AMERICAN COMMUNITY SURVEY: A Guide for Data Users

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PRB Population Reference Bureau

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Introduction

The U.S. government has a long history of gathering information about the American people. Congress has authorized funds to conduct a national census of the U.S. population every 10 years since 1790, as required by the U.S. Constitution. When American leaders chose to allocate congressional seats according to population size, the decennial census was mandated to obtain a complete and official enumeration of the population.

In recent decades the decennial census has been conducted using two questionnaires: a "short form" and a "long form." From every housing unit and group quarters address in the United States the short form collects the basic demographic data needed to reapportion Congress and to redistrict legislative districts in each state. The long form collects additional social, economic, and housing data from a sample of addresses.

The 21st century marks a new era in census taking and a break with tradition. The American Community Survey (ACS), a relatively new survey conducted by the U.S. Census Bureau, is ushering in the most substantial change in the decennial census in more than 60 years. The ACS is a nationwide monthly survey designed to provide communities with reliable and timely demographic, housing, social, and economic data every year.

The ACS will replace the 2010 Census long form by collecting detailed information throughout the decade. The decennial census will still be conducted in 2010, collecting the demographic data needed for reapportioning Congress and redistricting. But while the primary aim of the census is coverage—obtaining a complete population enumeration—the ACS program is focused on content—obtaining accurate information about population and housing characteristics. The ACS data will provide, for the first time, a continual stream of updated information for states and local areas, and may revolutionize the way federal, state, local, and tribal governments plan, administer, and evaluate their programs.

This user's guide reviews the information you need to know about the ACS with a focus on data for children. The guide begins by briefly describing the basic design of the ACS, variables related to child well-being, and the 2005 data release schedule. It then presents practical information on using one-year and multi-year averages, including issues related to geographic boundary changes, population changes, adjusting dollar amounts, and measuring trends. It also includes information about the importance of confidence intervals and how to use them. Finally, appendices provide supplemental information about state sample sizes in 2004, differences between the ACS and the traditional census long form, and how to include confidence intervals in your charts and graphs using Microsoft Excel.

Background and Basics

The basic design of the ACS is self-enumeration through mail-out and mail-back questionnaires, with follow-up telephone calls and visits to housing units that do not return a form. To provide information for communities each year, the ACS will provide one-, three-, and five-year estimates of data, depending on the area's population size:

- One-year estimates of data will be released for areas with 65,000 or more people;
- Three-year estimates will be released for areas with 20,000 or more people; and
- Five-year estimates will be released for all geographic areas down to the census tract and block group level.

The estimates from the ACS are based on pooled data. The one-year estimates are based on data pooled over 12 months. Similarly, the three-year estimates are based on data pooled over 36 months, and the five-year estimates on data pooled over 60 months. The five-year estimates from the ACS are designed to replace estimates from the decennial census long form.[1]

In 2000, the Census Bureau conducted a large-scale national test of the ACS, sampling more than 800,000 addresses. This data collection effort continued every year from 2000 through 2004. (See Appendix 1 for more details, including the sample size in each state for 2004.) As a result, the Census Bureau has published data since 2000 for all states, the District of Columbia, and other areas with a resident population of 250,000 or more.

The testing phase of the ACS ended in 2004 and full implementation began in 2005, with one exception; The 2005 data collection effort did not include group quarters due to lack of funding. The Census Bureau began collecting data from group quarters with the 2006 ACS. This is important to note, especially if your data needs extend beyond households. If you are using data that generally pertains to all people—not only those in households—it is important to note that people who live in group quarters were not sampled in 2005 and are not included in the data. The following types of living quarters are considered group quarters and were not included prior to 2006:

- College and university housing
- Nursing homes
- Mental hospitals and psychiatric units in other hospitals
- Residential schools for people with disabilities
- YMCA, YWCA, and hostels
- Emergency and transitional shelters
- Dormitories, bunkhouses, and other group living arrangements for agricultural and non-agricultural workers
- Religious group quarters (convents, monasteries, and abbeys)
- Military barracks and dormitories at military academies
- Military ships
- Military disciplinary barracks and jails
- Federal detention centers
- Federal and state prisons
- Local jails
- Correctional residential facilities (halfway houses, prerelease centers, work release centers, study centers, and restitution centers)
- Privately operated correctional facilities
- Group homes for adults or juveniles
- Residential treatment centers for adults or juveniles
- Juvenile correctional facilities

Questionnaires are mailed every month to a random sample of approximately 250,000 addresses—about 3 million addresses per year—making it one of the largest surveys in the world. Responding to the ACS questionnaire is required by law, as is responding to the decennial census. The questions used in the ACS are essentially the same as those in the census long form. Table 1 presents some of the key variables related to children and families in the ACS questionnaire. A summary of several major differences between the census and the ACS along with some implications of those differences are outlined in Table 2 (See Appendix 2, “How the ACS Differs from the Decennial Census” for a more detailed description).

Table 1

ACS Measures Related to Child Well-Being

Income
Poverty
Parental employment
School enrollment
Citizenship and foreign-born status
Language spoken at home and ability to speak English
Disability
Birth in the past 12 months to females ages 15 to 19
Grandparents as caregivers

Source: U.S. Census Bureau

Table 2
Summary of Differences Between 2000 Census and ACS

	Decennial Census	ACS	Implications
Data Collection – Follow-up Phase	In-person follow-up of all nonresponsive addresses	Telephone follow-up of all nonresponsive addresses In-person follow-up of sample of remaining nonresponsive addresses	ACS has higher response rate.
	Interviewers are temporary employees given brief training.	Interviewers are permanent employees and given extensive training.	ACS interviewers are more effective at obtaining responses.
	Accepts proxy responses from neighbor.	Does not accept proxy responses from anyone who does not live at sampled address.	ACS has more accurate and complete information.
Sample Size	One in six addresses (18.3 million)	One in eight addresses (15.8 million)	ACS generates larger standard errors, some of which may be offset by better response rate in follow-up phase of data collection.
Residency Rules	Usual residence rule: place where a person lives most of the time	Two-month current residence rule	ACS should have better representation of seasonal residents and migratory groups. Areas with large seasonal populations may show different characteristics in the ACS than the census.
Income and Poverty Reference Period	Prior calendar year	Prior 12 months	Income in the ACS is adjusted to reflect last month of data collection time period (for example, end of year for single-year estimates, last months of final year in a multi-year average).
School Enrollment Reference Period	Since February 1	Prior three months	Enrollment rates may differ.

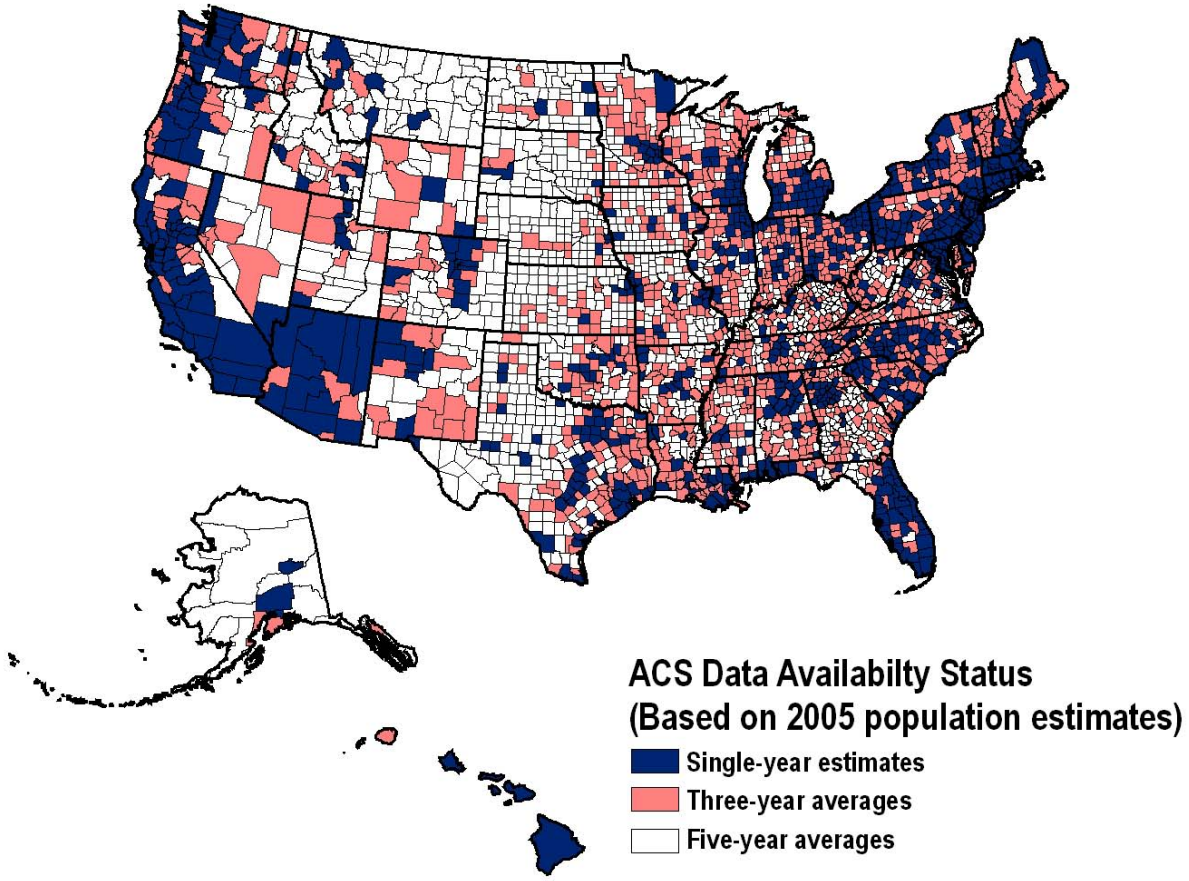
The first information from the 2005 ACS will be available in August 2006, providing detailed social, economic, and demographic estimates for the U.S. population at mid-decade. The Census Bureau plans to release ACS data in four waves:

• Release Wave 1	Demographic and social data products	Aug. 15, 2006
• Release Wave 2	Economic data products	Aug. 29, 2006
• Release Wave 3	Housing data products	Oct. 3, 2006
• Release Wave 4	Race, ethnicity, and ancestry data products	Nov. 14, 2006

Data products in each wave will include base tables, tabular profiles, narrative profiles, ranking tables, geographic comparison tables, and thematic maps. The Public Use Microdata Sample (PUMS) files will be released at the same time as the economic data products—in Release Wave 2. The PUMS files contain individual records of a sample of people and households that responded to the survey. Data users with statistical software packages such as SAS, SPSS, and STATA can use the PUMS files to create custom tabulations of the data.

Assuming sufficient congressional funding, the ACS will have sampled 15 million addresses by 2009. By 2010, the ACS will provide five-year averages of demographic, housing, social, and economic data for the nation, states, cities, counties, and even smaller geographic areas, such as census tracts and block groups. These five-year moving averages will then be updated annually and will provide, for the first time, the ability to monitor social and economic trends in local communities in years between decennial censuses. Figure 1 illustrates when ACS data will first be available at the county level.

Figure 1 ACS Data Availability by County



Using One-Year and Multi-Year Estimates

To provide information for communities each year, the ACS will provide one-, three-, and five-year estimates of data, depending on the area's population size. As mentioned previously, one-year estimates of data will be released for areas with 65,000 or more people, three-year estimates will be released for areas with 20,000 or more people, and five-year estimates will be released for all geographic areas down to the census tract and block group level. This means that states, large cities, large counties, and other geographic areas with populations of at least 65,000 will **all** have one-year, three-year, and five-year period estimates. This has implications for measuring trends and comparing geographic areas of different population sizes.

Comparing Geographic Areas

ACS data users need to be cautious when comparing geographic areas with varying population sizes. A one-year estimate is not comparable to a three-year estimate or a five-year estimate because the time periods are inconsistent. To compare geographies, use a consistent time frame – all one-year estimates, all three-year estimates, or all five-year estimates. For example, to make valid comparisons between Boston (which will have one-, three-, and five-year period estimates) and the much smaller Massachusetts community of Nantucket (which will only have a five-year period estimate), data users need to use the five-year estimates. Boston data for 2005 to 2009 should be compared with Nantucket data for the same time period, even though more recent estimates will be available for Boston. The availability of five-year estimates for every level of geography down to the census tract will allow users to compare data across all geographic areas.

Using Geographic Areas with Boundary Changes

Because geographic boundaries change over time, multi-year estimates are adjusted to reflect the geographic boundaries in the last year of the time period. For example, an estimate for the time period 2005 – 2007 will reflect the geographic boundaries in 2007.

The Census Bureau's Boundary and Annexation Survey is the source of up-to-date boundary information. The Bureau publishes significant boundary changes in the TIGER section of their website. If you want to show a time series, and significant boundary changes occurred at any time during the time series, you either need to aggregate units up to a larger geography that is consistent over time or restrict your analysis to geographic units that are already consistent over time. For example, if you want to show a trend of poverty rates across counties, but some counties experienced significant boundary changes during the time you want to graph, you should either aggregate counties up to a level where the geographic boundaries are consistent over time or choose a different level of geography—one that is consistent across the time—to illustrate the trend. The other alternative is to change the time frame you are analyzing.

Using Geographic Areas with Rapidly Changing Populations

Another issue to address with respect to geography and multi-year estimates is population change. As mentioned earlier, an area will have a one-, three-, or five-year estimate based on that area's resident population.

The Census Bureau is most concerned with areas that experience population decline. If an area meets the 20,000 person threshold for a three-year period estimate, but then experiences population decline during the three year period, a three-year estimate will be produced as long as the area does not drop more than 5 percent below the 20,000 person threshold.[2] For example, if a county has 20,100 people in 2005, it will be scheduled for a three-year estimate. If that county experiences population decline between 2005 and 2007, a three-year estimate will be produced if the county population does not drop below 19,000, or 5 percent below the 20,000 threshold. If the county population drops more than 5 percent below the 20,000 threshold, a five-year estimate will be produced in 2010 instead.

Measuring Trends

The ACS will provide all states and communities of at least 65,000 residents with annual estimates of demographic, housing, social, and economic characteristics—a boon to government agencies that need to plan and budget for public services such as transportation, medical care, and schools. These large areas will be able to track annual change in their communities starting with the 2005 ACS data.

Areas with smaller populations have a longer wait to accumulate enough data from the ACS to track such trends. The ACS samples too few households in smaller areas to provide single-year estimates—but several years of data can be pooled to obtain good estimates even for these smaller areas. ACS data from 2005 to 2007 are pooled for areas with at least 20,000 people. When the 2008 data are processed, the 2006 to 2008 data can be pooled, moving the average ahead a year. Both the single-year estimates and the multi-year estimates will be updated annually.

How can users decide whether an increase or decrease shown in the ACS signals a real trend or a temporary fluctuation? Cynthia Taeuber, an expert on the ACS, cautions that users should "not make a big deal of small differences."[3] The estimates portrayed in the ACS—whether they are based on 12 months or 60 months of data, include a range of uncertainty. For any given area, the larger the sample and the more months included in the estimate, the greater the confidence in the estimate.

Trends are harder to detect for areas with smaller populations because they rely on pooled data for three or five years. Comparisons of three-year estimates from 2000 to 2002 and 2001 to 2003 are unlikely to show much difference because two of the years overlap. For independent estimates, Taeuber suggests comparing periods that do not overlap—comparing 2000 to 2002 estimates with 2003 to 2005 estimates, for example, which means waiting longer to track a trend. But data users also must rely on their own judgment. In areas undergoing fundamental shifts in the size or composition of the population—change may be so substantial that it will be obvious after only a few years.

Using Variables with Dollar Amounts

Several of the estimates provided by the ACS are expressed as dollar values. The value of a dollar changes from year to year due to inflation. To account for this, the Census Bureau uses the Consumer Price Index (CPI) to adjust dollar amounts from the ACS. (See Box 1 for background information about the CPI.) In a three-year or five-year period estimate, dollar amounts are adjusted to reflect the final year in the time period. For example, a three-year period estimate of median income from 2005 to 2007 is based on income adjusted to reflect constant 2007 dollars.

If you want to compare different years or show a trend of an indicator from the ACS that is measured in dollar values, such as median family income or average rent, you need to adjust the dollar value for inflation so that you are showing comparable numbers. To adjust dollar amounts to constant dollars to make them comparable over time, the basic formula is:

Dollar Value in Constant Dollars (Recent Year) = Salary in Current Dollars (Old Year) x (CPI in Recent Year / CPI in Old Year)

Box 1

Consumer Price Index Basics

The Consumer Price Index (CPI) originated in 1919 and is an indicator that measures the percent change in the average market price of consumer goods and services purchased by a typical urban family. Two primary indexes are published by the Bureau of Labor Statistics (BLS):

1. **CPI-U**. This index reflects the spending patterns of urban consumers (for example, residents of urban or metropolitan areas). It includes expenditures made by professionals, the self-employed, people in poverty, the unemployed, and retired people. It does not account for the spending patterns of people living in rural areas, farm families, people in the armed forces, and people in institutions such as prisons and mental hospitals. The CPI-U is the most commonly used index and represents approximately 87 percent of the total U.S. population, according to the BLS.

2. **CPI-W**. This index reflects the spending patterns of a subset of households included in the CPI-U definition. The households included in the CPI-W must meet two criteria:
    a. More than one-half of the household's income must come from clerical or wage occupations; and
    b. At least one of the household's earners must have been employed for at least 37 weeks during the previous 12 months.

The Census Bureau administers the Consumer Expenditure Survey for the BLS, collecting information from families and individuals on goods and services they actually purchased. Information is collected from approximately 30,000 families in the United States and covers goods and services such as food and beverages, housing costs, apparel, transportation, medical care, recreation, education, communication, and other goods and services. It does not include investment items, such as stocks, bonds, real estate, and life insurance.

In addition, BLS economic assistants collect data on current, actual prices of goods and services each month by personally visiting or calling thousands of retail stores, service establishments, rental units, and doctor's offices all over the United States. The data from the Consumer Expenditure Survey and data collected by BLS economic assistants are then used to track and measure the changes in the CPI.

It is important to note that the CPI is a measure of average price changes only and does not reflect changes in consumption or spending patterns.

The example below illustrates how to adjust median family income in the United States from 2001 through 2004, in 2004 inflation-adjusted (constant) dollars. The original data, obtained from American FactFinder are:

Year	Median Family Income (MFI from FactFinder)	Average CPI for Year*
2001	$50,844 (in 2001 inflation-adjusted dollars)	177.1
2002	$51,742 (in 2002 inflation-adjusted dollars)	179.9
2003	$52,273 (in 2003 inflation-adjusted dollars)	184.0
2004	$53,692 (in 2004 inflation-adjusted dollars)	188.9

*The average CPI for a year was obtained from the Bureau of Labor Statistics table containing historical CPI-U in the United States from 1913 to present. (ftp://ftp.bls.gov/pub/special.requests/cpi/cpiai.txt)

2001 MFI in 2004 inflation-adjusted dollars = $50,844 x (188.9 / 177.1)
= $54,232

2002 MFI in 2004 inflation-adjusted dollars	=	$51,742 x (188.9 / 179.9)
	=	$54,331
2003 MFI in 2004 inflation-adjusted dollars	=	$52,273 x (188.9 / 184.0)
	=	$53,665

Weighting

Like the census long form, the ACS provides estimates of the characteristics of population and housing units rather than a complete count or enumeration. Both census long-form and ACS data are collected from only a sample of all people and housing units. As a result, both long-form and ACS data must be "controlled" to complete counts of population and housing units in order to produce reliable estimates of the number of people or households with certain characteristics.

In this case, controlling means using a process of ratio-adjusting to make sample-based estimates sum to an established total count.[4] The established total count of housing units and people come from the Census Bureau's Intercensal Population Estimates (IPE) program. The Census Bureau is required by federal law to produce population estimates for states, counties, and local governments (for example, cities, villages, towns, and townships) in the years between decennial censuses.

Single-year estimates of population characteristics from the ACS are weighted to be consistent with the county population estimates by age, sex, race, and Hispanic origin.[5] Multi-year estimates will be weighted using a method similar to the single-year estimates with one main difference. "The ACS population and housing unit estimates are controlled to the average of the current IPEs for the multi-year estimation period.[6]"

There is one important drawback to this approach: The intercensal estimates are based on a "usual" residence concept, while the ACS estimates are based on a two-month "current" residence concept. The IPEs represent the average annual population of year-round residents in a particular area. However, in areas with a significant seasonal population, control totals based on counts of "usual residents" may be misleading. For example, the 2000 Census, and the intercensal population estimates, treat residents from other states who are temporarily living in Arizona and Florida as residents of the states where they "usually reside." The ACS, on the other hand, counts these "snowbirds" where they are living at the time the ACS data are collected, as long as they have lived there for two months or longer. So, the ACS data collected in Florida during 2004 will reflect the characteristics of the population living there at various points throughout the entire year, rather than just those who reside there year-round. Controlling ACS data to counts of "usual" residents is problematic because it could result in skewed estimates of the average annual number of people and households with certain characteristics. This is especially likely if the seasonal population has different characteristics from the year-round population.

Although there are significant challenges in controlling the ACS to the intercensal population estimates, the introduction of the ACS could help improve the intercensal population estimates. The Census Bureau is researching ways to integrate information from the decennial census, administrative records, and the ACS to improve the quality of intercensal population and housing unit estimates. The ACS provides annual distributions of population characteristics for all counties and many subcounty areas and can be used to improve estimates of the components of annual change (births, deaths, and net migration) that are essential to the development of intercensal population estimates. For example, 2000 to 2002 ACS data on the foreign-born population were used to estimate national levels of international migration that were then used in the intercensal estimates for 2003.

Using Confidence Intervals

Data from the ACS are estimates of the actual figures that would be obtained by surveying or interviewing the entire population. Estimates that are derived from sample surveys are subject to two types of error—sampling error and nonsampling error.

Nonsampling error can be attributed to many different things, such as:

- Editing;
- Reviewing or keying data from questionnaires;
- Differing respondent interpretations; and
- Respondent inability to recall information.

Although it is impossible to eliminate all nonsampling error, the Census Bureau attempts to reduce systematic errors by conducting extensive research and evaluation on sampling techniques, questionnaire design, and data collection and processing procedures.

Sampling errors that arise from interviewing a sample, rather than the entire population, occur due to the use of probability sampling. The sample used for the ACS is only one of a large number of possible samples of the same size and design that could have been selected. For example, assume that there are only 100,000 people in the United States and the ACS samples 1,500 of those people. There are many possible pools of 1,500 people that could be sampled to receive the ACS questionnaire. If you sampled five different pools of 1,500 people, you could then calculate estimates from each pool, or sample. The differences in the estimates you would get from sample 1, sample 2, sample 3, sample 4, and sample 5 is the sampling error. It occurs by chance and can be measured statistically.

Standard error is the statistic used to measure sampling error. Standard error is a measure of how much a single sample estimate (for example, the estimate from sample 1) deviates from the average of all possible samples. With an estimate of the standard error, a data user can construct a range of values that includes the “true” population value with a certain probability. This range of values is called the confidence interval.

The confidence interval allows users to assess the accuracy of an estimate. The interval represents the range of values that includes the true value with a given probability. The Census Bureau publishes a 90 percent confidence interval around each ACS estimate. For example, according to the 2004 ACS data, 18.4 percent of children under age 18 in the United States live in poverty. The 90 percent confidence interval is 18.1 – 18.7 percent. That means that there is a 90 percent chance that the true percent of children under age 18 in poverty was anywhere between 18.1 and 18.7 percent in 2004.

Many users may be more familiar with the concept of margin of error (MOE) than with confidence intervals. During every presidential election, news stations often report where a candidate stands in the exit polls. For example, a presidential candidate who carries an estimated 43 percent of the vote(± 3 percent) may have between 40 percent and 46 percent of the votes cast. The ± 3 percent is the MOE around the estimate of 43 percent.

In some tables containing ACS data, the Census Bureau reports the margin of error rather than the lower bound and upper bound of the confidence interval. The margin of error is the difference between the estimate and either its upper or lower confidence bound. Using the previous example of children in poverty in 2004, 18.4 percent of children were in poverty and the lower confidence bound was 18.1. As a result, the MOE is plus or minus 0.3 percentage points:

18.4 (estimate) - 18.1 (lower confidence bound) = 0.3 percentage points (MOE)
18.7 (upper confidence bound) - 18.4 (estimate) = 0.3 percentage points (MOE)

Confidence intervals and the MOE are generally larger for variables focused on subgroups of the population, such as children, because of the smaller population base. When you survey the entire population, there is no uncertainty around an estimate. However, as the size of the population base sampled decreases, the uncertainty increases. A smaller confidence interval or MOE indicates high precision in an estimate. If the MOE is plus or minus 0.01 percentage points, the estimate is rather precise. On the other hand, if the MOE is plus or minus 10 percentage points, the estimate is rather imprecise.

This has implications for when and how you use data from the ACS. If your state is attempting to evaluate a program aimed at reducing high school dropout rates and you receive a call from a legislator asking you for the most recent dropout rate for teens 16 to 19, you should look at the confidence interval around the ACS estimate to evaluate the precision of the estimate.

There is no general rule of thumb about what constitutes a MOE so large that it is not useful. Whether or not to use a particular estimate is a judgment call. If the confidence interval is rather large, you might consider calculating a multi-year average, in which case you would also calculate a new standard error and confidence interval. By averaging two or more years, the standard error should decrease and the confidence interval should become smaller. In other words, your estimate should become more precise. Essentially, you need to think carefully about the implications of using an estimate given the MOE associated with that estimate.

For example, if you determine from published tables that in 2004 the percentage of teens ages 16 to 19 who were not in school and were not high school graduates was 7.6 percent ± 0.3 percentage points, or anywhere between 7.3 and 7.9 percent, this is clearly a precise estimate and you should feel comfortable providing that 7.6 percent to your legislator. On the other hand, if you determine that the percent was 9.9 ± 6.1 percentage points (i.e., anywhere between 3.8 and 16 percent), you might consider doing a multi-year average. If the objective is to evaluate whether the dropout rate has decreased, a range of 3.8 and 16.0 percent is too large to say anything meaningful about whether the rate is actually changing.

As mentioned previously, the Census Bureau will publish a confidence interval or MOE for every estimate it publishes from the ACS. However, at times you will need to sum two or more estimates, aggregate counties, or calculate a percent. Once you perform *any* kind of calculation of published ACS data, additional calculations are required to get the confidence interval or MOE associated with the new estimate you created.

The Census Bureau maintains "Accuracy of the data" documents on the ACS website.[7] Those documents contain the standard error and confidence interval formulas and in many cases provide examples. They also include information about sample design, sampling error, non-sampling error, and estimation methodology.

There are several different accuracy documents:

- Each survey year;
- Profiles of change from year to year;
- Multi-year averages; and
- PUMS.

Please note that the formulas may differ from year to year. Formulas for calculating standard error for the PUMS are different from those used with tables published on the Census Bureau website.

Conclusion

The Census Bureau is entering a new era of data availability. The data user community has clearly indicated that more timely data are needed at small levels of geography to effectively distribute tax dollars and identify areas of need within communities, and the traditional once-a-decade data collection is no longer sufficient. The ACS is the Census Bureau's answer to the data needs of government agencies, businesses, and organizations around the country in the 21st century.

This User's Guide was written for the Kids Count Network and other data users, with funding from the Annie E. Casey Foundation, in an effort to provide important details about the ACS and tools needed to use the data effectively. For more information about the ACS, please visit www.census.gov/acs or contact the Population Reference Bureau.

References

[1] Leslie Kish, "Rolling Samples and Censuses," *Survey Methodology* 16, no. 1 (1990): 63-79.
[2] U.S. Census Bureau, *Design and Methodology: American Community Survey* (Washington, DC: Government Printing Office, 2006).
[3] Cynthia M. Taeuber, "Tracking Who We Are and Where We Are Going: An Example of Using the American Community Survey in Calvert and Prince George's Counties, MD" (May 2005), accessed online at www.prb.org/pdf05/TrackingWhoWeAre.pdf, on July 19, 2005.
[4] For a technical description of this complex process of sequential "iterative proportional fitting," see Chapter 8 of Census 2000 Summary File 3 Technical Documentation, accessed online at www.census.gov/prod/cen2000/doc/sf3.pdf, on July 19, 2005.
[5] Estimates of the group quarters population will be weighted at the state level. For more information, see U.S. Census Bureau, *Design and Methodology: American Community Survey*.
[6] U.S. Census Bureau, *Design and Methodology: American Community Survey*.
[7] As of May 2006, "Accuracy of the Data" documents for published ACS data can be found in the *Using the Data* section of the ACS website, www.census/gov/acs. "Accuracy of the Data" documents for estimates derived from the ACS Public Use Microdata Sample can be found in the Documentation section of the *Public Use Microdata Documentation* section of the ACS website, www.census/gov/acs.

Suggested Resources

U.S. Census Bureau ACS website
www.census.gov/acs

U.S. Census Bureau American FactFinder
http://factfinder.census.gov

U.S. Census Bureau, *Design and Methodology: American Community Survey*. Washington, DC: U.S. Government Printing Office, 2006.

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Acknowledgments

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Appendix 1
The Testing Phase and Sample Sizes

The Census Bureau began testing the American Community Survey (ACS) in 1996 in four test sites. In 1998, they expanded the testing phase sample to 31 test sites. In 2000, they expanded the sample again to 1,204 counties in addition to the 31 test sites. This expansion was done primarily to test the feasibility of conducting the ACS while the decennial census was also being conducted. The 2000 expansion also provided estimates that are representative at the state level.

The testing phase of the ACS continued from 2000 through 2004, as the Census Bureau continued to sample addresses in the 31 test sites and the additional 1,204 counties. As a result, comparable state-level data are available from the 2000, 2001, 2002, 2003, and 2004 surveys.

The table below shows the sum of the 12 monthly address samples selected from the Master Address File for each state in 2004. The figures in the final interview columns represent all interviews successfully conducted by mail, telephone, or personal visit between January 1 and December 31, 2004.

Table 1
Sample Size and Total Number of Interviews Completed, by State, 2004

State	Sample Size	Final Interviews	State	Sample Size	Final Interviews
United States	838,293	568,966	Missouri	14,040	9,911
Alabama	11,180	7,162	Montana	7,567	5,102
Alaska	6,843	3,981	Nebraska	11,076	8,108
Arizona	19,630	12,797	Nevada	6,853	4,305
Arkansas	7,120	4,533	New Hampshire	6,387	4,518
California	76,315	50,472	New Jersey	18,542	12,824
Colorado	10,343	7,370	New Mexico	7,156	4,387
Connecticut	7,629	5,543	New York	52,574	33,308
Delaware	6,990	4,631	North Carolina	20,070	13,231
District of Columbia	6,205	3,707	North Dakota	6,168	4,489
Florida	54,321	35,684	Ohio	35,163	25,779
Georgia	19,875	12,646	Oklahoma	8,509	5,531
Hawaii	6,560	4,304	Oregon	13,130	9,574
Idaho	6,203	4,143	Pennsylvania	31,914	23,138
Illinois	32,283	22,681	Rhode Island	6,583	4,571
Indiana	14,968	10,852	South Carolina	10,481	6,714
Iowa	12,641	9,675	South Dakota	8,511	6,251
Kansas	9,725	7,112	Tennessee	14,601	10,068
Kentucky	15,867	10,672	Texas	53,062	32,806
Louisiana	14,487	9,122	Utah	6,049	4,273
Maine	6,659	4,342	Vermont	6,838	4,562
Maryland	14,307	10,054	Virginia	16,635	12,069
Massachusetts	17,599	12,747	Washington	15,640	11,235
Michigan	23,619	17,219	West Virginia	12,048	7,798
Minnesota	11,316	8,886	Wisconsin	14,555	10,892
Mississippi	15,124	9,042	Wyoming	6,332	4,145

Source: U.S. Census Bureau

Appendix 2
How the ACS Differs from the 2000 Census

The decennial census long form questionnaire is mailed once every decade to a random sample of addresses. In contrast, the American Community Survey (ACS) is mailed every month of every year to a random sample of addresses.[1] There are several other differences between the two surveys. This section outlines several major differences between the census and the ACS and some of their implications.

Data Collection

The decennial census uses two phases of data collection:

1. Mail-out and mail-back, and
2. In-person follow-up by a field representative for all addresses that did not respond by mail.

The nonresponse follow-up for the census is conducted by thousands of temporary interviewers who are trained by the Census Bureau and sent out into the field for a few months of data collection. The decennial census allows for proxy responses from a neighbor or another person who is not a resident of the sampled housing unit.

The ACS uses three phases of data collection:

1. Mail-out and mail-back;
2. Computer-assisted telephone interviewing (CATI) of people at all addresses that did not respond by mail, providing the Census Bureau has telephone information; and
3. Computer-assisted personal interviewing (CAPI) of a sample of the addresses that did not complete a questionnaire during either the mail or the CATI phase.[2]

The nonresponse follow-up for the census is conducted by thousands of temporary interviewers who are trained by the Census Bureau and sent out into the field for a few months of data collection. Because of its continuous nature, the ACS requires a constant supply of interviewers to follow-up on nonreturned forms. In contrast to the census, the ACS maintains a staff of professional interviewers who receive extensive training.

ACS staff achieve a higher response rate than decennial census staff for households that do not return forms. ACS field workers are also more effective than decennial census enumerators at reducing "item nonresponse" by getting people to provide usable information for more items on the questionnaire. In addition, information about occupants who are absent is usually more accurate and complete, when it comes from a household member than from a neighbor. Unlike the census, the ACS does not accept proxy responses from a neighbor or anyone else who is not a resident of the sampled housing unit. For all these reasons, the ACS obtains more accurate and complete population and housing information than the census long form.[3]

Sample Size

The 2000 Census long form was mailed to approximately one in six U.S. households. The ACS sample size will be smaller than that of the 2000 Census long form (see Table 1). The 2005 to 2009 ACS five-year estimates will be based on a sample of about one in eight U.S. households.

The smaller sample size of the ACS will result in larger standard errors than those for the decennial census long form. Census Bureau researchers expect to offset some of the higher sampling error in the ACS with lower nonsampling error through more effective follow-up of nonresponses.[4]

Table 1

Household Sampling Rates for the Decennial Census and the American Community Survey

	U.S. households in sample	
Data source	Number (millions)	Percent
2000 Census short form	115.9	100.0
2000 Census long form	18.3	15.8
2004 ACS	0.8	0.7
2005 ACS (projected)	3.0	2.5
Multiyear ACS (2005-2009)	15.0	12.5

Source: U.S. Census Bureau.

Residency Rules

Information collected in censuses and surveys pertains to the people residing in the housing units or group quarters that received the questionnaire. Place of residence may seem like a straightforward concept, but it can be difficult to measure for individuals or families with complex living arrangements—including people with second homes, college students, and migrant workers. The decennial census and ACS differ in how they define who lives in a housing unit, but they do not differ on how they define who lives in group quarters.[5] Only housing unit residence rules will be discussed in this section.

The decennial census uses a "usual residence" rule. Usual residence is the place where a person lives most of the time. The American Community Survey (ACS) uses the concept of "current residence," based on a two-month rule. Under the two-month rule, a person is considered a current resident if any of the following are true:

- The person has been at the residence for more than two months at the time of survey contact.
- The person has no other place where he or she usually stays, regardless of length of time at the residence at the time of survey contact (for example, a person moved into a sampled housing unit one month before the time of survey contact and has no other place where he or she usually stays).
- The person is away at the time of the survey contact and has been away for two months or less, for example, traveling on business or vacation. (Information on the absent household member would be obtained from another household member.)

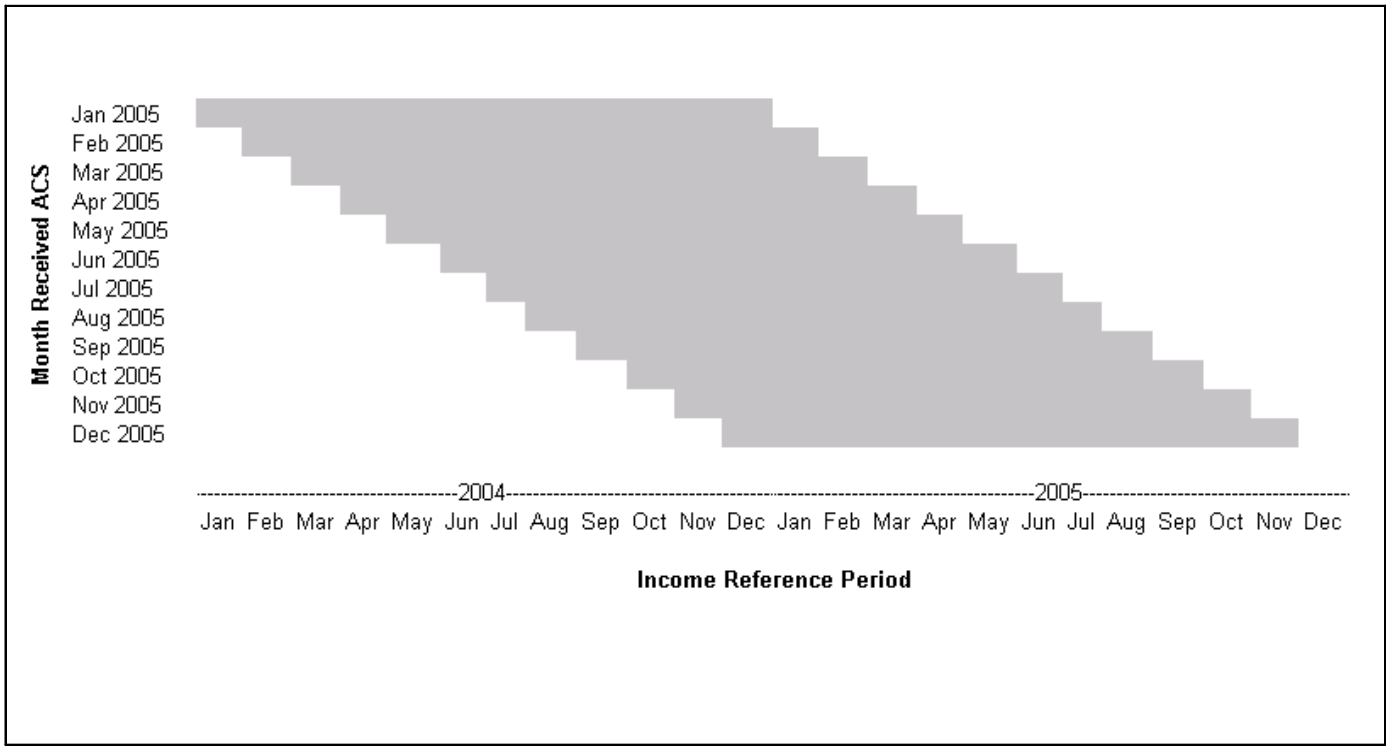
There are a few exceptions to the two-month rule. Children who are away at school (below college level) are considered residents of their parents' home.[6] Children in joint custody are considered to be current residents of the sample unit if they are staying there at the time of survey contact. Individuals who stay at a residence close to their work and return regularly to another residence are considered to be current residents of the family residence, not the work-related residence.

The Census Bureau contends that the current residence rule is more appropriate for the ACS than the usual residence rule, because the survey is conducted every month on independent samples and produces annual average estimates. The Census Bureau notes that the "current residence" concept recognizes that people can have more than one place where they live or stay over the course of a year, and that estimates of the characteristics of the population for some areas are affected by these people. According to the Census Bureau, this approach provides better representation of seasonal residents and migratory groups.[7] As a consequence, ACS data for areas with large seasonal populations—such as retirement destinations; beach, lake, or mountain vacation areas; or university towns—may show different characteristics than data based on the census.

Reference Period for Income

The census long form asks respondents whether they worked for pay "last week" and collects data between March and August. Income data collected in the Census refer to the previous calendar year. The ACS also asks respondents whether they worked for pay "last week." However, the ACS collects data year-round, and produces an average of the monthly data. The ACS asks respondents to state their income for the previous 12 months. A household that received the 2005 ACS in January reported income received between January 2004 and December 2004; a household that received the 2005 ACS in December reported income received between December 2004 and November 2005 (see Figure 1). The 2005 estimate would reflect an average of values from this 23-month period.

Figure 1.
Income Reference Period for the American Community Survey



Source: U.S. Census Bureau

All income values from the ACS are adjusted for inflation using the Consumer Price Index (CPI). The adjustment factor that the Census Bureau uses is based on the difference between the average Consumer Price Index (CPI) for the 12 months in the survey year and the average CPI for each respondent's 12-month reference period.[8]

Poverty statistics are derived from the same questions used to derive income statistics. Poverty status is based on family income (for example, income reported by all family members ages 15 and older), family composition, and age of family members.[9] The reference period for the income questions necessitates a special procedure for creating poverty estimates.

To determine a person's poverty status, family income for the prior 12 months is compared with a poverty threshold that corresponds to those 12 months. Put simply, income estimates are derived by adjusting 12 months of income, whereas poverty estimates are derived by adjusting 12 months of poverty thresholds.

Reference Period for School Enrollment

Another difference between the census and ACS is the reference period used to determine school enrollment. The census long form asks if a person has attended school "any time since February 1." The ACS asks if a person has attended school during the "last three months." Census staff point out that the "differences in the reference period for the school enrollment question and differences in the time of year in which the question was asked" may result in different enrollment estimates between the two surveys.[10] The ACS produced lower estimates of enrollment for children in nursery school and kindergarten, when compared to the decennial census. Additional analysis indicated that the enrollment rates for people ages 5 to 19 were similar across the two surveys.

Summary

Clearly, there are many important differences between the traditional decennial census long form and the ACS. The table below summarizes the differences discussed in this section. The bottom line is that the ACS is a different survey from the decennial census. Other differences in the wording and order of questions may also cause the ACS estimates to differ from what one might expect from a census long form. Census Bureau staff and other professionals continue to study the correspondence between the census and ACS estimates and to offer guidance interpreting the results.

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[1] No address will receive the ACS more than once in a five-year period, although the same person could receive it again within five years, if he or she moved to another address included in the sample.
[2] The CAPI sampling rate varies depending on the overall response rate at the census-tract level. In census tracts with an overall response rate below 36 percent, for example, the sampling rate is one in two, while it drops to one in three for tracts with a response rate between 51 percent and 60 percent.
[3] Because the ACS has lower item nonresponse rates, ACS estimates are less likely than decennial census estimates to include data derived from allocation. Allocation is a statistical procedure that imputes the responses for blank questionnaire items based on responses from neighbors or other household members. See U.S. Census Bureau, "Using the Data: Quality Measures," accessed online at www.census.gov/acs, on Sept 7, 2005.
[4] Charles H. Alexander, "American Community Survey Data for Economic Analysis" (presentation to the Census Advisory Committee Meeting of the American Economic Association, Washington, DC, October 18-19, 2001).
[5] Both the Decennial Census and ACS determine residency in group quarters by a de facto rule. For example, the rule includes everyone staying in the group quarters when the group quarters are sampled, regardless of the length of stay.
[6] The ACS uses the two-month rule to determine college students' place of residence.
[7] U.S. Census Bureau, "Report 4: Comparing General Demographic and Housing Characteristics With Census 2000," *Meeting 21st Century Demographic Data Needs—Implementing the American Community Survey* (Washington, DC: Government Printing Office, 2004).
[8] U.S. Census Bureau, *Advanced Methodology: Data Collection & Processing*, accessed online at www.census.gov/acs/www/AdvMeth/CollProc/CollProc1.htm, on July 19, 2006.
[9] Poverty status is determined for all individuals except those who are under age 15 and not related to anyone in the household and individuals who are living in institutions, military group quarters, and college dormitories.
[10] Scott Boggess and Nikki L. Graf, "Measuring Eduction: A Comparison of the Decennial Census and the American Community Survey" (presented at the 2003 Joint Statistical Meetings, San Francisco, August 3-7, 2003).

Appendix 3
Graphing and Charting Confidence Intervals Using Microsoft Excel

This appendix illustrates how to include confidence intervals in graphs and charts using Microsoft Excel. The following illustration compares the percent of children under age 18 who are in poverty in three states.

To chart the percent and the confidence interval, you will need to have the percent and the margin of error in your spreadsheet.

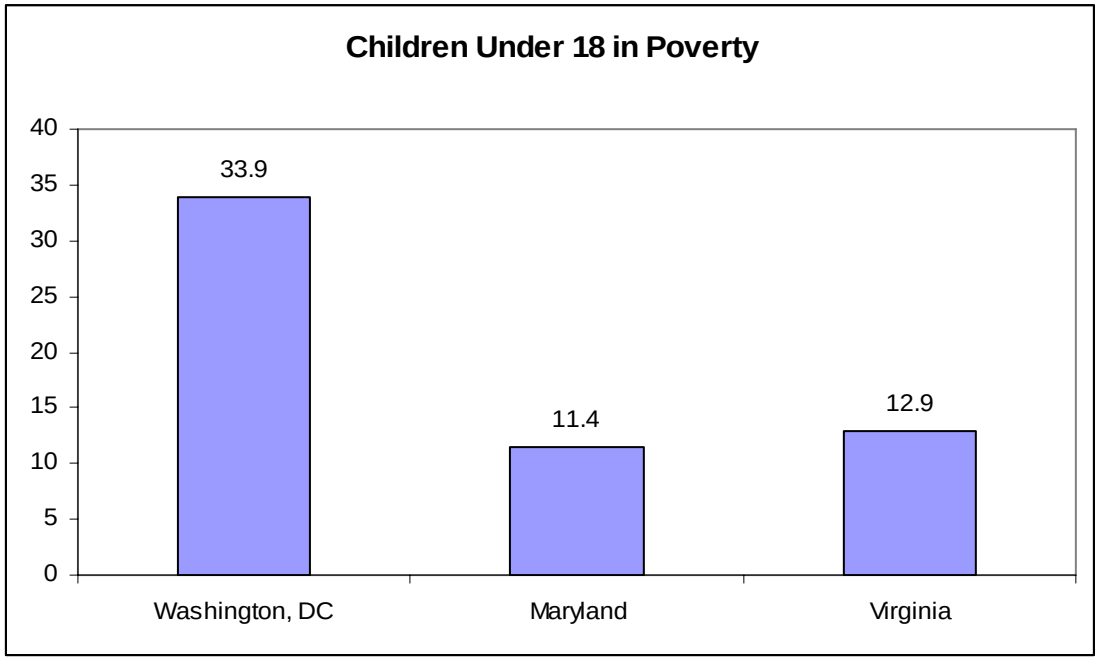
	Percent of children under 18 in poverty	MOE
Washington, DC	33.9	4.5
Maryland	11.4	1.3
Virginia	12.9	1.5

Source: U.S. Census Bureau, 2004 American Community Survey.

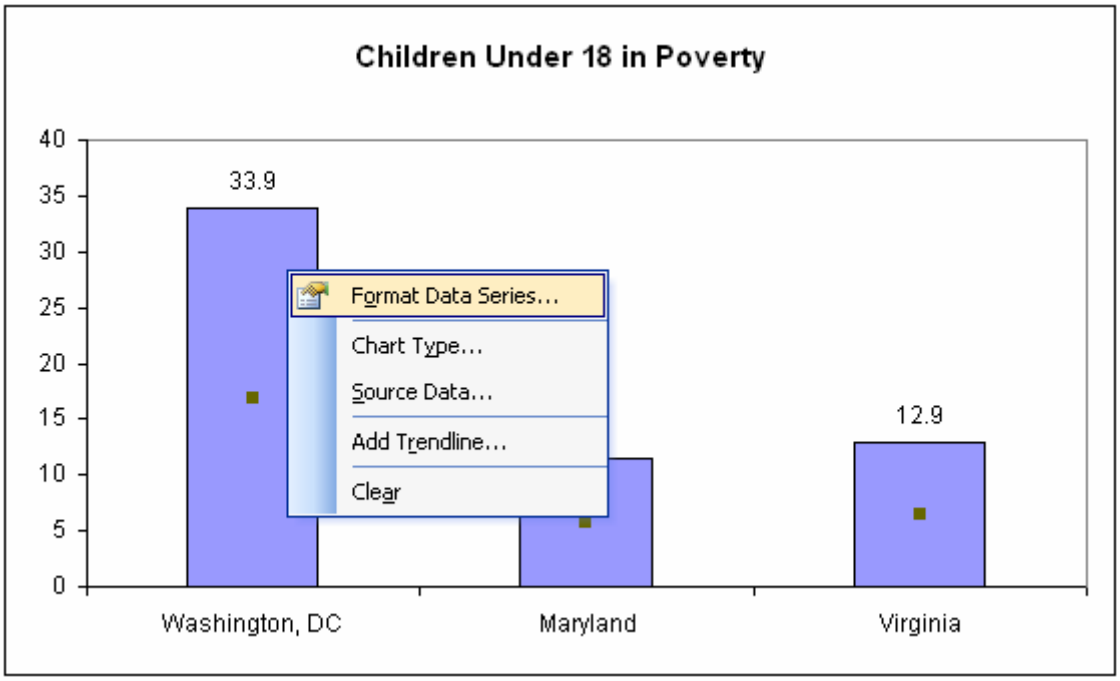
1. Begin by setting up your bar chart as you normally would:

   - Highlight the data you want to chart (you can include the column headers and row stubs)
   - Do not highlight the MOE data
   - The data to be charted and the MOE data need to be in the same format.
     - Use the *Format Cells* tool to check the format of your data. If the data are percentages, the MOE also need to be percentages. If the data are numbers, the MOE also need to be formatted as numbers.
     - The number of decimal places does not have to be consistent.

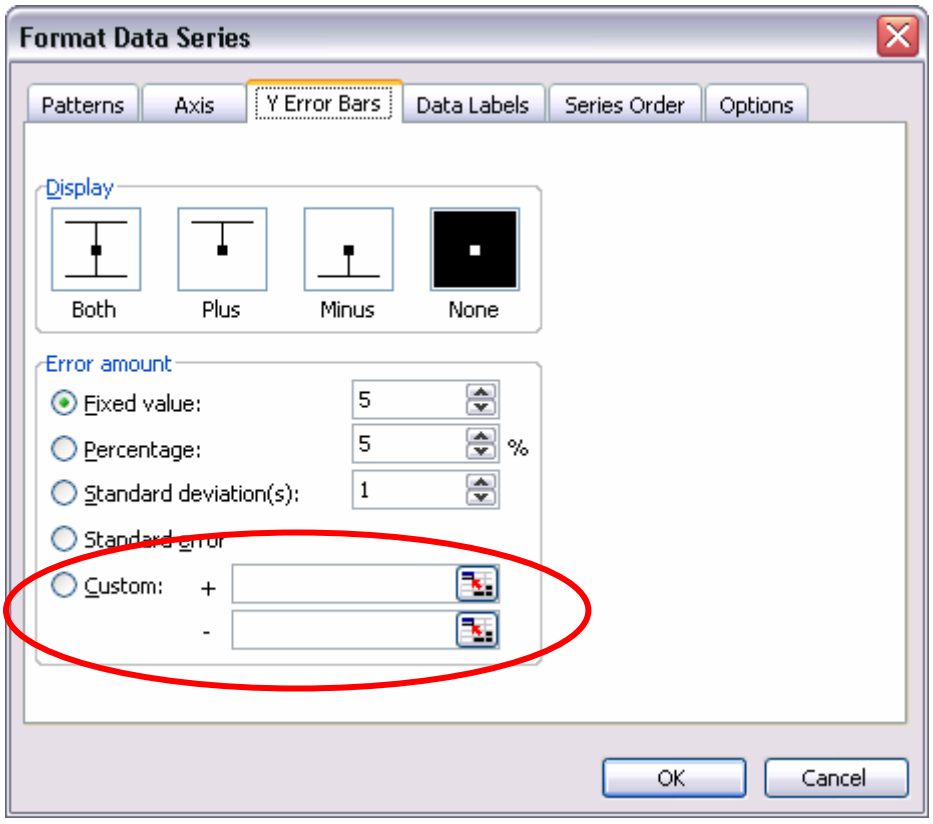
   The resulting chart might look like this:



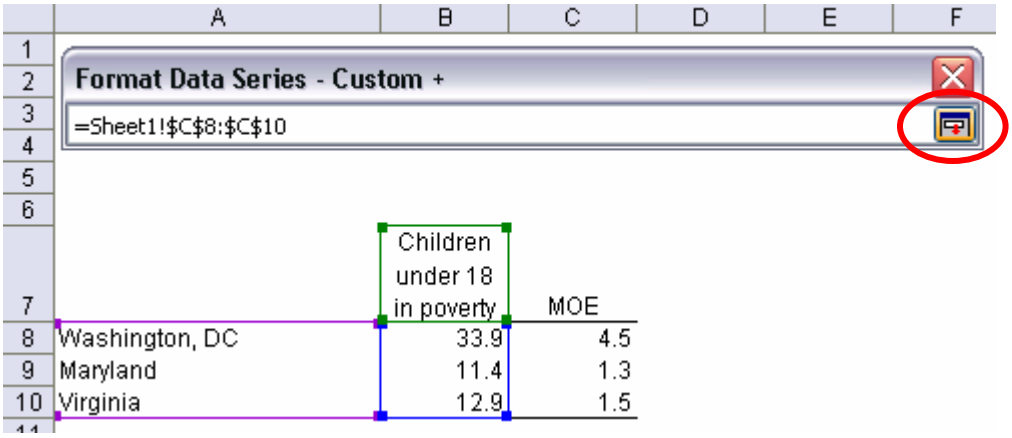
2. To add the bars to show the confidence interval, right click (or double left click) on any of the blue bars and select **Format Data Series** from the menu that pops up.



3. Click on the **Y Error Bars** tab. To set the error bars, use the **Custom** plus and minus setting:



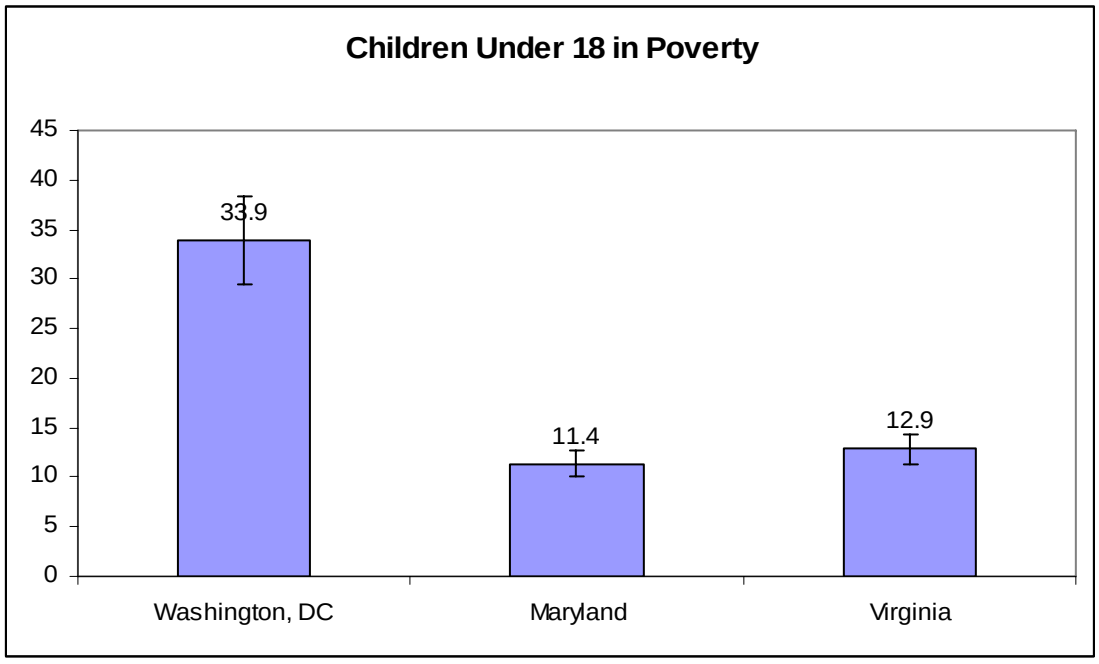
4. Click on the  icon in the **+** box and highlight the margin of error figures that correspond to the data being charted.



Notice that the cells from C8 to C10 were entered in the **Custom +** box.

5. Click on the  icon to return to the **Format Data Series** dialogue box.
6. Click on the  icon in the – box and highlight the margin of error figures that correspond to the data being charted.
7. Click on the  icon to return to the **Format Data Series** dialogue box and click **OK**.

Your chart should look like this:



You can move the individual percent values in your chart to make it easier to read:

- Left click once on a value (ex. 33.9) and pause
- Left click a second time and while holding the left mouse button, drag the value to a new location.

You can also change the color and width of the error bar line by right clicking on an error bar and choosing **Format Error Bars**.

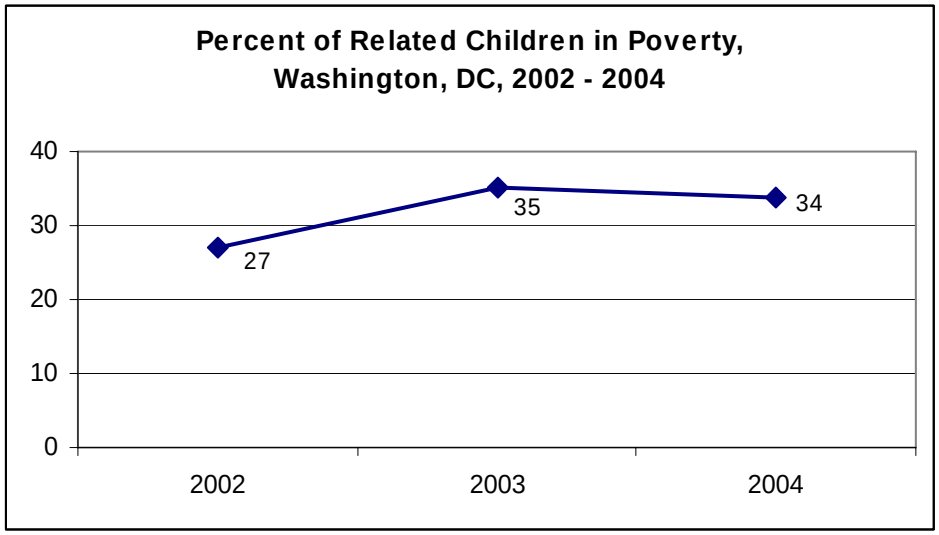
The next example uses a line graph to show the three-year trend of the percent of children under age 18 who are living in poverty. To graph the percents and the confidence intervals, you will need to have the percents and the margins of error in your spreadsheet.

	2002	2003	2004
Percent of Related Children Under 18 in Poverty	27	35	34
MOE	4.3	3.9	4.5

1. Begin by setting up your line graph as you normally would:

   - Highlight the data you want to graph (you can include the column headers and row stubs)
   - Do not highlight the MOE data
   - The data to be graphed and the MOE data need to be in the same format.
     - Use the *Format Cells* tool to check the format of your data. If the data are percentages, the MOE also need to be percentages. If the data are numbers, the MOE also need to be formatted as numbers.
     - The number of decimal places does not have to be consistent.

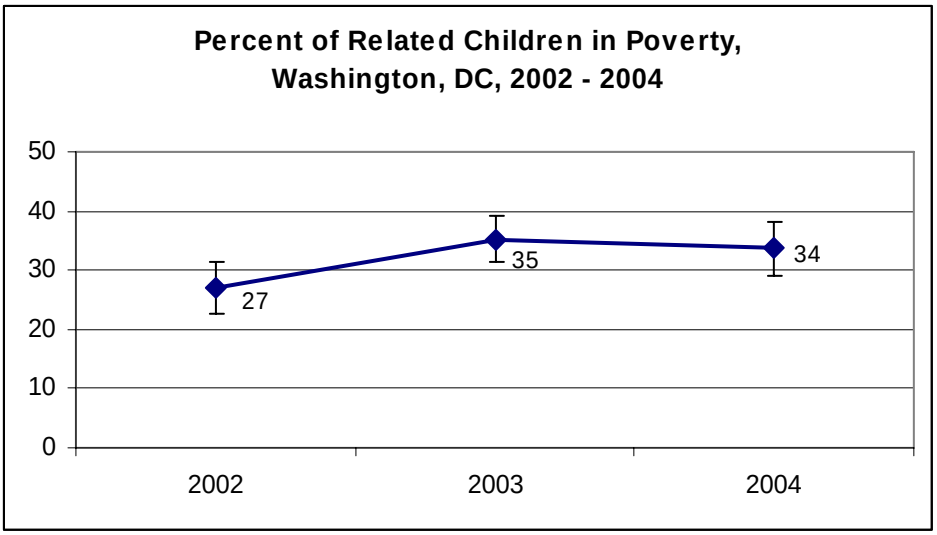
   Your graph might look like this:



To add the bars to show the confidence interval:

2. Right click anywhere on the line in your line graph and select **Format Data Series**.
3. As in the previous example, select the **Y Error Bars** tab and enter the MOE in the **Custom +** and **–** sections.

   Your line graph should now show the confidence interval bars around each percent.



Once again, you can change the color and width of the error bar line by right clicking on an error bar and choosing **Format Error Bars**.

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For more information or for a pdf version of this report, visit the Annie E. Casey Foundation's KIDS COUNT website at www.kidscount.org or PRB's website at www.prb.org.

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