

### 3. ACCESSING AND MAPPING ACS DATA

Data.census.gov is the Census Bureau’s primary tool for accessing population, housing, and economic data from the American Community Survey (ACS), the Puerto Rico Community Survey, the decennial census, and many other Census Bureau data sets.

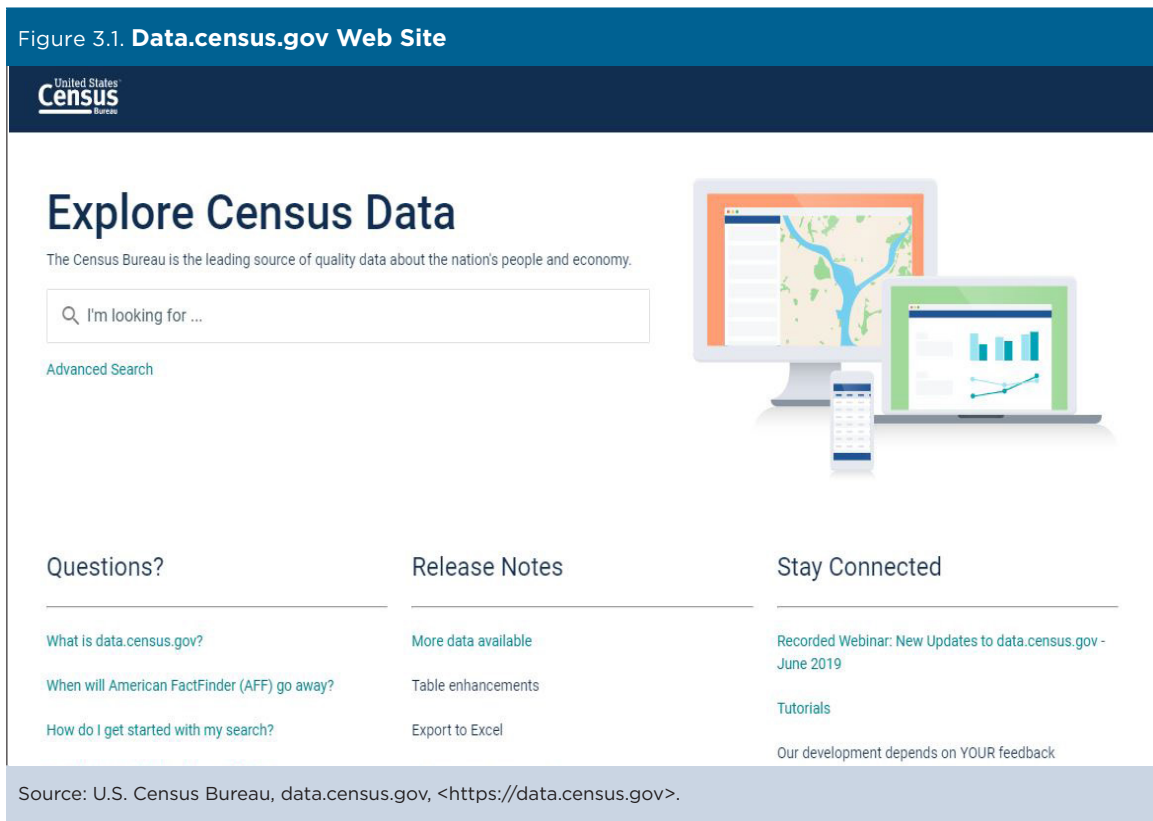
Data.census.gov provides access to ACS data for a wide range of geographic areas, including states, cities, counties, census tracts, and block groups. For more information about data.census.gov, view the Census Bureau’s release notes and answers to frequently asked questions about the site.<sup>16</sup>

Other specialized tools, such as My Congressional District and Census Business Builder, provide users with quick and easy access to statistics for particular geographic areas and topics.<sup>17</sup> More advanced users also have several options to access more detailed ACS data through the downloadable Summary File, the Public Use Microdata Sample (PUMS) files, or the Census Bureau’s Application Programming Interface (API).<sup>18</sup>

<sup>16</sup> U.S. Census Bureau, Data.census.gov: Census Bureau’s New Data Dissemination Platform Frequently Asked Questions and Release Notes, <<https://data.census.gov/assets/releases/notes/faqs-release-notes.pdf>>.

<sup>17</sup> U.S. Census Bureau, My Congressional District, <[www.census.gov/mycd/](http://www.census.gov/mycd/)>; Census Business Builder (CBB), <[www.census.gov/data/data-tools/cbb.html](http://www.census.gov/data/data-tools/cbb.html)>.

<sup>18</sup> U.S. Census Bureau, American Community Survey (ACS), Summary File Data, <[www.census.gov/programs-surveys/acs/data/summary-file.html](http://www.census.gov/programs-surveys/acs/data/summary-file.html)>; American Community Survey (ACS), PUMS Data, <[www.census.gov/programs-surveys/acs/data/pums.html](http://www.census.gov/programs-surveys/acs/data/pums.html)>; Developers, <[www.census.gov/developers/](http://www.census.gov/developers/)>.



---

## Topologically Integrated Geographic Encoding and Referencing (TIGER) Data and Products

If you need to combine ACS estimates with spatial data, the TIGER products are a good place to start. TIGER products are spatial extracts from the Census Bureau's Master Address File (MAF)/TIGER database (MTDB), designed for use with GIS (geographic information science/system) software. The data contain features, such as roads, railroads, and rivers, as well as legal and statistical geographic areas.<sup>19</sup>

TIGER products include the following:

- TIGERweb is a Web-based system that allows users to visualize TIGER data in several ways such as viewing spatial data online or streaming to mapping applications.
- TIGER/Line with Selected Demographic and Economic Data are geodatabases (or shapefiles, for some 2010 Census data) joined with selected attributes (including population and housing unit counts, demographic characteristics, such as sex by age, and socio-economic characteristics such as poverty) from the 2010 Census, 2006–2010 through current ACS 5-year estimates, and County Business Patterns for selected geographic areas.

---

<sup>19</sup> U.S. Census Bureau, Geography Program, TIGER Data Products Guide, <[www.census.gov/programs-surveys/geography/guidance/tiger-data-products-guide.html](http://www.census.gov/programs-surveys/geography/guidance/tiger-data-products-guide.html)>.

- TIGER/Line Shapefiles provide legal boundaries, roads, address ranges, water features, and more.<sup>20</sup> These files do not include demographic information but can be linked to data from demographic tables using the GEOID.
- TIGER/Line Geodatabases are spatial extracts from the Census Bureau's MTDB. The geodatabases contain national coverage (for geographic boundaries or features) or state coverage (boundaries within state). These files do not include demographic data, but they contain GEOIDs that can be linked to the Census Bureau's demographic data.
- Cartographic Boundary Shapefiles are small scale (limited detail) mapping projects clipped to shoreline. These files are designed for thematic mapping using GIS and are available for a limited set of geographic types.
- Keyhole Markup Language—Cartographic Boundary Files are simplified representations of selected geographic areas from the Census Bureau's MAF/TIGER system. These boundary files are specifically designed for small-scale thematic mapping using an online tool such as Google Earth or Google Maps.

The Census Bureau produced a brochure that describes several of these products in more detail.<sup>21</sup>

---

<sup>20</sup> U.S. Census Bureau, Census Blogs, *Understanding Census Bureau Address Ranges*, <[www.census.gov/newsroom/blogs/research-matters/2016/04/understanding-census-bureau-address-ranges.html](http://www.census.gov/newsroom/blogs/research-matters/2016/04/understanding-census-bureau-address-ranges.html)>.

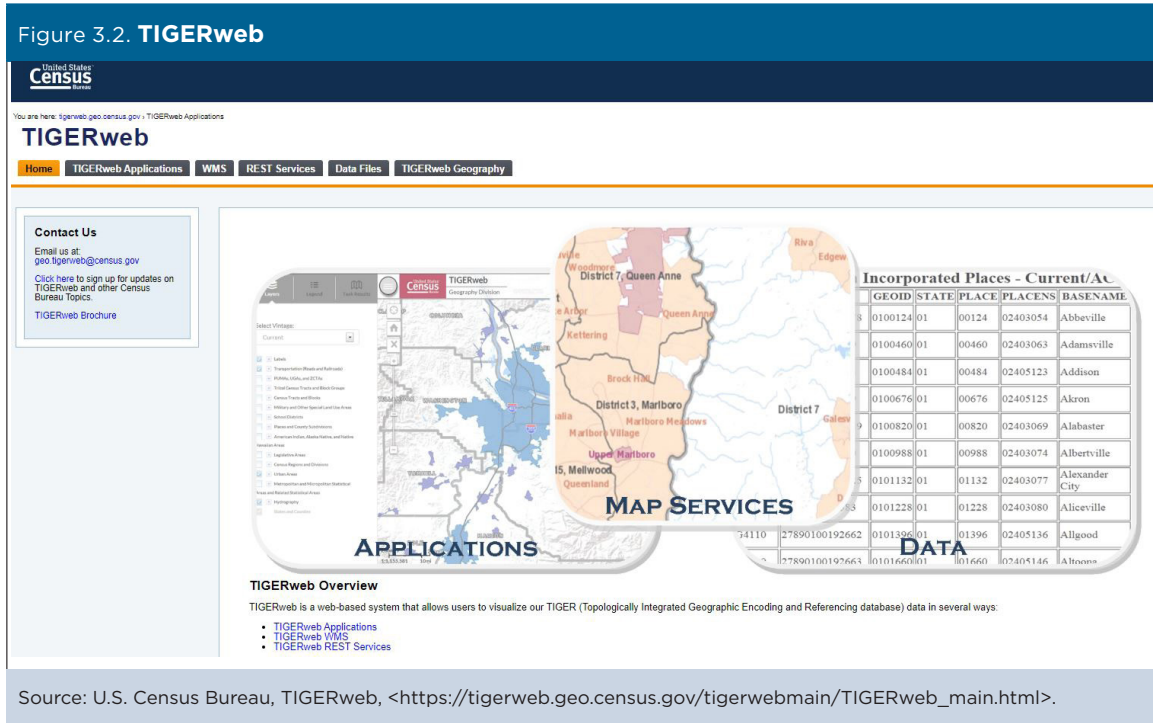
<sup>21</sup> U.S. Census Bureau, Geography Program, TIGER Products Brochure, <[www.census.gov/programs-surveys/geography/about/training/brochures.html](http://www.census.gov/programs-surveys/geography/about/training/brochures.html)>.

## Working With TIGERweb

TIGERweb applications allow users to select features and view their attributes, search for features by name or GEOID, and identify features by selecting them from

a map (see Figure 3.2).<sup>22</sup> The TIGERweb and TIGERweb Decennial applications provide a simple way to view TIGER data without GIS software and without downloading data.

<sup>22</sup> U.S. Census Bureau, TIGERweb, <[https://tigerweb.geo.census.gov/tigerwebmain/TIGERweb\\_main.html](https://tigerweb.geo.census.gov/tigerwebmain/TIGERweb_main.html)>.



Data users can visualize geographic boundaries, such as PUMAs, using the TIGERweb online application.<sup>23</sup>

- Go to the TIGERweb Web site at <<https://tigerweb.geo.census.gov/tigerweb/>>.
- Use the Zoom In feature on the map—by clicking on the individual plus sign or using the slide bar—to display a geographic area of interest.
- Then use the “Layers” menu to select “2010 Census Public Use Microdata Areas.” Figure 3.3 shows a

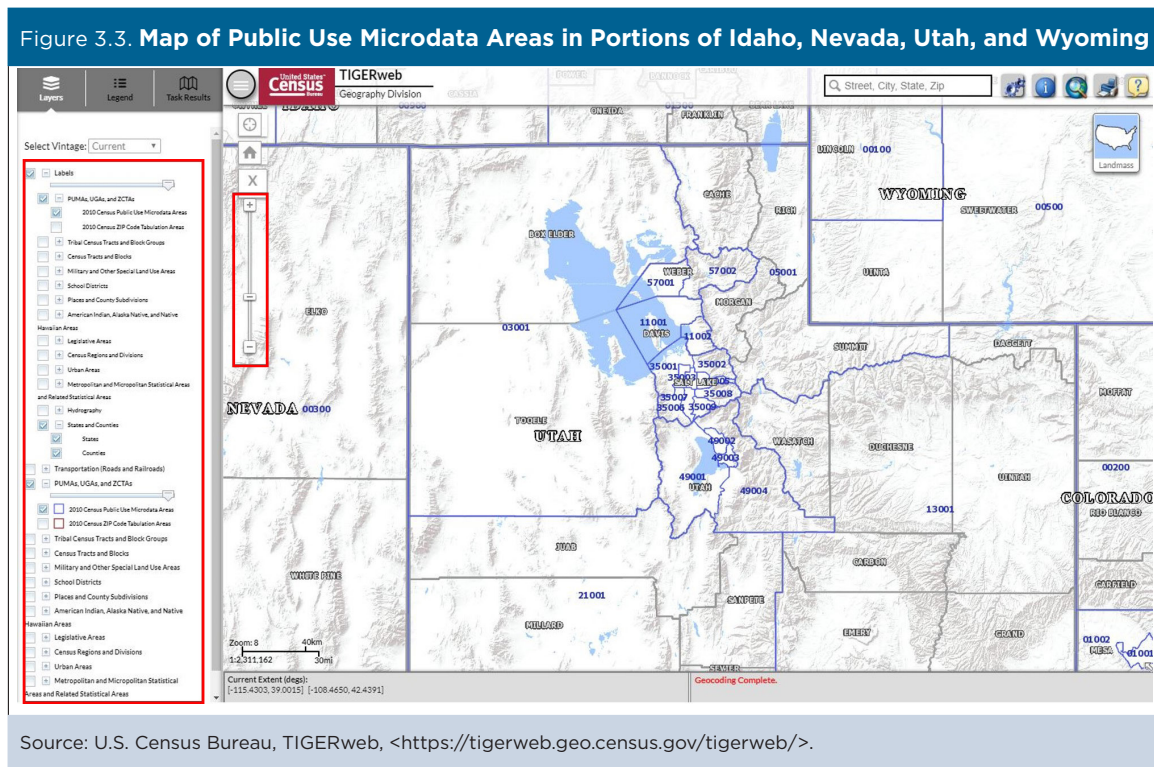
<sup>23</sup> Ibid.

TIGERweb map of PUMA boundaries in portions of Utah and other states in the Mountain West.

The TIGERweb WMS and TIGERweb REST Services allow users to integrate Census Bureau data into their own GIS or custom Web-based applications.

For more information about using TIGERweb, see the TIGERweb User Guide.<sup>24</sup>

<sup>24</sup> U.S. Census Bureau, TIGERweb User Guide, <[https://tigerweb.geo.census.gov/tigerwebmain/TIGERweb\\_apps.html](https://tigerweb.geo.census.gov/tigerwebmain/TIGERweb_apps.html)>.



## Working With TIGER/Line Geodatabases

The Census Bureau's TIGER/Line Geodatabase files provide access to ACS 5-year estimates that have been joined with frequently used geographic areas ranging from block groups to states. These prejoined geodatabases include thousands of variables such as age, ancestry, citizenship, disability, educational attainment, family structure, geographic mobility, household structure, housing (counts and characteristics), income, journey to work, language, marital status, nativity, occupation, poverty, race/ethnicity, school enrollment, and variables for a number of additional topics. Many of these variables are provided with cross tabulations by age, sex, or race/ethnicity.

Here are the steps to download TIGER/Line Geodatabases:

- Begin at the “TIGER/Line with Selected Demographic and Economic Data,” page: [www.census.gov/geographies/mapping-files/time-series/geo/tiger-data.html](http://www.census.gov/geographies/mapping-files/time-series/geo/tiger-data.html).
- Click on the tab corresponding to your data year of interest to view the list of available downloads (see Figure 3.4).
- From that list, select a geographic area of interest and download the file to your workspace.
- Open ArcMap (or other geospatial software) and select the “Add Data” option. Navigate to the geodatabase you downloaded. This will open a list of data items available to add to map. (You can use CTRL + Select to add more than one data item from the geodatabase.)
- Once you have added the data, you can join data to polygons using the GEOID field.

Figure 3.4. TIGER/Line With Selected Demographic and Economic Data

The screenshot shows the U.S. Census Bureau website interface. At the top is the 'United States Census Bureau' logo and a search bar. Below the logo is a navigation menu with options: BROWSE BY TOPIC, EXPLORE DATA, LIBRARY, SURVEYS/ PROGRAMS, INFORMATION FOR..., FIND A CODE, and ABOUT US. The main content area is titled 'Geographies' and features a sidebar with 'Mapping Files', 'Mapping Tools', 'Reference Files', and 'Reference Maps'. The main heading is 'TIGER/Line with Selected Demographic and Economic Data'. Below this is a description: 'A limited set of TIGER/Line Shapefiles are available pre-joined with data in geodatabase and shapefile format.' and 'American Community Survey 5-Year Estimates – Geodatabase Format'. A year selector shows '2016' selected, with other years (2015, 2014, 2013, 2012, 2011, 2010) visible. Below the year selector is the heading '2016' and '2012 - 2016 Detailed Tables'. A paragraph explains: 'These geodatabases bring together geography from the 2016 TIGER/Line Shapefiles and data from the 2012-2016 American Community Survey (ACS) 5-year estimates.' There is a link to 'Download these files from the FTP archive' and a section for 'Download the Geodatabases' with a file listing: 'American Indian/Alaska Native/Native Hawaiian Area [22.2 MB]'. On the right side, there is a 'Related Information' section with links to 'TECHNICAL DOCUMENTATION', 'TIGER/Line with Selected Demographic and Economic Data Record Layouts', 'TIGER/Line Shapefiles and TIGER/Line Files Technical Documentation', and 'Summary File Documentation'.

Source: U.S. Census Bureau, Geographies, TIGER/Line with Selected Demographic and Economic Data, [www.census.gov/geographies/mapping-files/time-series/geo/tiger-data.html](http://www.census.gov/geographies/mapping-files/time-series/geo/tiger-data.html).

In each geodatabase is a metadata table with a short name and a full description of each data element (see Figure 3.5). Metadata for each geodatabase are published in text online, or you can open your GIS software tool (for example, ArcCatalog) and review metadata there.<sup>25</sup> In geodatabases, as with many other

downloadable ACS data products, joined variables from data tables are short names beginning with a letter. The short names in the metadata file correspond to the data element field headings in the detailed tables of each geodatabase.

<sup>25</sup> U.S. Census Bureau, Geography Program, TIGER/Line with Selected Demographic and Economic Data Record Layouts, <[www.census.gov/programs-surveys/geography/technical-documentation/records-layout/tiger-line-demo-record-layouts.html](http://www.census.gov/programs-surveys/geography/technical-documentation/records-layout/tiger-line-demo-record-layouts.html)>.

**Figure 3.5. Metadata Example for County Geodatabase**

Short_Name	Full_Name
B00001e1	UNWEIGHTED SAMPLE COUNT OF THE POPULATION: Total: Total population -- (Estimate)
B00001m1	UNWEIGHTED SAMPLE COUNT OF THE POPULATION: Total: Total population -- (Margin of Error)
B00002e1	UNWEIGHTED SAMPLE HOUSING UNITS: Total: Housing units -- (Estimate)
B00002m1	UNWEIGHTED SAMPLE HOUSING UNITS: Total: Housing units -- (Margin of Error)
B01001e1	SEX BY AGE: Total: Total population -- (Estimate)
B01001m1	SEX BY AGE: Total: Total population -- (Margin of Error)
B01001e2	SEX BY AGE: Male: Total population -- (Estimate)
B01001m2	SEX BY AGE: Male: Total population -- (Margin of Error)
B01001e3	SEX BY AGE: Male: Under 5 years: Total population -- (Estimate)
B01001m3	SEX BY AGE: Male: Under 5 years: Total population -- (Margin of Error)
B01001e4	SEX BY AGE: Male: 5 to 9 years: Total population -- (Estimate)
B01001m4	SEX BY AGE: Male: 5 to 9 years: Total population -- (Margin of Error)
B01001e5	SEX BY AGE: Male: 10 to 14 years: Total population -- (Estimate)
B01001m5	SEX BY AGE: Male: 10 to 14 years: Total population -- (Margin of Error)
B01001e6	SEX BY AGE: Male: 15 to 17 years: Total population -- (Estimate)
B01001m6	SEX BY AGE: Male: 15 to 17 years: Total population -- (Margin of Error)
B01001e7	SEX BY AGE: Male: 18 and 19 years: Total population -- (Estimate)
B01001m7	SEX BY AGE: Male: 18 and 19 years: Total population -- (Margin of Error)
B01001e8	SEX BY AGE: Male: 20 years: Total population -- (Estimate)
B01001m8	SEX BY AGE: Male: 20 years: Total population -- (Margin of Error)
B01001e9	SEX BY AGE: Male: 21 years: Total population -- (Estimate)
B01001m9	SEX BY AGE: Male: 21 years: Total population -- (Margin of Error)
B01001e10	SEX BY AGE: Male: 22 to 24 years: Total population -- (Estimate)
B01001m10	SEX BY AGE: Male: 22 to 24 years: Total population -- (Margin of Error)
B01001e11	SEX BY AGE: Male: 25 to 29 years: Total population -- (Estimate)
B01001m11	SEX BY AGE: Male: 25 to 29 years: Total population -- (Margin of Error)
B01001e12	SEX BY AGE: Male: 30 to 34 years: Total population -- (Estimate)

Source: U.S. Census Bureau, TIGER/Line with Selected Demographic and Economic Data Record Layouts, County Metadata, <[www.census.gov/programs-surveys/geography/technical-documentation/records-layout/tiger-line-demo-record-layouts.html](http://www.census.gov/programs-surveys/geography/technical-documentation/records-layout/tiger-line-demo-record-layouts.html)>.

## Linking Other ACS Data to TIGER/Line Shapefiles

In some cases, users may not be able to find the ACS data they need in the Selected Demographic and Economic Data geodatabases (for example, users working with ACS 1-year data). A more comprehensive set

of ACS data tables is available through [data.census.gov](https://data.census.gov) and the ACS Summary File.

Experienced users can access aggregate ACS data by using the “Advanced Search” feature in [data.census.gov](https://data.census.gov), which allows users to conduct keyword searches or search by predefined topics, geographies, years, surveys, or codes (see Figures 3.6 and 3.7).

Figure 3.6. Advanced Search in Data.census.gov

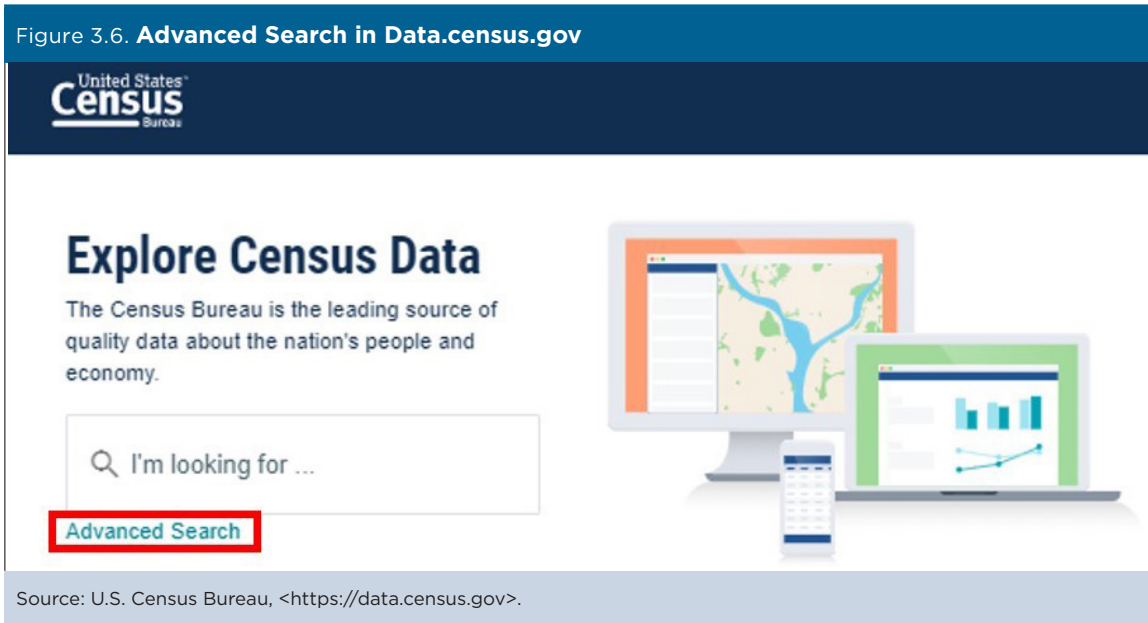
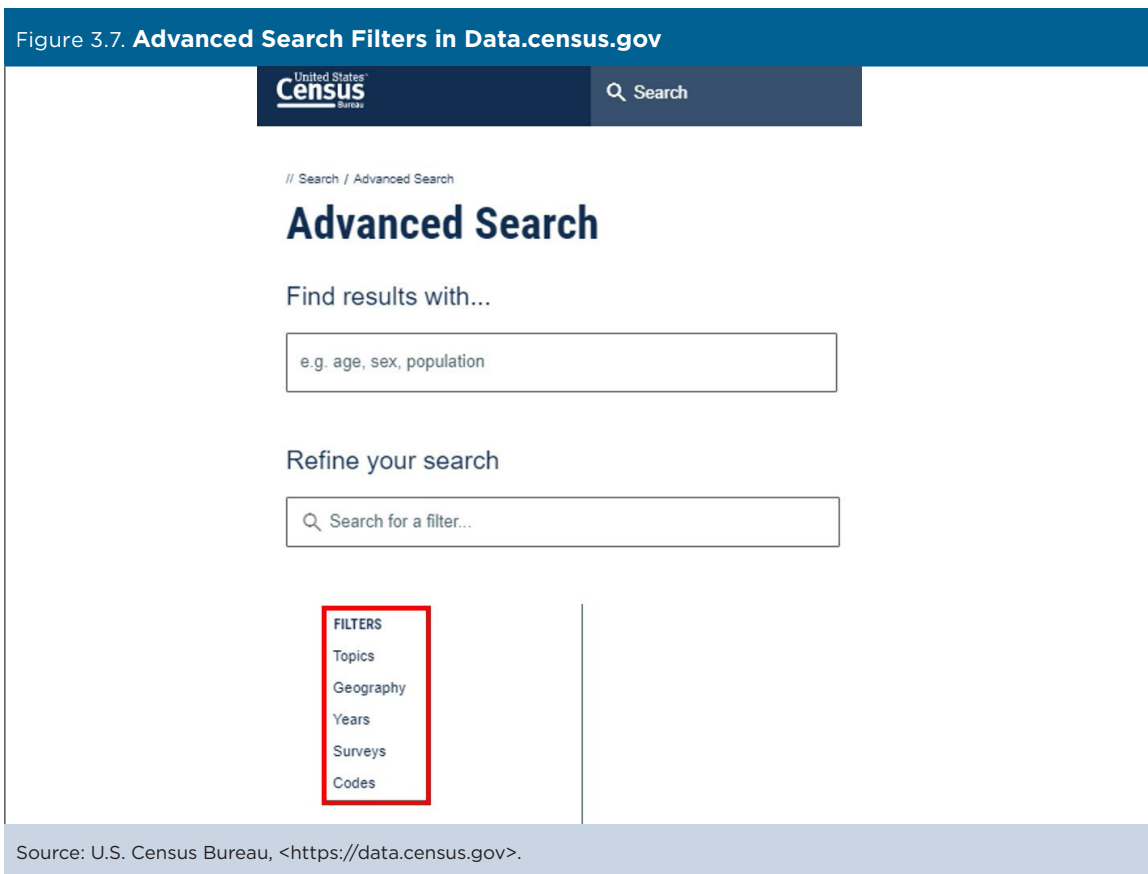


Figure 3.7. Advanced Search Filters in Data.census.gov



Data users looking for a particular table can also use the search bar on the data.census.gov home page to search by Table ID. For example, typing “B01001” into the search bar generates a list of relevant Sex by Age tables (see Figure 3.8).

After the required ACS estimates from data.census.gov have been downloaded, they can be linked to TIGER shapefiles using the GEOID.

Data users with programming skills and access to statistical software can use the ACS Summary File to download and analyze ACS data from the same set of Detailed Tables that are available in data.census.gov. The Summary File provides access to aggregate ACS data and includes information for geographic areas down to the block group. It is useful for skilled programmers who want to access multiple ACS tables for large numbers of geographic areas.

*TIP: The ACS Summary File is geared toward more advanced data users, so the Census Bureau recommends that users check to see if their tables of interest are easily available for download through data.census.gov before using this data product.*

The Summary File documentation provides users with all the information they need to access and process these data, including survey methods and links to sample SAS (statistical software) programs for processing the data files.<sup>26</sup> The ACS Summary File can be downloaded as zipped files from the Census Bureau’s FTP site.<sup>27</sup> Developers can also access Summary File data through the Census Bureau’s APIs.<sup>28</sup>

After the required ACS Summary File data have been downloaded, they can be linked to TIGER shapefiles using the GEOID. For instructions, see the Census Bureau’s: Instructions on Joining the ACS Summary File to the TIGER/Line Shapefiles.<sup>29</sup>

<sup>26</sup> U.S. Census Bureau, American Community Survey (ACS), Summary File Documentation, <[www.census.gov/programs-surveys/acs/technical-documentation/summary-file-documentation.html](http://www.census.gov/programs-surveys/acs/technical-documentation/summary-file-documentation.html)>.

<sup>27</sup> U.S. Census Bureau, American Community Survey (ACS), Data via FTP, <[www.census.gov/programs-surveys/acs/data/data-via-ftp.html](http://www.census.gov/programs-surveys/acs/data/data-via-ftp.html)>.

<sup>28</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)>.

<sup>29</sup> U.S. Census Bureau, Instructions on Joining the ACS Summary File to the TIGER/Line Shapefiles, <[https://www2.census.gov/programs-surveys/acs/summary\\_file/2014/documentation/tech\\_docs/ACS\\_SF\\_TIGERLine\\_Shapefiles.pdf](https://www2.census.gov/programs-surveys/acs/summary_file/2014/documentation/tech_docs/ACS_SF_TIGERLine_Shapefiles.pdf)>.

Figure 3.8. Searching by Table ID in Data.census.gov

