AMERICAN COMMUNITY SURVEY RESEARCH NOTE
Change in Population Controls
September 22, 2011

The American Community Survey (ACS) uses independently derived population estimates as population controls in its weighting methodology. While the ACS uses updated population estimates every year, the update in the population estimates from 2009 to 2010 was particularly significant. The 2010 ACS 1-year estimates use population estimates that reflect the results of the 2010 Census. The 2009 ACS 1-year data and ACS 1-year estimates for prior years used population estimates that were based on the 2000 Census results and updated to account for births, deaths, domestic and international migration (these estimates are referred to as the postcensal estimates).

Because the 2009 ACS and 2010 ACS 1-year estimates use controls that are based on different Census base years, users should use caution when making comparisons across years. Specifically, estimates of the number of people in a given location are not strictly comparable between these two years. The characteristic distributional measures (such as rates or ratios) are not expected to be substantially affected by the change in population controls. The Census Bureau is currently researching the impact on these distributions.

This Research Note provides information about the population estimates used in the 2010 ACS weighting methodology. Further, it describes some possible inconsistencies between the 2010 ACS 1-year estimates which used population estimates updated to include results of the 2010 Census and the 2009 ACS 1-year estimates which used population estimates based on Census 2000.

How the ACS Uses Population Estimates

The ACS is a probability sample of housing units and group quarters designed to produce national, state and local estimates of the distribution of characteristics of the population. The demographic characteristics of the ACS sample can differ from known population levels due to sampling variability and differential coverage.[1] To account for differences in demographic characteristics due to differential coverage, the ACS uses a weighting methodology that forces ACS estimates to be consistent with official population estimates by age, sex, race, and Hispanic origin.[2] These specific estimates are called population controls. Data users may be aware of these from the notes on some tables in American FactFinder.[3]

The postcensal population estimates used for the 2000 through 2009 ACS were based on Census 2000 results updated with annual changes in births, deaths, domestic and international migration. As in past

[1] One of the sources of undercoverage is non-response or non-participation. If a specific demographic group is less likely to respond, then the weighting methodology recognizes and accounts for that so that the final estimates are representative of the population.

[2] Chapter 11 “Weighting and Estimation” of the ACS Design and Methodology Report provides additional details on weighting and population estimates in the ACS.
<http://www.census.gov/acs/www/methodology/methodology_main/>

[3] When an ACS estimate has this forced consistency, the Census Bureau does not produce an estimate of variance. In American FactFinder, these "controlled" statistics are noted as follows: An entry of “*****” in the margin of error column indicates that the estimate is controlled. A statistical test for sampling variability is not appropriate. For those characteristics that are controlled, the change between any two years is the result of updating the population estimates.

decades, the population estimates are modified to incorporate the new decennial census counts as soon as they are available. The 2010 ACS population controls were developed based on the 2010 Census results.

Analysis of the Differences Between Population Estimates based on the 2010 Census and those Based on Census 2000

Table 1 presents a comparison between two sets of estimates: the postcensal estimates of the population for July 1, 2010 (these postcensal estimates are based on Census 2000 and do not incorporate the 2010 Census results) and estimates for July 1, 2010 that are based on Census 2010.[4] At the national level, the difference between the two sets of estimates is small -- the Census 2010 based estimates are slightly higher than the postcensal estimate based on Census 2000. The difference is less than 300,000 people or 0.10 percent. This small difference occurred because the difference between the Census 2010 result and the postcensal estimate for April 1, 2010 is the smallest observed in recent decades.

At the state level, the percent differences between the two sets of estimates for July 1, 2010 were larger but still generally modest. For the majority of states, the two sets of estimates are within one percent of each other. The percent differences for the most populous states were very small. Specifically, the difference for California was less than 83,000 people or 0.2 percent and for Texas it was less than 44,000 people or 0.2 percent.

When the estimates are disaggregated by age and sex, there are some differences between the two sets of estimates (see Table 2). At the national level, the differences between the postcensal estimates and estimates based on the 2010 Census are largest for the youngest age group, those under age 5. For this age group, the estimates based on the 2010 Census are lower than the postcensal estimates by about 5 percent for both males and females. This is a pattern seen across decennial censuses: the age group under 5 seems to be smaller than expected in the census when compared to postcensal estimates. Note that the age group under 5 in the postcensal estimates is based almost solely on data on births as both migration and mortality have a minor impact on this age group.

For those aged 25 to 34, the estimates based on the 2010 Census are lower than the postcensal estimates by 1.7 percent. This is mainly due to the difference between the two sets of estimates for men in this age group, where the difference is 3.3 percent compared to 0.2 percent for women. This age group can be heavily influenced by international migration and these differences may reflect recent migration out of the country that was reflected in the census but not the postcensal estimates.

There is also a difference between the two sets of estimates for the older population, those aged 75 and over. Again, the estimates based on the 2010 Census are lower than the postcensal estimates for this age group. The difference is larger for men (3.1 percent) than women (2.4 percent).

[4] Note that the multiyear ACS data are controlled to several years of population estimates. The estimates used for the multiyear ACS are referred to as intercensal estimates and take into account both Census 2000 and the 2010 Census data.

Finally, there were differences in the controls by race and Hispanic origin (see Table 3).[5] Table 3 presents the set of estimates for the racial and ethnic groups that are used as controls for the ACS. These groups include 5 non-Hispanic race alone categories (White, Black, American Indian and Alaska Native, Asian, and Native Hawaiian or Pacific Islander) and the Hispanic population of any race. The data are also disaggregated by sex.

The smallest percent differences are seen for the White and Black populations. The estimates based on the 2010 Census are just over 1 percent lower for Whites than the postcensal estimates. The difference for Blacks is much smaller, 0.1 percent lower in the estimates based on the 2010 census. The estimates based on the 2010 Census for American Indians and Alaska Natives are lower than the postcensal estimate by about 5 percent.

For Asians, Native Hawaiians and Pacific Islanders, and Hispanics, the estimates based on the 2010 Census are higher than the postcensal estimates. At the national level, the difference for Asians was 5.3 percent, the difference for Native Hawaiians or Pacific Islanders was 9.4 percent and the difference for Hispanics was 2.6 percent. Note there was a larger difference for Hispanic women (4.7 percent) than for Hispanic men (0.5) percent. These differences (smaller than the differences in the Census 2000 evaluation of population estimates) reflect improvements in the postcensal estimates, particularly the improvements in the estimation of net international migration, which is significant for this demographic group.

Summary

Since the ACS weighting process controls to population totals by age, sex, race, and Hispanic origin, the impact of differences in the 2009 and 2010 ACS population controls will be observed in estimates of the number of people in a particular location. The change in controls is not expected to have a meaningful impact in the percent distributions, rates, or ratios for non-demographic characteristics for many of the largest geographic areas. The Census Bureau is currently researching the impact of the change of controls on these characteristics.

The best way to measure the effect of the change in population controls on percent distributions, rates, or ratios of specific distributions would be is to develop a set of ACS weights using the 2010 postcensal population estimates based on Census 2000 – those that do not incorporate the 2010 Census results. The Census Bureau plans to use alternative weights to estimate the subject-specific distributions and examine the differences. Results from this examination will be available in Fall 2011.

In the absence of such analysis, the Census Bureau does not have the data to provide more specific guidance. Users are urged to use caution in ACS comparisons between years especially for distributions that are highly correlated to demographic characteristics used in the ACS weighting process.

[5] Note that the population estimates used as controls do not include the “Some Other Race” category. The original race data from Census 2000 and the 2010 Census are modified to reclassify the "Some Other Race" category.

Table 1. Comparison of the National and State Total Resident Population: July 1, 2010

Geography	Vintage 2010 Postcensal Estimates	Census 2010 Based Estimates	Difference	
			Numeric	Percent
United States	309,050,816	309,349,689	298,873	0.1
Alabama	4,729,656	4,785,298	55,642	1.2
Alaska	708,862	713,985	5,123	0.7
Arizona	6,676,627	6,413,737	-262,890	-3.9
Arkansas	2,910,236	2,921,606	11,370	0.4
California	37,266,600	37,349,363	82,763	0.2
Colorado	5,095,309	5,049,071	-46,238	-0.9
Connecticut	3,526,937	3,577,073	50,136	1.4
Delaware	891,464	899,769	8,305	0.9
District of Columbia	610,589	604,453	-6,136	-1.0
Florida	18,678,049	18,843,326	165,277	0.9
Georgia	9,908,357	9,712,587	-195,770	-2.0
Hawaii	1,300,086	1,363,621	63,535	4.9
Idaho	1,559,796	1,571,450	11,654	0.7
Illinois	12,944,410	12,843,166	-101,244	-0.8
Indiana	6,445,295	6,490,621	45,326	0.7
Iowa	3,023,081	3,049,883	26,802	0.9
Kansas	2,841,121	2,859,169	18,048	0.6
Kentucky	4,339,435	4,346,266	6,831	0.2
Louisiana	4,529,426	4,544,228	14,802	0.3
Maine	1,312,939	1,327,567	14,628	1.1
Maryland	5,737,274	5,785,982	48,708	0.8
Massachusetts	6,631,280	6,557,254	-74,026	-1.1
Michigan	9,931,235	9,877,574	-53,661	-0.5
Minnesota	5,290,447	5,310,584	20,137	0.4
Mississippi	2,960,467	2,970,036	9,569	0.3
Missouri	6,011,741	5,996,231	-15,510	-0.3
Montana	980,152	990,898	10,746	1.1
Nebraska	1,811,072	1,830,429	19,357	1.1
Nevada	2,654,751	2,704,642	49,891	1.9
New Hampshire	1,323,531	1,316,759	-6,772	-0.5
New Jersey	8,732,811	8,801,624	68,813	0.8
New Mexico	2,033,875	2,065,932	32,057	1.6
New York	19,577,730	19,392,283	-185,447	-0.9
North Carolina	9,458,888	9,561,558	102,670	1.1
North Dakota	653,778	674,499	20,721	3.2
Ohio	11,532,111	11,536,182	4,071	0.0
Oklahoma	3,724,447	3,761,702	37,255	1.0
Oregon	3,855,536	3,838,957	-16,579	-0.4
Pennsylvania	12,632,780	12,709,630	76,850	0.6
Rhode Island	1,056,870	1,052,886	-3,984	-0.4
South Carolina	4,596,958	4,636,312	39,354	0.9
South Dakota	820,077	816,463	-3,614	-0.4
Tennessee	6,338,112	6,356,897	18,785	0.3
Texas	25,213,445	25,257,114	43,669	0.2
Utah	2,830,753	2,776,469	-54,284	-1.9
Vermont	622,433	625,960	3,527	0.6
Virginia	7,952,119	8,024,617	72,498	0.9
Washington	6,746,199	6,744,496	-1,703	0.0
West Virginia	1,825,513	1,853,973	28,460	1.6
Wisconsin	5,668,519	5,691,047	22,528	0.4
Wyoming	547,637	564,460	16,823	3.1

Source: U.S. Census Bureau, Population Estimates Program

Table 2. Comparison of the National Resident Population by Sex and Age: July 1, 2010

Sex and age	Vintage 2010 Postcensal Estimates	Census 2010 Based Estimates	Difference	
			Numeric	Percent
Both Sexes	309,050,816	309,349,689	298,873	0.1
0-4 years	21,262,402	20,200,529	-1,061,873	-5.0
5-14 years	40,735,102	41,076,420	341,318	0.8
15-24 years	43,313,974	43,627,025	313,051	0.7
25-34 years	41,981,483	41,247,075	-734,408	-1.7
35-44 years	40,778,665	40,981,425	202,760	0.5
45-54 years	44,437,638	45,013,249	575,611	1.3
55-64 years	36,003,484	36,766,385	762,901	2.1
65-74 years	21,432,543	21,841,372	408,829	1.9
75 years and over	19,105,525	18,596,209	-509,316	-2.7
Males	152,712,500	152,107,993	-604,507	-0.4
0-4 years	10,867,070	10,317,894	-549,176	-5.1
5-14 years	20,834,822	20,994,448	159,626	0.8
15-24 years	22,421,620	22,319,109	-102,511	-0.5
25-34 years	21,441,451	20,739,220	-702,231	-3.3
35-44 years	20,425,462	20,396,050	-29,412	-0.1
45-54 years	21,864,682	22,148,815	284,133	1.3
55-64 years	17,371,046	17,738,809	367,763	2.1
65-74 years	9,956,332	10,160,744	204,412	2.1
75 years and over	7,530,015	7,292,904	-237,111	-3.1
Females	156,338,316	157,241,696	903,380	0.6
0-4 years	10,395,332	9,882,635	-512,697	-4.9
5-14 years	19,900,280	20,081,972	181,692	0.9
15-24 years	20,892,354	21,307,916	415,562	2.0
25-34 years	20,540,032	20,507,855	-32,177	-0.2
35-44 years	20,353,203	20,585,375	232,172	1.1
45-54 years	22,572,956	22,864,434	291,478	1.3
55-64 years	18,632,438	19,027,576	395,138	2.1
65-74 years	11,476,211	11,680,628	204,417	1.8
75 years and over	11,575,510	11,303,305	-272,205	-2.4

Source: U.S. Census Bureau, Population Estimates Program

Table 3. Comparison of the National Resident Population by Sex, Hispanic Origin, and Race: July 1, 2010

Sex, Hispanic origin, and race	Vintage 2010 Postcensal Estimates	Census 2010 Based Estimates	Differences	
			Numeric	Percent
Both Sexes	309,050,816	309,349,689	298,873	0.1
Non-Hispanic White alone	199,921,049	197,380,184	-2,540,865	-1.3
Non-Hispanic Black alone	38,053,708	38,012,830	-40,878	-0.1
Non-Hispanic AIAN alone	2,388,523	2,270,371	-118,152	-4.9
Non-Hispanic Asian alone	13,992,198	14,738,414	746,216	5.3
Non-Hispanic NHOPI alone	457,386	499,396	42,010	9.2
Hispanic	49,545,523	50,810,213	1,264,690	2.6
Males	152,712,500	152,107,993	-604,507	-0.4
Non-Hispanic White alone	98,389,162	97,062,393	-1,326,769	-1.3
Non-Hispanic Black alone	18,171,245	18,116,542	-54,703	-0.3
Non-Hispanic AIAN alone	1,179,537	1,119,358	-60,179	-5.1
Non-Hispanic Asian alone	6,760,485	7,006,807	246,322	3.6
Non-Hispanic NHOPI alone	230,140	251,820	21,680	9.4
Hispanic	25,662,559	25,794,075	131,516	0.5
Females	156,338,316	157,241,696	903,380	0.6
Non-Hispanic White alone	101,531,887	100,317,791	-1,214,096	-1.2
Non-Hispanic Black alone	19,882,463	19,896,288	13,825	0.1
Non-Hispanic AIAN alone	1,208,986	1,151,013	-57,973	-4.8
Non-Hispanic Asian alone	7,231,713	7,731,607	499,894	6.9
Non-Hispanic NHOPI alone	227,246	247,576	20,330	8.9
Hispanic	23,882,964	25,016,138	1,133,174	4.7

Source: U.S. Census Bureau, Population Estimates Program

Note: Hispanic origin is considered an ethnicity, not a race. Hispanics may be of any race.

Abbreviations: Black = Black or African American; AIAN = American Indian or Alaska Native; NHPI = Native Hawaiian and Other Pacific Islander. The original race data from Census 2000 and the 2010 Census are modified to reclassify the "Some Other Race" category.