THE QUALITY OF ESTIMATES FROM THE AMERICAN COMMUNITY SURVEY FOR SMALL POPULATION GROUPS

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I. INTRODUCTION

This paper discusses the quality and usefulness of estimates from the planned American Community Survey (ACS), for very small populations groups. The ACS is intended to replace the long form survey in the 2010 census. Since the long form is unique as a source of information about smaller population groups, a priority objective of the ACS design has been to provide good information about smaller groups.

The general premise of the ACS design is that by spreading the "long form" sample across the decade, it is possible to provide updated information for all sizes of population groups. In principle, this should be especially advantageous for small population groups, because there is currently very little information about how these populations change over time. Also, the ACS is expected to have more consistent quality because of the advantages of a continuous operation, which is especially important for those small groups that have traditionally been difficult to include in surveys and collect information about characteristics.

Questions have been asked about the quality of ACS estimates for very small population groups. These concerns are described in Section III, with responses in subsequent sections. We have described the ACS as replacing the long form "snapshot" with a "video." Using this metaphor, the most widespread concerns are: (1) that a "freeze frame" from the video is not as clear as a snapshot, and (2) that if the subject of the picture is small and fast-moving, the video may show a blur.

The response is, continuing the metaphor, that the freeze frame is almost as clear as the snapshot, and provides the advantage of being able to look at a freeze frame at any time. For fast-moving subjects, a video at least tells you that the subject is moving and in what direction, while a snapshot misses the action totally. Small population groups have the potential to change more dramatically than larger groups, so having a "video" is particularly valuable for smaller groups.

The sections of this paper present a discussion of the basic statistical issues.

Comments on topics for which this paper may not have effectively explained the issues are welcome. There will be subsequent revisions of this paper as new information is available from evaluations of the ACS and comparisons with Census 2000.

II. BACKGROUND ON THE OPERATIONS AND DESIGN OF THE AMERICAN COMMUNITY SURVEY

The ACS is part of a plan to re-engineer the 2010 census. Besides replacing the long form with the ACS, the plan includes modernizing the geographic system and updating the list of addresses throughout the decade (i.e., MAF/TIGER), and early planning and research to design better and more accurate ways to count the population in 2010.

The ACS plan is to start in July 2004, with an annual sample of 3 million addresses spread across the list of addresses in each census tract, covering all places (such as cities or towns), American Indian Reservations, Alaska Native villages, and Hawaiian Homelands. About 250,000 addresses will be contacted for the first time each month. No address will be in sample more than once in a 5-year period. We expect that for most addresses, there will be about forty years between ACS interviews.

Most addresses in the sample start out with a mail questionnaire in their first month, with a prenotice, a reminder card, and a targeted second mailing. In the second month, Census staff follow up at addresses that did not respond and for which a telephone number is available with a Computer-Assisted Telephone Interviewing (CATI) operation. In the third month, we select a one-in-three sample of addresses which have still not responded for follow-up by Field Representatives who use Computer-Assisted Personal Interviewing (CAPI). Mail responses with substantial amounts of missing data are designated for recontact by telephone in a "failed edit follow-up" operation. Units for which there is no usable mailing address skip the mail and CATI phases. A two-in-three sample of such units goes straight to the CAPI operation.

As was done for the last three census long form samples, small governmental units will be sampled at a higher rate, depending on the population of the area. In particular, the smallest governmental units will be sampled at a rate of 10 percent per year. Addresses in large census tracts are sampled at a somewhat lower rate, unless they are in a small governmental unit.

Beginning in 2005, the ACS will be complementing a plan to oversample census tracts that have much lower-than-average mail response rates. When this plan is implemented in such areas, the CAPI follow-up rate would be greater than 1 in 3. To make up for this, the initial sampling rate will be reduced slightly in tracts with above-average mail response rates.

A Puerto Rico Community Survey with similar design and sampling rates, is planned starting in 2005, pending congressional funding.

A crucial part of the ACS message is that the ACS provides the *characteristics* of the population, not *counts*. The census will continue to provide a complete count of the population every ten years. In the intercensal years, the official number of people will continue to come from the intercensal demographic estimates program, as part of the Federal/State Cooperative Population Estimates (FSCPE) program. Information from the ACS will be used to improve these population estimates.

To replace the long-form estimates, the ACS will produce annually updated 5-year average estimates for geographic areas down to the block group level. In 2010, for example, we plan data products covering the period 2005-2009. In 2011, the updated estimates will cover 2006-2010, and so forth. Each 5-year average may be thought of as replacing a hypothetical census long form in the middle year; for example, the 2005-2009 average would correspond to a "2007 long-form estimate." The 2008-2012 average is the one most closely corresponding to the 2010 time period. These updated 5-year averages are the most important ACS data product for small population groups because they will show the direction and level of trends, information never before available for smaller groups.

The ACS will also produce 3-year averages and 1-year average estimates. For larger areas and population groups of 20,000 or more people, there will be 3-year averages, and 1-year averages for areas and groups of 65,000 or more people. These averages will be regularly available and updated in the data products to show changes in characteristics over time.

For research purposes, we will make 3-year and 1-year averages available for smaller areas and population groups. We will discuss the details of the format (e.g., SAS files) with data users to determine what is generally the most useful. Research might include, for example, statistical analyses such as time series modeling or multiple regression analyses which pool information from a number of areas. These data will also be useful to help interpret multi-year averages, that is, to study in more detail the changes that took place within the 5-year period for which the averages are shown in the core products. The single year and 3-year averages for the smaller areas and groups will have high standard errors and are useful only for detecting large changes.

III. IMPROVED INTER-CENSAL ESTIMATES FOR RACE, ETHNIC, AND ANCESTRY GROUPS

The complete counts of race and Hispanic origin groups will be collected on the decennial census short form as always. The advantage the ACS provides is updated information about patterns of change in the size, social and economic characteristics, and geographic location of race, ethnic, and ancestry groups during the decade. This information will be incorporated into the intercensal population estimates program to improve their accuracy.

In years between censuses, the ACS offers clear improvements in the information available to estimate the number of people in the race and ethnic groups listed on the decennial census short form, including specific groups. This encompasses not only broad groups such as "Asian," "Hispanic," and "American Indian or Alaska Native," but also specific groups such as "Korean," "Jamaican," "Puerto Rican," "English," "Cuban," and specific American Indian tribes. For the decennial census, ancestry groups are collected on the sample (long) form only. The American Community Survey will update information about ancestry groups every year.

Information from the ACS, along with other advancements in the methodology for intercensal estimates, will improve the quality of sub-state estimates of the broad race/origin and ancestry groups. Without the ACS, the intercensal estimates program can now provide estimates only for the broad race groups or the total "Hispanic" category. There are no intercensal estimates for the detailed subgroups or specific American Indian tribes or for ancestry groups. Even for the broader groups, the intercensal estimates historically have not done well in reflecting changes in migration patterns below the state level.

To bring about improvements in the quality and detail of intercensal estimates for the smaller groups, we are developing an improved methodology that uses the ACS estimates of demographic characteristics. The ACS multi-year averages will provide information about changes between censuses in the characteristics and geographic areas in the detailed groups. As illustrated in subsequent sections, for small groups the ACS measures dramatic changes, the most important ones to measure.

IV. STATISTICAL ISSUES ABOUT THE ACS AND SMALL GROUPS

This discussion uses examples for 400 people to respond to questions that data users have asked about the ACS and small population groups. The examples could represent (1) the number of people in a particular population group in a particular area; or (2) the number of people in an area from a group who have a specific long-form characteristic, such as being employed in a particular industry, teenage mothers enrolled in school, or people who use a language other than English at home. This hypothetical example uses a relatively high, yet realistic, standard error for both the ACS and the long form. The relatively high standard error in the example would correspond to a characteristic that has the same value for all or most of the members of a household. Such characteristics tend to have higher-than-typical standard errors. As long form and ACS data become available for a wider range of characteristics, analyses like this one are being done using the actual standard errors for a variety of estimates, large and small.

This section focuses on four basic questions and our responses to the concerns and how we are addressing the issues that data users have raised.

Question 1. *What is the impact of having a smaller ACS sample size in any single 5-year period than the long form has in the census year?*

Response: It is correct that a single 5-year average from the ACS is based on a smaller effective sample size[1] than the census long form. As such, the ACS estimates will have larger confidence intervals than long-form estimates. Since the long-form estimates already have large confidence intervals for small groups, this may make the data too noisy to be useful for some purposes but not for others. This is like the "blurry freeze frame" in our video metaphor – you may not be certain about what is occurring but you can get some hints, more information than having nothing at all. For a group of 400 people, the census long form would typically have a 90-percent confidence interval of roughly 280 - 520.[2] An ACS 5-year average would have a slightly larger interval, on the order of 240 - 560. In other words, a typical confidence interval for a hypothetical 2010 census long-form estimate of 400 would be ± 120. By comparison, a 2008-2012 ACS average estimate of 400 would have a 90-percent confidence interval of ± 160.

The basic premise of the ACS rolling sample is that this relatively moderate increase in the sampling error for one part of a decade is a reasonable tradeoff so as to profit from the ability to update the 5-year average every year and thereby gain a picture of the direction of change and relative differences among groups and areas. If the size and characteristics of the population change, such as from 400 to 480, the 5-year average gives a more accurate picture of current conditions than the out-of-date long form statistics. As shown in Table 1, small population groups change by much more than this. The updated ACS estimates would give a more accurate reflection of current conditions, compared with continuing to use the years-old previous census.

Another valuable aspect of the ACS is that it provides information about when during the decade changes take place. It helps us to move away from relying on national averages to imagine what is going on in regions of the country and among different population groups. For example, we can better identify geographic areas or groups that are in a recession when the nation is, on average, doing "well." Alternatively, we can identify areas of success when, on average, the nation is in a recession. This ability to go beyond national averages between censuses helps us assess the reasons for change and differences and how and whether the change is likely to continue. It could help decision makers to develop more proactive policies to prevent problems before they become serious. Because of the relatively small annual ACS sample size, this ability is limited to large changes, as discussed and illustrated in the next section.

Confidence intervals primarily reflect sampling error but also some aspects of nonsampling error. This discussion has not taken into account potential improvements in nonsampling error in the ACS due to experienced interviewers and follow up by telephone that result in more questions on the form being answered (that is, a higher "item" response rate). Such reductions in nonsampling errors compensate in part for the slightly larger confidence intervals compared with the decennial long form.

Question 2. *Are the multi-year averages more difficult to interpret than point-in-time estimates (a snapshot), especially when there are substantial changes in the population during the period of the estimate?*

Response. When there is little change in a population of less than 20,000 people, a single 5-year average is equivalent to a snapshot. When there is substantial change, the 5-year average is more like a blurry video for fast-moving objects that can be improved by the updated series of 5-year averages. The bottom line is that if the population is changing substantially, getting some information about the change is better than getting no information, as happens when data are collected only once in ten years.

A more detailed answer depends on the specific situation. In the next section, we provide examples of ways a population might change over time, and how to use such information from the ACS.

There are some cases where a single 5-year average only, with no updating, would not be as good as a decennial snapshot. It is the yearly updating that gives the ACS its advantage. In all the examples, the updated series of 5-

[1] The term effective sample size" refers to the number of distinct units in the sample and to the relative sample size that will result in a similar level of sampling error when compared with simple random sampling and unbiased estimation. Based on the ACS design, the "effective sample size" is about 64 percent.

[2] This would be the confidence interval will be centered on 400, if the estimate is 400. The actual estimate would not be exactly equal to the population value because of sampling error. The length of the interval depends on what characteristic is being measured.

year averages are preferable to statistics for only one year out of ten. In some situations, to make the most complete use of the ACS information, analysts would supplement the series of standard 5-year averages with information from the 3-year and 1-year averages in the "research files." Obviously, it would be ideal if we could collect the full long-form sample every year, but that is not an option because of the cost and public burden.

Question 3. *Won't there be an increase in the standard errors in areas where response by mail or telephone is relatively low because you use a subsample of 1 in 3 nonresponse cases for follow up with personal visits from Field Representatives to collect the data?*

Response: Our evaluation studies show there are issues of both precision and differential bias among groups, and the Census Bureau is focusing on how we can best tackle these issues. It is important to reduce bias and bring the standard errors for all groups and areas in line with the objectives for response rates overall.

On average, about 60 percent of the population are represented by the ACS data collected by mail or CATI. For most of the remaining 40 percent of the population, the data are collected from a one-in-three subsample of nonrespondents. It is essential to maintain a low proportion of missing data for all areas and all population groups. Incomplete data increases the overall error of the estimates.

Additionally, it is important to reduce statistical bias in the estimates for all groups. There is a potential for differential bias among groups if the survey systematically excludes people with characteristics that would be missed by the survey even if their address had been selected for sample and follow up.

From the evaluation studies we have learned that there is substantial variation in mail response rates by race and geography. Mail response rates in the testing phase have been lower for tracts with high proportions of African American or Hispanic populations. There is some evidence of substantially lower rates for tracts with high proportions of American Indian or Alaska Native population or Native Hawaiian and Other Pacific Islander population. There is also evidence that households with limited English proficiency, including non-Hispanic households, have a lower-than-average mail return rate.

The Census Bureau proposes to address these issues through several techniques, including (a) using a subsample rate larger than 1 in 3 in areas with low mail response; and (b) making it easier for people with limited English proficiency to respond by mail or telephone. Nonsampling errors can be larger than sampling errors and so our research program monitors both. Because the Field Representatives are experienced, they have had good success in areas where it has traditionally been difficult to collect survey statistics during the short decennial census operations with temporary staff. This may partially compensate for subsampling the nonresponse cases for follow up to collect responses to the questionnaire.

Judging from 1990 census results, in areas and for population groups with lower-than-average mail response rates, the completeness of the long form data collection (that is, responses to all the questions) tends to be uneven as well. There is evidence from our early evaluations that the ACS has had more complete data collection for the units in its sample more consistently than is the case for the long form. While we continue to monitor and evaluate item nonresponse rates, we believe the higher completion rates in the ACS are because of its smaller, more experienced interviewing staff compared with the large number of temporary decennial census interviewers. Additionally, in the ACS, there is more opportunity over time to adjust our operations and methods and thereby improve data collection than is possible in the rushed environment of the decennial census data collection period.

Question 4: *How can a small monthly sample, such as that of the ACS, be representative of a small population group that is geographically dispersed?*

Response: In some months, it is possible that no one is selected from a particular small population group that is widely dispersed geographically. Even so, while the estimates for a single month may be very unpredictable, data averaged over 60 months provides reasonably stable estimates. Sampling statisticians use the laws of probability to select survey samples that are representative and have a specified margin of error. Intuitively, it is harder to visualize how the averages result in representative statistics when a population group is geographically scattered without any particular pattern and the sampling rate is relatively small. It is easier to visualize how a systematic sample, for example taking every sixth address, gives good representation for a population group that is clustered in a particular geographic area

These intuitive concerns about a "guarantee" of representativeness raise a legitimate issue. The laws of probability make "guarantees" only within a certain "margin of error" or "confidence interval." When the sample and population group are both small, the margin of error can be large, as a percentage of the survey estimate. The laws of probability do not ensure precise estimates from small samples. What the laws of probability do ensure is that statisticians can calculate how large the margin of error is likely to be due to sampling,[3] a topic covered in more detail in the next section.

[3] By contrast, it is hard to quantify how large the resulting error in the estimates is likely to be for nonsampling errors such as nonresponse, undercoverage, or misunderstanding of questions.

Whether a survey's sample size is adequate depends on whether the confidence intervals for the survey estimates are small enough to allow data users to use the estimates for their purposes. A common way to think about the adequacy of confidence intervals is to consider how large a difference it would take in the survey's estimates to be "statistically significant." With census long-form estimates for two groups of about 400, each having a confidence interval of ± 120, the difference in the survey's estimates would not be statistically significant unless the two estimates were as different as about 315 for one group versus 485 for the other.

With the larger ACS confidence interval of ±160 for a 5-year average, the difference between averages of 315 and 485 would not be statistically significant. It would take a difference of 287 versus 513 to be statistically significant. This indicates the price paid because the proposed ACS has a smaller sample size in a single 5-year period than the long form has in the census year. And yet, it is not the *single* multi-year average that is the important comparison to make between the usefulness of the two data sets. It is the annually updated *series* of multi-year averages the allow data users to be better informed by understanding the level and direction of changes during the decade. Additionally, the reductions in nonsampling error in the ACS help to offset some of the "price" paid for slightly higher sampling errors.

The ultimate question for users of statistics for small groups is whether the long form's slightly greater precision for comparing groups is of such practical importance that it is worth giving up the opportunity to learn about substantial changes in the size and characteristics of the small group over time. The premise of the ACS design is that, for small groups, the ability to learn about substantial changes over time is essential and worth a moderate loss of precision for any single point in time.

For example, consider the potential use of estimates of children under age 5 who speak a language other than English at home in helping school systems prepare and provide for appropriate educational opportunities in coming years. The *series* of ACS 5-year averages can monitor trends in the number of such children, and the 1- and 3-year averages can detect sudden large changes. By contrast, neither a single decennial estimate or a single 5-year average, whether 400±120 or 400±160, has the precision or timeliness to be much help in planning. The 2010 long-form statistics will be available in late 2012, in time for planning for the 2013-2014 school year and preferable to a single 2007-2011 ACS average that will also be available in mid-2012. Rather, it is the series of updated ACS averages that would alert school planners more quickly when there are large changes in the needs of children who will be entering the school system and thus better inform their strategic planning.

V. EXAMPLES AND DISCUSSION

Below we will illustrate how the ACS standard errors for small populations change over time under different scenarios. For each figure, the population starts at 400 in the year 2010 but the graphic begins with the year 2012. First, we show the series of ACS 5-year averages and then the decennial long-form information that would be available to data users. In each figure:

- The "diamond" symbol represents the assumed actual value compared with the estimates from each data set;

- For the ACS graphics, the solid lines indicate the upper and lower bounds for the probable estimate averaged over the previous five years and then the updated survey estimate each year. For example, the bounds for the year 2018 show the range that has a 90-percent probability of containing the 2013-2017 average estimate for the ACS sample, given the population values indicated by the diamond symbols.

The increasing spread between the upper and lower bounds of the ACS estimates in Figure 1 occurs because the number of people with the characteristics is increasing. Larger estimates tend to have larger standard errors, although the standard error grows smaller as a percentage of the estimate.

Multi-year averages for changing populations.

If the population does not change meaningfully over a 5-year period, there is no issue about interpreting the 5-year average. For different patterns of change over time, as illustrated below, the average may relate in different ways to the single-year estimates. With the continuously collected ACS data, it is possible to get considerable information about the magnitude and direction of change over time. Because of the sampling error, however, it will not be possible to be sure of picking up a slight trend, or whether a strong trend is steady or somewhat irregular. The long form, of course, provides no trend information except for two points ten years apart.

The examples below address the question of how useful it would be to know only the information available from the averages, compared with knowing one individual value out of ten. To keep the examples simple, the tables below do not include the margins of error, as did the graphs Figure 1-8. Appendix 2 provides a discussion of some important statistical points for those who want a more detailed technical discussion.

In all the examples, averages that cannot be calculated from the data for the years shown in the tables are left blank to make the example easier to follow. These rules would be available from the ACS documentation once it has been fully implemented.

In most of the examples, the census year is the fifth year shown in the table, so data before and after the census are shown. In some examples, to illustrate what would have happened if the pattern of change had occurred one year earlier compared to the census, there is an additional row of numbers showing what would be measured by a census in the sixth year.

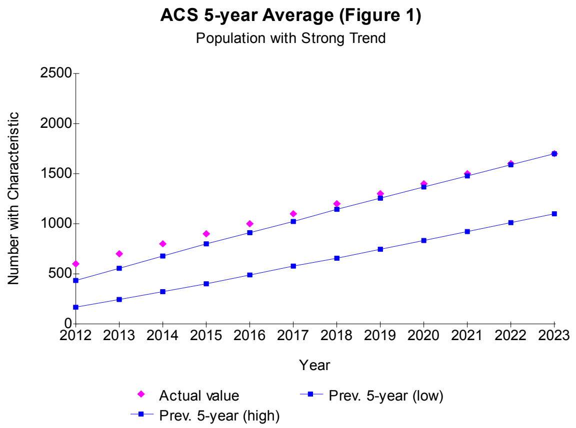
The 5-year averages in Figure 1 tend to lag slightly behind the actual population values, and the sampling errors are greater than those for the long form in Figure 2. Yet, the 5-year moving averages are obviously closer to the actual, current population value in most years than for the long form. Unlike the long form, the ACS 5-year averages reflect the direction of the actual trend.

Figures 3 and 4 show the same scenario using ACS 1- and 3-year averages. The 3-year averages in Figure 3 are a reasonable alternative to the 5-year averages for uses of the statistics where the smaller time lag would compensate for the higher sampling error. The single-year survey estimate in Figure 4 has a much larger range of probable error, and is not as useful unless the change is very large.

In Figures 5 through 8, the true values jump suddenly from 400 in 2010 to 1,400 at the end of 2014. The 5-year ACS averages in Figure 5 picks up the changes within a few years, much sooner than the decennial long form in Figure 6. The changes are fully reflected it in the 2015-2019 average. The 5-year averages give the impression, however, that there is a steady increase starting in 2015, rather than the sudden jump. This is not the best picture of the change, but still better than that provided by the long form's two points of information.

Figures 5 through 8 illustrate scenarios where the more detailed analysis using 3-year and 1-year averages is useful after seeing that the 5-year averages indicate an important change. In this extreme example, comparing each 1-year average to the previous year would give a good indication of the timing of the change. After learning from the 1-year numbers that there might be an unusual jump in 2015, the 3-year averages gives a better idea of the size of the jump without overly "smoothing" the change as the 5-year averages do. Having considered all three ACS charts, the changes (up or down), the analyst would know the direction and magnitude of the increase, and that it took place over a several years in the middle of the decade. The analyst might still be uncertain whether the change took place all in one year or over several years. None of this information would be available from two measurements taken ten years apart (Figure 6).

The practical implications for policy decision are obvious. The ACS allows informed decisions to be made in response to changing conditions. The decennial census documents two points of historical change after they have occurred over a decade.


ACS 5-year Average (Figure 1)
Population with Strong Trend
Number with Characteristic
0
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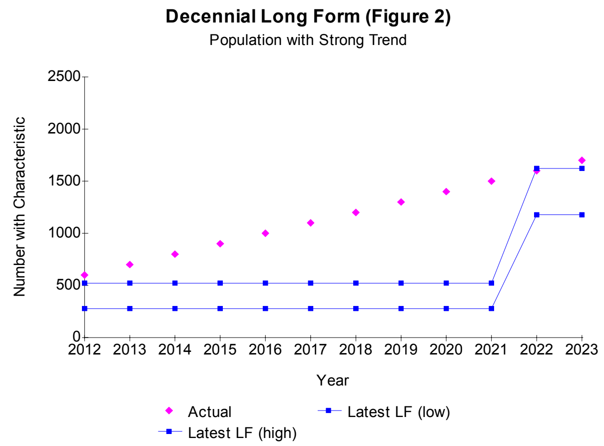
2012 2013 2014 2015 2016 2017 2018 2019 2020 2021 2022 2023
Year
Actual value
Prev. 5-year (low)
Prev. 5-year (high)


Decennial Long Form (Figure 2)
Population with Strong Trend
Number with Characteristic
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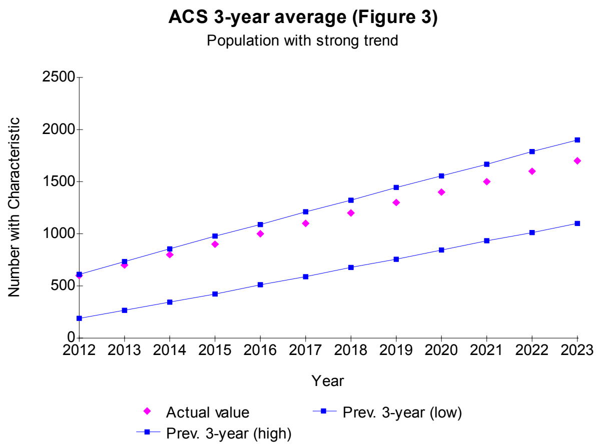
2012 2013 2014 2015 2016 2017 2018 2019 2020 2021 2022 2023
Year
Actual
Latest LF (low)
Latest LF (high)


ACS 3-year average (Figure 3)
Population with strong trend
Number with Characteristic
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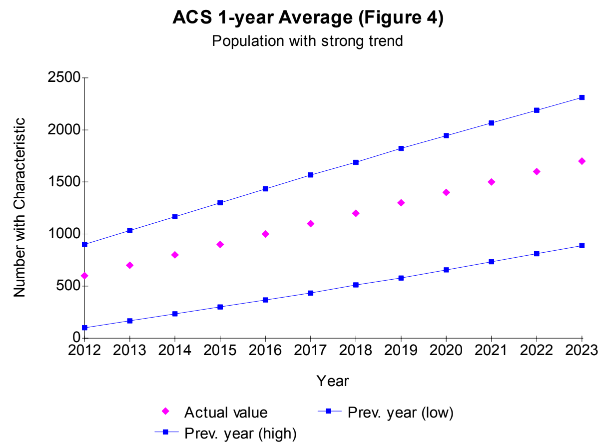
2012 2013 2014 2015 2016 2017 2018 2019 2020 2021 2022 2023
Year
Actual value
Prev. 3-year (low)
Prev. 3-year (high)


ACS 1-year Average (Figure 4)
Population with strong trend
Number with Characteristic
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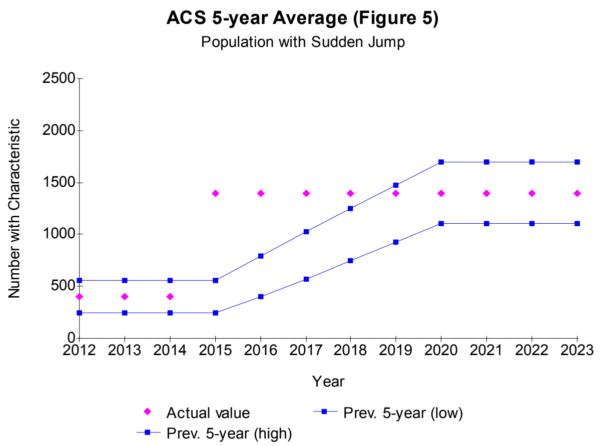
Year
Actual value
Prev. year (low)
Prev. year (high)


ACS 5-year Average (Figure 5)
Population with Sudden Jump
Number with Characteristic
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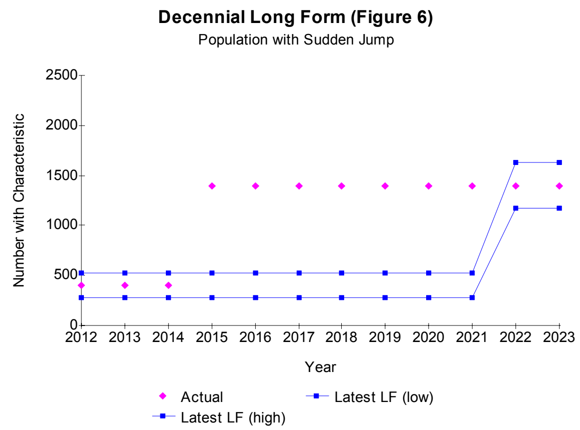
2012 2013 2014 2015 2016 2017 2018 2019 2020 2021 2022 2023
Year
Actual value
Prev. 5-year (low)
Prev. 5-year (high)


Decennial Long Form (Figure 6)
Population with Sudden Jump
Number with Characteristic
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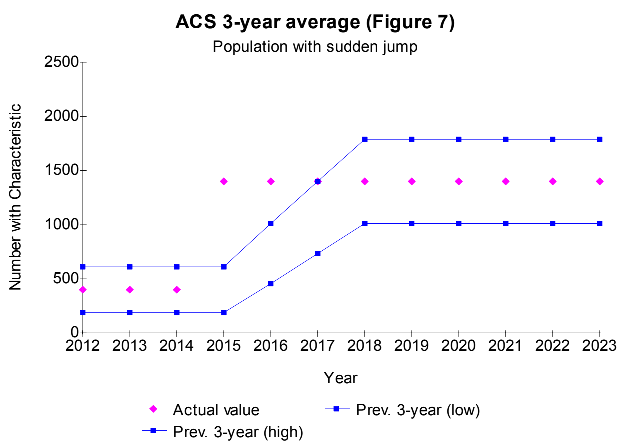
2012 2013 2014 2015 2016 2017 2018 2019 2020 2021 2022 2023
Year
Actual
Latest LF (low)
Latest LF (high)


ACS 3-year average (Figure 7)
Population with sudden jump
Number with Characteristic
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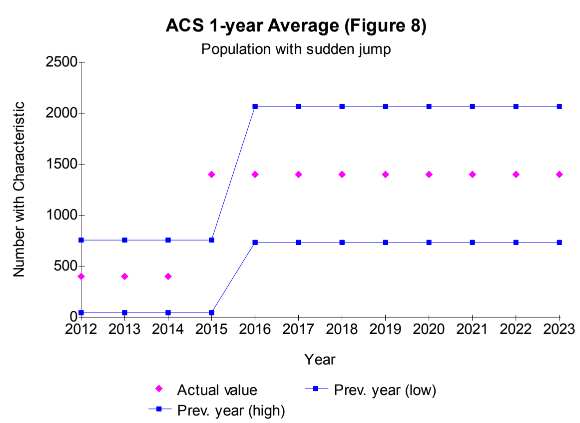
2012 2013 2014 2015 2016 2017 2018 2019 2020 2021 2022 2023
Year
Actual value
Prev. 3-year (low)
Prev. 3-year (high)


ACS 1-year Average (Figure 8)
Population with sudden jump
Number with Characteristic
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2012 2013 2014 2015 2016 2017 2018 2019 2020 2021 2022 2023
Year
Actual value
Prev. year (low)
Prev. year (high)

Table 1 - Examples of Large Growth For Small Population Groups in the ACS Comparison Counties

Population Group	County	1990 Estimate	2000 Estimate	Sources (1990/2000)
Asian Indian	Pima, AZ	1,041	2,105	STF-1/SF-1
Chinese	Ft Bend, TX	4,072	10,500	STF-1/SF-1
Korean	Lake, IL	1,923	4,089	STF-1/SF-1
Vietnamese	Douglas, NE	529	1,122	STF-1/SF-1
Black or African American	Schuylkill, PA	842	3,147	STF-1/SF-1
American Indian or Alaska Native	Bronx NY	6,069	11,371	STF-1/SF-1
American Indian or Alaska Native	Lake, IL	1,198	1,801	STF-1/SF-1
Native Hawaiian and Other Pacific Islander	Bronx NY	541	1,383	STF-1/SF-1
Other Micronesian	Multnomah, OR	181	505	STF-1/SF-1
Dominican	Broward, FL	3,489	8,869	STF-3/ACS
Salvadoran	Douglas, NE	52	414	STF-3/ACS
Arab	Broward, FL	5,174	9,461	STF-3/ACS
Ukrainian	Multnomah, OR	1,524	5,469	STF-3/ACS

NOTES: The 2000 estimates for race or Hispanic origin are for those marking one race or one origin. The ancestry estimates are the first ancestry reported on the form. Census counts have been used when available. For the "Native Hawaiian and Other Pacific Islander" count for 1990, the detailed race tables were used. For the ACS estimates, the lower bound of the confidence interval for the 2000 data is shown. This is the most conservative estimate, and the actual growth is likely to have been larger than that shown in the tables.

Bibliography

Alexander, Charles H.. Jr., "American Community Survey Data for Economic Analysis," paper presented at the Census Advisory Committee of the American Economic Association, October 18, 2001. Available at: http://www.census.gov/acs/www/AdvMeth/Papers/Papers1.htm

Scott Boggess & Jonathan Chong, "Skills and Abilities of the Working-Age Population, Rockland County, NY: 1996-1999," Population Division, Education and Social Stratification Branch. April 2001, Available at: http://www.census.gov/acs/www/AdvMeth/Papers/Papers1.htm

Dahl, Scott A., "Weighting the 1996 and 1997 American Community Surveys," March 1998. Available at: http://www.census.gov/acs/www/AdvMeth/Papers/ACS/Paper12.htm

Kalton, Graham, Daniel B. Levine, Joseph Waksberg, John Helmick (Westat), "The American Community Survey and the Quality of Rural Data," June 29, 1998. Available at:http://www.census.gov/acs/www/AdvMeth/Papers/Papers1.htm

Love, Susan P., "Difficulties of Comparing Quality Measures Between the Census and the American Community Survey," U.S. Census Bureau, discussion from Power Point presentation at the 2002 Joint Statistical meetings.

Salvo, Joseph J and Arun Peter Lobo, "The American Community Survey: Quality of Response by Mode of Data Collection in the Bronx Test Site," Population Division, New York City Department of City Planning. Paper presented at the 2002 Joint Statistical meetings.

Salvo, Joseph J and Arun Peter Lobo, "The American Community Survey: Nonresponse Follow-Up in the Rockland County Test Site," Presented to the Annual Meeting of the American Statistical Association, Anaheim, California, August 1997. Available at: http://www.census.gov/acs/www/AdvMeth/Papers/ACS/Paper10.htm

Taeuber, Cynthia and Cheryl Chambers, "Fresh Data Every Year: The American Community Survey Can Help Improve the Measure of Poverty," Poverty Research News, Summer 1998, Available at: http://www.census.gov/acs/www/AdvMeth/Papers/Papers1.htm

Tersine, Anthony, "Item Nonresponse: 1996 American Community Survey," March 1998, Available at: http://www.census.gov/acs/www/AdvMeth/Papers/ACS/Paper13.htm

Tersine, Anthony, et.al., "Alternative Oversampling Options for Low Mail Response Areas in the American Community Survey," presented at 2002 Joint Statistical Meetings. Available at: http://www.census.gov/acs/www/AdvMeth/Papers/Papers1.htm