And Now for the Grain of Salt

Margins of Error and
the American Community Survey

Julie N. Zimmerman, Professor of Rural Sociology and Cameron McAlister, Graduate Assistant.

Margins of error tells us about the reliability of our data.

We need to always include them when we use estimates from the American Community Survey.

The American Community Survey (ACS) is an ongoing survey conducted by the U.S. Census Bureau and is one of the richest sources for county level data. It used to be that detailed data on social, economic, and housing characteristics were collected through the Decennial Census Long Form. Now, these data come from the **American Community Survey**.

Two important changes that came with the American Community Survey are:

1) the data are **less reliable** than what we had in the past;

and

2) **judging the reliability of estimates is up to us**.

To assess the reliability of estimates from the American Community Survey, we now need to understand something called a margin of error.

> If this is your first-time using data from the American Community Survey, see "**New Kid in Town: Understanding Data from the American Community Survey**."
>
> A copy is available on the **Kentucky: By The Numbers** website at:
> **http://kybtn.ca.uky.edu**

What 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 how reliable the estimate is.

If you have seen poll results reported in the news, when they say "plus or minus 5 points" or "(+/- 5)" 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 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 same is true when it comes to any data for our counties and communities.

For the American Community Survey, the margin of error is an **important tool**. It gives us some of the information we need to be critical about the data.

With the margin of error, we can determine

the range within which the estimate most likely falls.

Kentucky: By The Numbers
http://kybtn.ca.uky.edu

Updated: March 2020

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 (+/- 29), you will want to use a larger "grain of salt" than if your estimate is 30 (+/- 1).

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 low as 40 people or as high as 60 people.

That's 50 -- plus or minus 10 people.

Now imagine planning that same program but this time they estimate that the number of people attending your program could be anywhere between 10 and 90 people (+/- 40 people).

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.

120 **120**

| Small margin of error | LARGE margin of error |
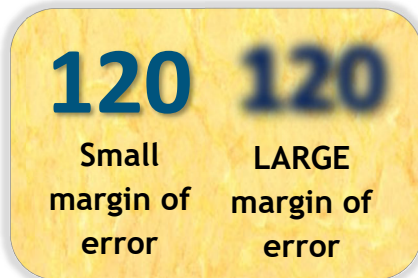
Why do I need to know about margins of error?

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.

Do all data 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 contains both estimates as well as percents. You can find these in the **Data Profiles** ("DP") and **Subject Tables** ("S").

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 you are using.

The American Community Survey uses a **smaller sample** than the Decennial Census Long Form did.

While about 16.6% of all households received the 2000 Decennial Census Long Form, only about 3% receive the American Community Survey each year.

Another reason why we see large margins of error is that the **5-year estimates** (the only estimates available for most counties and the only estimates that are comparable across all counties)

are **not filtered for reliability**.

In other words, for the American Community Survey, the Census Bureau publishes all of the estimates (unless an individual can be identified) and leaves

judging their reliability up to the user.

If the size of the margin of error depends in part on how many people answered the survey, can I find out how many people responded?

Yes. To find out the sample size and response rates for Kentucky as a whole, go to:

https://www.census.gov/acs/www/methodology/ sample_size_and_data_quality/

If you want to see how many in your county responded, Table B98001 tells us the number of households that were selected and the number that were included in the estimates.

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 your number.

According to the 2018 American Community Survey 5-Year Estimates, between 2014-2018, there were 381 (+/-114) widowed men in Mercer county.

Table B12001. Sex by Marital Status for the Population 15 Yeas and Over. Mercer County, Kentucky, 2014-2018.

Marital Status	Estimate	Margin of Error
Males 15 years and over	**8,438**	**+/- 44**
Never Married	2,129	+/- 211
Now Married	4,853	+/- 291
Separated	155	+/- 96
Widowed	**381**	**+/- 114**
Divorced	1,075	202

*The margin of error for this estimate is **plus or minus 114**.*

Source: U.S. Census Bureau, 2018 American Community Survey 5-Year Estimates.

495

+114

381

-114

267
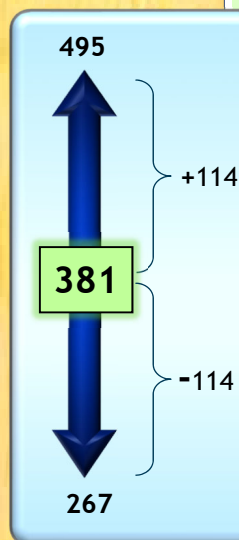
To find the __top__ of the range, __add__ the margin of error (+114) to the estimate (381).

This means that the estimated number of men in Mercer county who are widowed could be as __high__ as 495.

To find the __bottom__ of the range, __subtract__ the margin of error (-114) from the estimate (381).

This means that the estimated number of men in Mercer county who are widowed could be as __low__ as 267.

The same applies whether you are looking at the estimates or the __pre-calculated percents__ provided by the Census Bureau.

For example, according to the 2018 American Community Survey's 5-year estimates, 3.1% (+/-0.1) of men in Kentucky were widowed. In this case, the range represented by the margin of error is 3.2% to 3.0%.

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 of +/- 1,000, in this case, the smaller margin of error of +/- 10 is the better choice.

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

Another piece of the puzzle relates to your own needs for the data. For example, according to the 2018 American Community Survey 5-year estimates, between 2014 and 2018, the number of widowed men in Mercer county was 381 (+/- 114).

This means that the range the estimate most likely falls is between 495 and 267 widowed men.

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.

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. Either way,

__there will be times when the margin of error doesn't make sense__.

If your range includes a __negative number__, since there cannot be a negative person, the Census Bureau says to treat the estimate as being __as low as zero__.

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 error is too big, in actuality, there aren't. So, 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 **combine categories**. By combining categories we can also increase the number of people included in the estimate.

If it is more important to know the total number of something than to know how many were men and how many were women, you can use the total number instead.

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

In these cases, the Census Bureau recommends that you DO NOT USE the estimate.

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

More and more, data sources are reporting margins of error for the data they provide. Some sources give you the actual range. If this happens, it is called a confidence interval.

Some of the other places you will see them include the Small Area Income and Poverty Estimates, the Small Area Health Insurance Estimates, and health data such as those from the Behavioral Risk Factor Surveillance System (BRFSS).

My county has 1- and 5-year estimates. How does this affect the margin of error?

If your county is large enough to have both 1- and 5-year estimates, 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 I also need to do something with the margins of error?

Yes. If you do any math with the estimates, it is called a "derived measure." And, **any derived measure must have its own margin of error**.

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

To help in doing the math correctly, the Census Bureau provides formulas in their guides for data users and other assistance on their website:

https://www.census.gov/programs-surveys/acs

There is also an "online calculator" available at:

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

Remember, the **Data Profiles** ("DP") and **Subject Tables** ("S") are two places where you can find pre-calculated estimates.

> ### 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 can affect data reliability***.

This publication synthesizes Information drawn primarily from U.S. Census Bureau publications and websites.
Data for the examples are from ACS Tables B12002 and S1201.