API User Guide, <[www.census.gov/data/developers/guidance/api-user-guide.html](http://www.census.gov/data/developers/guidance/api-user-guide.html)>.

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

# 1. OVERVIEW OF THE CENSUS DATA API

The Census Data API is a data service that enables developers, data scientists, and others to access and use statistical data from the American Community Survey (ACS), decennial census, Population Estimates and Projections, County Business Patterns, and many other U.S. Census Bureau programs. The Census Bureau's Web site provides a complete list of data sets available through the Census Data API.<sup>3</sup>

## Why Use the Census Data API?

The Census Data API has a simple interface. It provides an efficient way to get ACS and other data directly from the Census Bureau, without storing the data on a computer or a local server. If you know how to read the documentation and create a request, you can easily download variables and geographic areas of interest. Data are continuously available and regularly updated, so you have immediate access to new data as it is released.

The Census Data API makes it easy to access ACS data, but for novice users, the amount of data available can be overwhelming. The ACS covers over 40 different topics and releases thousands of tables.<sup>4</sup> Developers can help make the ACS data more accessible by building programs using statistical software like R and Python, creating mobile and Web apps, and developing interactive data visualizations that display data directly in an app or browser window in an easily consumable format.

Examples of Census Bureau applications that draw ACS data directly from the Census Data API include My Tribal Area and My Congressional District.<sup>5</sup>

The Census Data API is also used widely by organizations outside of the Census Bureau.

For example, the Pennsylvania State Data Center uses the API to produce a series of dashboards based on ACS estimates, and Cleargov.com uses the Census Data API and other sources to produce online profiles of cities and towns for state and local governments.<sup>6</sup>

<sup>3</sup> U.S. Census Bureau, Developers, Available APIs, <[www.census.gov/data/developers/data-sets.html](http://www.census.gov/data/developers/data-sets.html)>; Census API: Datasets in /data and its descendants, <<https://api.census.gov/data/>>.

<sup>4</sup> U.S. Census Bureau, American Community Survey (ACS), Subjects Included in the Survey, <[www.census.gov/programs-surveys/acs/guidance/subjects.html](http://www.census.gov/programs-surveys/acs/guidance/subjects.html)>.

<sup>5</sup> U.S. Census Bureau, My Tribal Area, <[www.census.gov/tribal/](http://www.census.gov/tribal/)>; My Congressional District, <[www.census.gov/mycd/](http://www.census.gov/mycd/)>.

<sup>6</sup> Pennsylvania State Data Center, PaSDC Dashboards, <<https://pasdc.hbg.psu.edu/Data/PaSDCDashboards/tabid/2049/Default.aspx>>; ClearGov, <[www.cleargov.com/](http://www.cleargov.com/)>.

## ACS Data Sets Available Through the Census Data API

The Census Data API currently includes the following ACS data sets:

- ACS 1-Year Estimates: Data for geographic areas with populations of 65,000 or more. Covers a broad range of topics about social, economic, housing, and demographic characteristics of the U.S. population.<sup>7</sup>
- ACS 5-Year Estimates: Data available down to the block-group level.<sup>8</sup> Covers a range of topics about social, economic, housing, and demographic characteristics of the U.S. population.<sup>9</sup>
- ACS Migration Flows: Data on the movement of people between counties, minor civil divisions, and metropolitan statistical areas using ACS 5-year estimates. Flows are crossed by selected characteristics.<sup>10</sup>
- ACS 1-Year Supplemental Estimates: Simplified versions of popular ACS tables for geographic areas with populations of 20,000 or more.<sup>11</sup>
- The Planning Database: Data File with selected variables from the 2010 Decennial Census and ACS 5-year estimates at the block group and census tract levels.<sup>12</sup>

Within the ACS 1-year and 5-year data sets, five different collections of data are available. "Profiles" contain some of the most commonly used ACS statistics, while "Tables" provide more detailed tabulations of ACS estimates:

- Detailed Tables: Include the most detailed cross-tabulations of ACS data, many of which are published down to the block-group level. There are over 31,000 variables in this data set.

<sup>7</sup> U.S. Census Bureau, Developers, American Community Survey 1-Year Data, <[www.census.gov/data/developers/data-sets/acs-1year.html](http://www.census.gov/data/developers/data-sets/acs-1year.html)>.

<sup>8</sup> Block groups are subdivisions of census tracts that include between 600 and 3,000 people each.

<sup>9</sup> U.S. Census Bureau, Developers, American Community Survey 5-Year Data, <[www.census.gov/data/developers/data-sets/acs-5year.html](http://www.census.gov/data/developers/data-sets/acs-5year.html)>. In addition to the 1-year and 5-year data files, the Census Bureau also produced a 3-year data file, but that series has been discontinued.

<sup>10</sup> U.S. Census Bureau, Developers, American Community Survey Migration Flows, <[www.census.gov/data/developers/data-sets/acs-migration-flows.html](http://www.census.gov/data/developers/data-sets/acs-migration-flows.html)>.

<sup>11</sup> U.S. Census Bureau, Developers, American Community Survey 1-Year Supplemental Data, <[www.census.gov/data/developers/data-sets/ACS-supplemental-data.html](http://www.census.gov/data/developers/data-sets/ACS-supplemental-data.html)>.

<sup>12</sup> U.S. Census Bureau, Developers, The Planning Database (2015–2016), <[www.census.gov/data/developers/data-sets/planning-database.html](http://www.census.gov/data/developers/data-sets/planning-database.html)>.



- **Data Profiles:** Include profiles of social, economic, housing, and demographic characteristics for areas down to the census tract level. Data are presented as both counts and percentages. There are over 1,000 variables in this data set.
- **Comparison Profiles:** Include ACS data for the nation, states, counties, places, congressional districts, and metropolitan/micropolitan statistical areas with populations of 5,000 or more. Comparison Profiles are similar to Data Profiles but include comparisons with past-year data and statistical significance testing. There are over 1,000 variables in this data set.
- **Subject Tables:** Include estimates covering specific topics—such as age, commuting characteristics, educational attainment, and marital status—for geographic areas down to the census tract level. The data are presented as both counts and percentages. There are over 16,000 variables in this data set.
- **Selected Population Profiles:** Include estimates covering social, economic, housing, and demographic data. Data are available for over 100 racial, ethnic, tribal, ancestry, and country/region of birth groups. These profiles are generally only available

for areas with large populations and for large population subgroups.

## Finding the Data Set and Variables You Need

With all the data sets available in the Census Data API, finding the one you need can be challenging. The Census Data API Discovery Tool can help you make sense of all this information.<sup>13</sup> A complete list of available data sets is available on the Census Bureau's Web site in HTML format.<sup>14</sup> Users can also navigate to specific data sets from the Developers Web page.<sup>15</sup>

To find a particular data set, you can scroll through the list or search within your Web browser for a specific year or phrase (for example, "2016" or "ACS 5-Year"). If you click on the link for "geographies" for the 2016 ACS 5-Year Detailed Tables, you can see a list of the 87 geographic areas available for that data set (see Figure 1.1).

<sup>13</sup> U.S. Census Bureau, Developers, Census Data API Discovery Tool, <[www.census.gov/data/developers/updates/new-discovery-tool.html](http://www.census.gov/data/developers/updates/new-discovery-tool.html)>.

<sup>14</sup> U.S. Census Bureau, Census API: Datasets in /data and its descendants, <<https://api.census.gov/data.html>>.

<sup>15</sup> U.S. Census Bureau, Developers, Available APIs, <[www.census.gov/data/developers/data-sets.html](http://www.census.gov/data/developers/data-sets.html)>.

**Figure 1.1. List of Selected Geographic Areas Available From the 2012–2016 ACS 5-Year Detailed Tables**

*Census Data API: FIPS Geographies in /data/2016/acs/acs5/geography*

Reference Date	Geography Level	Geography Hierarchy
2015-01-01	010	us
2015-01-01	020	region
2015-01-01	030	division
2015-01-01	040	state
2015-01-01	050	state > county
2015-01-01	060	state > county > county subdivision
2015-01-01	140	state > county > tract
2015-01-01	160	state > place
2015-01-01	230	state > alaska native regional corporation
2015-01-01	250	american indian area/alaska native area/hawaiian home land
2015-01-01	310	metropolitan statistical area/micropolitan statistical area
2015-01-01	330	combined statistical area
2015-01-01	350	new england city and town area
2015-01-01	400	urban area
2015-01-01	500	state > congressional district
2015-01-01	950	state > school district (elementary)
2015-01-01	960	state > school district (secondary)

Note: Only the first 17 rows and the first 3 columns are displayed in Figure 1.1.

Source: U.S. Census Bureau, Census Data API Discovery Tool, <<https://api.census.gov/data/2016/acs/acs5/geography.html>>.

You can also click on the link for “variables” to view a list of all the variables available in the data set (see Figure 1.2). This Web page may take a minute or two to load, given the large number of variables—over 22,000—that are available in the 2012-2016 ACS 5-Year Detailed Tables. You can use the search feature within

your Web browser to find variables related to your topic of interest. You can also click on a data set on the Census Bureau’s Web site to view the data documentation for that file.<sup>16</sup>

<sup>16</sup> U.S. Census Bureau, Developers, Available APIs, <[www.census.gov/data/developers/data-sets.html](http://www.census.gov/data/developers/data-sets.html)>.

Figure 1.2. List of Variables Available From the 2012-2016 ACS 5-Year Detailed Tables

Census Data API: Variables in /data/2016/acs/acs5/variables		
Name	Label	Concept
<a href="#">AIANHH</a>	American Indian Area/Alaska Native Area/Hawaiian Home Land	
<a href="#">AIHHTLI</a>	American Indian Area (Off-Reservation Trust Land Only) Hawaiian Home Land	
<a href="#">AITSCE</a>	American Indian Tribal Subdivision (Census)	
<a href="#">ANRC</a>	Alaska Native Regional Corporation	
<a href="#">B00001_001E</a>	Estimate!!Total	UNWEIGHTED SAMPLE COUNT OF THE POPULATION
<a href="#">B00002_001E</a>	Estimate!!Total	UNWEIGHTED SAMPLE HOUSING UNITS
<a href="#">B01001_001E</a>	Estimate!!Total	SEX BY AGE
<a href="#">B01001_002E</a>	Estimate!!Total!!Male	SEX BY AGE
<a href="#">B01001_003E</a>	Estimate!!Total!!Male!!Under 5 years	SEX BY AGE
<a href="#">B01001_004E</a>	Estimate!!Total!!Male!!5 to 9 years	SEX BY AGE
<a href="#">B01001_005E</a>	Estimate!!Total!!Male!!10 to 14 years	SEX BY AGE
<a href="#">B01001_006E</a>	Estimate!!Total!!Male!!15 to 17 years	SEX BY AGE
<a href="#">B01001_007E</a>	Estimate!!Total!!Male!!18 and 19 years	SEX BY AGE

Note: Only the first 13 rows and the first three columns are displayed in Figure 1.2.  
Source: U.S. Census Bureau, Census Data API Discovery Tool, <<https://api.census.gov/data/2016/acs/acs5/variables.html>>.

Others may find it useful to search for variables within “groups” to classify variables based on the published ACS tables from which they are drawn. For example, in Figure 1.3, the third row provides a link to selected variables available from ACS Table B01001: Sex by Age. The next section describes how you can use the “groups” function to select multiple ACS variables with a single API query.

The Census Data API Discovery Tool is also available in Extensible Markup Language (XML) and JavaScript Object Notation (JSON) formats for more advanced data users who want to access the metadata (the descriptive information or documentation about the data sets) in machine-readable formats.<sup>17</sup>

<sup>17</sup> U.S. Census Bureau, <<https://api.census.gov/data.xml>>; <<https://api.census.gov/data.json>>.

Figure 1.3. List of Groups in the 2012-2016 ACS 5-Year Detailed Tables

*Census API: groups in /data/2016/acs/acs5/groups*

Name	Description	Variable List
B00001	UNWEIGHTED SAMPLE COUNT OF THE POPULATION	<a href="#">selected variables</a>
B00002	UNWEIGHTED SAMPLE HOUSING UNITS	<a href="#">selected variables</a>
B01001	SEX BY AGE	<a href="#">selected variables</a>
B01001A	SEX BY AGE (WHITE ALONE)	<a href="#">selected variables</a>
B01001B	SEX BY AGE (BLACK OR AFRICAN AMERICAN ALONE)	<a href="#">selected variables</a>
B01001C	SEX BY AGE (AMERICAN INDIAN AND ALASKA NATIVE ALONE)	<a href="#">selected variables</a>
B01001D	SEX BY AGE (ASIAN ALONE)	<a href="#">selected variables</a>
B01001E	SEX BY AGE (NATIVE HAWAIIAN AND OTHER PACIFIC ISLANDER ALONE)	<a href="#">selected variables</a>
B01001F	SEX BY AGE (SOME OTHER RACE ALONE)	<a href="#">selected variables</a>
B01001G	SEX BY AGE (TWO OR MORE RACES)	<a href="#">selected variables</a>
B01001H	SEX BY AGE (WHITE ALONE, NOT HISPANIC OR LATINO)	<a href="#">selected variables</a>
B01001I	SEX BY AGE (HISPANIC OR LATINO)	<a href="#">selected variables</a>
B01002	MEDIAN AGE BY SEX	<a href="#">selected variables</a>
B01002A	MEDIAN AGE BY SEX (WHITE ALONE)	<a href="#">selected variables</a>
B01002B	MEDIAN AGE BY SEX (BLACK OR AFRICAN AMERICAN ALONE)	<a href="#">selected variables</a>

Note: Only the first 15 rows are displayed in Figure 1.3.

Source: U.S. Census Bureau, Census Data API Discovery Tool, <<https://api.census.gov/data/2016/acs/acs5/groups.html>>.

## 2. WORKING WITH THE CENSUS DATA API

The U.S. Census Bureau has produced an API User Guide and organized a Webinar to help developers and researchers access and use the Census Data API to request data from Census Bureau data sets.<sup>18</sup> Key information from these resources is summarized below.

### API Key

Any user may query small quantities of data with minimal restrictions (up to 50 variables in a single query, and up to 500 queries per IP address per day). However, more than 500 queries per IP address per day requires that you register for an API key.

To request an API key:

- Go to <[www.census.gov/developers/](http://www.census.gov/developers/)>.

<sup>18</sup> U.S. Census Bureau, Developers, Census Data API User Guide, <[www.census.gov/data/developers/guidance/api-user-guide.html](http://www.census.gov/data/developers/guidance/api-user-guide.html)>; American Community Survey (ACS), Using the Census API with the American Community Survey Webinar, <[www.census.gov/data/academy/webinars/2019/api-acs.html](http://www.census.gov/data/academy/webinars/2019/api-acs.html)>.

- Click on the Request a KEY box on the left side of the page.
- Fill out the form: <[https://api.census.gov/data/key\\_signup.html](https://api.census.gov/data/key_signup.html)>.
- You will receive an email with your key code and activation instructions in the message.

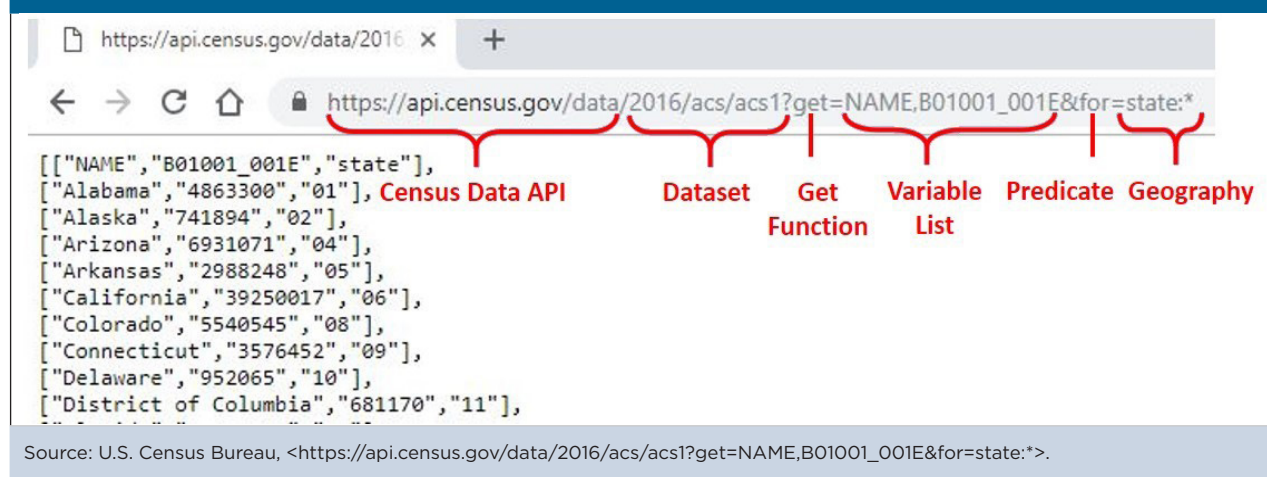
Once you have an API key, you can extract information from Census Bureau data sets using a variety of tools including JSON, R, Python, or even by typing a query string into the URL of a Web browser.<sup>19</sup>

### Components of an API Query

Each API call, or query, requires a series of components to function properly. Figure 2.1 provides an example of an API call and its components.

<sup>19</sup> Users may not be able to view the results from API queries in all Web browsers, but Firefox and Chrome provide this functionality.

Figure 2.1. Results of Query for Total Population by State: 2016



With the API, you access only the variables and geographic areas that you need. In the query above:

- The “Census Data API” specifies the API that is being used to access the data.
- The “Dataset” specifies the data source is the 2016 ACS 1-Year Detailed Tables.
- The “Get Function” (get=) specifies the variable(s) you are requesting the API to give you.
- The “Variable List” includes the variable(s) you are requesting. You can include up to 50 variables in a single API query (separated by commas). In this data set, the variable called NAME provides the name of the geographic area(s) that you are using to limit your search.
- The “Predicate” clause specifies how variables should be filtered or limited (for example, for certain geographic areas).
- “Geography” specifies the geographic area(s) of interest.

## Understanding Variable Names

Each variable in a data set has a name, which may have meaning on its own (for example, TRACT for census tract, or NAME for geographic area name) or may be an alpha-numeric identifier. In the American Community Survey (ACS), many of the variable names are alpha-numeric, such as B01003\_001E, which is the Total Population. The “Variable List” column on the Census API Datasets Web page provides links to all the variables in each data set.<sup>20</sup>

The first letter in an ACS variable’s name indicates the table type. For example, a “B” at the beginning of a name indicates that data are from a “base” table and “C” is for a collapsed table. The collapsed tables cover the same topics as the base tables, but with fewer details.<sup>21</sup>

The next five digits in an ACS variable name refer to the rest of the summary table identifier (ID). The first two digits are a subject identifier and the next three

are a sequential number. Tables beginning with “01,” for example, are for age and sex, “08” tables are commuting (journey to work) and place of work.<sup>22</sup> The next three digits reflect the table number within a subject.

Some variables end in “A” through “I,” which tells you that the corresponding ACS table provides characteristics that are repeated for different race and Hispanic origin groups. For example, table numbers ending in a “C” are for American Indian and Alaska Native Alone populations. Table numbers with an “H” suffix are for non-Hispanic White populations. For example, Table B01001H is Sex by Age (White Alone, Not Hispanic or Latino).

Other tables end in “PR,” which tells you that the data came from the Puerto Rico Community Survey instead of the ACS. These Puerto Rico-specific tables exist because the wording of the Puerto Rico Community Survey questionnaire for some subjects differs slightly from the ACS questionnaire.

The six-character table ID is followed by an underscore and three more digits. Those three digits refer to the line number within a table. For example, “001” may refer to the total, “002” may refer to males, and so on.

Finally, the last character in an ACS variable is an alphabetical suffix (E, M, PE, or PM).

- “E” refers to a numeric representation of the ACS estimate.
- “M” refers to a numeric representation of the margin of error.
- “PE” refers to an estimate representing a percent of the total.
- “PM” refers to the margin of error for a percentage.

In some data sets, users may also see variables ending with “EA,” “MA,” “PEA,” “PMA,” or “SS.” These suffixes are special annotations used to communicate information about estimates, margins of error, or statistical significance. For example, “SS” refers to “Statistical Significance” and is only included in the Comparison Profile tables. When extracting data for ACS estimates or margins of error, it is important to also extract the data for any special annotations.

<sup>20</sup> U.S. Census Bureau, Census API: Datasets in /data and its descendants, <<https://api.census.gov/data.html>>.

<sup>21</sup> Detailed information about ACS table IDs is available on the Census Bureau’s Table IDs Explained Web page at <[www.census.gov/programs-surveys/acs/guidance/which-data-tool/table-ids-explained.html](https://www.census.gov/programs-surveys/acs/guidance/which-data-tool/table-ids-explained.html)>.

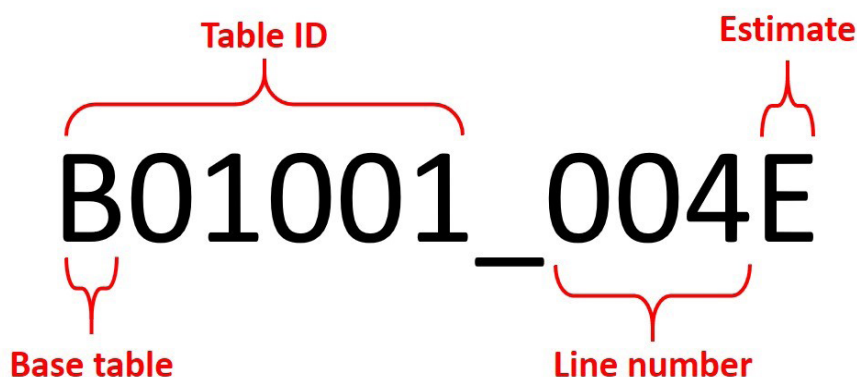
<sup>22</sup> Data Profiles, Narrative Profiles, Comparison Profiles, and Selected Population Profiles cover multiple topics, so they do not have any characters to indicate a subject.

Suppose you needed an estimate of the male population aged 5 to 9. Those data are located in Table B01001: Sex by Age. Data for males aged 5 to 9 appear within that table on line 4. Finally, estimates are designated by an “E.” Thus, the variable string to include in your API query would be B01001\_004E (see Figure 2.2).

For more information about variable formats, types, and annotations, see the Census Bureau’s Notes on ACS 5-Year Data.<sup>23</sup>

<sup>23</sup> U.S. Census Bureau, Developers, Notes on ACS 5-Year Data, <[www.census.gov/data/developers/data-sets/acs-5year/data-notes.html](http://www.census.gov/data/developers/data-sets/acs-5year/data-notes.html)>.

Figure 2.2. Understanding the Components of a Variable Name



#### SEX BY AGE

Survey/Program: American Community Survey Universe: Total population Year: 2016 Estimate: 1-Year TableID: **B01001**

Table B01001, Line Number 4, Estimate = B01001\_004E

[RESTORE TABLE LAYOUT](#) [CHANGE TABLE LAYOUT](#)

	United States	
	Estimate	Margin of Error
1 Total:	323,127,515	*****
2 Male:	159,061,631	+/-26,978
3 Under 5 years	10,130,841	+/-16,406
4 5 to 9 years	10,487,494	+/-39,583
5 10 to 14 years	10,579,748	+/-40,352
6 15 to 17 years	6,480,400	+/-14,693
7 18 and 19 years	4,511,323	+/-21,516
8 20 years	2,355,103	+/-25,093

Source: U.S. Census Bureau, [data.census.gov](http://data.census.gov), <<https://data.census.gov/>>.

## Filtering Geography

In an API query, you can use a “predicate” to filter your ACS results by geography:

- The “for” predicate (&for) restricts the variables by geography at various levels.
- The “in” predicate (&in) restricts the geographic scope and can be used in combination with a “+” sign to further specify a geographic area of interest.

An asterisk can be included as a wildcard to search for all the values of a geographic area or a string variable; however, you cannot build a predicate with wildcards for numeric variables. Table 2.1 provides several

examples of predicates of geography you can use when building your queries.

Every query must include a geography. The Census Data API supports Federal Information Processing Series (FIPS) codes and Geographic Names Information System (GNIS) codes. You may look up codes for certain geographic areas on the Census Bureau’s Geography Web page.<sup>24</sup> You can also easily find specific codes by using the wildcard with a geographic level of interest in the API.

<sup>24</sup> U.S. Census Bureau, Geography, American National Standards Institute (ANSI) Codes, <[www.census.gov/library/reference/code-lists/ansi.html](http://www.census.gov/library/reference/code-lists/ansi.html)>.

Table 2.1. Examples of Predicates for Geography

Predicate	Action
&for=state:*	Retrieves the result for all states.
&for=state:01	Restricts the result to include only Alabama (state code = 01).
&for=county:*&in=state:01	Restricts the result to include all counties in Alabama.
&for=county:001&in=state:01	Restricts the result to include only Autauga County (County: 001), Alabama.
&for=county (or part):*&in=state:01+place:62328	Restricts the result to include all counties (or portions of counties) within Prattville city (Place: 62328), Alabama.
&for=county (or part):073&in=state:01+place:07000	Restricts the result to include the portion of Jefferson County (County:073), Alabama that is within Birmingham city (Place:07000).

Source: U.S. Census Bureau.



For example, to retrieve data from Table B01001\_001E (total population) for all states, use the following string:

`<https://api.census.gov/data/2016/acs/acs1?get=NAME,B01001_001E&for=state:*>`

The results of this query are displayed in Figure 2.3.

Figure 2.3. Results of Query for Total Population by State: 2016



The results shown in Figure 2.3 are in JavaScript Object Notation (JSON) format. JSON, like XML, is a simple format for exchanging data between platforms using human-readable language. In order to return results in a concise manner, the Census Bureau uses a nonstandard, streamlined version of JSON:

- Data are represented in a two-dimensional array.
- Square brackets [ ] hold arrays.

- Values are separated by commas (,).
- The first line of data contains the variable names.
- Each subsequent line of data is a record for a given geography.

Data users familiar with JSON can convert results into a standard JSON format using the following code snippet:

```
``js
let standardJSON =
<fetch stats async with promise>
.then(data => {
  let labels = data[0].map(datum => datum.toUpperCase());
  let rows = data.slice(1);
  let objArray = rows.map(row => { return Object.assign(
    {},
    ...labels.map((key, idx) => ({ [key]: row[idx] })))
  });
});
```

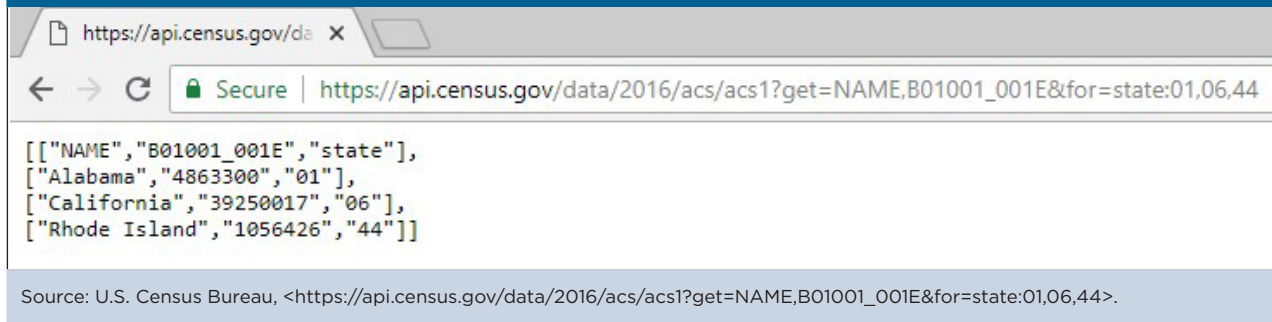


To query 2016 total population only for Alabama (01), California (06), and Rhode Island (44), we could use the following string:

```
<https://api.census.gov/data/2016/acs/acs1?get=NAME,B01001_001E&for=state:01,06,44>.
```

In this example, the predicate “for” is used to limit the search to Alabama (state code = 01), California (state code = 06), and Rhode Island (state code = 44). (See Figure 2.4).

Figure 2.4. Results of Query for Total Population of Selected States: 2016



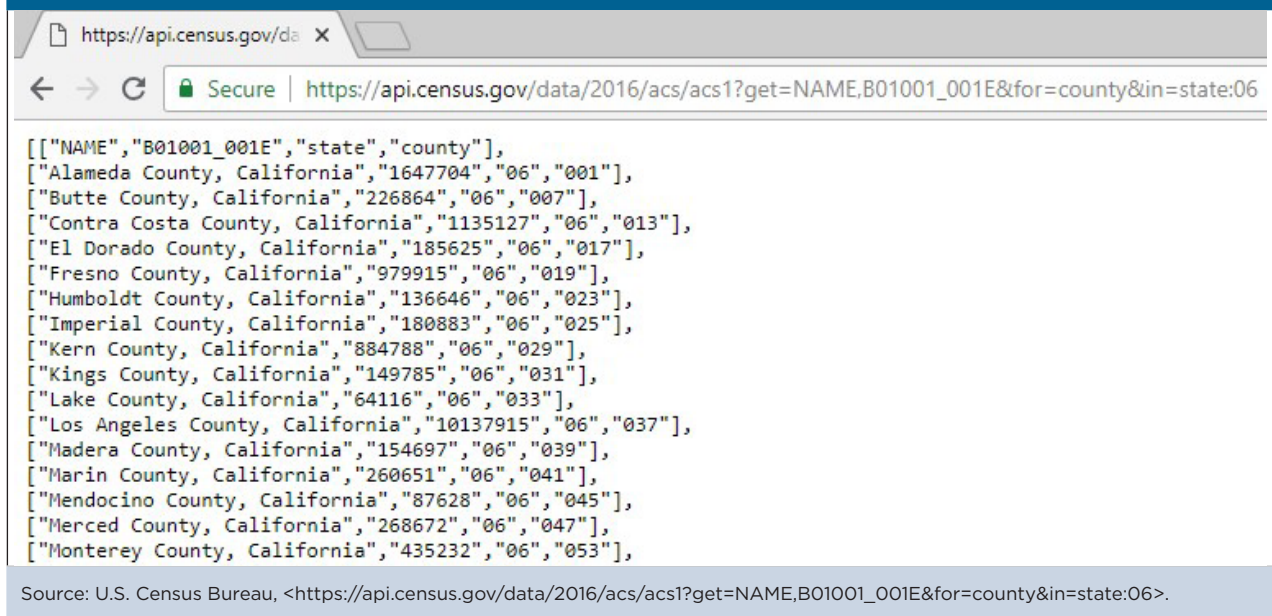
To query 2016 total population for counties included in the 2016 ACS 1-year data set for California (06), we could use the following string:

```
<https://api.census.gov/data/2016/acs/acs1?get=NAME,B01001_001E&for=county&in=state:06>.
```

Note that certain predicates will result in an error (“unknown/unsupported geography hierarchy”) if the specified geographic area is not available in the data set. For example, estimates for small geographic areas with fewer than 20,000 people are only available through the ACS 5-year data.

The predicate “for” limits the search to counties, and the “in” term limits the search to California (&in=state:06). (See Figure 2.5).

Figure 2.5. Results of Query for Total Population of Counties in California: 2016



You can include up to 50 variables in a single API query, but it is possible to query more than 50 variables with a single call using the “groups” function. For example, to query all elements from Table B01001 (Sex by Age, for the United States) from the 2016 ACS 1-year data, you would use the following string:

That query returns all elements of the Sex by Age Table, with variable names in the first line and data in subsequent lines (see Figure 2.6).

<sup>25</sup> U.S. Census Bureau, Developers, Groups Functionality-Pull more than 50 variables with 1 call, <[www.census.gov/data/developers/updates/groups-functionality.html](http://www.census.gov/data/developers/updates/groups-functionality.html)>.

https://api.census.gov/data/2016/acs/acs1?get=group(B01001)&for=us:\*

```
[["B01001_001E", "B01001_001M", "B01001_002E", "B01001_002M", "B01001_003E", "B01001_003M", "B01001_004E", "B01001_004M", "B01001_005E", "B01001_005M", "B01001_006E", "B01001_006M", "B01001_007E", "B01001_007M", "B01001_008E", "B01001_008M", "B01001_009E", "B01001_009M", "B01001_010E", "B01001_010M", "B01001_011E", "B01001_011M", "B01001_012E", "B01001_012M", "B01001_013E", "B01001_013M", "B01001_014E", "B01001_014M", "B01001_015E", "B01001_015M", "B01001_016E", "B01001_016M", "B01001_017E", "B01001_017M", "B01001_018E", "B01001_018M", "B01001_019E", "B01001_019M", "B01001_020E", "B01001_020M", "B01001_021E", "B01001_021M", "B01001_022E", "B01001_022M", "B01001_023E", "B01001_023M", "B01001_024E", "B01001_024M", "B01001_025E", "B01001_025M", "B01001_026E", "B01001_026M", "B01001_027E", "B01001_027M", "B01001_028E", "B01001_028M", "B01001_029E", "B01001_029M", "B01001_030E", "B01001_030M", "B01001_031E", "B01001_031M", "B01001_032E", "B01001_032M", "B01001_033E", "B01001_033M", "B01001_034E", "B01001_034M", "B01001_035E", "B01001_035M", "B01001_036E", "B01001_036M", "B01001_037E", "B01001_037M", "B01001_038E", "B01001_038M", "B01001_039E", "B01001_039M", "B01001_040E", "B01001_040M", "B01001_041E", "B01001_041M", "B01001_042E", "B01001_042M", "B01001_043E", "B01001_043M", "B01001_044E", "B01001_044M", "B01001_045E", "B01001_045M", "B01001_046E", "B01001_046M", "B01001_047E", "B01001_047M", "B01001_048E", "B01001_048M", "B01001_049E", "B01001_049M", "B01001_050E", "B01001_050M", "B01001_001A", "B01001_001M", "B01001_002M", "B01001_002EA", "B01001_002MA", "B01001_003M", "B01001_003EA", "B01001_003MA", "B01001_004M", "B01001_004EA", "B01001_004MA", "B01001_005M", "B01001_005EA", "B01001_005MA", "B01001_006M", "B01001_006EA", "B01001_006MA", "B01001_007M", "B01001_007EA", "B01001_007MA", "B01001_008M", "B01001_008EA", "B01001_008MA", "B01001_009M", "B01001_009EA", "B01001_009MA", "B01001_010M", "B01001_010EA", "B01001_010MA", "B01001_011M", "B01001_011EA", "B01001_011MA", "B01001_012M", "B01001_012EA", "B01001_012MA", "B01001_013M", "B01001_013EA", "B01001_013MA", "B01001_014M", "B01001_014EA", "B01001_014MA", "B01001_015M", "B01001_015EA", "B01001_015MA", "B01001_016M", "B01001_016EA", "B01001_016MA", "B01001_017M", "B01001_017EA", "B01001_017MA", "B01001_018M", "B01001_018EA", "B01001_018MA", "B01001_019M", "B01001_019EA", "B01001_019MA", "B01001_020M", "B01001_020EA", "B01001_020MA", "B01001_021M", "B01001_021EA", "B01001_021MA", "B01001_022M", "B01001_022EA", "B01001_022MA", "B01001_023M", "B01001_023EA", "B01001_023MA", "B01001_024M", "B01001_024EA", "B01001_024MA", "B01001_025M", "B01001_025EA", "B01001_025MA", "B01001_026M", "B01001_026EA", "B01001_026MA", "B01001_027M", "B01001_027EA", "B01001_027MA", "B01001_028M", "B01001_028EA", "B01001_028MA", "B01001_029M", "B01001_029EA", "B01001_029MA", "B01001_030M", "B01001_030EA", "B01001_030MA", "B01001_031M", "B01001_031EA", "B01001_031MA", "B01001_032M", "B01001_032EA", "B01001_032MA", "B01001_033M", "B01001_033EA", "B01001_033MA", "B01001_034M", "B01001_034EA", "B01001_034MA", "B01001_035M", "B01001_035EA", "B01001_035MA", "B01001_036M", "B01001_036EA", "B01001_036MA", "B01001_037M", "B01001_037EA", "B01001_037MA", "B01001_038M", "B01001_038EA", "B01001_038MA", "B01001_039M", "B01001_039EA", "B01001_039MA", "B01001_040M", "B01001_040EA", "B01001_040MA", "B01001_041M", "B01001_041EA", "B01001_041MA", "B01001_042M", "B01001_042EA", "B01001_042MA", "B01001_043M", "B01001_043EA", "B01001_043MA", "B01001_044M", "B01001_044EA", "B01001_044MA", "B01001_045M", "B01001_045EA", "B01001_045MA", "B01001_046M", "B01001_046EA", "B01001_046MA", "B01001_047M", "B01001_047EA", "B01001_047MA", "B01001_048M", "B01001_048EA", "B01001_048MA", "B01001_049M", "B01001_049EA", "B01001_049MA", "us"]], ["323127515", "555555555", "159061631", "26978", "10130841", "16406", "10487494", "39583", "10579748", "40352", "6480400", "14693", "4511323", "21516", "2355103", "25093", "2318893", "32204", "6731345", "36177", "11496946", "18544", "10901776", "18541", "10377670", "37412", "9837971", "36901", "10375001", "15006", "10726369", "16428", "10557089", "34982", "3971452", "31470", "5461772", "27670", "3301033", "20272", "4609409", "25477", "5498831", "28260", "3717778", "21953", "2460143", "17440", "2173244", "16718", "164065884", "26978", "9667713", "18409", "9995616", "39495", "10126049", "37510", "619882", "11402", "4430296", "22515", "2240006", "26412", "2162305", "24114", "6365021", "35524", "11191021", "16898", "10800505", "16178", "10472556", "36939", "9967395", "39630", "10562933", "15472", "11091287", "14543", "11157614", "36157", "4311444", "28305", "5999554", "33605", "3647935", "25134", "5198759", "29179", "6425841", "27427", "4649877", "30396", "3428939", "24123", "4103376", "28830", "55555555", null, "26978
```

## 12 Using the Census Data API With the American Community Survey

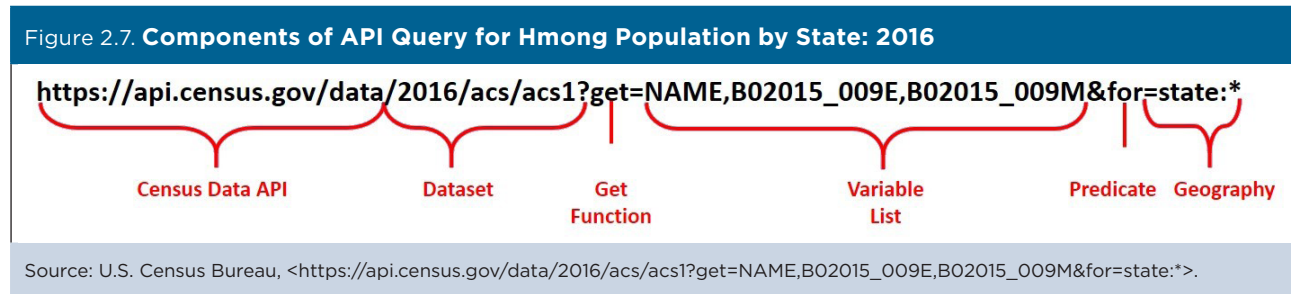


## Sample Query: Hmong Population by State

Suppose you needed information on the Hmong population living in each state. How would you use the Census Data API to get that information?

There are many ACS data sets available through the Census Data API. For this example, we focus on the ACS 1-Year Detailed Tables because we need state-level data for the most recent year.

Figure 2.7 provides an example of an API call and its components that could be used for this query.



Here are steps you can use to assemble the components of this query:

1. Start your query with the Census Data API Web address: "<https://api.census.gov/data>."
2. Add the data set year (2016) and name acronym for the 1-Year Detailed Tables, and follow this base URL with a question mark: "<https://api.census.gov/data/2016/acs/acs1?>"
3. Add variables starting with a get clause, "get=": "<https://api.census.gov/data/2016/acs/acs1?get=>"
4. Add the variable NAME, which provides the name of the geographic area(s) that you will use to limit your search: "<https://api.census.gov/data/2016/acs/acs1?get=NAME>."
5. Find your variable of interest (B02015\_009E) by searching for "Hmong" among the list of variables for the 2016 ACS 1-Year Detailed Tables.<sup>26</sup>
6. Use a comma to separate the NAME and B02015\_009E variables. Add an additional

variable, B02015\_009M, to get the margin of error:

"[https://api.census.gov/data/2016/acs/acs1?get=NAME,B02015\\_009E,B02015\\_009M](https://api.census.gov/data/2016/acs/acs1?get=NAME,B02015_009E,B02015_009M)."

7. Add geography using a predicate clause starting with an ampersand (&) to separate it from your "get" clause and then a "for=" to identify geographic areas of interest: "[https://api.census.gov/data/2016/acs/acs1?get=NAME,B02015\\_009E,B02015\\_009M&for=](https://api.census.gov/data/2016/acs/acs1?get=NAME,B02015_009E,B02015_009M&for=)"
8. Identify the geographic area(s) that you need (state) by reviewing the list of geographies available for the 2016 ACS 1-Year Detailed Tables.<sup>27</sup>
9. Because you need data for all the states, add an asterisk (after a colon) to get all state values: "[https://api.census.gov/data/2016/acs/acs1?get=NAME,B02015\\_009E,B02015\\_009M&for=state:\\*](https://api.census.gov/data/2016/acs/acs1?get=NAME,B02015_009E,B02015_009M&for=state:*)."

If you are using an API key, insert "&key=" followed by your key code at the end of your query.

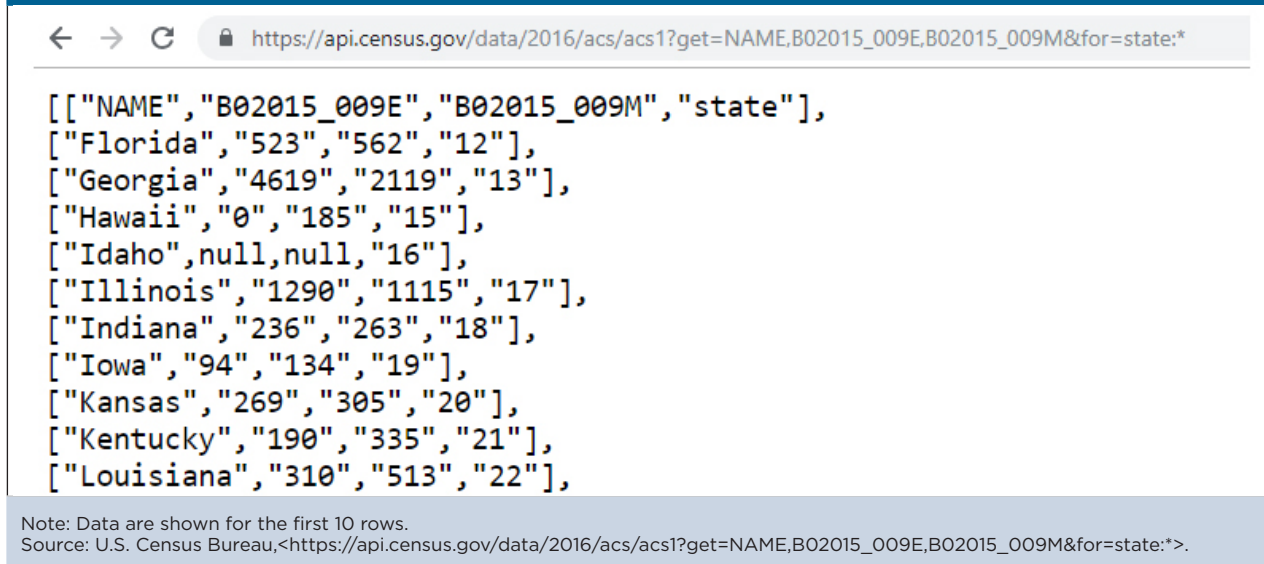
<sup>26</sup> U.S. Census Bureau, Census Data API: Variables in <<https://api.census.gov/data/2016/acs/acs1/variables.html>>.

<sup>27</sup> U.S. Census Bureau, <<https://api.census.gov/data/2016/acs/acs1/geography.html>>.

The results of the query are shown in Figure 2.8. In this figure, some of the data cells for Alaska and Delaware include “null” values. This means that there are no data available for a particular query.

If your query returns an error message with no data, check your spelling, capitalization, and spacing. Correct any errors and run the query again.

Figure 2.8. Results of API Query for the Hmong Population by State: 2016



## Getting Data for Detailed Population Groups

Suppose you also wanted to get information on the percentage of Hmong Americans with a bachelor's degree or higher. You could use the Selected Population Profile (SPP) data set to find this information for the nation and for states with relatively large populations of Hmong Americans.

The first step is to find a code that we can use to identify the Hmong subpopulation in the SPP data set. Here is a sample query:

```
<https://api.census.gov/data/2016/acs/acs1/spp
?get=S0201_0006E,POPGROUP,POPGROUP_
TTL,NAME&for=us:*>.
```

In this query:

- The “spp?” identifier is included to query results from the Selected Population Profile data set.
- S0201\_0006E is the variable for total population, POPGROUP is the code for the population group, and POPGROUP\_TTL is the name of the population group, as shown in the list of variables for the 2016 ACS 1-Year Selected Population Profile.<sup>28</sup>

By scrolling through the results of this query, we find that the POPGROUP code for the Hmong alone population is “020” (see Figure 2.9).

<sup>28</sup> U.S. Census Bureau, Census Data API: Variables in <<https://api.census.gov/data/2016/acs/acs1/spp/variables.html>>.

Figure 2.9. Results of API Query for Population Groups: 2016

```
[ "17556935", "012", "Asian alone (400-499)", "United States", "1" ],
[ "3813407", "013", "Asian Indian alone (400-401)", "United States", "1" ],
[ "175592", "014", "Bangladeshi alone (402)", "United States", "1" ],
[ "259554", "015", "Cambodian alone (405-409)", "United States", "1" ],
[ "4214856", "016", "Chinese alone (410-419)", "United States", "1" ],
[ "4048973", "017", "Chinese (except Taiwanese) alone (410-411)", "United States", "1" ],
[ "165883", "018", "Taiwanese alone (412-419)", "United States", "1" ],
[ "2811885", "019", "Filipino alone (420-421)", "United States", "1" ],
[ "278871", "020", "Hmong alone (422)", "United States", "1" ],
[ "76516", "021", "Indonesian alone (423-429)", "United States", "1" ],
[ "789830", "022", "Japanese alone (430-439)", "United States", "1" ],
[ "1438915", "023", "Korean alone (440-441)", "United States", "1" ],
[ "205131", "024", "Laotian alone (442)", "United States", "1" ],
[ "460515", "026", "Pakistani alone (445)", "United States", "1" ],
[ "202744", "028", "Thai alone (447-449)", "United States", "1" ],
[ "1803575", "029", "Vietnamese alone (450-459)", "United States", "1" ],
```

Note: Data are only displayed for selected rows.

Source: U.S. Census Bureau, <[https://api.census.gov/data/2016/acs/acs1/spp?get=S0201\\_0006E,POPGROUP,POPGROUP\\_TTL,NAME&for=us:\\*](https://api.census.gov/data/2016/acs/acs1/spp?get=S0201_0006E,POPGROUP,POPGROUP_TTL,NAME&for=us:*)>.

Now that we know the code for the Hmong population, we can get data on the share of Hmong Americans with a bachelor's degree or higher nationwide:

```
<https://api.census.gov/data/2016/acs/acs1/spp?get=S0201_0099E,POPGROUP,POPGROUP_TTL,NAME&for=us:*&POPGROUP=020>.
```

Here is a similar query for states:

```
<https://api.census.gov/data/2016/acs/acs1/spp?get=S0201_0099E,POPGROUP,POPGROUP_TTL,NAME&for=state:*&POPGROUP=020>.
```

The results from the U.S. query show that 18 percent of Hmong Americans aged 25 and older had a bachelor's degree or higher in 2016. Because of the relatively small Hmong population in many states, state-level SPP data on the Hmong population are only available for California and Minnesota (see Figure 2.10).

You can find other examples of queries for this data set by clicking the link in the "Examples" column on the API "datasets" page, which will take you to the examples page here: <https://api.census.gov/data/2016/acs/acs1/spp/examples.html>.

Figure 2.10. Results of API Query for the Share of Hmong Americans With a Bachelor's Degree or Higher: 2016

```
[["S0201_0090E","S0201_0099E","POPGROUP","POPGROUP_TTL","NAME","POPGROUP","state"],
["48883","17.1","020","Hmong alone (422)","California","020","06"],
["34573","19.4","020","Hmong alone (422)","Minnesota","020","27"]]
```

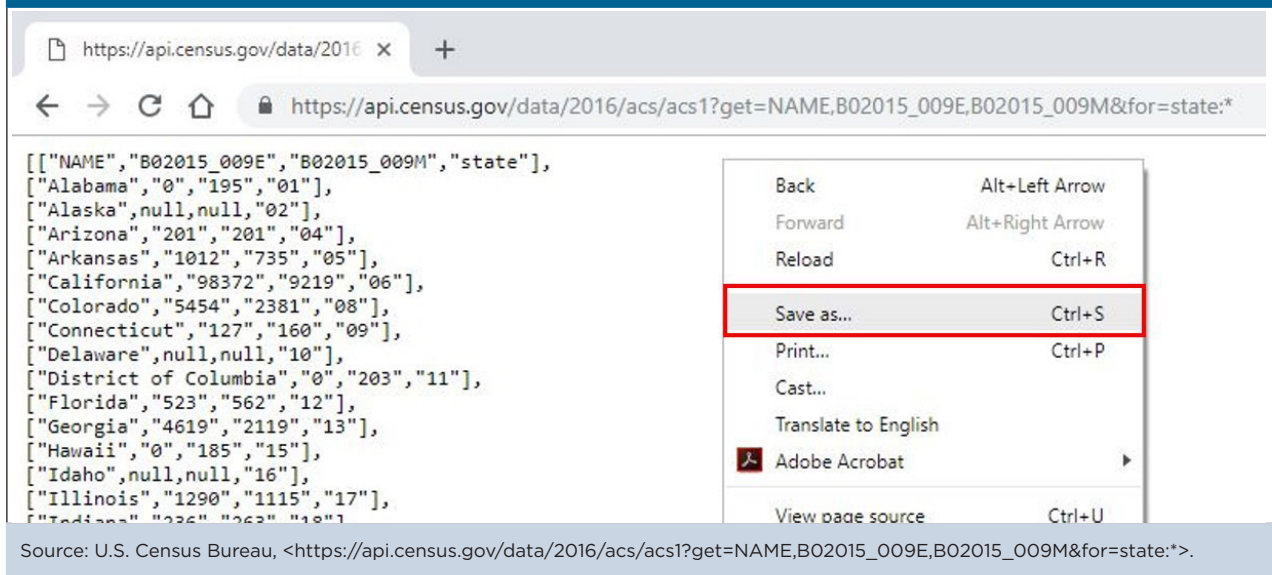
Source: U.S. Census Bureau, [https://api.census.gov/data/2016/acs/acs1/spp?get=S0201\\_0090E,S0201\\_0099E,POPGROUP,POPGROUP\\_TTL,NAME&for=state:\\*&POPGROUP=020](https://api.census.gov/data/2016/acs/acs1/spp?get=S0201_0090E,S0201_0099E,POPGROUP,POPGROUP_TTL,NAME&for=state:*&POPGROUP=020).

## Opening Query Results in a Spreadsheet

From your browser, you can save query results as a .csv file to work with the file in other programs. Here are the steps to open your query results in a spreadsheet:

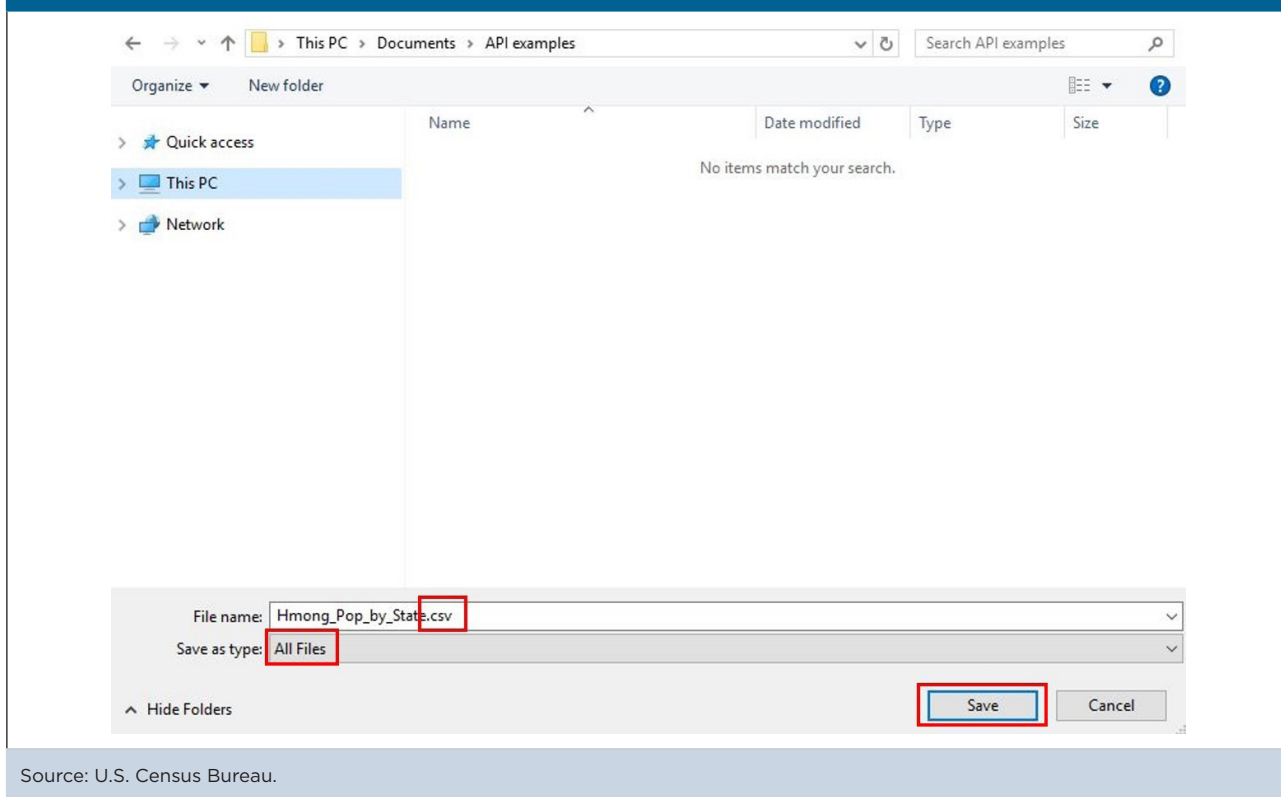
1. Right click on the page and select “Save As” (see Figure 2.11).

Figure 2.11. Saving the API Query Results

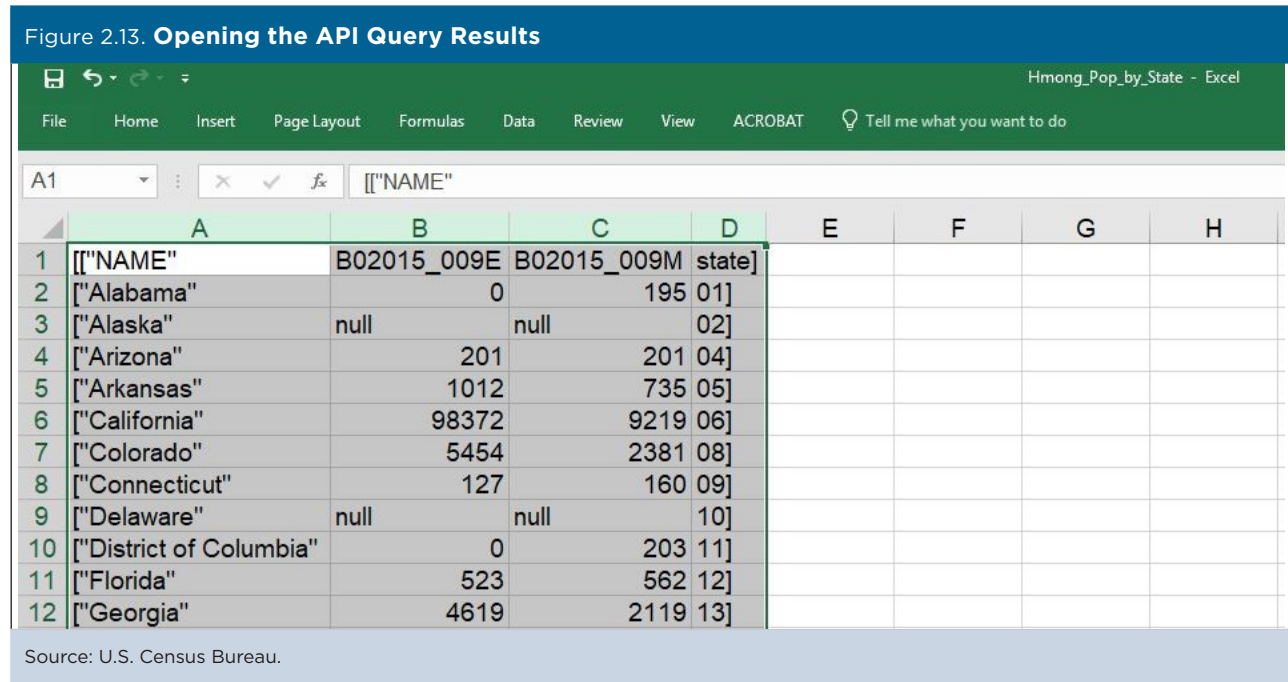


2. Save the page as a Comma-Separated Values (CSV) file by adding “.csv” at the end of the file name and selecting “All Files” as the file type (see Figure 2.12).

Figure 2.12. Saving the Results as a CSV File



- Open the CSV file in a spreadsheet for further analysis of the query results (see Figure 2.13).



The Census Bureau's Webinar on Using the Census API with the ACS provides more detail on how to open and manipulate your results in a spreadsheet.<sup>29</sup>

<sup>29</sup> U.S. Census Bureau, American Community Survey (ACS), Using the Census API with the American Community Survey Webinar, <[www.census.gov/programs-surveys/acs/guidance/training-presentations/acs-api.html](http://www.census.gov/programs-surveys/acs/guidance/training-presentations/acs-api.html)>.



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## 3. ADDITIONAL RESOURCES

### ***Understanding and Using American Community Survey Data: What All Data Users Need to Know***

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

This handbook provides an overview of the ACS to help data users understand the basics of the survey, how the data can be used, how to judge the accuracy of ACS estimates, and how to access ACS data.

### ***Census Data API User Guide***

<[www.census.gov/data/developers/guidance/api-user-guide/Overview.html](http://www.census.gov/data/developers/guidance/api-user-guide/Overview.html)>

The purpose of this user guide is to instruct developers and researchers on how to use the Census Data Application Programming Interface (API) to request data from Census Bureau data sets.

### ***Webinar: Using the Census API with the American Community Survey***

<[www.census.gov/data/academy/webinars/2019/api-acs.html](http://www.census.gov/data/academy/webinars/2019/api-acs.html)>

In this Webinar, Census Bureau staff discuss how to access the API, identify ACS variables and geographies to build queries, and locate additional resources.

### ***API Forums***

<<https://gitter.im/uscensusbureau/home>>  
<<https://uscensusbureau.slack.com/messages/C6E9GR962/>>

These Web sites provide forums for developers to share information related to the Census Bureau's API.

### ***App Gallery***

<[www.census.gov/data/developers/app-gallery.html](http://www.census.gov/data/developers/app-gallery.html)>

This Web page highlights a mix of Census Bureau and third-party applications built using the Census Bureau API.

### ***Geography and ACS***

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

This Web page includes information about changes in geographic boundaries in the ACS, key concepts and definitions, and reference maps.