Using the American Community Survey Table-Based Summary File

What Data Users Need to Know

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1. INTRODUCTION

The American Community Survey (ACS) Table-Based Summary File is a pipe-delimited text file that contains all the Detailed Tables from the ACS. Data users with programming skills and access to statistical software can use the Summary File to download and analyze ACS data for a wide range of geographic areas.

This guide provides an overview of the ACS Table-Based Summary File and how it can be used to access data on America's communities.

Starting with the 2022 ACS data releases, the table-based format will be the only format available. The 2021 data releases were the final releases of the original sequence-based format. For information about accessing the ACS Summary File in the original sequence-based format, refer to *Using the American Community Survey Summary File: What Data Users Need to Know*.[1]

What Is the ACS?

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 U.S. 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 has been 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

[1] U.S. Census Bureau, *Using the American Community Survey Summary File: What Data Users Need to Know*, <www.census.gov/programs-surveys/acs/library/handbooks/summary-file.html>.

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 website—refer to the Census Bureau's handbook on *Understanding and Using American Community Survey Data: What All Data Users Need to Know.*[2]

1. OVERVIEW OF THE ACS SUMMARY FILE

The American Community Survey (ACS) Summary File is a unique data product that includes all estimates and margins of error (MOE) from the Detailed Tables for all geographies that are published for the ACS. The Detailed Tables are designed for advanced data users or those who want access to the most comprehensive ACS tables. They begin with the letters "B" for base tables and "C" for collapsed tables (e.g., B01001 or C15002). The "collapsed" tables cover the same topics as the base tables, but with fewer categories. Other ACS data products, such as Subject Tables and Data Profiles, are created from the Detailed Tables and, therefore, are not available in the ACS Summary File.[3]

The 2005 through 2021 ACS Summary Files were released in a sequence-based format containing the estimates and MOEs from the tables in two separate files. The sequences excluded metadata such as the titles of the tables, the descriptions of the rows, and the names of the geographic areas. The metadata and MOEs were stored in other files that users had to merge with the data files to reproduce the complete tables.

Beginning with the 2018 ACS, the U.S. Census Bureau began testing a streamlined format that the estimates and MOEs were grouped by table ID. Under this table-based format, a file is posted for each table that contains the estimates and MOEs for all available geographies. Users can easily select the individual table(s) they want to access, only needing to merge in a separate file containing geographic labels to reproduce the complete table(s). The table-based format will be the only format available starting with the 2022 ACS data release.

The ACS Summary File can be challenging to use and is intended for advanced users who work with statistical software, like SAS or Python. The Census Bureau provides SAS programs that can be used to access and process the data, as well as instructions for using Excel to merge the geography file with a sample data table in the Table-Based ACS

[2] U.S. Census Bureau, *Understanding and Using American Community Survey Data: What All Data Users Need to Know*, <www.census.gov/programs-surveys/acs/library/handbooks/general.html>.
[3] For information about the types of ACS tables that are available, refer to the U.S. Census Bureau's Table IDs Explained webpage at <www.census.gov/programs-surveys/acs/data/data-tables/table-ids-explained.html>.

Summary File format.[4] Before using the Summary File, users should first check if the data of interest are easily available for download on data.census.gov—the Census Bureau's data dissemination platform.[5]

Benefits and Uses of the ACS Summary File's Table-Based Format

The Table-Based Format for the ACS Summary File provides access to each Detailed Table for all available geographies. The main benefit of the Table-Based Format is that for each table, estimates and MOEs are combined into a single file, and only require data users to merge in a single file of geography labels to create complete tables. The new format enables data users to:

- Make comparisons across different geographic areas.
- Evaluate the precision of a particular estimate since each table's estimates and margins of error are now in a single file.
- Access the ACS data they need since each table is now in a separate file and the supporting documentation has been simplified.
- Use either a statistical (e.g., SAS, SPSS, Python) or spreadsheet (e.g., Excel) program to work with the Summary File tables.

And the Table-Based Format still allows users the ability to:

- Connect data across tables. For example, calculate the number of people living in census tracts with at least 30 percent of the population living in poverty.
- Filter the data based on specified criteria. For example, only extract data for table totals and selected estimates.
- Recode variables. For example, aggregate data across several categories or calculate rates and percentages.
- Produce tabulations across many subjects and geographies. For example, tables about educational attainment, poverty, disability, and commuting for all 50 states, the District of Columbia, and Puerto Rico.

Geographies Covered

The ACS Summary File covers geographic areas based on "summary levels." Summary levels range from very large reporting units such as "State" to much smaller reporting units such as "Census Tract." Summary levels may nest within other geographic areas such as "State" to "County" to "Census Tract," or they may cross between two or more geographic hierarchies to produce units that are only portions of geographic areas. For example, summary level "State-Place-County" crosses the "State-Place" hierarchy with the "State-County" hierarchy

[4] U.S. Census Bureau, Instructions on How to Read ACS Geography Names into Summary File Tables Using Excel, <www2.census.gov/programs-surveys/acs/summary_file/2021/table-based-SF/documentation/ACS_Table_Based_SF_Excel_Import%20GEO%20Names_Tool.pdf>.
[5] U.S. Census Bureau, data.census.gov, <https://data.census.gov>.

and may create units that cover only a portion of one county.

Each summary level has an assigned three-digit summary level code to help data users link each summary level to its appropriate use in a table, map, or other data summarization format. Here are some common summary levels used to identify types of geographic areas:[6]

- 010 Nation
- 020 Region
- 030 Division
- 040 State
- 050 State-County
- 140 State-County-Census Tract
- 250 American Indian Area/Alaska Native Area/ Hawaiian Home Land
- 310 Metropolitan Statistical Area/Micropolitan Statistical Area
- 500 State-Congressional District

Not all geographic levels are published for all ACS Summary File datasets. While all available geographic levels are available for the 5-year files, some levels are not available for the 1-year datasets as they may not meet the minimum population threshold of 65,000. For a list of the most common geographic levels published for the 1-year and 5-year Summary Files (as well as for the 1-year Supplemental Files), refer to the "Areas Published" or "Reference Materials" pages on the Census Bureau's website.[7]

Many resources are available to help users understand the ACS geographic terms and concepts. For additional information, refer to the Census Bureau's "About Geographic Areas" and "Geography and ACS" webpages.[8]

Comparing Published Detailed Tables to the ACS Summary File

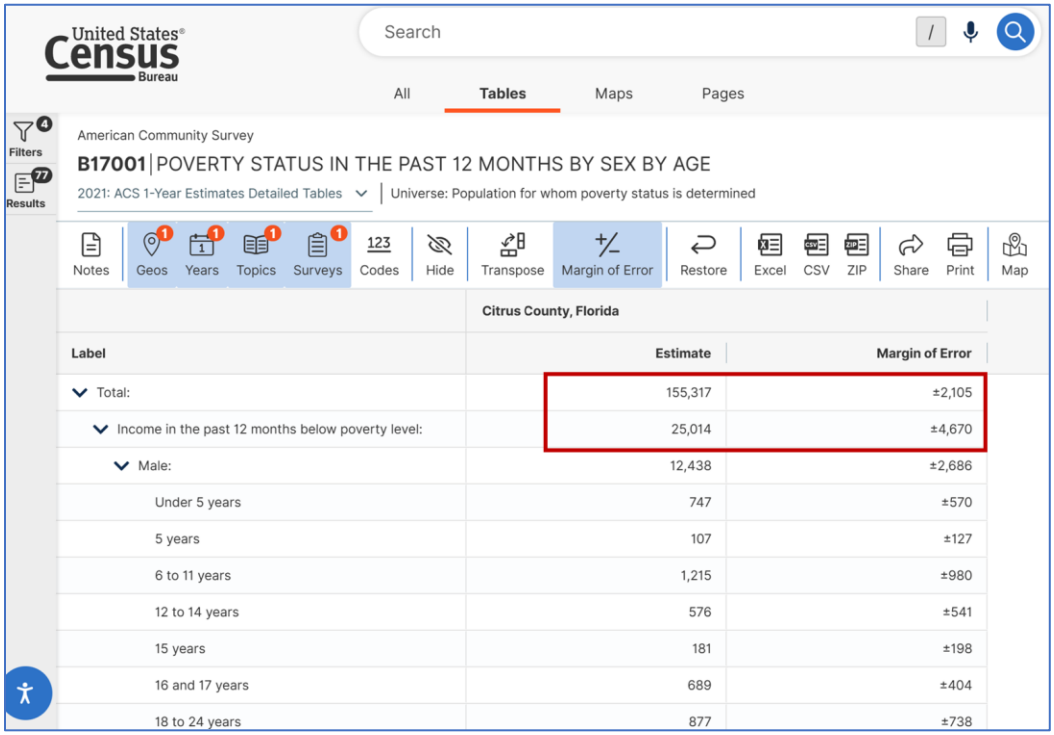
The ACS Summary File contains the same data as the Detailed Tables but in a more flexible format to allow data users to extract only the desired data.

Figure 1.1 shows an example using a table from data.census.gov, and Figure 1.2 shows the corresponding estimates from the Summary File. The published table includes information

[6] A figure showing the complete geographic hierarchy for standard entities is available in the file "Standard Hierarchy of Census Geographic Entities" available at <www2.census.gov/geo/pdfs/reference/geodiagram.pdf>.
[7] U.S. Census Bureau, "Areas Published," <www.census.gov/programs-surveys/acs/geography-acs/areas-published.html>. To view the complete list of geographic levels published, refer to the Census Bureau's Reference Materials Web page, <www.census.gov/programs-surveys/acs/geography-acs/reference-materials.html>.
[8] U.S. Census Bureau, "About Geographic Areas," <www.census.gov/programs-surveys/geography/guidance/geo-areas.html>; and U.S. Census Bureau, "Geography & ACS," <www.census.gov/programs-surveys/acs/geography-acs.html>.

such as the table ID (B17001), the table title "Poverty Status in the Past 12 Months by Sex by Age", and the source file, "2021 American Community Survey 1-year Estimates." The body of the table provides the estimates and MOEs for each selected geography (in this case, Citrus County, Florida). The highlighted box shows that in 2021, there were 155,317 people whose poverty status was determined in Citrus County, and there were 25,014 people whose income in the past 12 months was below the poverty level. (The margins of error for these estimates were +/- 2,105 and +/- 4,670, respectively.)

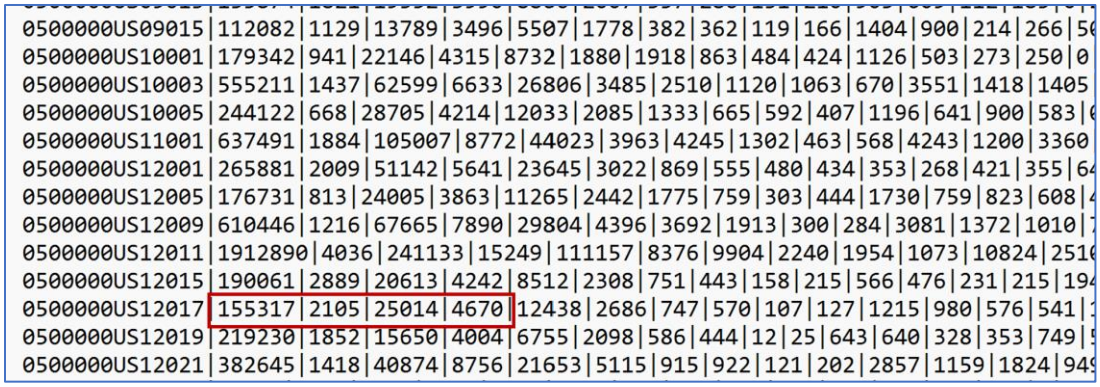
Figure 1.1. Excerpt From a Published Table (2021 ACS 1-Year, Table B17001) in Data.census.gov



Source: U.S. Census Bureau, 2021 ACS 1-Year Estimates Detailed Tables, Table B17001, <https://data.census.gov/table?q=B17001:+POVERTY+STATUS+IN+THE+PAST+12+MONTHS+BY+SEX+BY+AGE&g=050XX00US12017&tid=ACSDT1Y2021.B17001>.

As shown in Figure 1.2, the Summary File does not contain any of the metadata that is included in the published table. Rather, the file only contains the geographic identifiers, estimates, and MOEs, all of which are separated by pipes (i.e., vertical bar symbols).

Figure 1.2. Excerpt From 2021 ACS 1-Year Summary File, Table B17001



```
0500000US09015|112082|1129|13789|3496|5507|1778|382|362|119|166|1404|900|214|266|5
0500000US10001|179342|941|22146|4315|8732|1880|1918|863|484|424|1126|503|273|250|0
0500000US10003|555211|1437|62599|6633|26806|3485|2510|1120|1063|670|3551|1418|1405
0500000US10005|244122|668|28705|4214|12033|2085|1333|665|592|407|1196|641|900|583|
0500000US11001|637491|1884|105007|8772|44023|3963|4245|1302|463|568|4243|1200|3360
0500000US12001|265881|2009|51142|5641|23645|3022|869|555|480|434|353|268|421|355|6
0500000US12005|176731|813|24005|3863|11265|2442|1775|759|303|444|1730|759|823|608|
0500000US12009|610446|1216|67665|7890|29804|4396|3692|1913|300|284|3081|1372|1010|
0500000US12011|1912890|4036|241133|15249|111157|8376|9904|2240|1954|1073|10824|251
0500000US12015|190061|2889|20613|4242|8512|2308|751|443|158|215|566|476|231|215|19
0500000US12017|155317|2105|25014|4670|12438|2686|747|570|107|127|1215|980|576|541|
0500000US12019|219230|1852|15650|4004|6755|2098|586|444|12|25|643|640|328|353|749|
0500000US12021|382645|1418|40874|8756|21653|5115|915|922|121|202|2857|1159|1824|94
```

Source: U.S. Census Bureau, 2021 ACS 1-year Estimates, 1-Year Summary File (Table-Based), Table B17001 (truncated). The complete file is available on the Census Bureau's Web site, <www2.census.gov/programs-surveys/acs/summary_file/2021/table-based-SF/data/1YRData/acsdt1y2021-b17001.dat>.

Data Release Schedule and Notable Changes to the Summary File

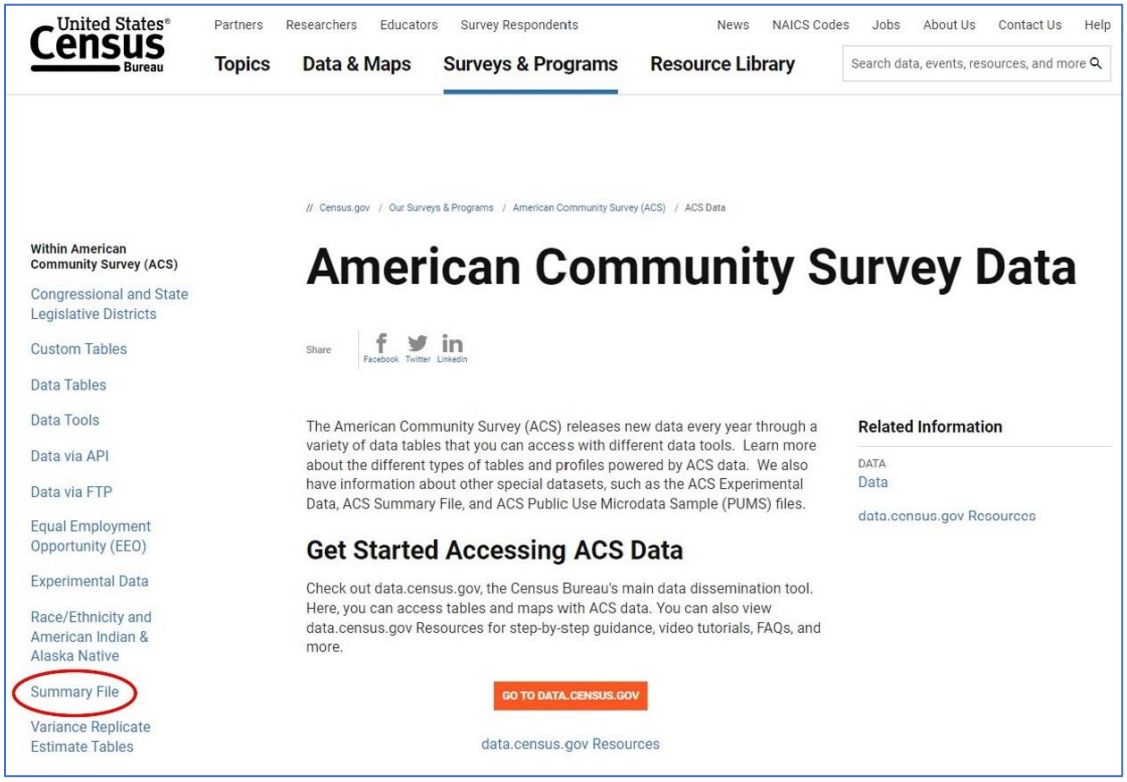
You can learn more details about each data release by visiting the ACS Data Releases page on the Census Bureau's website.[9] This page includes links to a schedule, notes about new estimates or new guidance, and technical information about geography and product changes. Check the updated data release information before using the Summary File, as changes may impact the tables or geographies. You can also browse notes from previous years.

2. HOW TO USE THE ACS TABLE-BASED SUMMARY FILE

The American Community Survey (ACS) Summary File is located on the U.S. Census Bureau's file transfer protocol (FTP) server.[10] The easiest way to find the file is to start at the ACS website.[11] From the ACS main page, <www.census.gov/programs-surveys/acs>, select the "Data" navigation link on the left. From there, click on the "Summary File" navigation link on the left, as shown in Figure 2.1.

[9] U.S. Census Bureau, American Community Survey, Data Releases, <www.census.gov/programs-surveys/acs/news/data-releases.html>.
[10] U.S. Census Bureau, American Community Survey, Data via the file transfer protocol server, <www.census.gov/programs-surveys/acs/data/data-via-ftp.html>.
[11] U.S. Census Bureau, American Community Survey, <www.census.gov/programs-surveys/acs>.

Figure 2.1 Locating the ACS Summary File



Source: U.S. Census Bureau, American Community Survey Data, <www.census.gov/programs-surveys/acs/data.html>.

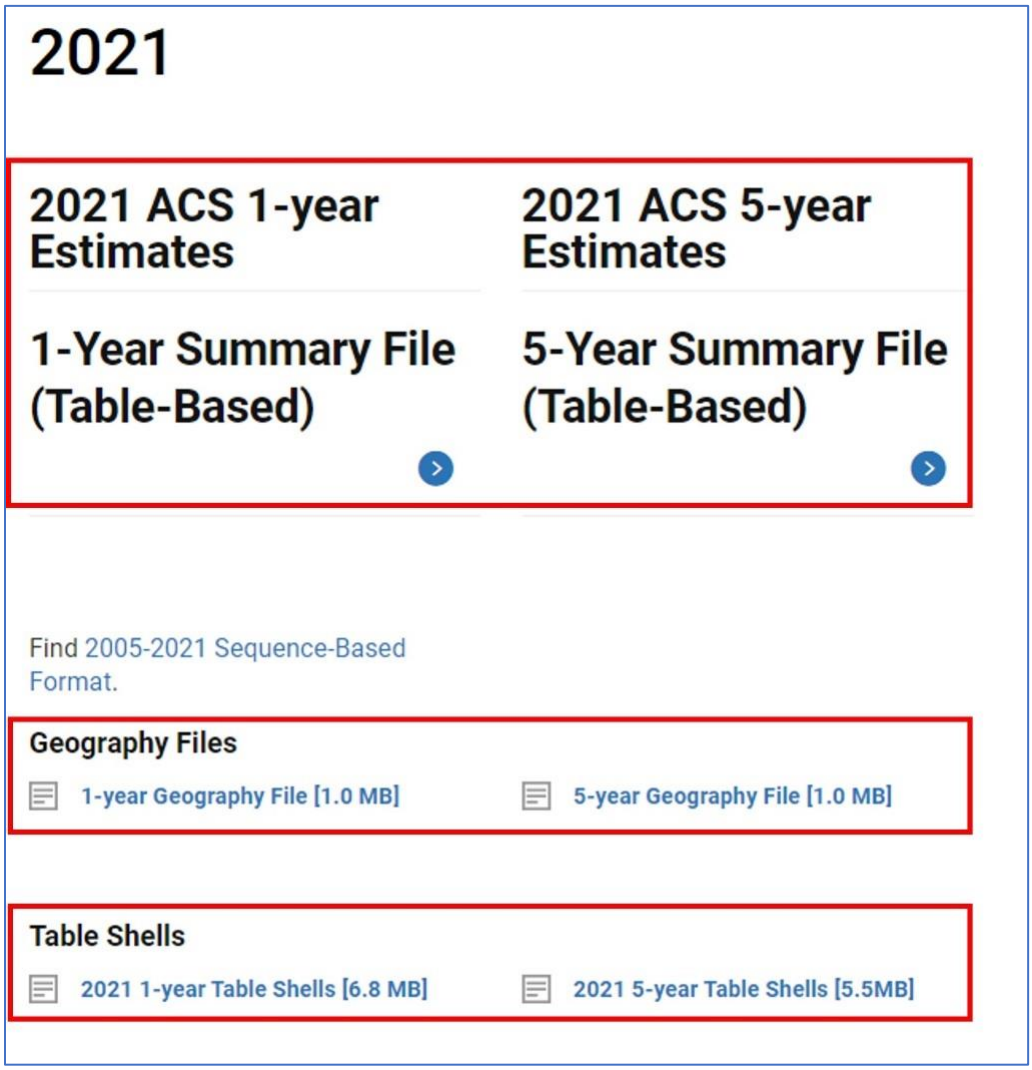
The ACS Table-Based Summary File is in pipe-delimited, Unicode Transformation Format (UTF-8), which can easily be imported into software packages. The file is divided into three components: Table labels (or table shells), geography labels (or geography files), and data files. This section describes the components of the Summary File, and the next section provides information and resources to put them together.

- **Data files:** Data (including estimates, margins of error, and geographies) organized by table ID for the 1-year or 5-year release:
    - *Folder:* 1YRData, 5YRData
    - *Example:* The file acsdt1y2021-b01001.dat, variable B01001_E003 for 0400000US06 = 1,129,355
- **Geography labels (or geography files):** All geography labels for the 1-year or 5-year data release:
    - *File name example:* Geos20211YR.txt or Geos20215YR.txt
    - *Variable label example:* 0400000US06 = "California"
- **Table labels (or table shells):** A description of each line item in a table for the 1-year or 5-year data release:
    - *File name example:* ACS20211YR_Table_Shells.txt or ACS20215YR_Table_Shells.txt

- *Variable label example:* B01001_003 = "SEX BY AGE – Total Males Under 5 Years"

Figure 2.2 shows the location of each of these components on the Census Bureau's ACS Summary File website (2021 data release).

Figure 2.2 ACS Summary File Components Associated with the 2021 Data Release



Source: U.S. Census Bureau, ACS Summary File, <www.census.gov/programs-surveys/acs/data/summary-file.2021.html#list-tab-1622397667>.

Data Files

Under the new Table-Based Format, the ACS Summary File is organized by individual Detailed Tables that can be downloaded separately. Each data file contains estimates and margins of error (MOE) for all available geographies. As Figure 2.3 shows, there is also a compressed file of the entire data set.

Figure 2.3. Summary File Directory for the 2021 ACS 1-Year Data

United States Census Bureau

Name	Last modified	Size	Description
Parent Directory		-	
1YRData.zip	2022-08-22 14:36	515M	
acsdt1y2021-b01001.dat	2022-08-22 14:33	3.7M	
acsdt1y2021-b01001a.dat	2022-08-22 14:33	2.3M	
acsdt1y2021-b01001b.dat	2022-08-22 14:33	1.2M	
acsdt1y2021-b01001c.dat	2022-08-22 14:33	259K	
acsdt1y2021-b01001d.dat	2022-08-22 14:33	862K	
acsdt1y2021-b01001e.dat	2022-08-22 14:33	63K	
acsdt1y2021-b01001f.dat	2022-08-22 14:33	945K	
acsdt1y2021-b01001g.dat	2022-08-22 14:33	1.7M	
acsdt1y2021-b01001h.dat	2022-08-22 14:33	2.3M	
acsdt1y2021-b01001i.dat	2022-08-22 14:33	1.7M	
acsdt1y2021-b01002.dat	2022-08-22 14:33	335K	
acsdt1y2021-b01002a.dat	2022-08-22 14:33	336K	
acsdt1y2021-b01002b.dat	2022-08-22 14:33	330K	
acsdt1y2021-b01002c.dat	2022-08-22 14:33	364K	
acsdt1y2021-b01002d.dat	2022-08-22 14:33	340K	
acsdt1y2021-b01002e.dat	2022-08-22 14:33	529K	
acsdt1y2021-b01002f.dat	2022-08-22 14:33	327K	

Source: U.S. Census Bureau, 2021 ACS 1-year Estimates, 1-Year Summary File (Table-Based), Data via FTP, <https://www2.census.gov/programs-surveys/acs/summary_file/2021/table-based-SF/data/1YRData/>.

Table 2.1 shows the naming convention used for a selected file in the 1-year data directory (for 2021). In the file name, "acsdt1y" refers to the ACS 1-year Detailed Tables, "2021" refers to the data collection year, and "b01001" refers to the table ID.

Table 2.1. Naming Convention for Files Within Data Directory

acsdt1y2021-b01001.dat		
Example	**Name**	**Range or Type**
acs	Survey Name	American Community Survey (ACS)
dt	Table Type	Detailed Table
1y	Period Covered	1y=1-year, 5y=5-year

2021	Reference Year	ACS data year (last year of the period for multiyear periods)
-	Hyphen	
b01001	Table Number	Unique table number

Source: U.S. Census Bureau.

Figure 2.4 shows the first few rows from a 2017–2021 ACS 5-year Summary File estimate file for Table B08121: "Median Earnings in the Past 12 Months (In 2021 Inflation-Adjusted Dollars) by Means of Transportation to Work." The first row of the pipe-delimited file shows the variable labels, while subsequent rows show the ACS estimates for this table. The rows highlighted in the table show the results for the United States, U.S. rural areas, and the Midwest region (that will be spotlighted in the "Geography Files" subsection below).

Figure 2.4. Excerpt of 2017-2021 ACS 5-Year Data File for Table B08121

```
GEO_ID|B08121_E001|B08121_M001|B08121_E002|B08121_M002|B08121_E003|B08121_M003|B08121_E004|
0100000US|42296|74|42770|71|31995|93|42437|238|24723|193|33389|279|59742|232
0100001US|42471|84|42970|76|31610|101|42367|255|24077|211|33085|298|61657|243
0100043US|41575|72|41962|73|34105|204|46427|2281|27674|454|35914|828|51504|281
0100089US|34342|330|35371|392|29797|904|29331|4145|26869|1283|23701|2400|36704|1523
0100090US|44063|12926|42500|16203|-666666666|-222222222|-666666666|-222222222|42917|29464|-
0100091US|37113|263|38378|269|29813|650|22741|2483|19804|1443|26974|1430|40638|1001
0100092US|42766|922|43676|1040|34631|3087|43000|22438|30054|6029|37361|8445|47415|6024
0100093US|45819|1040|50299|1035|50022|3143|32593|8648|32770|1551|38905|2934|41564|3060
0100094US|35445|454|36987|494|26517|820|19757|5698|19756|3716|29721|2112|37971|2769
0100095US|39520|1088|41034|980|34446|3116|25764|5765|37857|13791|25000|3825|41506|9997
01000A0US|42701|74|43153|71|32043|92|42525|208|24732|206|33586|291|60796|227
01000C0US|43349|75|43760|74|32232|99|42690|205|25318|148|33984|293|62296|230
01000C1US|41131|78|41642|85|30915|135|39349|238|27293|189|35077|492|60421|351
01000C2US|44699|83|44906|82|33328|156|53368|475|21941|182|32674|390|63271|195
01000E0US|35785|115|37165|117|30204|232|24214|1397|19718|520|28733|873|39000|506
01000E1US|32723|179|34596|186|26998|315|20165|976|14680|490|24911|1171|33779|1124
01000E2US|37533|108|38416|113|31740|282|30786|1665|24360|794|32115|919|40960|477
01000G0US|35061|104|36046|108|31236|233|25091|1175|24599|555|30038|610|36618|510
01000H0US|35499|95|36724|96|30615|184|24532|1038|21371|242|29252|584|38015|348
0200000US1|47697|149|48568|144|34756|254|47871|387|28574|366|37446|737|66793|407
0200000US2|41686|80|42491|81|31676|156|36776|468|20714|223|32062|425|55452|405
0200000US3|39898|85|40511|86|30098|145|32768|413|21803|218|29704|490|56786|297
0200000US4|43298|87|43724|89|34232|156|37673|420|26545|247|37616|589|61639|346
0200001US1|48265|162|49370|152|34575|301|47672|382|28476|404|37519|766|68655|444
0200001US2|41520|98|42391|105|30592|193|36975|466|18853|418|31207|488|58133|473
0200001US3|39965|90|40689|93|29432|209|32467|402|21319|232|28882|546|58102|352
0200001US4|43277|89|43679|92|33978|160|37503|423|26311|286|37373|581|62899|244
0200043US1|45004|179|45351|201|35997|579|75502|4496|29720|1014|36662|1554|55375|857
0200043US2|42184|89|42752|91|35915|330|28980|2882|29136|694|36633|1095|47276|551
0200043US3|39680|114|39981|115|32089|270|41192|1897|25738|673|33336|1271|52407|493
0200043US4|43505|183|44157|180|37788|647|46096|4518|28188|1081|41189|1705|50664|707
02000A0US1|48117|154|49027|145|34874|261|47888|388|28820|372|37599|736|67433|417
02000A0US2|42198|87|42947|84|31577|171|37059|472|20262|244|32118|453|57227|433
```

Source: U.S. Census Bureau, 2017-2021 ACS 5-year Estimates, Table B08121 (truncated). The complete file is available on the Census Bureau's Web site, <www2.census.gov/programs-surveys/acs/summary_file/2021/table-based-SF/data/5YRData/acsdt5y2021-b08121.dat>.

The directory for the ACS 1-year Summary File is organized in a similar fashion.

Geography Labels (or Geography Files)

The Census Bureau provides a separate file that contains labels for all the geographies in both the 1-year and 5-year ACS data files. You can use the geography identifier (GEO_ID) in this geography file to match the corresponding geographic identifier in each data file. Table 2.2 shows the contents of the geography file, which is available in .TXT format. Each row represents a different geographic area and the first four fields contain metadata, such as the state postal abbreviation and summary level. Following those fields are the different geographic levels available for a particular data release. The fields in the table are left blank if the geographic level is not available for a particular data release. The GEO_ID is displayed in a red box in the table.

Table 2.2. Contents of Geography File

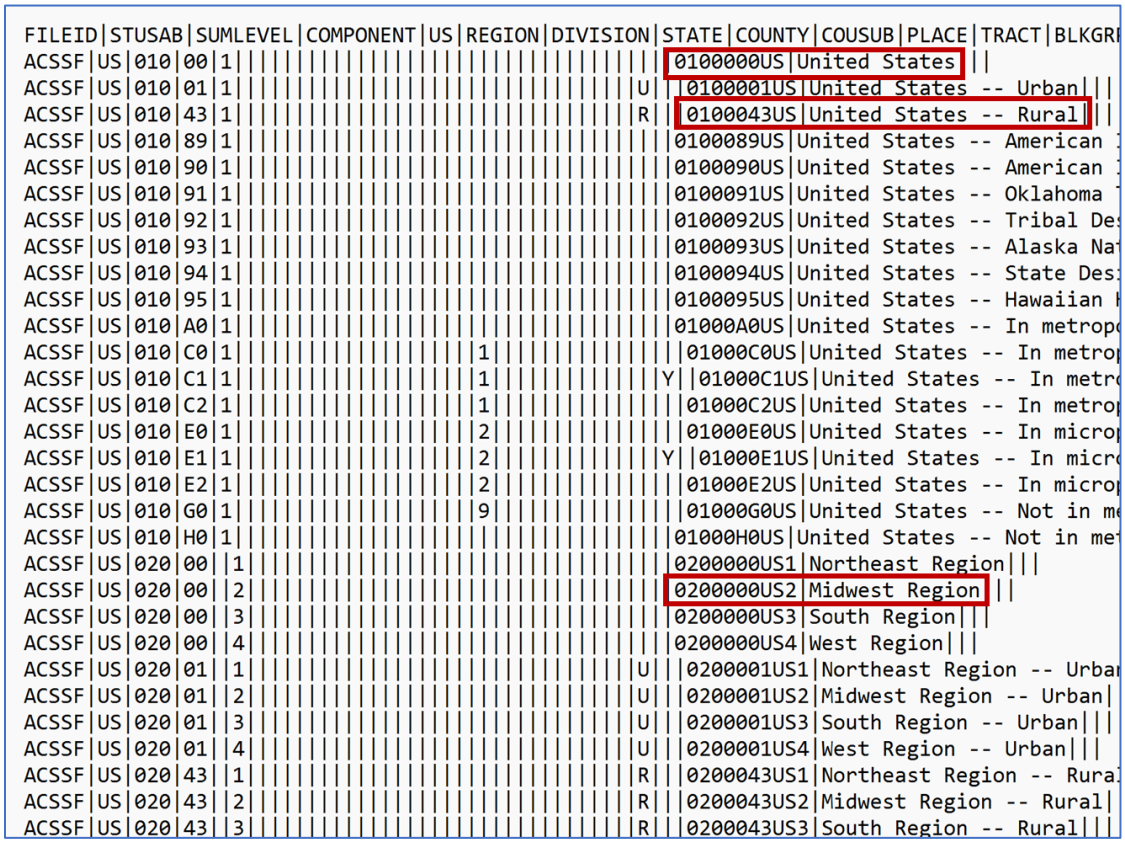
Variable Name	Description	Code Type
FILEID	Always equal to ACS Summary File identification	Record
STUSAB	State Postal Abbreviation	Record
SUMLEVEL	Summary Level	Record
COMPONENT	Geographic Component	Record
US	US	Geographic
REGION	Census Region	Geographic
DIVISION	Census Division	Geographic
STATE	State (FIPS Code)	Geographic
COUNTY	County of current residence	Geographic
COUSUB	County Subdivision (FIPS)	Geographic
PLACE	Place (FIPS Code)	Geographic
TRACT	Census Tract	Geographic
BLKGRP	Block Group	Geographic
CONCIT	Consolidated City	Geographic
AIANHH	American Indian Area/Alaska Native Area/ Hawaiian Home Land (Census/FIPS)	Geographic
AIANHHFP	American Indian Area/Alaska Native Area/ Hawaiian Home Land (LEFT BLANK)	Geographic
AIHHTLI	American Indian Trust Land/ Hawaiian Home Land Indicator	Geographic
AITS	American Indian Tribal Subdivision (Census/FIPS)	Geographic
AITSFP	American Indian Tribal Subdivision (LEFT BLANK)	Geographic
ANRC	Alaska Native Regional Corporation	Geographic
CBSA	Metropolitan and Micropolitan Statistical Area	Geographic
CSA	Combined Statistical Area	Geographic
METDIV	Metropolitan Statistical Area- Metropolitan Division	Geographic
MACC	Metropolitan Area Central City	Geographic
MEMI	Metropolitan/Micropolitan Indicator Flag	Geographic
NECTA	New England City and Town Area	Geographic
CNECTA	New England City and Town Combined Statistical Area	Geographic
NECTADIV	New England City and Town Area Division	Geographic
UA	Urban Area	Geographic
CDCURR	Current Congressional District ***	Geographic
SLDU	State Legislative District Upper	Geographic
SLDL	State Legislative District Lower	Geographic
ZCTA5	5-digit ZIP Code Tabulation Area	Geographic
SUBMCD	Subminor Civil Division (FIPS)	Geographic
SDELM	State-School District (Elementary)	Geographic
SDSEC	State-School District (Secondary)	Geographic
SDUNI	State-School District (Unified)	Geographic
UR	Urban/Rural	Geographic
PCI	Principal City Indicator	Geographic
PUMA5	Public Use Microdata Area – 5% File	Geographic
GEO_ID	Geographic Identifier	Geographic
NAME	Area Name	Geographic
BTTR	Tribal Tract	Geographic
BTBG	Tribal Block Group	Geographic
TL_GEO_ID	Geographic Identifier (for TIGER/Line Shapefiles)	Geographic

Sources: U.S. Census Bureau, 2017-2021 ACS 5-Year Estimates, 5-Year Geography File, <www2.census.gov/programs-surveys/acs/summary_file/2021/table-based-SF/documentation/Geos20215YR.txt>.

Figure 2.5 shows the first few rows and columns in the 5-year geography file. The first row displays the variable labels and the following rows include identifiers for all the geographic areas included in the Summary File. For example:

- In Row 2, the GEO_ID is "0100000US," representing the United States.
- In Row 4, the GEO_ID is "0100043US," representing rural areas.
- In Row 21, the GEO_ID is "0200000US2," representing the Midwest region.

Figure 2.5. Excerpt of 2017-2021 ACS 5-Year Geography File



```
FILEID|STUSAB|SUMLEVEL|COMPONENT|US|REGION|DIVISION|STATE|COUNTY|COUSUB|PLACE|TRACT|BLKGR
ACSSF|US|010|00|1|||||||||||0100000US|United States||
ACSSF|US|010|01|1|||||||||U||0100001US|United States -- Urban|||
ACSSF|US|010|43|1|||||||||R||0100043US|United States -- Rural|||
ACSSF|US|010|89|1|||||||||||0100089US|United States -- American
ACSSF|US|010|90|1|||||||||||0100090US|United States -- American
ACSSF|US|010|91|1|||||||||||0100091US|United States -- Oklahoma
ACSSF|US|010|92|1|||||||||||0100092US|United States -- Tribal De
ACSSF|US|010|93|1|||||||||||0100093US|United States -- Alaska Na
ACSSF|US|010|94|1|||||||||||0100094US|United States -- State Des
ACSSF|US|010|95|1|||||||||||0100095US|United States -- Hawaiian
ACSSF|US|010|A0|1|||||||||||01000A0US|United States -- In metrop
ACSSF|US|010|C0|1|||||||||1||||01000C0US|United States -- In metro
ACSSF|US|010|C1|1|||||||||1||||Y||01000C1US|United States -- In metr
ACSSF|US|010|C2|1|||||||||1||||01000C2US|United States -- In metro
ACSSF|US|010|E0|1|||||||||2||||01000E0US|United States -- In micro
ACSSF|US|010|E1|1|||||||||2||||Y||01000E1US|United States -- In micr
ACSSF|US|010|E2|1|||||||||2||||01000E2US|United States -- In micro
ACSSF|US|010|G0|1|||||||||9||||01000G0US|United States -- Not in m
ACSSF|US|010|H0|1|||||||||||01000H0US|United States -- Not in me
ACSSF|US|020|00||1|||||||||||0200000US1|Northeast Region|||
ACSSF|US|020|00||2|||||||||||0200000US2|Midwest Region||
ACSSF|US|020|00||3|||||||||||0200000US3|South Region|||
ACSSF|US|020|00||4|||||||||||0200000US4|West Region|||
ACSSF|US|020|01||1|||||||||U|||0200001US1|Northeast Region -- Urba
ACSSF|US|020|01||2|||||||||U|||0200001US2|Midwest Region -- Urban|
ACSSF|US|020|01||3|||||||||U|||0200001US3|South Region -- Urban|||
ACSSF|US|020|01||4|||||||||U|||0200001US4|West Region -- Urban|||
ACSSF|US|020|43||1|||||||||R|||0200043US1|Northeast Region -- Rura
ACSSF|US|020|43||2|||||||||R|||0200043US2|Midwest Region -- Rural|
ACSSF|US|020|43||3|||||||||R|||0200043US3|South Region -- Rural|||
```

Source: U.S. Census Bureau, 2017-2021 ACS 5-Year Estimates, 5-Year Geography File (truncated). The complete file is available on the Census Bureau's Web site, <www2.census.gov/programs-surveys/acs/summary_file/2021/table-based-SF/documentation/Geos20215YR.txt>.

Table Labels (or Table Shells)

Table shells provide descriptions of each line item in the ACS Summary File, without the estimates or MOEfilled in. They contain the table IDs, line numbers, unique IDs, and descriptions of each data cell in the Census Bureau's Detailed Tables. Table shells are available 1 week before ACS data are released, allowing users to preview the contents of a new data release in advance. Figure 2.6 displays the columns and first few rows of the table shells for the 2017–2021 ACS 5-year release.

Figure 2.6. Excerpt of 2017-2021 ACS 5-Year Table Shells

```
Table ID|Line|Indent|Unique ID|Label|Title|Universe|Type
B01001|1.0|0|B01001_001|Total:|SEX BY AGE|Total population|int
B01001|2.0|1|B01001_002|Male:|SEX BY AGE|Total population|int
B01001|3.0|2|B01001_003|Under 5 years|SEX BY AGE|Total population|int
B01001|4.0|2|B01001_004|5 to 9 years|SEX BY AGE|Total population|int
B01001|5.0|2|B01001_005|10 to 14 years|SEX BY AGE|Total population|int
B01001|6.0|2|B01001_006|15 to 17 years|SEX BY AGE|Total population|int
B01001|7.0|2|B01001_007|18 and 19 years|SEX BY AGE|Total population|int
B01001|8.0|2|B01001_008|20 years|SEX BY AGE|Total population|int
B01001|9.0|2|B01001_009|21 years|SEX BY AGE|Total population|int
B01001|10.0|2|B01001_010|22 to 24 years|SEX BY AGE|Total population|int
B01001|11.0|2|B01001_011|25 to 29 years|SEX BY AGE|Total population|int
B01001|12.0|2|B01001_012|30 to 34 years|SEX BY AGE|Total population|int
B01001|13.0|2|B01001_013|35 to 39 years|SEX BY AGE|Total population|int
B01001|14.0|2|B01001_014|40 to 44 years|SEX BY AGE|Total population|int
B01001|15.0|2|B01001_015|45 to 49 years|SEX BY AGE|Total population|int
B01001|16.0|2|B01001_016|50 to 54 years|SEX BY AGE|Total population|int
B01001|17.0|2|B01001_017|55 to 59 years|SEX BY AGE|Total population|int
B01001|18.0|2|B01001_018|60 and 61 years|SEX BY AGE|Total population|int
B01001|19.0|2|B01001_019|62 to 64 years|SEX BY AGE|Total population|int
B01001|20.0|2|B01001_020|65 and 66 years|SEX BY AGE|Total population|int
B01001|21.0|2|B01001_021|67 to 69 years|SEX BY AGE|Total population|int
B01001|22.0|2|B01001_022|70 to 74 years|SEX BY AGE|Total population|int
B01001|23.0|2|B01001_023|75 to 79 years|SEX BY AGE|Total population|int
B01001|24.0|2|B01001_024|80 to 84 years|SEX BY AGE|Total population|int
B01001|25.0|2|B01001_025|85 years and over|SEX BY AGE|Total population|int
```

Source: U.S. Census Bureau, 2017-2021 ACS 5-Year Estimates, 5-Year Table Shells (truncated). The complete file is available on the Census Bureau's Web site, <www2.census.gov/programs-surveys/acs/summary_file/2021/table-based-SF/documentation/ACS20215YR_Table_Shells.txt>.

Table IDs

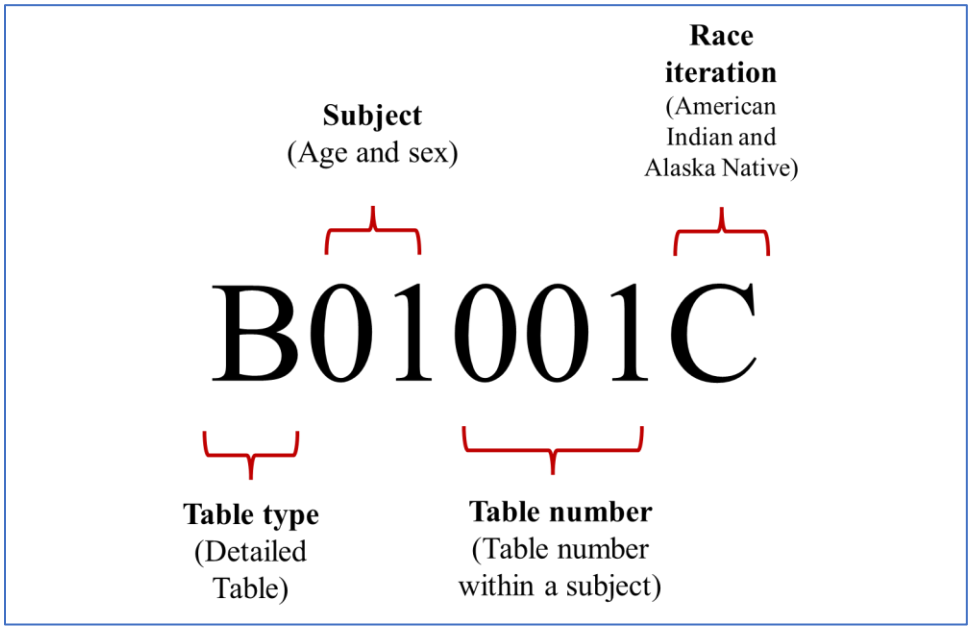
All ACS tables have a table ID that follows specific naming conventions. This makes it easy to identify the same table across different tools, such as in data.census.gov, the Summary File, and the application programming interface (API). You will need to know the table ID to identify the table you want from the Summary File. The Census Bureau provides a spreadsheet with table shells and associated table IDs for all Detailed Tables on their website.[12]

Table IDs consist of up to five elements. The first element is a letter that indicates the table type. For example, as shown in Figure 2.7, the first letter is "B" indicating that the data are from a Detailed (or Base) Table. Table IDs that start with "C" refer to collapsed tables. B tables have the most detail for a given topic while C tables have collapsed categories.

[12] U.S. Census Bureau, Table Shells and Table List, <www.census.gov/programs-surveys/acs/technical-documentation/table-shells.html>.

The next two characters identify the subject of the table. Tables beginning with "01," for example, are for tables in the age and sex subject. Each subject has a unique 2-digit subject number.

Figure 2.7. ACS Table IDs Explained



Source: U.S. Census Bureau, ACS Data Tables, Table IDs Explained, <https://www.census.gov/programs-surveys/acs/data/data-tables/table-ids-explained.html>.

The following three digits are a sequential table number that uniquely identifies a table within a given subject.

The fourth element is an alphabetic suffix that indicates the corresponding ACS table is repeated for different race and Hispanic origin groups. For example, table IDs ending in a "C" are for the American Indian and Alaska Native alone population. Those with an "H" suffix are for the non-Hispanic White population. Lastly, selected tables will have a final alphabetic suffix "PR" to indicate a table is available for Puerto Rico geographies only.

Refer to the U.S. Census Bureau's website for more details about naming conventions and subject numbers for ACS tables.[13]

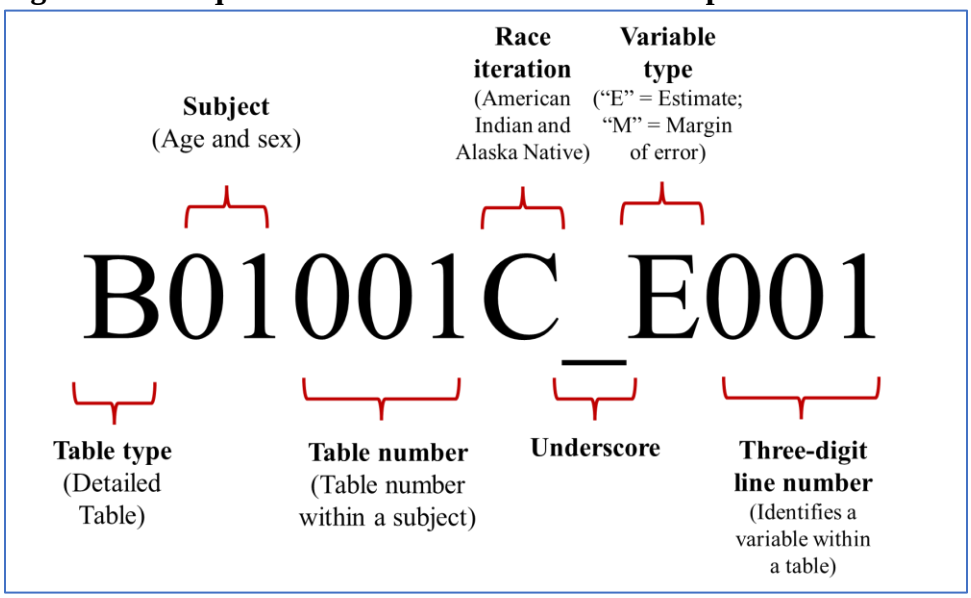
Unique ID for Variable Names

In the ACS Summary File, variable names for estimates and MOE are displayed using a unique, alpha-numeric identifier (a unique ID).

[13] U.S. Census Bureau, American Community Survey, Table IDs Explained, <www.census.gov/programs-surveys/acs/data/data-tables/table-ids-explained.html>.

The unique ID includes four elements: a table ID, an underscore, a letter to indicate the variable type (E=estimate, M=margin of error), and a three-digit line number, which identifies ACS estimates within each table.[14] For example, in Table B01001, "Sex by Age," the unique ID for the estimated total number of people who are American Indian and Alaska Native alone is "B01001C_E001" (Figure 2.8).

Figure 2.8. Unique IDs for ACS Variable Names Explained



Source: U.S. Census Bureau, 2021 ACS 1-Year Summary File (Table-Based), Table B01001, <www2.census.gov/programs-surveys/acs/summary_file/2021/table-based-SF/data/1YRData/acsdt1y2021-b01001.dat>.

[14] The table shells for the American Community Survey Summary File provide unique IDs without the "variable type" displayed, since all the rows represent estimates rather than margins of error. However, the data files include this information.

3. TOOLS AND RESOURCES FOR THE ACS SUMMARY FILE

The U.S. Census Bureau provides several resources to help data users access and use the Table-Based American Community Survey (ACS) Summary File on their "Getting Started" page, including:

- Links to the ACS Summary File data.
- Release notes and supporting materials.
- Instructions on how to read ACS geography names into Summary File tables using Excel.
- Example programs to access the ACS Summary File using SAS or Python.
- Webinars that provide guidance on using the ACS Summary File in the Table-Based Format.[15]

Reading the ACS Summary File into Excel

The Census Bureau provides a document that describes how data users without access to SAS or other statistical software—or who are seeking data for just a few tables—can retrieve ACS Summary File tables using Excel.[16]

- Select a table of interest from the Census Bureau's file transfer protocol (FTP) directory and download it as a text file.
- In Excel, open the text file of the table of interest, using Excel's Text Import Wizard. The table file uses pipe delimiters (i.e., vertical bar symbols).
- Download the corresponding geography file, either from the Table-Based Format page or the FTP website. Make sure the geography file corresponds with the ACS Summary File from where you selected the table. For example, if the data table comes from the 2021 1-year Summary File, you will want to download the 2021 1-year geography file. Like the data table, the geography file will be saved as a text file.
- Open the geography file in Excel, again using the Text Import Wizard. Like the table file, the geography file uses pipe delimiters.
- Once both the data table and geography files are open, use the VLOOKUP function to merge the geography names into the data table.

[15] U.S. Census Bureau, American Community Survey Summary File, Getting Started, <www.census.gov/programs-surveys/acs/data/summary-file.Getting_Started.html#list-tab-1622397667>.
[16] U.S. Census Bureau, "Instructions on How to Read ACS Geography Names into Summary File Tables Using Excel," <www2.census.gov/programs-surveys/acs/summary_file/2021/table-based-SF/documentation/ACS_Table_Based_SF_Excel_Import%20GEO%20Names_Tool.pdf>.

SAS and Other Statistical Programs

More advanced users can also use the Census Bureau's example programs, available on the ACS Summary File webpage, as a starting point to access ACS data using SAS, Python, or other statistical software.[17] These programs can be used to access:

- ACS 1-year data for all the geographies in a single state (California); or
- ACS 5-year data for all the tracts in the United States.

The SAS code displayed in Figure 3.1 could be used to output 2021 ACS 1-year data for all geographies in California from Table B01001, "Sex and Age." The Census Bureau also has an ACS Data Users GitHub page where data users can share code for working with ACS data with different programming languages (R, Python, SAS, Stata, etc.).[18]

[17] U.S. Census Bureau, American Community Survey Summary File, Getting Started, <www.census.gov/programs-surveys/acs/data/summary-file.Getting_Started.html#list-tab-1622397667>.
[18] U.S. Census Bureau, American Community Survey, Data Users GitHub webpage, <https://github.com/Census-ACS>.

Figure 3.1. SAS Code Used to Output 2021 ACS 1-Year Data for California Geographies in Table B01001

```
/*------------ADD INPUT HERE ------------*/
%let Table_ID =b01001;
%let State  =ca;
%let Data_Dir =../../1YRData;
%let Geo_File =../../Geos20211YR.txt;
/*----------------------------------------------------*/
libname out ".";

/** Import Data **/
proc import datafile = "&Data_Dir./acsdt1y2021-&Table_ID..dat"
  out = &Table_ID
  dbms = dlm
  replace;
  getnames = yes;
  delimiter = '|';
  GUESSINGROWS=10000;
run;

/* import geography labels */
proc import datafile="&Geo_File"
    out = Geos
    dbms = dlm
    replace;
    getnames=yes;
            delimiter = '|';
            GUESSINGROWS=10000;
run;

/* merge data with geography labels and output */
proc sql;
            create table out.&Table_ID as
            select geo.name, tbl.*
            from &Table_ID as tbl
            left join Geos as geo
            on tbl.GEO_ID = geo.GEO_ID
            where geo.stusab = upcase("&State");

quit;
```

Source: ACS Data Users GitHub Repository, <https://github.com/Census-ACS/acs-summary-file/blob/master/SAS/Example01.sas>.

Webinars and Other Supporting Materials

The Census Bureau has organized a series of webinars for data users who want more

information about using the ACS Table-Based Summary File.[19]

USER NOTES

Population Thresholds

The U.S. Census Bureau publishes American Community Survey (ACS) 1-year and 5-year estimates, with population thresholds set for the ACS 1-year estimates to provide reliable data. Table 4.1 provides a brief comparison of the two types of estimates:

Table 4.1. Understanding ACS 1-Year and 5-Year Estimates

1-Year Estimates	5-Year Estimates
Published for selected geographic areas with populations of 65,000 or greater	Published for all geographic areas
Represent the average characteristics over a calendar year	Represent the average characteristics over a 5-year period of time
Have fewer published geographic areas than the 5-year estimates	Have more published areas than the 1-year estimates

Source: U.S. Census Bureau, *Using the American Community Survey Summary File: What Data Users Need to Know*, <www.census.gov/programs-surveys/acs/library/handbooks/summary-file.html>.

For more guidance on using ACS 1-year and 5-year estimates, refer to the Chapter on "Understanding Multiyear Estimates" in *Understanding and Using American Community Survey Data: What All Data Users Need to Know*.[20]

Explanation of Missing Estimates and Data Release Filtering Rules

Data users often question why certain ACS estimates are not available. Missing estimates can be caused by data suppression through various methods or restrictions that are applied to ACS data to limit the disclosure of information about individual respondents and the number of published estimates with unacceptable statistical reliability.

Filtering rules, based on statistical reliability of the ACS 1-year estimates, are used to ensure that Detailed Tables are not released where the majority of estimates in the Detailed Tables have an unacceptable level of reliability.

[19] U.S. Census Bureau, American Community Survey Summary File, Getting Started, <www.census.gov/programs-surveys/acs/data/summary-file.Getting_Started.html#list-tab-1622397667>.
[20] U.S. Census Bureau, "*Understanding and Using American Community Survey Data: What All Data Users Need to Know*," <www.census.gov/programs-surveys/acs/library/handbooks/general.html>.

Learn more about missing estimates and filtering rules on the Census Bureau's Data Suppression webpage.[21]

Margins of Error and Rounding Rules

There are a few special rules on how certain margins of error (MOE) are determined for ACS estimates. The accuracy of the estimate (decimal place) within the Detailed Tables determines the number of digits to where the margin of error is rounded.

Some ACS tables and estimates do not have MOE associated with them, including:

- Tables B98001, B98002, and B98003, which are sample counts, not estimates.
- The remaining tables in series B98 (quality measure tables) and B99 (allocation tables).
- ACS estimates that are controlled to independent population or housing unit totals.

Jam Values

A "jam value" is a hard-coded value used to explain the absence of data. The Table-Based Summary File uses numeric jam values, whereas the previous sequence-based format used character values. For example, a jam value is represented by a value in the data display, such as "-666666666" in cases where the estimate could not be computed because there was an insufficient number of sample observations. The sequence-based format used a dot (.) to express this information. Learn more about these special data values on the Census Bureau's Code Lists, Definitions, and Accuracy webpage.[22]

Display of ACS Estimates

The estimates in the Summary File are stored using standard notation instead of in scientific notation. The estimates are stored as whole numbers. The largest estimate in the ACS Summary File contains 14 digits.

For More Information

For any technical questions or comments you have on the ACS Summary File, e-mail: <acso.users.support@census.gov>. If you have questions or comments about the ACS, you can submit a question online at <https://ask.census.gov/>.

[21] U.S. Census Bureau, American Community Survey, Data Suppression, <www.census.gov/programs-surveys/acs/technical-documentation/data-suppression.html>.
[22] U.S. Census Bureau, Code Lists, Definitions, and Accuracy, <www.census.gov/programs-surveys/acs/technical-documentation/code-lists.html>.