

# And Now for the Grain of Salt

## Margins of Error and the American Community Survey

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Resources for accessing data in real time  
<http://www.ca.uky.edu/snarl>

The **American Community Survey (ACS)** has changed the landscape for detailed data on our counties and local communities.

Two important changes are:

- 1) the data are **less reliable** than what we have had in the past; and
- 2) **judging that reliability is up to us.**

To assess the reliability of estimates from the American Community Survey, we now need to understand something called “margin of error.” The margin of error helps us to see how reliable the data are.

Because their reliability can vary, we need to **always include the margin of error** when we use estimates from the American Community Survey.

To help out, this publication provides some of the basics about what “margins of error” are and how they affect the way we use and understand estimates from the American Community Survey.

If this is your first time using data from the ACS, see ***New Kid in Town: Understanding Data from the American Community Survey***. You can find it on the Kentucky: By The Numbers website at:

<http://www.ca.uky.edu/snarl/>

### What exactly is a “margin of error?”

The margin of error (sometimes abbreviated as MOE) tells us **the range** within which the estimate most likely falls. By giving us the range, the margin of error is an indication of the estimate’s reliability.

If you have seen poll results reported in the news, when they say “plus or minus 5 points,” they are telling you the margin of error.

### What do margins of error have to do with a “grain of salt?”

Margin of error is a term we don’t use a lot in our daily language. So, relating it to something familiar can be helpful.

One way to think about margins of error is to think of them as our “grain of salt.” We often use this phrase when we need to be **cautious** about taking something at face value.

The margin of error gives us the information we need to determine **the range within which the estimate most likely falls.**

In a way, the size of that range helps us decide how large our proverbial “grain of salt” should be. For instance, if your estimate is 30 (+/- 25), you will want to use a larger “grain of salt” than if your estimate is 30 (+/- 0.5).

You can also think of this as “wiggle room.” The larger the range, the more “wiggle room” there is for the estimate.

Kentucky:  
By The Numbers



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### Why are margins of error important?

Imagine if someone asked you to plan a program for them. They estimate that there will be 50 people attending the program, but the number could be...

as few as 40 people or as high as 60 people.

That's 50 - plus or minus 10 people (+/- 10).

Now imagine planning that same program but this time they estimate that the number of people attending your program could be...

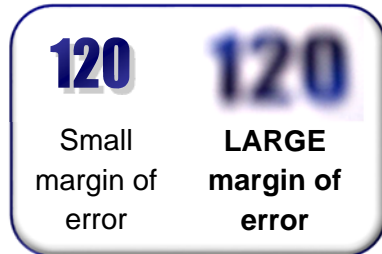
as few as 10 or as many as 90 people.

That's 50 - plus or minus 40 people (+/-40).

When the range is this large, you can see how things can become more difficult.

The same goes for understanding margins of error. When the margin of error is smaller, the estimate is more precise or the focus is sharper.

When the margin of error is larger, the estimate is more 'fuzzy' or 'blurry.'



### Why do I need to know about margins of error?

One reason that margins of error are important is that there will be times when they are VERY large. This is especially the case for small groups and small places.

Remember that "grain of salt?"

The larger the range represented by the margin of error, the more cautious we need to be about the estimate.

### Do I have to include the margin of error when I use estimates from the American Community Survey?

Yes. All text, tables, charts and graphs must

ALWAYS include the margins of error.

### Does everything from the American Community Survey have margins of error?

Yes. The Census Bureau publishes margins of error for nearly all of the estimates from the American Community Survey.

For many of the commonly-used estimates, the American Community Survey provides both estimates as well as percentages. You can find these in the "Subject Tables."

### Why are some of the margins of error so large?

One factor that affects the size of a margin of error is the size of the sample being used (the number of people asked to respond to the survey).

The smaller the sample, the larger margin there is for error.

For the American Community Survey, this is important because it uses a smaller sample than the Decennial Census Long Form.

When the Long Form was used, it was sent to about 16.6% of all households. For the American Community Survey, only about 3% of all households receive the survey each year.

Another reason we see large margins of error is that the 5-year estimates (the only estimates available for all counties) are not filtered for reliability.

In other words, for the American Community Survey, the Census Bureau publishes all of the 5-year estimates (unless an individual can be identified).

It's up to us to judge their reliability.

### How do I find the range for a margin of error?

Since the estimate is generally the midpoint, finding the range represented by the margin of error is as straightforward as it seems.

To find the top of the range, add the margin of error to your number.

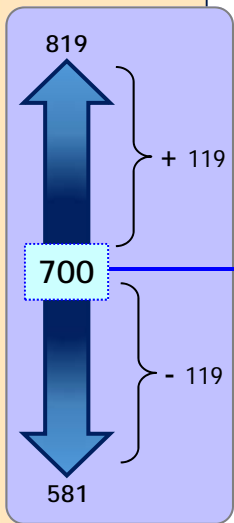
To find the bottom of the range, subtract the margin of error from you number.

**Table 1. Educational Attainment in Green County, 2010-2014.**

	Estimate	Margin of Error
<b>Population 25-64 years</b>		
Less than high school graduate	996	+/-160
High school graduate (incl. eqv)	2,843	+/-189
Some college or associate's degree	1,262	+/-160
<b>Bachelor's degree or higher</b>	<b>700</b>	<b>+/-119</b>

Source: U.S. Census Bureau, 2014 American Community Survey 5-Year Estimates.

The margin of error for this estimate is plus or minus 119.



To find the top of the range, add the margin of error (119) to the estimate (700).

*This means that the estimated number of people 25-64 with a Bachelor's degree or higher could be as high as 819.*

To find the bottom of the range, subtract the margin of error (119) from the estimate (700).

*This means that the estimated number of people 25-64 with a Bachelor's degree or higher could be as low 581.*

According to the 2014 American Community Survey 5-Year Estimates, between 2010-2014 there were **700 (+/- 119)** people ages 25-64 with a Bachelor's degree or higher in Green county.

error is too big, in actuality, there aren't. The Census Bureau recommends that you use your own judgment when assessing margins of error.

**What do I do if I think the margin of error is too big?**

According to the Census Bureau, if you consider the margin of error for a particular estimate to be too big to be useful, there are two options.

One option is to move to the next largest geography. Remember how the size of the margin of error depends on the number of people in the sample? If the margin of error is too big for data at the level of place (ie. county seat), then look at the same data for your county as a whole.

The second option is to move to the next largest category. This can also increase the number of people included in the estimate.

For example, if the margin of error is too large for male single parent families with children, look at all single parent families instead.

Depending upon your needs, these might be viable choices. But, there will be times when they are not.

In these cases, the Census Bureau recommends that you **DO NOT USE** the estimate from the American Community Survey. Instead, you might want to see if there are any alternative data sources.

**Why are there no clear rules to tell me if a margin of error is too big?**

The reason why there are no clear rules to tell us if a margin of error is too big is because the answer depends on the margin of error and the needs that we have for the estimate.

If two surveys give you an estimate of 3,000 but one has a margin of error of +/- 10 and the other has a margin of error is +/- 1,000, in this case, the smaller margin of error of +/- 10 is the better choice.

But its not just the size of the margin of error that's important, it's the range it represents as well.

For instance, a margin of error of +/- 10 is big if your estimate is only 30.

But that same margin of error of +/- 10 is small if your estimate is 3,000.

The same principles apply whether you are looking at the estimates or the pre-calculated percentages provided by the Census Bureau.

For example, according to the 2014 American Community Survey's 5-year estimates, in Green county 77.5% (+/-2.3) of the total population has a high school degree or higher. In this case when we do the math, 79.8% to 85.2% is the range represented by the margin of error.

**The range for my MOE is really large. How big is too big?**

While it would seem that there should be clear cut rules when it comes to determining if a margin of

Another piece of the puzzle relates to our own needs for the data. For example, According to the 2014 American Community Survey 5-Year Estimates, between 2010-2014, there were 700 (+/- 119) people ages 25-64 with a Bachelor's degree or higher in Green county.

This means that the range the estimate most likely falls is between 819 and 581 - a difference of 238 people.

In some instances, this range might be too large -- remember the example of planning a program? But, if precision is not important, it could still be a useful estimate.

#### Technically Speaking...

*The range represented by the margin of error is called a confidence interval. Since the Census Bureau uses 90% confidence intervals, this means that there is a 90% probability that the range contains the actual number.*

Either way, there will be times when the margin of error doesn't make sense.

For example, according to the 2014 American Community Survey 5-year estimate, the number of men ages 25 and over in Robertson county with a Master's degree was 4 (+/- 7).

*Since there cannot be a negative person, if this happens the Census Bureau says to treat the estimate as being as low as zero.*

**Is the ACS the only place where I will see margins of error?**

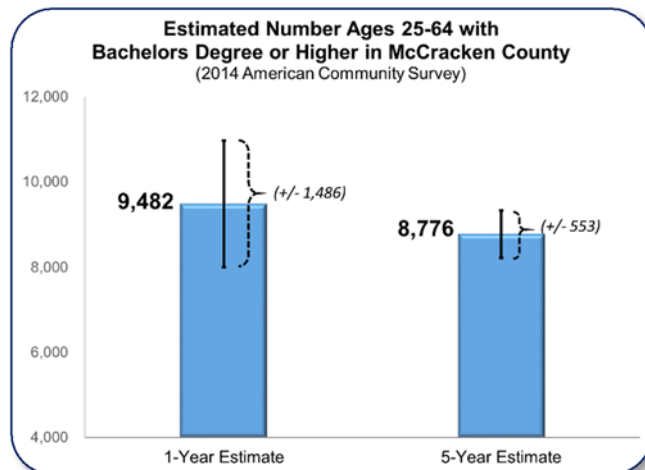
No. More and more, data sources based on surveys are reporting margins of error.

Other places you will see them includes the Small Area Income and Poverty Estimates (SAIPE) and the Small Area Health Insurance Estimates (SAHIE). Here, instead of an MOE, the Census Bureau reports the actual range.

**My county has both 1-year and 5-year estimates. Does this affect the margin of error?**

Some counties are large enough to have both 1-year and 5-year estimates. While the 1-year estimates are more current, they also have larger margins of error. Basically it boils down to this...

The longer the time frame, the more surveys are included in the estimate. The more surveys included, the margin of error should be smaller.



**If I do any math myself, do need to do anything with the margins of error?**

Yes. When you do any math yourself, it is called a "derived measure." And, any derived measure must have its own margin of error.

Remember, the "**Subject Tables**" already provide the percentages and their margins of error.

If you do any math yourself, only the original estimates can be cited as coming from the American Community Survey.

For simple math or comparisons, Cornell's Program on Applied Demographics has a great online calculator that is easy to use:

<https://pad.human.cornell.edu/acscalc/index.cfm>

#### Technically Speaking...

*There are two types of errors: sampling error and nonsampling error. The margin of error tells us about error due to sampling.*

*Good surveys (and polls) go to great lengths to: 1) develop a good survey, 2) get a sample of people that is representative of the entire group, 3) work hard to get a good response rate, and 4) are diligent about recording the responses accurately.*

*This helps reduce the amount of sampling error.*

*Since the American Community Survey is not just conducted once every decade, the Census Bureau is able to maintain trained interviewers. This helps reduce the amount of nonsampling error.*

*Problems in areas such as these affect data reliability.*

This publication synthesizes Information drawn primarily from U.S. Census Bureau publications and websites.

**Kentucky: By The Numbers** is a program located in the Department of Community and Leadership Development and is part of the Kentucky Cooperative Extension Service at the University of Kentucky. For more information contact your local County Cooperative Extension office or Dr. Julie N. Zimmerman, Professor, Rural Sociology, Department of Community and Leadership Development, 500 Garrigus Building, University of Kentucky, Lexington, KY 40546-0215. email: [jjimm@email.uky.edu](mailto:jjimm@email.uky.edu).

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