Two Year Averages

The purpose of this documentation is to provide data users with a basic understanding of the estimation methodology and the accuracy of the ACS data for two year averages.

Two year average tables and profiles will be tabulated using the most up-to-date geography for the most recent year in the two year average. For a 1997-1998 average, this means that the 1997 data is updated to 1998 geography.

TWO YEAR AVERAGES

For this documentation, year one refers to the first (or oldest) year of the average and year two refers to second (or most recent) year of the average.

Computing the Average

The combined year one through year two (weighted) averages are computed from the individual year estimates using the following formulas:

(A) Year One through Year Two Count =

(Count for Year One + Count for Year Two) / 2

(B) Year One through Year Two Aggregate =

(Aggregate for Year One + Aggregate for Year Two) / 2

(C) Year One through Year Two Ratio =

(Year One through Year Two numerator) / (Year One through Year Two denominator)

(This holds for proportions, means and per capita amounts)
The numerator and denominator could either be a count or an aggregate. For example, in Summary Table P81A the numerator is aggregate income and the denominator is count of persons.

(D) Year One through Year Two Median = Median of all observations for the two years

Note on Rounding

When you sum the cell estimates in a table, it may not give you the same estimate as the universe table because the cells of the table are rounded separately and not controlled to the marginal total. An example follows for Brevard County for 1996 and 1997 data:

Table P1

1996 estimate	1997 estimate	1996-1997 estimate not rounded	1996-1997 estimate rounded
447,416	454,603	451,009.5	451,010

Table P6

Table Stub	1996 estimate	1997 estimate	1996-1997 estimate not rounded	1996-1997 estimate rounded
White	390,683	397,366	394,024.5	394,025
Black	40,472	42,538	41,505	41,505
American Indian, Eskimo, and Aleut	2,529	2,920	2,724.5	2,725
Asian and Pacific Islander	8,310	8,360	8,335	8,335
Other Race	5,422	3,419	4,420.5	4,421
Total	447,416	454,603	451,009.5	451,011

From Table P6 we can see that the total number of people is 451,011, but from Table P1 it is 451,010. The difference here is due to rounding in the stubs of Table P6.

Computing the Year One through Year Two Average Standard Error

When using formulas (A) or (B) you first need to calculate the standard errors for the year one and year two estimates. The procedures for calculating the standard errors for individual years can be found in the Accuracy of the Data documents for the appropriate years. Once you have the standard errors for the year one and year two estimates separately, use the following formula to obtain the standard error for the year one through year two average for counts and aggregates.

$$\text{se for counts and aggregates} = \sqrt{\frac{1}{4} * (SE^2_{\text{year 1}} + SE^2_{\text{year 2}})}$$

If the average estimate is a ratio (C), then you need the standard errors for each of the individual year estimates that make up the numerator and denominator, which are of the form (A) or (B). Once you have the standard errors for the year one and year two estimates for the numerator and denominator separately, use the following formula to obtain the standard error for the year one through year two average for ratios.

se for proportions, ratios, means and per capita amounts =

$$\frac{EST_{n\text{year 1}} + EST_{n\text{year 2}}}{EST_{d\text{year 1}} + EST_{d\text{year 2}}} \sqrt{\frac{SE^2_{n\text{year 1}} + SE^2_{n\text{year 2}}}{(EST_{n\text{year 1}} + EST_{n\text{year 2}})^2} + \frac{SE^2_{d\text{year 1}} + SE^2_{d\text{year 2}}}{(EST_{d\text{year 1}} + EST_{d\text{year 2}})^2}}$$

Where n stands for numerator and d for denominator. So $EST_{\text{nyear 1}}$ is the estimate of the numerator for year one and $SE_{\text{dyear 2}}$ is the standard error of the denominator for year two.

The direct standard error for medians (D) was obtained by using, with the combined data, the method that was used for both the year one and year two single year data products.

There are three exceptions to the above formulas:

1. Only a small number of identical values are reported and used to calculate an aggregate for an individual year or the median for the two years. In this case, there are too few sample observations to compute a stable estimate of the standard error. The lower and upper bounds are assigned a value of "*". This is also true for means and per capita amounts because the numerators for these estimates are aggregates.

2. There are no sample observations available to compute a ratio estimate or an estimate of its standard error. This happens when $EST_{\text{dyear 1}}$ and $EST_{\text{dyear 2}}$ are both equal to zero. The estimate of the average is represented by a "-" and the lower and upper bounds are assigned a value of "**".

3. The estimate of the denominator for a proportion is non-zero, but $EST_{\text{nyear 1}}$ and $EST_{\text{nyear 2}}$ are both equal to zero. Use the following formula to obtain the standard error:

se for proportions =

$$\sqrt{\frac{SE^2_{n\text{year 1}} + SE^2_{n\text{year 2}}}{(EST_{d\text{year 1}} + EST_{d\text{year 2}})^2}}$$

Computing the Two Year Average Upper and Lower Bounds

If the year one and year two standard errors are both zero due to the estimates being controlled, then the lower and upper bounds were given a value of "*****". This also holds for proportions when both the numerator and denominators are controlled for both years.

For all other estimates the lower and upper bounds for the average estimate were calculated as follows:

lower bound (lb) = average - 1.65 * se(average)

upper bound (ub) = average + 1.65 * se(average)

Generalized variances are used wherever applicable for both the year one and year two components of the averages.

For examples please see “Estimates for 1996-1997 Data Products.”