



# Using American Community Survey Estimates and Margins of Error

April 19<sup>th</sup>, 2017

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Decennial Statistical Studies Division  
U.S. Census Bureau



# Outline

- ACS Estimates
- What is the Margin of Error (MOE)
- Why do MOEs Matter
- Statistical Testing Using the MOE
- Special Cases
- Approximating the MOE
- Available Resources
- Questions



# Outline

- **ACS Estimates**
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# ACS Estimates

- Every year, over 3.5 million housing unit addresses are contacted to participate in the ACS
- ACS estimates are based on a sample of the population
  - Creates uncertainty in the data
- For more information on ACS Design and Methodology, please visit:

<https://census.gov/programs-surveys/acs/methodology.html>

# Availability of ACS Data Products

<b>Estimated Population of Geographic Area</b>	<b>1-Year Estimates</b>	<b>1-Year Supplemental Estimates</b>	<b>5-Year Estimates</b>
65,000 or more	X	X	X
20,000 to 64,999		X	X
Less than 20,000			X
<b>Planned Release Date</b>	September	October	December

[census.gov/programs-surveys/acs/news/data-releases.html](https://census.gov/programs-surveys/acs/news/data-releases.html)










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- Why do MOEs Matter
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# What is the Margin of Error?

B01001 SEX BY AGE  
Universe: Total population ⓘ  
2011-2015 American Community Survey 5-Year Estimates

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Although the American Community Survey (ACS) produces population, demographic and housing unit estimates, it is the Census Bureau's Population Estimates Program that produces and disseminates the official estimates of the population for the nation, states, counties, cities and towns and estimates of housing units for states and counties.







Versions of this table are available for the following years:  
**2015** ▶  
2014  
2013  
2012  
2011  
2010  
2009

		United States	
		Estimate	Margin of Error
49	Total:	316,515,021	*****
of	Male:	155,734,280	+/-6,323
49	Under 5 years	10,175,713	+/-3,826
↓	5 to 9 years	10,470,147	+/-19,282
	10 to 14 years	10,561,873	+/-18,975
	15 to 17 years	6,447,043	+/-2,839
	18 and 19 years	4,495,581	+/-4,738
	20 years	2,453,321	+/-11,935
	21 years	2,400,843	+/-11,798
	22 to 24 years	6,722,248	+/-15,192
	25 to 29 years	10,989,596	+/-3,803
	30 to 34 years	10,625,791	+/-3,805



# What is the Margin of Error?

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# What is the Margin of Error?

- **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 the actual population value will differ by no more than the value of the MOE
  - 90% confidence level is the Census Bureau Standard
- ACS MOEs are provided in the same units as their respective estimates

# What is the Margin of Error?

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# Measures of Sampling Variability

Variance

(Calculated with estimate)



Standard Error

$$SE = \sqrt{\text{Variance}}$$



Margin of Error

$$MOE = 1.645 \times SE$$

(Census Bureau Standard: 90 percent Confidence Level)

# Alternate Confidence Levels

Confidence Level	Margin of Error (MOE)
90%	1.645 x SE
95%	1.96 x SE
99%	2.58 x SE

Converting MOE to different confidence level:

$$\begin{aligned} \text{MOE}_{95\% \text{ confidence level}} &= \frac{1.96}{1.645} \times \text{MOE}_{90\% \text{ confidence level}} \\ &= 1.96 \times \frac{\text{MOE}_{90\% \text{ confidence level}}}{1.645} \end{aligned}$$

# Alternate Confidence Levels

	<b>SEX BY AGE</b>	
	Universe: Total Population 2011-2015 American Community Survey 5-Year Estimates	
	<b>United States</b>	
	<b>Estimate</b>	<b>Margin of Error</b>
Under 5 years	10,175,713	+/-3,826

$$\begin{aligned} \text{MOE}_{95\% \text{ confidence level}} &= \frac{1.96}{1.645} \times 3,826 \\ &= +/- 4,559 \end{aligned}$$

# Alternate Confidence Levels

<b>B01001</b>	<b>SEX BY AGE</b> Universe: Total Population 2011-2015 American Community Survey 5-Year Estimates	
	<b>United States</b>	
	<b>Estimate</b>	<b>Margin of Error</b>
Under 5 years	10,175,713	+/-3,826

$$\text{MOE}_{95\% \text{ confidence level}} = \frac{1.96}{1.645} \times 3,826$$

$$= \pm 4,559$$

Confidence Level	Margin of Error (MOE)	MOE for Example Estimate
90%	1.645 x SE	+/- 3,826
95%	1.96 x SE	+/- 4,559
99%	2.58 x SE	+/- 6,001



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# Confidence Intervals

Confidence Interval: (Estimate - MOE, Estimate + MOE)

Geography	Median Household Income (\$)	MOE (\$)
Block Group 1	37,284	+/- 20,922

$$\text{Upper Bound} = \$37,284 + 20,922 = \$58,206$$

$$\text{Lower Bound} = \$37,284 - 20,922 = \$16,362$$

Confidence Interval<sub>90%</sub>: (\$16,362, \$58,206)

# Why MOEs Matter

<b>Geography</b>	<b>Median Household Income (\$)</b>	<b>MOE (\$)</b>
Block Group 1	37,200	
Block Group 2	42,797	
Block Group 3	56,875	
Block Group 4	66,725	
Block Group 5	76,850	

# Why MOEs Matter

<b>Geography</b>	<b>Median Household Income (\$)</b>	<b>MOE (\$)</b>
Block Group 1	37,200	+/-20,920
Block Group 2	42,797	+/-21,305
Block Group 3	56,875	+/-20,956
Block Group 4	66,725	+/-32,137
Block Group 5	76,850	+/-47,200



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# What is Statistical Testing

- **Definition** : A test to determine if a difference is unlikely to occur by chance
- To be “statistically different”, there must be statistical evidence that there is a difference between two estimates
- Testing should be conducted for all comparisons, both implicit and explicit

# Statistical Testing

Generic Z-score formula:

$$\frac{|Est_1 - Est_2|}{\sqrt{MOE_{est1}^2 + MOE_{est2}^2}}$$

# Statistical Testing

S0201 SELECTED POPULATION PROFILE IN THE UNITED STATES				
2015 American Community Survey 1-Year Estimates				
Subject	United States		New York	
	Total Population		Total Population	
	Estimate	Margin of Error	Estimate	Margin of Error
25 to 34 years	13.7%	+/-0.1	14.5%	+/-0.1
35 to 44 years	12.7%	+/-0.1	12.6%	+/-0.1
45 to 54 years	13.4%	+/-0.1	13.9%	+/-0.1
55 to 64 years	12.7%	+/-0.1	12.8%	+/-0.1
65 to 74 years	8.6%	+/-0.1	8.4%	+/-0.1
75 years and over	6.3%	+/-0.1	6.6%	+/-0.1
Median age (years)	37.8	+/-0.1	38.3	+/-0.2
18 years and over	77.1%	+/-0.1	78.7%	+/-0.1
21 years and over	72.9%	+/-0.1	74.6%	+/-0.1

# Statistical Testing

Subject	United States		New York	
	Total Population		Total Population	
	Estimate	Margin of Error	Estimate	Margin of Error
Median age (years)	37.8	+/-0.1	38.3	+/-0.2

Step	Process	Result
1	Take the difference of the estimates	$37.8 - 38.3 = -0.5$
2	Take the absolute value of step 1	$ -0.5  = \text{abs}(-0.5) = 0.5$
3	Square the MOEs	$0.1^2 = 0.01$ $0.2^2 = 0.04$
4	Add the squared MOEs together	$0.01 + 0.04 = 0.05$



# Statistical Testing

Step	Process	Result
5	Take the square root of the sum	$\sqrt{0.05} \approx 0.224$
6	Divide step 2 by step 5	$0.5 / 0.224 = 2.24$
7	Compare result to 1.0	$2.24 > 1.0$

If the result is greater than 1.0,  
then the estimates are statistically different  
at the 90% confidence level

# Statistical Testing

Generic Z-score formula:

$$\frac{|Est_1 - Est_2|}{\sqrt{MOE_{est1}^2 + MOE_{est2}^2}}$$

Example:

$$\frac{|37.8 - 38.3|}{\sqrt{(0.1)^2 + (0.2)^2}} = 2.24$$

# Statistical Testing

This method is used for:

- Any type of estimate (count, percent, median, rate, etc.)
- Between years
  - Not between single-year and multi-year estimates
- Between non-overlapping multi-year periods
- Across geographic areas
- Between surveys (e.g. ACS vs Census)
  - To check ACS/ Census compatibility, visit:

<https://www.census.gov/programs-surveys/acs/guidance/comparing-acs-data.html>

# Statistical Testing Tool

Census.gov > Our Surveys & Programs > American Community Survey (ACS) > Guidance for Data Users > Statistical Testing Tool

## American Community Survey (ACS)


- About the Survey
- Respond to the Survey
- News & Updates
- Data
  - Guidance for Data Users**
    - Subjects Included in the Survey
    - Which Data Table or Tool Should I Use?
    - When to Use 1-year, 3-year, or 5-year Estimates
    - Handbooks
    - Comparing ACS Data
    - Statistical Testing Tool**
    - Training Presentations
  - Geography & ACS
  - Technical Documentation
  - Methodology

### Statistical Testing Tool

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Comparing American Community Survey (ACS) estimates involves more than determining which statistic is higher or lower. Users should also conduct statistical testing to make sure differences are statistically significant and are unlikely to have occurred by chance. This testing takes into account the margin of error (MOE) associated with survey estimates, which are based on responses from only a sample of the full population.

Looking for an easy way to conduct statistical testing? Try the Census Bureau's new [Statistical Testing Tool](#). Simply copy or download ACS estimates and their MOEs into the spreadsheet to get instant results of statistical tests.



Download Statistical Testing Tool  
[XLSX - 3.5 MB]

#### Tool Features:

- Compares up to 3,230 pairs of estimates at once
- Compares multiple estimates simultaneously (up to 150 estimates)
- Displays statistical testing results ("Yes", "No") automatically
- Handles special formatting and characters, such as the '+/-' in front of the MOE, without additional editing by the data user
- Uses the Census Bureau's standard 90% confidence level, but can also process statistical testing at 95% or 99% confidence levels
- May be used to conduct statistical testing for other Census Bureau surveys

<https://www.census.gov/programs-surveys/acs/guidance/statistical-testing-tool.html>

# Statistical Testing Tool

## Statistical Testing Tool

### Statistical Testing for Two Estimates



#### Purpose

This spreadsheet determines whether there is statistical evidence to conclude that two estimates are different from each another.

#### Results

Yes	Estimates are statistically different.
<b>No</b>	Estimates are NOT statistically different (or are statistically tied).
N/A	Statistical testing is not applicable for one or both of the estimates.

[Overview](#)

[Instructions](#)

[Statistical Testing for Multiple Estimates](#)

[Worked Example](#)

[Contact Us](#)

	Label	First Estimate	First Margin of Error (MOE)	Second Estimate	Second Margin of Error (MOE)	Statistically Different?
1	Median age (years)	37.8	+/-0.1	38.3	+/-0.2	Yes
2						
3	Block Groups	37,200	20,920	76,850	47,200	<b>No</b>
4						
5						

<https://www.census.gov/programs-surveys/acs/guidance/statistical-testing-tool.html>

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**How to Use**

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5. Sort the da  
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[Overview](#) [Ins](#)

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						1	2	3	4	5	6
1	Block Group 1	37,200	+/-20,920	Block Group 1		X	No	No	No	No	
2	Block Group 2	42,797	+/-21,305	Block Group 2		No	X	No	No	No	
3	Block Group 3	56,875	+/-20,956	Block Group 3		No	No	X	No	No	
4	Block Group 4	66,725	+/-32,137	Block Group 4		No	No	No	X	No	
5	Block Group 5	76,850	+/-47,200	Block Group 5		No	No	No	No	X	
6											

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3	Block Group 3	56,875	+/-20,956	Block Group 3		No	No	X	No	No
4	Block Group 4	66,725	+/-32,137	Block Group 4		No	No	No	X	No
5	Block Group 5	76,850	+/-47,200	Block Group 5		No	No	No	No	X
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# ACS Comparison Profile

## Year to Year Change

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Advanced Search - Search all data in American FactFinder

1 Advanced Search | **2 Table Viewer**

Result 1 of 1 | VIEW ALL AS PDF

CP02 | **COMPARATIVE SOCIAL CHARACTERISTICS IN THE UNITED STATES** | 2011-2015 American Community Survey 5-Year Estimates

Table View

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Since the 5-year data do not benefit from data quality filtering, comparisons are only made for populations of 5,000 or more.

Subject	United States		Statistical Significance
	2011-2015 Estimates	2006-2010 Estimate	
<b>HOUSEHOLDS BY TYPE</b>			
Total households	116,926,305	114,235,99	*
Family households (families)	66.1%	66.8%	*
With own children of the householder under 18 years	28.8%	30.6%	*
Married-couple family	48.3%	49.6%	*
With own children of the householder under 18 years	19.4%	21.1%	*
Male householder, no wife present, family	4.8%	4.6%	*
With own children of the householder under 18 years	2.3%	2.2%	*
Female householder, no husband present, family	13.0%	12.6%	*
With own children of the householder under 18 years	7.1%	7.3%	*
Nonfamily households	33.9%	33.2%	*
Householder living alone	27.6%	27.2%	*
65 years and over	10.1%	9.3%	*

# ACS Ranking Tables

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1 Advanced Search | **2 Table Viewer** | Result 2 of 2 | VIEW ALL AS PDF

R0205 | PERCENT OF THE TOTAL POPULATION WHO ARE NATIVE HAWAIIAN AND OTHER PACIFIC ISLANDER ALONE - United States -- States; and Puerto Rico  
Universe: Total population | 2015 American Community Survey 1-Year Estimates

Table View | BACK TO ADVANCED SEARCH

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To view this table with statistical significance, select With Statistical Significance in the Action menu. A # next to a geography indicates when an estimate is not statistically significant from the estimate for the selected geography. The ## indicates the selected geography.

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Geography: United States

Rank	Geographical Area	Percent	Margin of Error
1	United States	0.2	+/-0.1
1	Hawaii	9.4	+/-0.4
2	Alaska	0.9	+/-0.2
3	Utah	0.8	+/-0.1
4	Nevada	0.6	+/-0.1
4	Washington	0.6	+/-0.1
6	California	0.4	+/-0.1
6	Oregon	0.4	+/-0.1
8	Arkansas	0.3	+/-0.1
9	Arizona	0.2	+/-0.1

# ACS Ranking Tables

**United States Census Bureau** AMERICAN FactFinder

Feedback

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**Advanced Search** - Search all data in American FactFinder

1 Advanced Search 2 **Table Viewer** Result 1 of 1

R0205 PERCENT OF THE TOTAL POPULATION WHO ARE NATIVE HAWAIIAN AND OTHER PACIFIC ISLANDER ALONE - United States -- States; and Puerto Rico  
Universe: Total population  
2015 American Community Survey 1-Year Estimates

Table View BACK TO

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Although the American Community Survey (ACS) produces population, demographic and housing unit estimates, it is the Census Bureau's Population Estimates Program that produces and disseminates the official population for the nation, states, counties, cities and towns and estimates of housing units for states and counties.

To view this table with statistical significance, select With Statistical Significance in the Action menu.  
A # next to a geography indicates when an estimate is not statistically significant from the estimate for the selected geography.  
The ## indicates the selected geography.

Versions of this table are available for the following years:  
2015  
2014  
2013  
2012  
2011  
2010  
2009  
2008  
2007  
2006

Geography: United States  
Stat Sig: Geographical Area: United States

Rank	Geographical Area	Stat Sig?	Percent	Margin of Error
1	United States	##	0.2	+/-0.1
1	Hawaii		9.4	+/-0.4
2	Alaska		0.9	+/-0.2
3	Utah		0.8	+/-0.1
4	Nevada		0.6	+/-0.1
4	Washington		0.6	+/-0.1
6	California		0.4	+/-0.1
6	Oregon		0.4	+/-0.1
8	Arkansas		0.3	+/-0.1
9	Arizona	#	0.2	+/-0.1
9	Colorado	#	0.2	+/-0.1

# ACS Ranking Tables

**United States Census Bureau** AMERICAN FactFinder

Feedback

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1 Advanced Search 2 **Table Viewer** Result 1 of 1

R0205 PERCENT OF THE TOTAL POPULATION WHO ARE NATIVE HAWAIIAN AND OTHER PACIFIC ISLANDER ALONE - United States -- States; and Puerto Rico  
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Versions of this table are available for the following years:  
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Geography: United States  
Stat Sig: Geographical Area: United States

Rank	Geographical Area	Stat Sig?	Percent	Margin of Error
1	United States	##	0.2	+/-0.1
1	Hawaii		9.4	+/-0.4
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4	Nevada		0.6	+/-0.1
4	Washington		0.6	+/-0.1
6	California		0.4	+/-0.1
6	Oregon		0.4	+/-0.1
8	Arkansas		0.3	+/-0.1
9	Arizona	#	0.2	+/-0.1
9	Colorado	#	0.2	+/-0.1



# Outline

- ACS Estimates
- What is the Margin of Error (MOE)
- Why do MOEs Matter
- Statistical Testing Using the MOE
- **Special Cases**
- Approximating the MOE
- Available Resources
- Questions



# Special Case

## Controlled Estimates

- MOE = \*\*\*\*\* (5 asterisks)
- Set MOE = 0 for statistical testing

B01001	SEX BY AGE	
	Universe: Total Population	
	2011-2015 American Community Survey 5-Year Estimates	
	United States	
	Estimate	Margin of Error
Total:	316,515,021	*****
Male:	155,734,280	+/-6,323
Under 5 years	10,175,713	+/-3,826
5 to 9 years	10,470,147	+/-19,282
10 to 14 years	10,561,873	+/-18,975
15 to 17 years	6,447,043	+/-2,839

# Special Case

## Zero Estimate MOEs

- Zero estimates will have an MOE

B01001E SEX BY AGE (NATIVE HAWAIIAN AND OTHER PACIFIC ISLANDER ALONE) Universe: People who are Native Hawaiian and Other Pacific Islander alone 2011-2015 American Community Survey 5-Year Estimates								
	Maine		New Hampshire		Vermont		Rhode Island	
	Estimate	Margin of Error	Estimate	Margin of Error	Estimate	Margin of Error	Estimate	Margin of Error
Total:	187	+/-67	228	+/-99	249	+/-91	373	+/-179
Male:	63	+/-33	118	+/-75	93	+/-60	224	+/-134
Under 5 years	0	+/-22	0	+/-26	0	+/-20	0	+/-29
5 to 9 years	0	+/-22	0	+/-26	0	+/-20	41	+/-37
10 to 14 years	16	+/-20	0	+/-26	8	+/-16	35	+/-36
15 to 17 years	0	+/-22	0	+/-26	0	+/-20	0	+/-29
18 and 19 years	0	+/-22	4	+/-7	0	+/-20	0	+/-29
20 to 24 years	0	+/-22	22	+/-27	18	+/-23	89	+/-98
25 to 29 years	17	+/-23	0	+/-26	25	+/-38	0	+/-29



# Special Case

## Medians and Aggregates

<b>B06001 MEDIAN INCOME IN THE PAST 12 MONTHS (IN 2015 INFLATION-ADJUSTED DOLLARS)            BY PLACE OF BIRTH IN THE UNITED STATES</b> Universe: Population 15 years and over in the United States with income 2011-2015 American Community Survey 5-Year Estimates		
	Haena CDP, Hawaii	
	Estimate	Margin of Error
Median income in the past 12 months --		
Total:	19,107	+/-6,953
Born in state of residence	14,773	+/-9,473
Born in other state of the United States	32,917	+/-22,935
Native; born outside the United States	-	**
Foreign born	2,500-	***

- Median and Aggregates with too few observations
  - Estimate = “-”, MOE = “\*\*\*”
- Medians in lower or upper categories:
  - Estimate = “\$2,500-”, MOE = “\*\*\*”
  - Estimate = “\$250,000+”, MOE = “\*\*\*”

Statistical testing **NOT** possible

# Special Case

## Medians and Aggregates

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Native; born outside the United States	-	**
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- Median and Aggregates with too few observations
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- Medians in lower or upper categories:
  - Estimate = “\$2,500-”, MOE = “\*\*\*”
  - Estimate = “\$250,000+”, MOE = “\*\*\*”

Statistical testing **NOT** possible

# Estimates with Large MOEs

B17001


POVERTY STATUS IN THE PAST 12 MONTHS BY SEX BY AGE  
 Universe: Population for whom poverty status is determined   
 2011-2015 American Community Survey 5-Year Estimates

Table View 

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- 2013
- 2012
- 2011
- 2010
- 2009

« 1 - 18 of 2,296 »»

	Census Tract 9601, Acadia Parish, Louisiana		Census Tract 9602, Acadia Parish, Louisiana		Census Tract 9603, Acadia Parish, Louisiana		Census Tract 9604, Acadia Parish, Louisiana		Census Tract 9605, Acadia Parish, Louisiana		Cen 961
	Estimate	Margin of Error	Estimate	Margin of Error	Estimate	Margin of Error	Estimate	Margin of Error	Estimate	Margin of Error	Estin
Total:	5,879	+/-547	5,859	+/-559	3,618	+/-357	6,591	+/-570	6,476	+/-683	5,
Income in the past 12 months below poverty level:	1,837	+/-468	404	+/-212	347	+/-170	898	+/-421	1,151	+/-428	
Male:	629	+/-247	243	+/-170	129	+/-80	332	+/-171	439	+/-215	
Under 5 years	66	+/-68	0	+/-17	38	+/-47	14	+/-17	24	+/-39	
5 years	13	+/-23	0	+/-17	0	+/-12	0	+/-17	0	+/-17	
6 to 11 years	172	+/-183	12	+/-20	0	+/-12	30	+/-36	75	+/-89	
12 to 14 years	70	+/-92	12	+/-20	0	+/-12	30	+/-29	0	+/-17	
15 years	68	+/-81	0	+/-17	0	+/-12	0	+/-17	0	+/-17	
16 and 17 years	0	+/-17	11	+/-18	19	+/-30	0	+/-17	0	+/-17	
18 to 24 years	48	+/-71	100	+/-142	0	+/-12	11	+/-17	22	+/-34	
25 to 34 years	0	+/-17	12	+/-21	15	+/-31	38	+/-29	82	+/-90	
35 to 44 years	0	+/-17	0	+/-17	0	+/-12	54	+/-57	20	+/-34	
45 to 54 years	109	+/-81	13	+/-22	0	+/-12	0	+/-17	57	+/-88	
55 to 64 years	40	+/-57	53	+/-49	35	+/-53	88	+/-89	62	+/-61	
65 to 74 years	0	+/-17	30	+/-34	0	+/-12	0	+/-17	97	+/-89	



# Estimates with Large MOEs

- Exercise Caution
  - Questionable Reliability
  - Small Sample Size
- Possible Solutions:
  - Use a larger geography
  - Combine estimates across characteristics, geographies or both



# Outline

- ACS Estimates
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# Deriving New Estimates

## Must approximate the MOE

B01001 | SEX BY AGE  
Universe: Total population ⓘ  
2011-2015 American Community Survey 5-Year Estimates

Table View

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	United States	
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Under 5 years	10,175,713	+/-3,826
5 to 9 years	10,470,147	+/-19,282
10 to 14 years	10,561,873	+/-18,975
15 to 17 years	6,447,043	+/-2,839
18 and 19 years	4,495,581	+/-4,738
20 years	2,453,321	+/-11,935
21 years	2,400,843	+/-11,798
22 to 24 years	6,722,248	+/-15,192
25 to 29 years	10,989,596	+/-3,803
30 to 34 years	10,625,791	+/-3,805
35 to 39 years	9,899,569	+/-18,114
40 to 44 years	10,330,986	+/-19,512
45 to 49 years	10,571,984	+/-3,325
50 to 54 years	11,051,409	+/-3,848
55 to 59 years	10,173,646	+/-15,150
60 and 61 years	3,730,038	+/-10,517
62 to 64 years	5,094,814	+/-14,486
65 and 66 years	3,060,112	+/-9,681
67 to 69 years	3,816,159	+/-9,513
70 to 74 years	4,867,513	+/-9,712
75 to 79 years	3,416,432	+/-8,382
80 to 84 years	2,378,691	+/-7,138
85 years and over	2,888,771	+/-7,241
Female:	160,780,741	+/-6,310
Under 5 years	9,738,365	+/-3,377
5 to 9 years	10,031,835	+/-16,038
10 to 14 years	10,117,913	+/-16,683



# Approximating the MOE

To calculate total number of children under the age of 5 years old:

1. Sum the estimates for males and females
2. Approximate the MOE:

$$MOE(Sum) = \sqrt{MOE_{est1}^2 + MOE_{est2}^2 \dots}$$

# Approximating the MOE

Characteristics	Estimate	MOE
Under 5 years, Males	10,175,713	+/-3,826
Under 5 years, Females	9,736,305	+/-3,377

Estimate of the Sum = 10,175,713 + 9,736,305  
= 19,912,018

$$MOE(Sum) = \sqrt{3,826^2 + 3,377^2} \approx 5,103$$

# Approximating the MOE

Characteristics (Native Hawaiian and Other Pacific Islander alone)	Estimate	MOE
Under 5 years old (Maine)	0	+/-22
5 to 9 years old (Maine)	0	+/-22
Under 5 years old (Rhode Island)	0	+/-29
5 to 9 years old (Rhode Island)	41	+/-37
<b>TOTAL</b>	41	+/-47

When approximating a sum,  
use only the largest zero estimate MOE, once:

$$MOE(Sum) = \sqrt{37^2 + 29^2} \approx 47$$

# Variance Replicate Tables

Census.gov > Our Surveys & Programs > American Community Survey (ACS) > Data > Variance Replicate Tables

## American Community Survey (ACS)

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  - Data Tables & Tools
  - Data via FTP
  - Summary File Data
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### Variance Replicate Tables

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Variance replicate estimate tables include estimates, margins of error, and 80 variance replicates for selected American Community Survey 5-year detailed tables.

View documentation and table shells on the [Variance Replicate Tables Documentation](#) page.

Users should be aware that issues may arise when opening large files in Excel due to the file exceeding the row limit (1,048,576 in current versions), causing Excel to truncate the data. Not all files will have this issue. Data users may need to use other programs to examine the variance replicate estimates in some of these large files.

2015 2014

### 2011-2015 ACS 5-year Estimates

[5-year Variance Replicate Tables](#)

<https://www.census.gov/programs-surveys/acs/technical-documentation/variance-tables.html>

# Collapsed Tables

## Detailed Table

B01001B SEX BY AGE (BLACK OR AFRICAN AMERICAN ALONE) Universe: People who are Black or African American alone 2015 American Community Survey 1-Year Estimates		
	United States	
	Estimate	Margin of Error
Total:	40,695,277	+/-62,504
Male:	19,429,854	+/-32,285
Under 5 years	1,412,491	+/-11,790
5 to 9 years	1,477,954	+/-17,659
10 to 14 years	1,462,379	+/-17,613
15 to 17 years	935,817	+/-8,432
18 and 19 years	657,217	+/-10,080
20 to 24 years	1,731,314	+/-14,258
25 to 29 years	1,521,425	+/-12,236
30 to 34 years	1,340,115	+/-11,969
35 to 44 years	2,506,498	+/-13,899
45 to 54 years	2,528,302	+/-13,049
55 to 64 years	2,148,437	+/-7,771
65 to 74 years	1,118,537	+/-7,828

## Collapsed Table

C01001B SEX BY AGE (BLACK OR AFRICAN AMERICAN ALONE) Universe: People who are Black or African American alone 2015 American Community Survey 1-Year Estimates		
	United States	
	Estimate	Margin of Error
Total:	40,695,277	+/-62,504
Male:	19,429,854	+/-32,285
Under 18 years	5,288,641	+/-22,715
18 to 64 years	12,433,308	+/-22,683
65 years and over	1,707,905	+/-7,693
Female:	21,265,423	+/-44,169
Under 18 years	5,111,963	+/-30,317
18 to 64 years	13,595,889	+/-21,310
65 years and over	2,557,571	+/-7,393



# Outline

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# Resources

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Learn more about upcoming ACS data releases, including the September 14th release of the 2016 ACS 1-year estimates, as well as a preview of Data.census.gov.

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Learn how

# ACS Documentation

<https://www.census.gov/programs-surveys/acs/technical-documentation/code-lists.html>

Census.gov > Our Surveys & Programs > American Community Survey (ACS) > Technical Documentation > Code Lists, Definitions, and Accuracy

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#### Statistical Testing Tool

Spreadsheet to quickly test whether ACS estimates are statistically different from one another

📎 Statistical Testing Tool

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A basic explanation of the sample design, estimation methodology, and accuracy of the data

📎 2011-2015 ACS Multiyear Accuracy (US) [<1 MB]  
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[2011-2015 ACS Multiyear Accuracy \(US\) \[<1 MB\]](#)  
[2011-2015 PRCS Multiyear Accuracy \(Puerto Rico\) \[<1 MB\]](#)  
[2015 ACS 1-year Accuracy of the Data \(US\) \[<1 MB\]](#)  
[2015 PRCS 1-year Accuracy of the Data \(Puerto Rico\) \[<1 MB\]](#)

# Compass Handbooks

<https://www.census.gov/programs-surveys/acs/guidance/handbooks.html>

Census.gov > Our Surveys & Programs > American Community Survey (ACS) > Guidance for Data Users > Handbooks





## American Community Survey (ACS)

- About the Survey
- Respond to the Survey
- News & Updates
- Data
- Guidance for Data Users**
- Subjects Included in the Survey
- Which Data Table or Tool Should I Use?
- When to Use 1-year, 3-year, or 5-year Estimates
- Handbooks
- Comparing ACS Data
- Statistical Testing Tool
- Training Presentations
- Geography & ACS
- Technical Documentation
- Methodology
- Library
- Operations and

### Handbooks for Data Users

You can use American Community Survey (ACS) data in different ways and for different reasons. Each one of our downloadable PDF Compass handbooks helps a particular group with specific how-to instructions and/or case studies.

For an introduction to ACS data, we recommend the compass handbook for General Data Users.

- **What Congress Needs to Know**  
*November 2008*  
This handbook helps congressional staff use ACS data to respond to constituent inquiries, draft floor/press statements, conduct legislative research, and more.
- **What Federal Agencies Need to Know**  
*December 2008*  
This handbook helps federal agencies use ACS data for eligibility determinations, allocation of funds, program parameters, and more.
- **What General Data Users Need to Know**  
*October 2008*  
This handbook helps general data users learn how to access and use ACS data and provide concrete examples of how ACS data can answer real-world questions.
- **What High School Teachers Need to Know**  
*December 2008*  
This handbook helps teachers learn more about how to help students grasp statistical ideas with ACS data and how to incorporate data into lesson plans.

# Training Presentations

<https://www.census.gov/programs-surveys/acs/guidance/training-presentations.html>

Census.gov Our Surveys & Programs American Community Survey (ACS) Guidance for Data Users Training Presentations

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- About the Survey
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- Statistical Testing Tool
- Training Presentations**
- Geography & ACS
- Technical

### Training Presentations

[Tweet](#) [Share](#)

Want to learn more about American Community Survey (ACS) data and data products? Need to train others how to understand the data? These training presentations can help.

- Introduction to the Public Use Microdata Sample (PUMS) File**  
*February 2017*  
Discover foundational aspects of working with the Public Use Microdata Sample (PUMS) Files and its organization, confidentiality, and geographic availability.
- Using American Community Survey Summary File Data**  
*January 2017*  
Learn more about the ACS Summary File, including website resources and tools to access the data.
- Using Census Bureau Data and Enigma's Smoke Signals to Save Lives**  
*October 2016*  
Learn how you can use free tools and public data to improve lives in your community.

# Crosswalk

<https://www.census.gov/acs/www/guidance/comparing-acs-data/acscensus-table-lookup>

## American Community Survey

About the Survey

Respond to the Survey

News & Updates

Data

Guidance for Data Users

Subjects Included in the Survey

Which Data Tool Should I Use?

When to use 1, 3, or 5-year estimates

Comparing ACS Data

ACS/Census Table Lookup

2015

2014

2013

2012

2011

### ACS/Census Table Comparison

Enter a table number below to search for a comparable table between ACS 5-year estimates and Census 2000 SF3 detailed tables. Or download all [table comparisons](#) [XLS 346KB].

ACS 5-year → Census 2000 SF3

Enter ACS Detailed Table #

example: B05008

OR

Census 2000 SF3 → ACS 5-year

Enter Census 2000 SF3 Detailed Table #

example: PCT63H

SUBMIT

RESET

Tell Us What You Think!

#### Related Resources

[Get ACS detailed tables](#) on American FactFinder

[Get Census 2000 SF3 detailed tables](#) on American Factfinder

[Browse ACS/Census 2000 comparison guidance](#) by subject area/topic

Tell Us What You Think!

[contact us](#) | [email updates](#) | [site map](#)

# Design and Methodology

<https://www.census.gov/programs-surveys/acs/methodology/design-and-methodology.html>

Census.gov > Our Surveys & Programs > American Community Survey (ACS) > Methodology > Design and Methodology Report

## American Community Survey (ACS)

About the Survey

Respond to the Survey

News & Updates

Data

Guidance for Data Users

Geography & ACS

Technical Documentation

**Methodology**

**Design and Methodology Report**

Sample Size and Data Quality

Content Test

Questionnaire Archive

Mandatory vs. Voluntary Methods

Library

Operations and Administration

Contact Us



Respond to the ACS  
Learn how

## Design and Methodology Report

Tweet Share

The 2014 Design and Methodology Report contains descriptions of the basic design of the American Community Survey and details of the data collection and processing methods. We have updated the methodology of the report.

### Download by chapter

- [Acknowledgements](#) [<1.0 MB]
- [Foreword](#) [<1.0 MB]
- [Chapter 1. Introduction](#) [<1.0 MB]
- [Chapter 2. Program History](#) [<1.0 MB]
- [Chapter 3. Frame Development](#) [<1.0 MB]
- [Chapter 4. Sample Design and Selection](#) [<1.0 MB]
- [Chapter 5. Content Development Process](#) [<1.0 MB]
- [Chapter 6. Survey Rules, Concepts and Definitions](#) [<1.0 MB]
- [Chapter 7. Data Collection and Capture for Housing Units](#) [<1.0 MB]
- [Chapter 8. Data Collection and Capture for Group Quarters](#) [<1.0 MB]
- [Chapter 9. Language Assistance Program](#) [<1.0 MB]
- [Chapter 10. Data Preparation and Processing for Housing Units and Group Quarters](#) [1.1 MB]
- [Chapter 11. Weighting and Estimation](#) [<1.0 MB]
- [Chapter 12. Variance Estimation](#) [<1.0 MB]
- [Chapter 13. Preparation and Review of Data Products](#) [<1.0 MB]
- [Chapter 14. Data Dissemination](#) [<1.0 MB]
- [Chapter 15. Improving Data Quality by Reducing Nonsampling Error](#) [<1.0 MB]
- [Chapter 16. Research and Evaluation](#) [<1.0 MB]
- [Appendix. Glossary](#) [<1.0 MB]

[Chapter 6. Survey Rules, Concepts and Definitions](#) [<1.0 MB]

# Source Us!

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



### College Destinations: How We Rank Them

American Institute for Economic Research - Apr 7, 2014

Sources: U.S. Census Bureau; American Community Survey, 2011 American Community Survey 1-Year Estimates, Table B01003; using ...



### NMSU Valencia County Extension providing youth develo...

New Mexico State University NewsCenter - Apr 14, 2015

... Mexico and \$53,046 for the United States, according to the U.S. Census Bureau's 2009-2013 American Community Survey 5-Year Estimate.



### Census Estimates Show Progress Toward ACA Coverag...

Health Affairs (blog) - Sep 28, 2015

Source: U.S. Census Bureau, 2013 and 2014 American Community Survey 1-year estimates from Table S2701 in American Fact Finder.

# Continue the Conversation #ACSDATA



Sign up for and manage alerts at:  
<https://public.govdelivery.com/accounts/USCENSUS/subscriber/new>



More information on the American Community Survey:  
<https://www.census.gov/acs>



(800) 923-8282 or  
(301) 763-1405



Email us at:  
[acso.users.support@census.gov](mailto:acso.users.support@census.gov)



[facebook.com/uscensusbureau](https://facebook.com/uscensusbureau)



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[pinterest.com/uscensusbureau](https://pinterest.com/uscensusbureau)





# AMERICAN COMMUNITY SURVEY DATA USERS GROUP

<https://acsdatacommunity.prb.org>

- 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
- 2017 ACS Data Users Conference, May 11-12, 2017

# Need Local Stats?

Assistance Near You!

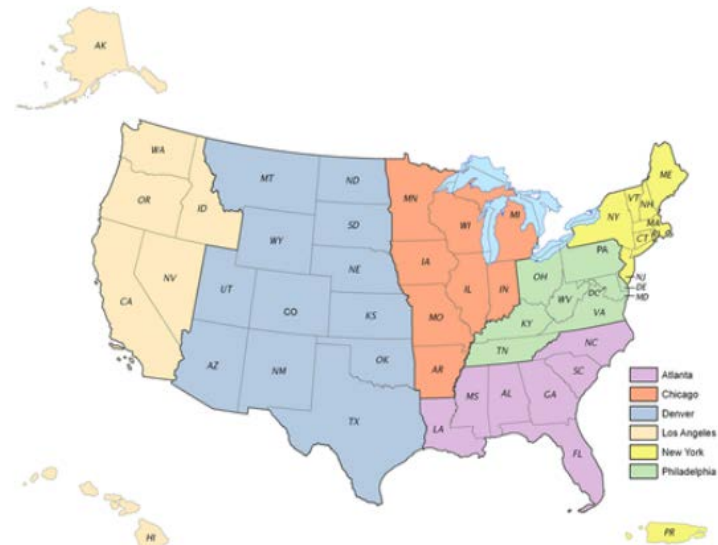
Our regional data staff can help you access local statistics from the ACS or offer training to help build your skills.

Contact local specialists at:

1-844-ASK-DATA

(1-844-275-3282)

[census.askdata@census.gov](mailto:census.askdata@census.gov)





# Outline

- ACS Estimates
- What is the Margin of Error (MOE)
- Why do MOEs Matter
- Statistical Testing Using the MOE
- Special Cases
- Approximating the MOE
- Available Resources
- **Questions**



# Questions?



Email us at:  
[acso.users.support@census.gov](mailto:acso.users.support@census.gov)



# Bonus Slides

# Bonus Slide:

## How to Determine if you are in a Survey

The screenshot shows the U.S. Census Bureau website. At the top, there is a navigation bar with the following categories: Topics (Population, Economy), Geography (Maps, Products), Library (Infographics, Publications), Data (Tools, Developers), Surveys/Programs (Respond, Survey Data), Newsroom (News, Blogs), and About Us (Our Research). A search bar is located on the right side of the navigation bar.

### Are You in a Survey?

Welcome to the primary resource center for our survey and census respondents. If you received a survey, like the American Community Survey or Annual Retail Trade, this site will provide information to help verify, complete, and submit your form.

**Read More**

- Verify Survey Legitimacy
- U.S. Census Bureau Staff?
- Protecting Your Information

**Latest**

- How Do I Know...
- Survey FAQs
- List Of Surveys
- Contact Us

**...if I am in a Household Survey?**  
Once we select your household, we send you an official letter from the U.S. Census Bureau director. We address the letter to "resident".

**...if I am in a Business Survey?**  
Once we select your business, we will mail an official letter signed by the U.S. Census Bureau director, or a form, with instructions, to your business.

**...that my information will be safe?**  
We use your answers to produce statistics that will never identify your household or business. Your data are confidential and not shared with anyone.

**U.S. Population**  
321,986,280

**COMPONENTS OF POPULATION CHANGE**

- One birth every 8 seconds
- One death every 12 seconds
- One international migrant (net) every 33 seconds
- Net gain of one person every 13 seconds

<https://www.census.gov/programs-surveys/are-you-in-a-survey.html>

# Bonus Slide:

## Why We Ask the Questions on the ACS

U.S. Department of Commerce | Bureau of Economic Analysis

Search

Topics: Population, Economy | Geography: Maps, Products | Library: Infographics, Publications | Data: Tools, Developers | Surveys/Programs: Respond, Survey Data | Newsroom: News, Blogs | About Us: Our Research

### American Community Survey

**About the Survey**

- How Do I Respond to the Survey?
- Is the ACS Legitimate?
- Is the ACS Mandatory?
- Why Was I Selected?
- Is My Privacy Protected?
- For People Living in Group Housing
- Questions on the Form and Why We Ask**
- Sample Forms & Instructions
- About the Puerto Rico Community Survey
- ACS and 2010 Census
- Frequently Asked Questions

**Respond to the Survey**

- News & Updates
- Data
- Guidance for Data Users
- Geography & the ACS
- Technical Documentation
- Methodology
- Library

**Questions on the Form and Why We Ask**

Select a topic below to view a fact sheet containing question(s) from the form, how long the question has been in use, a description of how the federal government uses the data, and how those uses translate into community benefits.

Show  entries

Filter by keywords or question number:

Why we ask about...	Question Numbers (person/housing)
Acresage, Agricultural Sales, Business on Property	h4, h5, h6
Age	p4
Ancestry	p13
Citizenship, Place of Birth, Year of Entry	p7, p8, p9
Class of Worker	p41
Computer and Internet Use	h9, h10, h11
Cost of Utilities, Condominium Fee	h14, h16
Disability	p17, p18, p19
Educational Attainment, Bachelor's Field of Degree	p11, p12
Family, Relationships	p2
Fertility	p24
Food Stamps Benefit	h15
Grandparents as Caregivers	p25
Health Insurance Coverage	p16
Hispanic Origin	p5
Home Heating Fuel	h13
Income	p47, p48

<https://www.census.gov/acs/www/about/why-we-ask-each-question/>



# Bonus Slide:

## Explanation of Detailed Table Code

**B01001APR**

- B is for Detailed Table, C is for Collapsed
- **01 is a 2-digit code for the subject**
  - For more information on ACS Subjects, visit:  
<https://www.census.gov/programs-surveys/acs/guidance/subjects.html>
- 001 is the table number
- A is if the table is a race/Hispanic iterated table
  - (A is white alone non-Hispanic, iterations are A through I)
- PR appears only if the table is published exclusively for Puerto Rico