

Getting Started With American Community Survey (ACS) Data in R and Python

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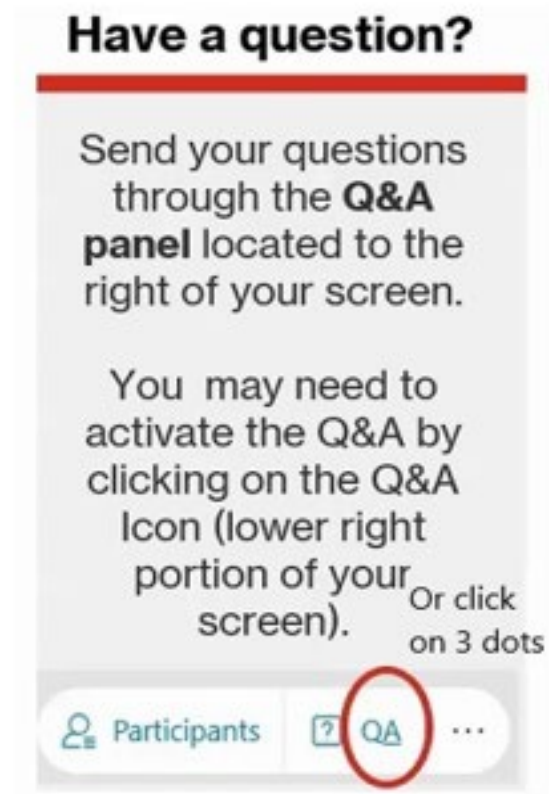
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Associate Professor of Demography

University of Texas at San Antonio

The American Community Survey

Questions by Chat



The American Community Survey

Overview

- **ACS Basics**
- Introduction to Open-Source and Application Programming Interfaces (APIs)
- Open-Source and the ACS
- Case Study
- Resources for Learning More


The American Community Survey

The Foundation

The American Community Survey is on the leading edge of survey design, continuous improvement, and data quality


- The nation's most current, reliable, and accessible data source for local statistics on critical planning topics such as age, children, veterans, commuting, education, income, and employment
- Surveys **3.5 million** addresses and informs over **\$675 billion** of federal government spending each year
- Covers **40+ topics**, supports over **300** evidence-based Federal government uses, and produces **11 billion** estimates each year
- Typically provides three key annual data releases:
 - 1-year Estimates (for large populations, geographies of 65,000+ population)
 - 1-year Supplemental Estimates (for small populations, geographies of 20,000+ population)
 - 5-year Estimates (for very small populations, geographies down to Census Tracts and Block Groups)

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 **The American Community Survey**

Start Here


You have two ways to respond:

 Respond online today at:
<https://respond.census.gov/acs>

OR

 Complete this form and mail it back as soon as possible.

Your response is required by law.
The American Community Survey is conducted by the U.S. Census Bureau. This survey is one of only a few surveys for which all recipients are required by law to respond. The U.S. Census Bureau is required by law to protect your information.

 If you need help or have questions about completing this form, please call 1-800-354-7271.

Toll Telephone (TTY):
Call 1-800-562-8330.

¿NECESITA AYUDA? Llame sin cargo alguno al 1-877-833-5625.

For more information about the American Community Survey, visit our website at: <https://www.census.gov/acs>

Please print the name and telephone number of the person who is filling out this form. We will only contact you if needed for official Census Bureau business.

Last Name

First Name MI

Area Code + Number -

How many people are living or staying at this address?


- **INCLUDE** everyone who is living or staying here for more than 2 months.
- **INCLUDE** yourself if you are living here for more than 2 months.
- **INCLUDE** anyone else staying here who does not have another place to stay, even if they are here for 2 months or less.
- **DO NOT INCLUDE** anyone who is living somewhere else for more than 2 months, such as a college student living away or someone in the Armed Forces on deployment.

Number of people

Fill out pages 2 - 7 for everyone, including yourself, who is living or staying at this address for more than 2 months. Then complete the rest of the form.

FORM **ACS-1(2021)**
(9-18-2021)

OMB No. 0607-0010
OMB No. 0607-0036



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Availability of Data Products

Estimated Population of Geographic Area	1-Year Estimates	1-Year Supplemental Estimates	5-Year Estimates
65,000 or more	X	X	X
20,000 to 64,999		X	X
Less than 20,000			X
Typical Release Date (Occurs in the calendar year after data collection)	September	October	December

census.gov/programs-surveys/acs/news/data-releases.html

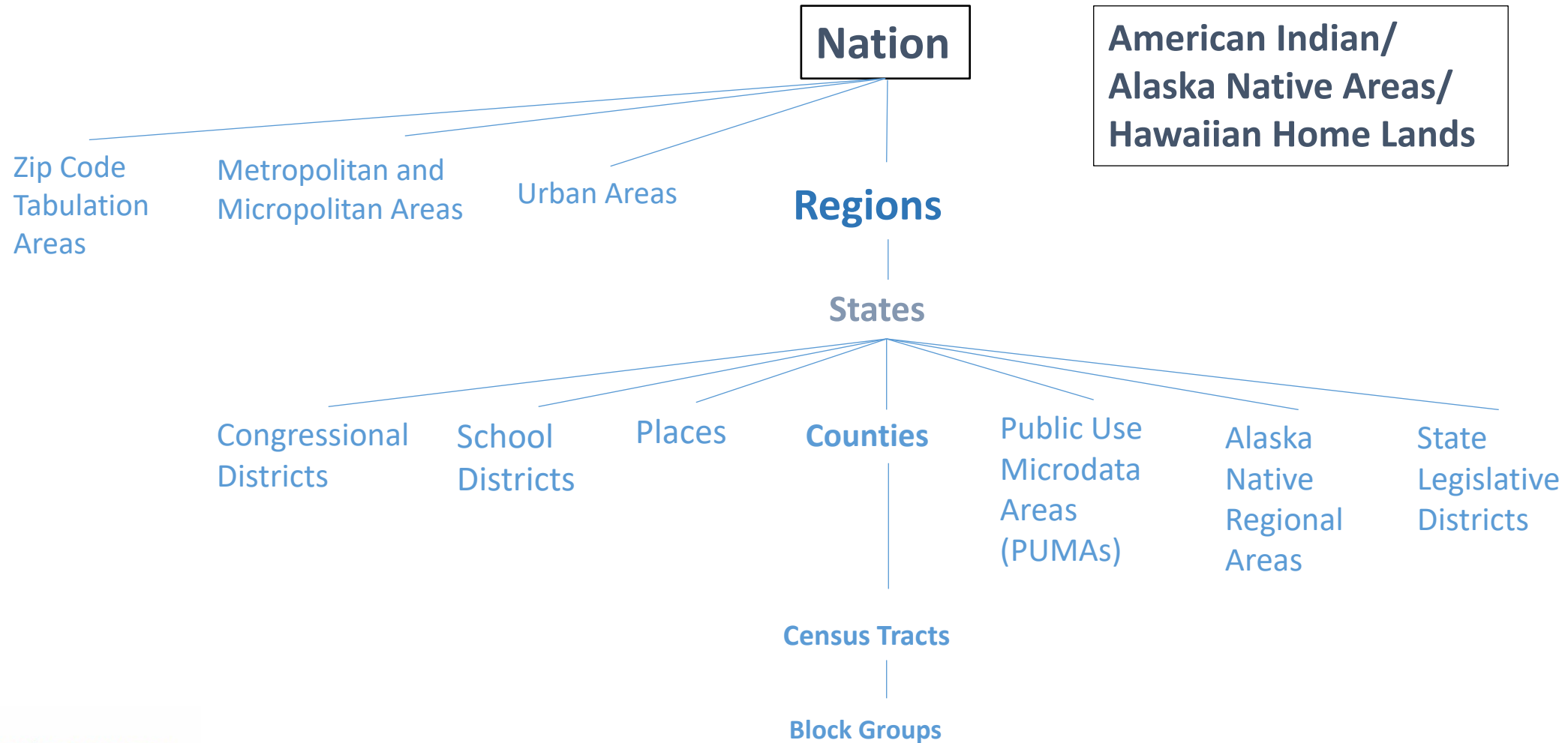
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Content Overview

POPULATION		HOUSING
SOCIAL Ancestry Citizenship Citizen Voting Age Population Disability Educational Attainment Fertility Grandparents Language Marital Status Migration School Enrollment Veterans	DEMOGRAPHIC Age Hispanic Origin Race Relationship Sex	Computer & Internet Use Costs (Mortgage, Rent, Taxes, Insurance) Heating Fuel Home Value Occupancy Plumbing/Kitchen Facilities Structure Tenure (Own/Rent) Utilities Vehicles Year Built/ Year Moved In
	ECONOMIC Class of Worker Commuting Employment Status Food Stamps (SNAP) Health Insurance Hours/Week, Weeks/Year Income Industry & Occupation	

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Selected Census Geographic Concepts



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data.census.gov

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Bureau

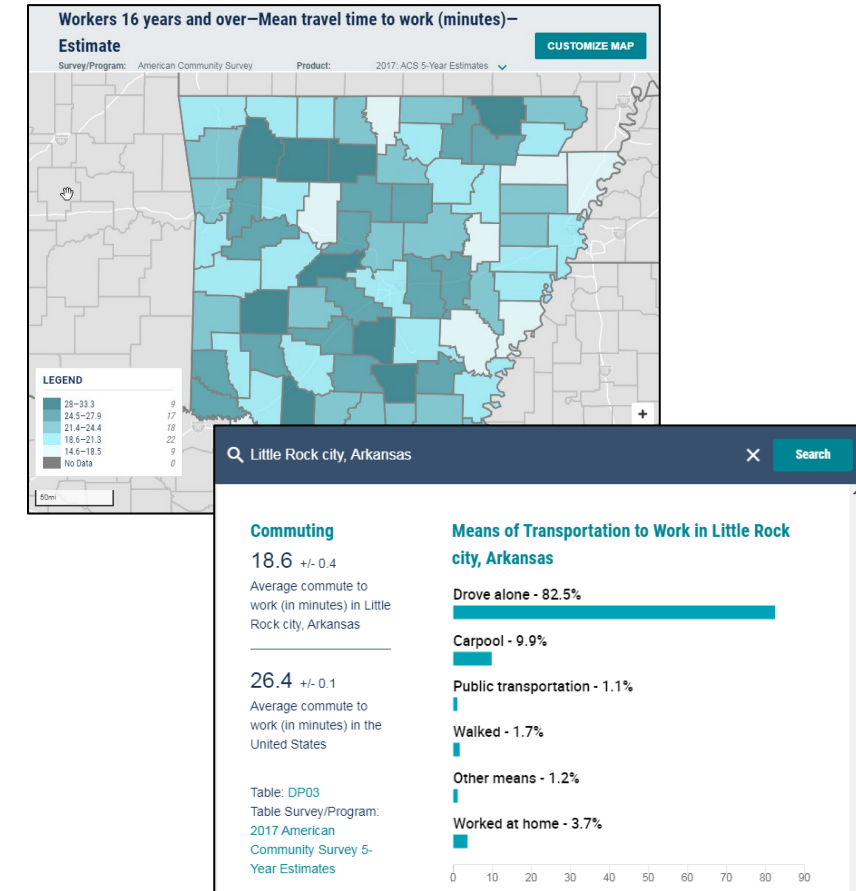
TablesMapsPages

Explore Census Data

The Census Bureau is the leading source of quality data about the nation's people and economy.

Find Tables, Maps, and more ...

Advanced Search? HelpFeedback



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Tables and Profiles

Tables

Types in API

- **Detailed Tables (B or C)**
- **Subject Tables (S)**

Description

- Most detailed ACS statistics
- Each table covers one primary topic
- May contain cross tabulations

Profiles

Types in API

- **Data Profiles (DP)** - includes %
- **Comparison Profiles (CP)** - includes statistical significance

Description

- Most common ACS statistics
- Derived from tables
- Each profile covers many topics

census.gov/programs-surveys/acs/data/data-tables/table-ids-explained.html

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Table and Profile Numbering

B06004APR

- B=Data Product Type (Detailed Table)
- 06=Subject (Place of Birth)
- 004=Sequential Number (2 or 3 digits)
- A=Race/Hispanic Origin (White Alone)
- PR=For Puerto Rico Geographies Only

census.gov/programs-surveys/acs/data/data-tables/table-ids-explained.html

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Visualizing ACS Variable Names

B17001 002E

B17001 = Table ID

002 = Line number

E = Estimate

B17001 002M

B17001 = Table ID

002 = Line number

M = Margin of Error

// Search / Tables / B17001

POVERTY STATUS IN THE PAST 12 MONTHS BY SEX BY AGE

Survey/Program: American Community Survey Universe: Population for whom poverty status is determined **TableID: B17001**

Product: 2018: ACS 1-Year Estimates Detailed Tables ▾

Notes Selections Geos Years Topics Surveys Codes 123 Hide Transpose Filter Margin of Error Restore Excel Download

	United States	
Label	Estimate	Margin of Error
▼ Total:	319,184,033	±23,581
▼ Income in the past 12 months below poverty level:	41,852,315	±232,949
▼ Male:	18,550,942	±111,801
Under 5 years	1,913,474	±28,529
5 years	364,556	±8,933
6 to 11 years	2,267,861	±32,114
12 to 14 years	1,064,847	±22,156

data.census.gov/cedsci/table?q=b17001&hidePreview=true&tid=ACSDT1Y2018.B17001

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What is the Margin of Error (MOE)

Definition: An MOE is a measure of the possible variation of the estimate around the population value

- At a given confidence level, the estimate and actual population value will differ by no more than the MOE
- 90% confidence level is the Census standard and ACS MOEs are provided in the same unit as the estimate

Example: How many males under age 5 live in WY?

Lower bound = $19,649 - 310 = 19,339$

Upper bound = $19,649 + 310 = 19,959$

We are 90% confident the true number of males under age 5 in Wyoming falls **between 19,339 and 19,959**

	Wyoming	
	Estimate	Margin of Error
Total:	579,679	*****
Male:	295,561	+/-598
Under 5 years	19,649	+/-310
5 to 9 years	19,198	+/-638
10 to 14 years	20,703	+/-632
15 to 17 years	11,500	+/-304
18 and 19 years	8,105	+/-322

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What is Open-Source?

- Source code is made freely available to the public
- Users can modify and share freely
- R and Python




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What is an Application Programming Interface (API)?


- Data Service which enables data providers to provide their data in a standardized way and hosted from a Central location
- Allows **data users** to have more direct access to data in order to conduct analyses
- Gives **software and web developers** the ability to create and easily update custom applications

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Google Maps API

 **Google Maps Platform**

OverviewProductsPricingDocumentation▼Blog

SearchEnglish▼

GuidesReferenceSamplesSupport

Overview

Get Started

Get an API Key

Maps SDK for iOS v.3.10.0 BETA

Installing Maps SDK v.3.10.0 BETA

Using Maps SDK v.3.10.0 BETA

Tutorials

Adding a Map with a Marker

Select Current Place

Reverse Geocoding

Creating a Map

Map Objects

Businesses and Other Points of Interest

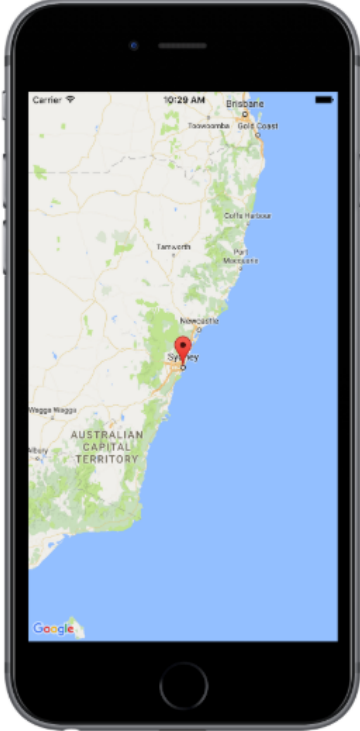
Street View

Launch Google Maps

Set up your development project

Follow these steps to install the Maps SDK for iOS:

1. Download and install [Xcode](#).
2. If you don't already have the CocoaPods tool, install it on macOS by running the following command from the terminal:



Contents

Get the code

[Set up your development project](#)

Get an API key and enable the necessary APIs

Add the API key to your application

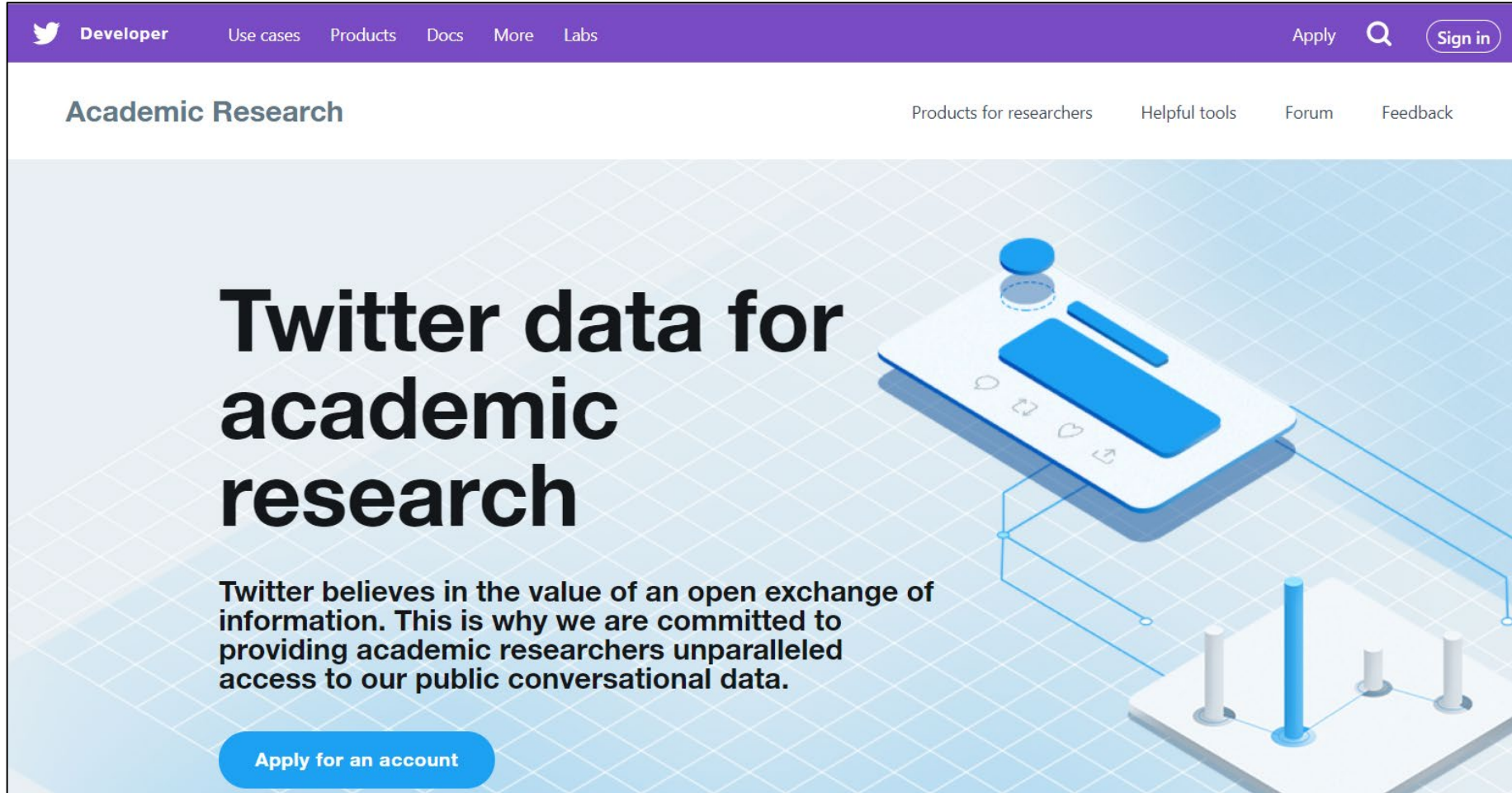
Build and run your app

Understand the code


Next steps

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Twitter API



The screenshot shows the Twitter Developer website's 'Academic Research' section. The top navigation bar is purple with links for 'Developer', 'Use cases', 'Products', 'Docs', 'More', and 'Labs'. On the right, there are links for 'Apply', a search icon, and a 'Sign in' button. Below the navigation bar, the 'Academic Research' title is on the left, and links for 'Products for researchers', 'Helpful tools', 'Forum', and 'Feedback' are on the right. The main content area features a large heading 'Twitter data for academic research' and a paragraph stating Twitter's commitment to providing academic researchers with unparalleled access to public conversational data. A blue button labeled 'Apply for an account' is positioned below the text. To the right of the text is an illustration of a smartphone with social media icons and a bar chart with three bars of increasing height, connected by lines, symbolizing data analysis.

Developer Use cases Products Docs More Labs Apply  [Sign in](#)

Academic Research Products for researchers Helpful tools Forum Feedback

Twitter data for academic research

Twitter believes in the value of an open exchange of information. This is why we are committed to providing academic researchers unparalleled access to our public conversational data.

[Apply for an account](#)

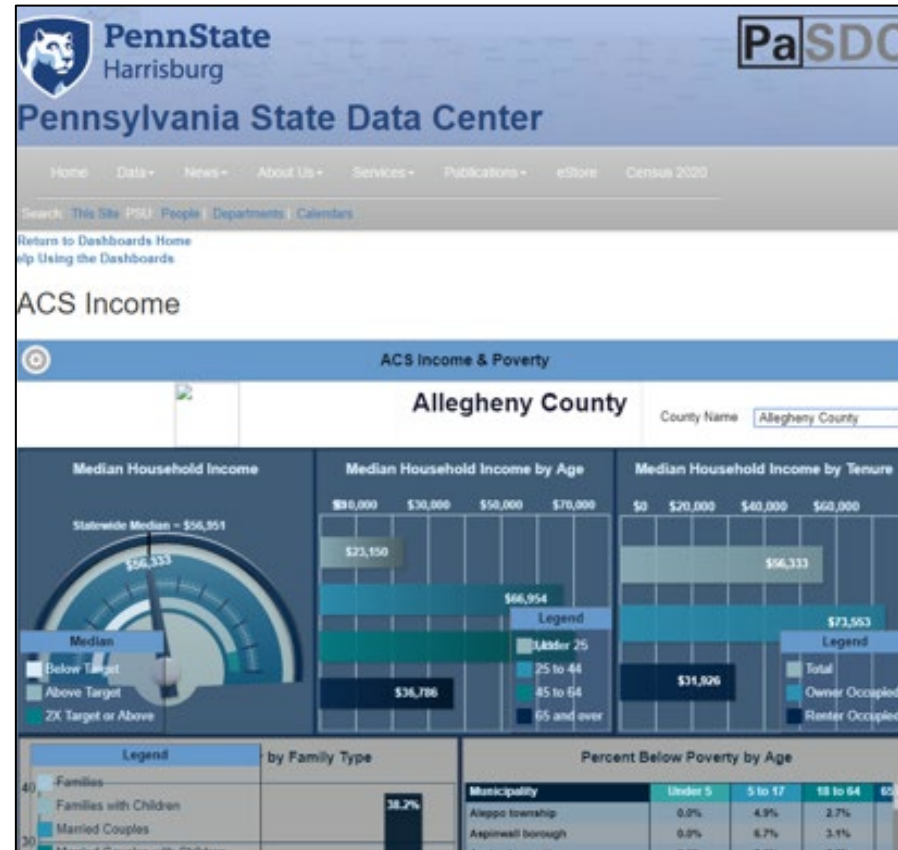
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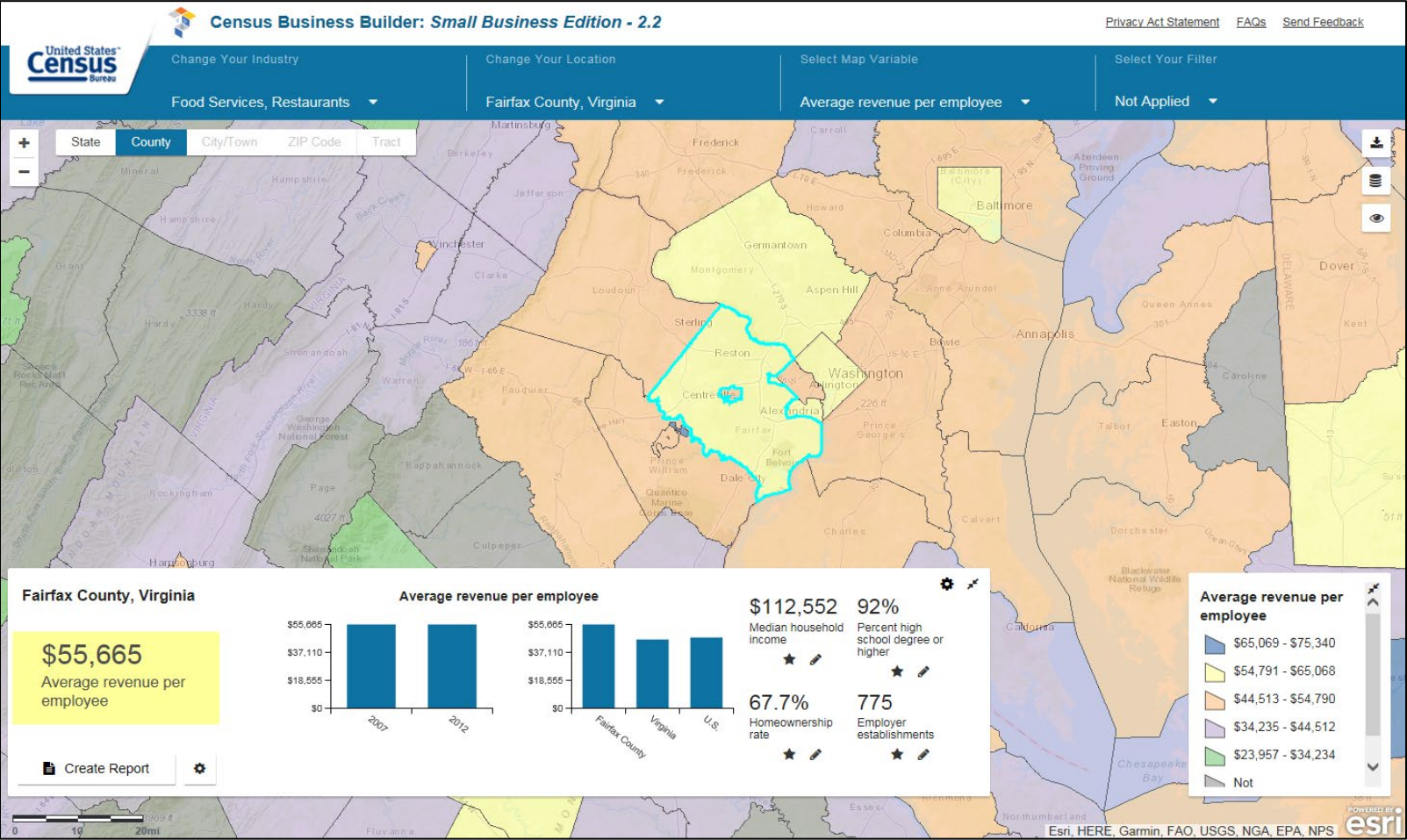
Pennsylvania State Data Center



<https://pasdc.hbg.psu.edu/Data/PaSDCDashboards/ACSIncome/tabid/1922/Default.aspx>

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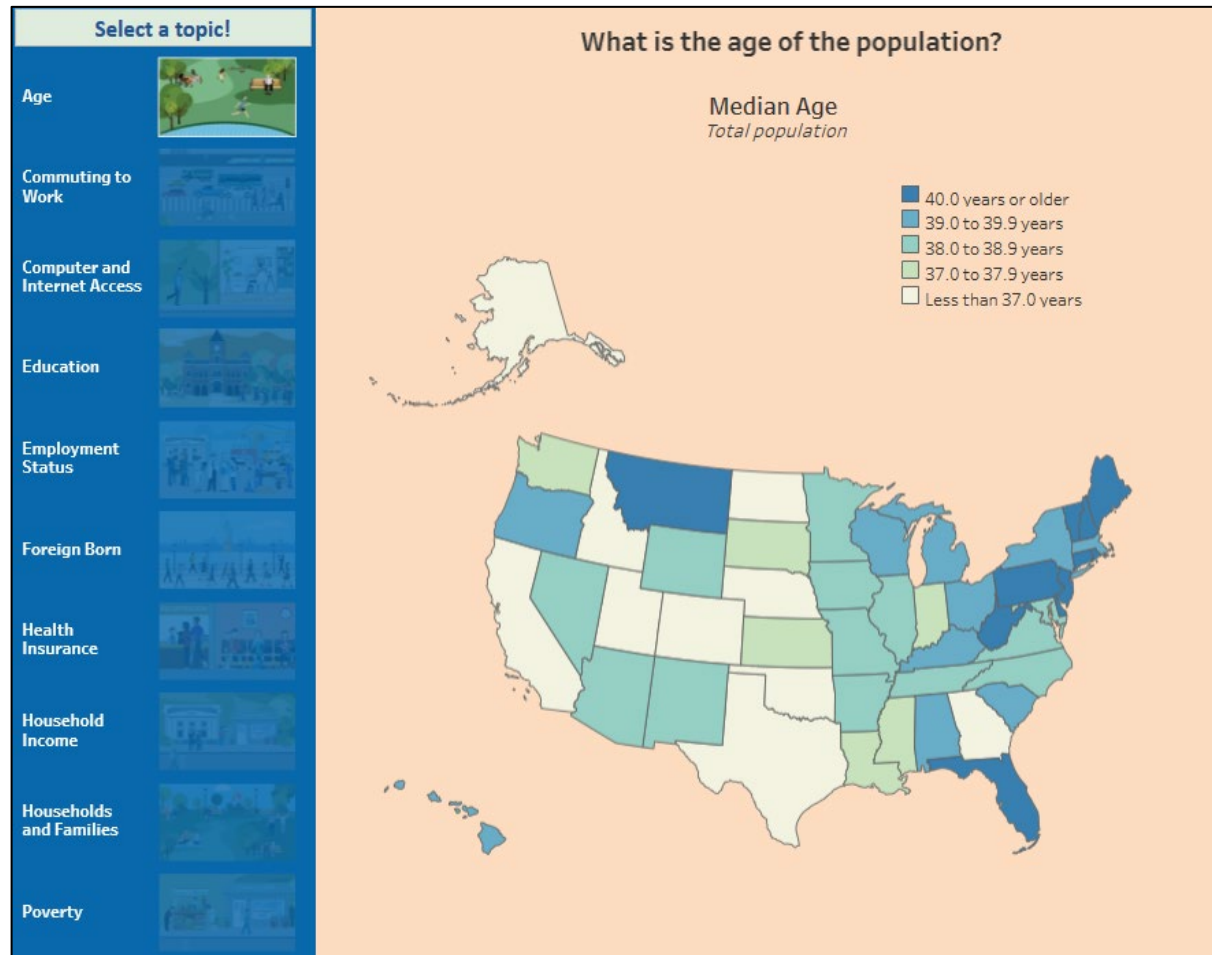
Census Business Builder



census.gov/data/data-tools/cbb.html

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ACS Data Visualizations



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Programs and Surveys in the API

Demographic Programs

- **American Community Survey**
- Decennial Census
- Decennial Census Self Response Rates
- Health Insurance stats (from Current Population Survey, Survey of Income Program Participation, ACS, Small Area Health Insurance Estimates)
- International Database
- Population Estimates and Projections
- Poverty stats (from CPS, Small Area Income & Poverty Estimates)

Economic (Business) Programs

- Annual Survey of Entrepreneurs and Annual Survey of Manufacturers
- Business Dynamics Statistics
- County Business Patterns and Nonemployer Stats
- Economic Census and Economic Indicators
- International Trade
- Quarterly Workforce Indicators
- Survey of Business Owners

Other Programs

- The Planning Database

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ACS Data User Resources

New resource page, Using American Community Survey Data with Open-Source Software, is now available.

This webpage provides information on open-source software packages that allow data users to access and work with ACS data.

WITHIN GUIDANCE FOR DATA USERS

Comparing ACS Data

Handbooks

Statistical Testing Tool




Subjects Included in the Survey

Training Presentations

Using ACS Data with Open-Source Software

When to Use 1-year or 5-year Estimates

Which Data Table or Tool Should I Use?



Using American Community Survey Data with Open-Source Software

Statistical software is a powerful way to quickly and consistently retrieve and interact with data. Open-source programming languages allow developers to create libraries and packages that give data users the opportunity to work with American Community Survey (ACS) data in new and innovative ways. Explore some of these open-source libraries and packages for working with ACS data that have been created by developers in the data user community.

These resources have been created externally and the Census Bureau does not maintain or provide support for any of these libraries and packages.

R and ACS


- **tidycensus** is a package that allows users to interface with the Census Bureau APIs and return tidyverse-ready data frames, with the option of including simple feature geometry.
- **censusapi** is a wrapper for the Census Bureau APIs. This package is designed to retrieve data using the same main function and the same syntax for each dataset.
- **tigris** is a package that allows users to directly download and use Census Bureau TIGER/Line shapefiles.

Python and ACS

- **cenpy** is an interface to explore and query the Census Bureau APIs and return Pandas data frames. This package is intended for exploratory data analysis.
- **datamade** is a simple wrapper for the Census Bureau APIs.

JavaScript and ACS

- **CitySDK** provides convenient JavaScript utilities for working with Census Bureau APIs including Statistics, Cartographic GeoJSON, latitude/longitude conversion to FIPS codes, and more.



Respond to the ACS
Learn how

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Data Dissemination and Training

- ✓ **Bring our data experts to you.**

Request a free data training for your organization.

- ✓ **Receive our Data Gems.**

These short “how-to” videos are an easy and quick way to increase your knowledge of Census data. Get them in your inbox!

- ✓ **Get access to our Courses.**

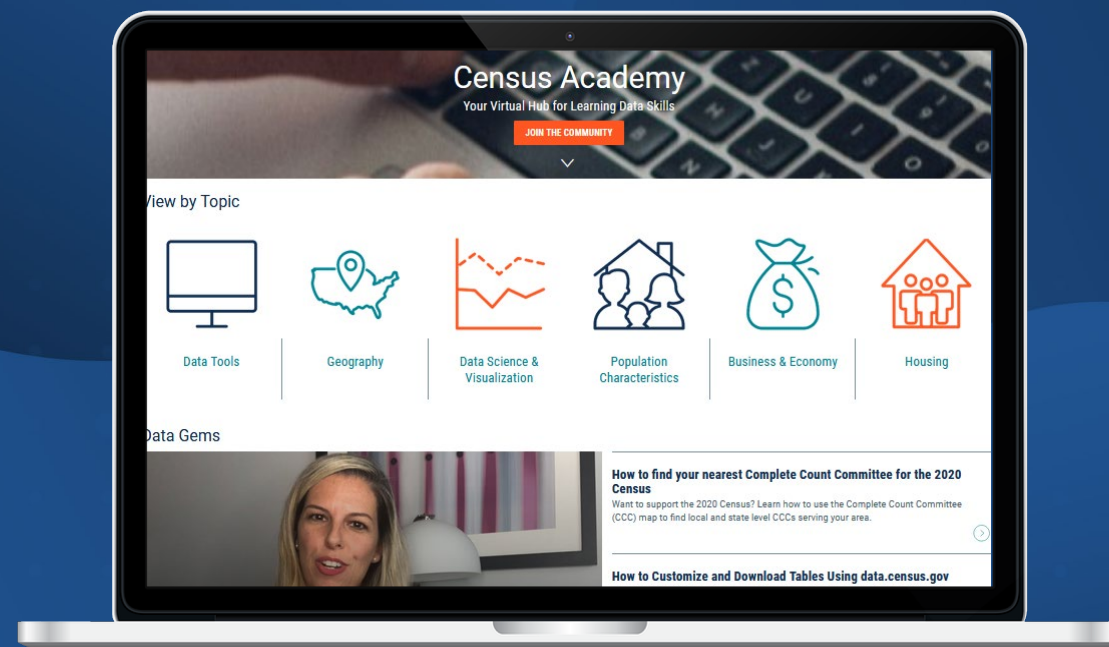
You will learn-at-your-own-pace with these video-tutorials designed for different skill levels.

- ✓ **Interact with our instructors via Webinars.**

Learn about our data releases and tools while attending these live virtual classes.



Census.gov/Academy



Contact us:

Census.askdata@census.gov

1-844-ASK-DATA

*Share your ideas and feedback at
census.academy@census.gov*

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ACS Website

// Census.gov / Our Surveys & Programs / American Community Survey (ACS)

WITHIN OUR SURVEYS & PROGRAMS

- About the ACS
- Data
- Geography & ACS
- Guidance for Data Users
- Information For...
- Library
- Methodology
- Microdata
- News & Updates
- Operations and Administration
- Respond to the ACS
- Technical Documentation
- Contact Us

American Community Survey (ACS)

The American Community Survey (ACS) helps local officials, community leaders, and businesses understand the changes taking place in their communities. It is the premier source for detailed population and housing information about our nation.





Complete the ACS



Find ACS Data





Subscribe

Data

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Census Bureau Developer's Site



 Search

BROWSE BY TOPICEXPLORE DATALIBRARYSURVEYS/ PROGRAMSINFORMATION FOR...FIND A CODEABOUT US

// Census.gov > Data > Developers

DEVELOPERS

About this Section

API Forum

App Gallery

Available APIs

Geography

Guidance for Developers

News

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Updates



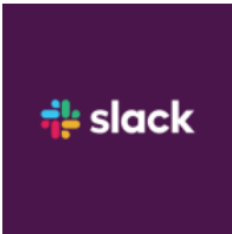
< Back to Data

Developers

The Census Bureau has begun rolling out our datasets via APIs. Check out our [Discovery Tool](#). Sign up for our [newsletter](#) to get the latest updates and newest dataset addition. We also invite you to make requests for features / data via our [forum](#).

[Read More](#)





The American Community Survey

Data Tells Stories. Tell Us Yours!



Share Your ACS Data Story

We want to hear about how you use American Community Survey (ACS) data!

Did you or your organization use the ACS to make an important decision, by community, open/expand a business, etc? If so, we are eager to learn more about ACS data in action. Share your story by completing the fields below to help showcase the value of the ACS.

Need help getting started? Check out featured examples from our current collection of [ACS data stories](#).

* Indicates a required field

Your Story *

Tell us how you use ACS data.

Outcome *

Tell us about any outcomes or decisions that you or your organization have made based on ACS data. For example: selecting a location for a \$250 million department store distribution center that brought 4,000 jobs to Denver, CO.

Your story

Your data details

Your outcome



- Purpose:
 - Improve understanding of the value and utility of ACS data.
 - Promote information sharing among data users about key ACS data issues and applications
- Membership is free and open to all interested ACS data users
- Webinars and special sessions at professional meetings planned
- Users group website and online community

The American Community Survey

For Further Information

Email

American Community Survey Office
acso.users.support@census.gov

Customer Service Center

1-800-923-8282 or 301-763-INFO (4636)

More information online:

census.gov/acs

Email Alerts

<https://public.govdelivery.com/accounts/USCENSUS/signup/12426>

Social Media

@uscensusbureau
#ACSdata

Source Us

U.S. Census Bureau's [YYYY – YYYY] American Community Survey
[1/5]-year [estimates/statistics/data release]