Coverage of American Indian and Alaska Native Persons and of the Population in American Indian and Alaska Native Areas in the American Community Survey[1]

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1. Introduction

The Census Bureau measures demographic, social, and economic characteristics of the United States population and housing through the American Community Survey (ACS). Coverage is the measure of completeness of the estimates of housing units (HU), persons living within HUs, and group quarters (GQ). Undercoverage exists when HUs, GQs, or people do not have a chance of being selected in the sample. Overcoverage exists when HUs, GQs, or people have more than one chance of selection in the sample, or are included in the sample when they should not have been. The Census Bureau produces ACS coverage rates for the nation and states every year based on comparisons of the ACS estimates before controlling to the Census Bureau's Population Estimates Program (PEP) estimates (U.S. Census Bureau, 2012a). However, a comprehensive and exhaustive analysis of the coverage of the ACS data has not been undertaken since 1999 (Shapiro and Waksberg, 1999), before the full implementation of the ACS. A more current and thorough study of ACS coverage rates may help the Census Bureau focus its resources better by identifying areas that may warrant special efforts.

The 2010 Census offered a unique opportunity to measure the coverage of the recently produced 2010 ACS 1-year estimates, as it provided an up-to-date listing of housing units and population for comparison. Furthermore, comparing to the 2010 Census counts allowed for detailed estimates of coverage of small geographies or race/ethnic groups not afforded by comparisons to the PEP. For this report we estimated ACS coverage by comparing the 2010 ACS 1-year estimates before controls to the 2010 Census counts. Previous published measures of the ACS coverage were based on comparisons to the PEP estimates, which were themselves based on the Census 2000.

This report focuses on the coverage of population in American Indian and Alaska Native (AIAN) areas[2] and of AIAN persons nationwide. It is an extract of a more general report (Jordan and Beaghen, 2013) that looked more broadly at ACS coverage of race/ethnic groups and states and counties.

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[1] This report is released to inform interested parties of ongoing research and to encourage discussion of work in progress. Any views expressed on statistical issues are those of the authors and not necessarily those of the U.S. Census Bureau.

[2] AIAN areas include but are not restricted to American Indian reservations and trust lands, tribal jurisdiction statistical areas, Alaska native regional corporations, Alaska native village statistical areas, and tribal designated statistical areas. For a complete listing and detailed description of types of AIAN areas go to the Census Bureau webpage,
http://www.census.gov/geo/www/2010census/gtc/gtc_aiannha.html.

2. Background

The Census Bureau regularly measures the coverage of its surveys as part of its evaluations of data quality. There is a long history of decennial census coverage evaluation (National Research Council, 2004) going back to the 1940 decennial census. Most recently, the 2010 Census coverage was measured by the Census Coverage Measurement (CCM) program (U.S. Census Bureau, 2012b). The Census Bureau annually publishes ACS quality measures on the ACS Web site (U.S. Census Bureau, 2012c), including national coverage rates of the population broken down by sex and several race/ethnic groups, the GQ population, state-level estimates of coverage of the population broken down by sex, and of housing units.

The ACS estimates are controlled to equal the PEP estimates by age, sex, race, and Hispanic origin at the weighting area level. An ACS weighting area is a county or a set of less populous counties that meet a minimum population or number of person interviews requirement. Adjustment of the ACS estimates to agree with PEP controls corrects for coverage error. (It also reduces the sampling error, and makes ACS estimates consistent with other published Census Bureau estimates). Consequently, the coverage error in ACS publications has been reduced by controlling. The measures of coverage the pre-controlled ACS estimates that we present pertain to the completeness of the ACS sampling frame, the ACS data collection, and the ACS interviewing. We can expect the controls to be most effective in the year of a decennial census or those just following one, as the PEP will be most accurate in those years. The efficacy of the controls in reducing coverage error has been explored in Asiala, Beaghen, and Albright (2008).

3. Methodology

We estimated coverage by determining the ratio of ACS pre-controlled estimates to 2010 Census counts[3]. To the extent this coverage ratio was larger than 1.0, we had net overcoverage. To the extent it was below 1.0, we had net undercoverage. We calculated the coverage ratio as the ratio of the 2010 ACS 1-year pre-controlled estimate of the demographic group to the 2010 Census count of that same demographic group (see equation 1 below). These pre-controlled weights reflected the inverse of the probability of selection, and the non-interview adjustments, in addition to other finer weight adjustments, but not the controls to the PEP estimates or rounding. See U.S. Census Bureau (2009) for details on the ACS weighting. We emphasize that the coverage ratio esimates net coverage, as overcoverage and undercoverage cancel.

$$\text{Coverage ratio} = \frac{\text{2010 1-year ACS pre-controlled estimate (demographic group)}}{\text{2010 Census count (demographic group)}} \quad (1)$$

To examine the AIAN person coverage for geographies such as states and AIAN areas we produced coverage ratios for the race group "AIAN alone and in combination with one or more other races". We preferred it to race group "AIAN alone" because it was more robust to race reporting discrepancies between the 2010 Census and the ACS. This was because persons who answered differently in the ACS and 2010 Census on AIAN

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[3] Estimates of coverage in this study were calculatedly differently than how they were calculated for the ACS Sample Size and Data Quality Web site, as the latter calculated coverage by comparing the ACS estimates to the 2010 Population Estimates Program estimates.

alone versus AIAN alone or in combination would agree on AIAN alone or in combination. Note that the 2010 Census Brief, "The American Indian and Alaska Nation Population: 2010", provides estimates of totals for both of these categorizations of AIAN persons.

All comparisons entailed hypothesis tests, with standard errors and margins of error (MOE) calculated by the production ACS successive differences replication methodology (U.S. Census Bureau, 2009). In this study we used the replicates corresponding to the pre-controlled weights. Because the census counts are constants, the estimated variance of the coverage ratio was the ACS estimate of variance divided by the census count squared. Census Bureau policy requires 90 percent confidence, so for a difference to be statistically significant, the absolute value of the test statistic must be greater than 1.645. When we made multiple comparisons between observations, we employed the Bonferroni method, which adjusts the cutoff value upward to account for the multiple comparisons.

4. Limitations

We recognize several important limitations that readers should be aware of. An obvious limitation of the coverage ratio calculated by comparing to the 2010 Census was that the Census results themselves suffer from coverage error (U.S. Census Bureau, 2012b). For example, if the ACS and the 2010 Census had equal coverage error for a given group, the coverage ratio would nonetheless be 1.0. That said, we believe the 2010 Census coverage error was generally small enough to make our method useful.

Further, there were data collection differences between the ACS and the 2010 Census that lead to differences in estimates which were not related to coverage. Importantly, there were differences in coverage ratios of specific race groups that are likely attributable to differences in race reporting between the ACS and 2010 Census. In particular, there were concerns about AIAN alone versus AIAN alone or in combination. Previous research on race reporting differences includes Bennett and Griffin (2002), and Raglin and Leslie (2002), who examined race and ethnicity reporting differences between the Census 2000 Supplementary Sample (the pilot study for the ACS) and the Census 2000.

Lastly, it must be emphasized that the estimates of coverage ratios were subject to sampling variation. The reliability of the ACS data for smaller populations or for smaller geographies requires attention.

5. Results and Discussion

Throughout this section, when we say that there is undercoverage or overcoverage, it is understood that the difference of the estimate of the coverage ratio from 1.0 was statistically significant at the 90 percent confidence level.

5.1 Coverage of the Population for the Nation
In this section we describe the coverage of the national population by major demographic groups, background that will help put the AIAN coverage in perspective. First, Table 1 shows the overall ACS person coverage. There was a net undercoverage of all persons (0.948) living in the United States. In Table 1 we also see females (0.954) had a higher overall coverage than males (0.942).

Table 1: National Coverage by Sex

	2010 Census Count	Coverage Ratio	MOE
Female	156,964,212	0.954	0.002
Male	151,781,326	0.942	0.002
Total	308,745,538	0.948	0.002

Source: 2010 American Community Survey 1-year Data and 2010 Census Data

Table 2 shows the coverage ratios by age group. At the national level, all age groups showed undercoverage, however, coverage varied by the age group. The 18-19 (0.898) and 20-24 (0.891) had the lowest coverage (the difference in coverage between the 18-19 and 20-24 age groups is not statistically significant). Coverage ratios for the oldest age groups, 65-74 (0.983) and 75+ (0.981), were higher than other age groups (the difference in coverage between the 65-74 and 75+ age groups is not statistically significant).

Table 2: National Coverage by Age

Age Group	2010 Census Count	Coverage Ratio	MOE
0-4	20,201,362	0.948	0.004
5-14	41,025,851	0.960	0.003
15-17	12,954,254	0.950	0.005
18-19	9,086,089	0.898	0.006
20-24	21,585,999	0.891	0.004
25-29	21,101,849	0.918	0.004
30-34	19,962,099	0.944	0.004
35-44	41,070,606	0.942	0.003
45-49	22,708,591	0.943	0.004
50-54	22,298,125	0.954	0.004
55-64	36,482,729	0.968	0.004
65-74	21,713,429	0.983	0.006
75+	18,554,555	0.981	0.006

Source: 2010 American Community Survey 1-year Data and 2010 Census Data

Table 3 shows the coverage ratios by age group crossed with sex. There were no large differences in coverage ratios between the sexes for many age groups. However, for age groups 25-29, 30-34, 35-44, 45-49, and 50-54, the coverage ratios for males were lower than for females. The higher overall coverage ratio for females is attributable to the differences in these age groups.

Table 3: Sex by Age at the National Level

	Age Group	2010 Census Count	Coverage Ratio	MOE
Female	0-4	9,881,935	0.947	0.005
	5-14	20,056,351	0.960	0.003
	15-17	6,298,045	0.948	0.007
	18-19	4,438,632	0.891	0.009
	20-24	10,571,823	0.898	0.006
	25-29	10,466,258	0.937	0.005
	30-34	9,965,599	0.957	0.005
	35-44	20,634,607	0.953	0.003
	45-49	11,499,506	0.951	0.004
	50-54	11,364,851	0.964	0.005
	55-64	18,881,581	0.975	0.005
	65-74	11,616,910	0.985	0.006
	75+	11,288,114	0.976	0.006
Male	0-4	10,319,427	0.950	0.006
	5-14	20,969,500	0.961	0.004
	15-17	6,656,209	0.952	0.006
	18-19	4,647,457	0.905	0.008
	20-24	11,014,176	0.884	0.005
	25-29	10,635,591	0.900	0.006
	30-34	9,996,500	0.931	0.005
	35-44	20,435,999	0.931	0.003
	45-49	11,209,085	0.934	0.005
	50-54	10,933,274	0.944	0.005
	55-64	17,601,148	0.960	0.005
	65-74	10,096,519	0.980	0.007
	75+	7,266,441	0.988	0.008

Source: 2010 American Community Survey 1-year Data and 2010 Census Data

In Table 4 we see white alone or in combination (0.977) had the highest coverage ratio of the major race groups. Black alone or in combination and Native Hawaiian/Pacific Islander (NHPI) alone or in combination had the lowest coverage ratios. Note that the total population 2010 Census count in Table 4 is less than the total population of the United States because Table 4 does not have include persons who identified themselves as 'some other race alone'.

Table 4: National Coverage by Race Alone or in Combination

Race	2010 Census Count	Coverage Ratio	MOE
White alone or in combination	231,040,398	0.977	0.002
Black alone or in combination	42,020,743	0.907	0.004
AIAN alone or in combination	5,220,579	0.930	0.011
Asian alone or in combination	17,320,856	0.939	0.006
NHPI alone or in combination	1,225,195	0.884	0.026

Source: 2010 American Community Survey 1-year Data and 2010 Census Data

5.2 Coverage of AIAN persons for the Nation

In Table 5 we see that nationally, estimates of both AIAN alone (0.810) and AIAN alone or in combination (0.930) were undercovered, while AIAN in combination (1.084) was overcovered. The differences seen between AIAN alone or in combination, AIAN alone, and AIAN in combination were most likely due to differences in how race was reported. Many persons who were identified as AIAN alone on the 2010 Census were identified as

AIAN in combination in the ACS. However, this differential race characterization is not a dilemma if we consider AIAN alone or in combination; either way a respondent was identified, AIAN alone, or AIAN in combination, they were categorized the same way in the comparison between the ACS and the 2010 Census. Since the primary purpose of this research was to measure coverage in the ACS, to understand the coverage of AIAN persons we chose to focus analysis on the coverage of persons AIAN alone or in combination.

Table 5: National Coverage for AIAN Alone and AIAN Alone or in Combination Persons

	2010 Census Count	Pre-controlled 2010 ACS Estimate	Coverage Ratio	MOE
AIAN Alone	2,932,248	2,373,966	0.810	0.012
AIAN in Combination	2,288,331	2,480,613	1.084	0.020
AIAN Alone or in Combination	5,220,579	4,854,579	0.930[4]	0.011

Source: 2010 American Community Survey 1-year Data and 2010 Census Data

In Table 6 we see the coverage ratios for males (0.928) and females (0.931) in the AIAN alone or in combination population were less than the corresponding ratios for males and females for the nation, 0.942 and 0.954; see Table 1 (the difference in the coverage ratio between males and females for the AIAN alone or in combination population is not statistically significant).

Table 6: National Coverage Ratios of AIAN Alone or in Combination Persons by Sex

Sex	Coverage Ratio	MOE
Female	0.931	0.013
Male	0.928	0.012

Source: 2010 American Community Survey 1-year Data and 2010 Census Data

In Table 7, we see that pattern of coverage for AIAN alone and in combination persons by age group is similar to that of the nation. We see lowest coverage for young adults and highest for older adults. Note that the 5-14 (0.910), 18-19 (0.859), 25-29 (0.852), 30-34 (0.904), 50-54 (0.985), 55-64 (1.031), and 65-74 (1.019) age groups were different from the total population seen in Table 2 (0.960, 0.898, 0.918, 0.944, 0.954, 0.968, and 0.983 respectively). (There are no statistically significant differences between the 5-14, 18-19, 25-29, and 30-34 age groups, and there are no statistically significant differences between the 50-54, 55-64, and 65-74 age groups). For the other age groups the coverage ratios were not different than those of the total population.

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[4] Neither estimates of AIAN alone nor AIAN alone or in combination are comparable to those found on the ACS Sample Size and Data Quality Web site, as the Web site coverage rates are for an AIAN population defined for the purposes of weighting. Further, on the Web site coverage is calculated by comparing to the 2010 Population Estimates Program estimates.

Table 7: Coverage of AIAN Alone or in Combination Persons by Age Group

Age Group	Coverage Ratio	MOE
0-4	0.922	0.033
5-14	0.910	0.021
15-17	0.926	0.031
18-19	0.859	0.037
20-24	0.879	0.029
25-29	0.852	0.026
30-34	0.904	0.027
35-44	0.926	0.021
45-49	0.933	0.025
50-54	0.985	0.028
55-64	1.031	0.025
65-74	1.019	0.033
75+	0.989	0.038

Source: 2010 American Community Survey 1-year Data and 2010 Census Data

To examine the person coverage of the 20 largest AIAN tribal groupings (Table 8) we produced coverage ratios for "AIAN alone, one tribal group reported". These are the detailed tribal groupings for which the ACS released estimates, and the interest of this paper was the coverage of published ACS estimates.

In Table 8 we see that coverage ratios for most of the 20 largest tribal groupings were not significantly different from 1.0. Among the larger AIAN tribal groupings, several had coverage ratios close to 1.0, for example Cherokee (1.010), Chippewa (1.003), and Sioux (1.051) (the differences in the coverage rates between Cherokee, Chippewa, and Sioux were not statistically significant). Only six tribal groupings, notably Navajo (0.911), showed undercoverage.

One tribal grouping, Inupiat (2.150), had noteworthy overcoverage. This overcoverage was possibly due to Remote Alaska cases in the Bethel, Dillingham, and Wade Hampton Census Areas, which have a relatively high concentration of Inupiats. Remote areas of Alaska provide special difficulties when interviewing, such as climate, travel, and seasonality of the population (U.S. Census Bureau, 2009). These areas have special data collection procedures, including but not limited to conducting interviews only in certain months and no mail or telephone interviews. Both the differences in the data collection methods or in the time of interview could lead to differences in ACS and 2010 Census estimates for this seasonal population.

Table 8: Coverage of AIAN Alone/One Tribal Grouping Reported Persons

Tribal Grouping	2010 Census Count	Coverage Ratio	MOE
Navajo	286,731	0.911	0.047
Cherokee	284,247	1.010	0.044
Chippewa	112,757	1.003	0.070
Sioux	112,176	1.051	0.075
Choctaw	103,910	0.835	0.071
Apache	63,193	0.961	0.094
Lumbee	62,306	0.901	0.124
Pueblo	49,695	0.940	0.119
Creek	48,352	0.927	0.095
Iroquois	40,570	1.073	0.112
Chickasaw	27,973	0.691	0.108
Blackfeet	27,279	0.793	0.143
Inupiat	24,859	2.150	0.204
Pima	22,040	0.813	0.205
Yaqui	21,679	0.728	0.124
Potawatomi	20,412	0.882	0.178
Tohono O'Odham	19,522	1.056	0.292
Alaska Athabaskan	15,623	1.109	0.214
Tlingit-Haida	15,256	1.096	0.284
Puget Sound Salish	14,320	0.839	0.140

Source: 2010 American Community Survey 1-year Data and 2010 Census Data

5.3 Coverage of AIAN Alone or in Combination Persons by State

Table 9 shows state-level estimates of the coverage of AIAN alone or in combination persons. We saw in Table 4, the race group AIAN alone or in combination was undercovered at the national level. However, this coverage varies greatly from state to state. Among the states with larger AIAN alone or in combination populations, we see undercoverage for AIAN alone or in combination in California (0.875), Arizona (0.833), and New Mexico (0.786), (the differences between the estimates of coverage for AIAN alone or in combination in Arizona, California, and New Mexico are not statistically significant from each other). In contrast, in Oklahoma (1.075) there was overcoverage. We also see some relatively higher overcoverage ratios for the AIAN alone or in combination persons in several states with smaller AIAN alone or in combination populations, namely Wyoming (1.303) and West Virginia (2.145), (the difference between the estimate of coverage for AIAN alone or in combination in Oklahoma is not statistically significant from that of Wyoming).

Table 9: Coverage of AIAN Alone or in Combination Persons by State and DC

State	2010 Census Count	Coverage Ratio	MOE	State	2010 Census Count	Coverage Ratio	MOE
AL	57,118	0.943	0.110	MT	78,601	0.813	0.075
AK	138,312	0.945	0.052	NE	29,816	1.110	0.171
AZ	353,386	0.833	0.044	NV	55,945	0.815	0.081
AR	47,588	0.871	0.103	NH	10,524	1.189	0.216
CA	723,225	0.875	0.035	NJ	70,716	0.835	0.097
CO	107,832	1.025	0.083	NM	219,512	0.786	0.053
CT	31,140	0.891	0.130	NY	221,058	0.727	0.043
DE	9,899	0.764	0.183	NC	184,082	0.976	0.071
DC	6,521	0.614	0.154	ND	42,996	0.878	0.100
FL	162,562	0.848	0.069	OH	90,124	1.010	0.081
GA	84,024	0.771	0.071	OK	482,760	1.075	0.034
HI	33,470	1.105	0.162	OR	109,223	0.942	0.082
ID	36,385	1.069	0.142	PA	81,092	0.870	0.077
IL	101,451	0.806	0.070	RI	14,394	0.797	0.242
IN	49,738	1.216	0.126	SC	42,171	0.812	0.099
IA	24,511	1.274	0.180	SD	82,073	0.913	0.082
KS	59,130	1.241	0.137	TN	54,874	1.080	0.127
KY	31,355	0.988	0.130	TX	315,264	0.909	0.046
LA	55,079	0.987	0.107	UT	50,064	0.892	0.125
ME	18,482	1.239	0.196	VT	7,379	0.727	0.159
MD	58,657	0.869	0.118	VA	80,924	0.814	0.086
MA	50,705	0.914	0.105	WA	198,998	0.999	0.060
MI	139,095	1.031	0.058	WV	13,314	2.145	0.396
MN	101,900	0.928	0.094	WI	86,228	1.057	0.083
MS	25,910	1.013	0.168	WY	18,596	1.303	0.252
MO	72,376	1.149	0.118				

Source: 2010 American Community Survey 1-year Data and 2010 Census Data

5.4 Coverage in AIAN Areas

In Table 10 we see that the coverage of the total population living in AIAN areas, 0.938, was modestly lower than that of the total population of the nation, 0.948 (see Table 1). This difference can be attributed to the concentration of AIAN alone or in combination persons in AIAN areas, whose coverage ratio in AIAN areas is 0.919. The high coverage ratio of AIAN in combination (only), 1.455, was an artifact of race reporting differences.

Table 11 shows the coverage of the total population for the 20 largest AIAN areas according to the 2010 Census. We see general undercoverage in AIAN areas. Note that no AIAN area had statistically significant overcoverage. The MOEs of the coverage ratios of AIAN areas are often large in comparison to the differences between them, which makes it difficult to establish that particular AIAN areas have higher coverage than others.

Table 10: Coverage of AIAN Alone or in Combination versus not AIAN Alone or in Combination for AIAN Areas

	2010 Census Count	Coverage Ratio	MOE
AIAN Alone or in Combination	1,147,552	0.919	0.021
AIAN Alone	967,135	0.819	0.018
AIAN in combination	180,417	1.455	0.076
Not AIAN Alone or in Combination	3,671,188	0.944	0.011
Total Population in AIAN Areas	4,818,740	0.938	0.009

Source: 2010 American Community Survey 1-year Data and 2010 Census Data

Table 11: Coverage of the Total Population in the 20 Largest AIAN Areas

	2010 Census Count	Coverage Ratio	MOE
Creek OTSA[5], OK	758,622	0.946	0.023
Cherokee OTSA, OK	505,021	0.984	0.027
Lumbee SDTSA[6], NC	490,899	0.947	0.035
Chickasaw OTSA, OK	302,861	0.924	0.041
Choctaw OTSA, OK	233,126	0.943	0.041
United Houma Nation SDTSA, LA	203,077	0.963	0.060
Kiowa-Comanche-Apache-Fort Sill Apache OTSA, OK	197,781	0.992	0.047
Cheyenne-Arapaho OTSA, OK	174,108	0.913	0.042
Navajo Nation Reservation and Off-Reservation, AZ-NM-UT	173,667	0.837	0.048
Citizen Potawatomi Nation-Absentee Shawnee OTSA, OK	117,911	0.913	0.061
Cherokees of Southeast Alabama SDTSA, AL	83,668	0.944	0.042
Knik ANVSA[7], AK	65,768	0.876	0.071
Sac and Fox OTSA, OK	57,450	0.873	0.074
Coharie SDTSA, NC	56,432	0.906	0.062
Echota Cherokee SDTSA, AL	53,622	0.885	0.092
Osage Reservation, OK	47,472	0.831	0.090
Puyallup Reservation and Off-Reservation Trust Land, WA	46,816	0.956	0.082
Samish TDSA[8], WA	36,727	1.004	0.066
Kenaitze ANVSA, AK	32,902	1.036	0.114
Yakama Nation Reservation and Off-Reservation Trust Land, WA	31,272	0.941	0.141

Source: 2010 American Community Survey 1-year Data and 2010 Census Data

Table 12 shows the coverage ratios of the 20 largest AIAN areas for 2010 ACS 1-year estimates for the race group AIAN alone or in combination. For comparison it also shows the coverage ratios for the not AIAN alone or in combination population in these AIAN areas.

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[5] Oklahoma Tribal Statistical Area
[6] State Designated Tribal Statistical Area
[7] Alaska Native Village Statistical Area
[8] Tribal Designated Statistical Area

Table 12: Coverage of AIAN Alone or in Combination versus not AIAN Alone or in Combination for the 20 Largest AIAN Areas

	AIAN Alone or in Combination			Not AIAN Alone or in Combination		
	2010 Census Count	Cov-erage Ratio	MOE	2010 Census Count	Cov-erage Ratio	MOE
Creek OTSA, OK	99,451	1.146	0.088	659,171	0.915	0.023
Cherokee OTSA, OK	125,440	1.067	0.063	379,581	0.956	0.034
Lumbee SDTSA, NC	71,754	0.897	0.106	419,145	0.955	0.038
Chickasaw OTSA, OK	41,048	1.047	0.144	261,813	0.904	0.043
Choctaw OTSA, OK	47,649	1.050	0.118	185,477	0.915	0.039
United Houma Nation SDTSA, LA	9,990	0.772	0.259	193,087	0.973	0.064
Kiowa-Comanche-Apache-Fort Sill Apache OTSA, OK	16,249	1.199	0.210	181,532	0.974	0.046
Cheyenne-Arapaho OTSA, OK	13,145	0.700	0.166	160,963	0.930	0.043
Navajo Nation Reservation and Off-Reservation, AZ-NM-UT	169,321	0.815	0.049	4,346	1.687	0.482
Citizen Potawatomi Nation-Absentee Shawnee OTSA, OK	13,463	0.897	0.199	104,448	0.915	0.065
Cherokees of Southeast Alabama SDTSA, AL	842	0.640	0.280	82,826	0.947	0.043
Knik ANVSA, AK	6,582	1.097	0.312	59,186	0.851	0.077
Sac and Fox OTSA, OK	8,347	0.645	0.189	49,103	0.912	0.078
Coharie SDTSA, NC	1,757	0.867	0.291	54,675	0.907	0.062
Echota Cherokee SDTSA, AL	3,590	0.577	0.323	50,032	0.907	0.092
Osage Reservation, OK	9,920	0.748	0.179	37,552	0.852	0.105
Puyallup Reservation and Off-Reservation Trust Land, WA	2,127	0.501	0.298	44,689	0.978	0.086
Samish TDSA, WA	801	1.366	0.487	35,926	0.996	0.068
Kenaitze ANVSA, AK	3,417	0.938	0.418	29,485	1.047	0.127
Yakama Nation Reservation and Off-Reservation Trust Land, WA	8,022	1.037	0.272	23,250	0.908	0.167

Source: 2010 American Community Survey 1-year Data and 2010 Census Data

We make the following observations from Table 12.

- There was overcoverage of the AIAN alone or in combination population in the Creek OTSA, OK (1.146) and Cherokee OTSA, OK (1.067) areas (the difference between the coverage rates of AIAN alone or in combination in Creek OTSA and that of Cherokee OTSA is not statistically significant). In contrast, there was undercoverage of the not AIAN alone or in combination in both of these areas (0.915 and 0.956) (the difference between the coverage rates of not AIAN alone or in combination in Creek OTSA and that of Cherokee OTSA is not statistically significant).
- There was undercoverage of the AIAN alone or in combination population in seven of the largest 20 AIAN areas.

- There was undercoverage of the not AIAN alone or in combination population in thirteen of the 20 largest AIAN areas.
- There was overcoverage of the not AIAN alone or in combination population in only the Navajo Reservation and Off-Reservation-AZ-NM-UT (1.687), though the population involved was small at 4,346 and the MOE was large.

In Table 13 we see that both males (0.928) and females (0.948) showed undercoverage in AIAN areas. As seen in earlier in Table 1, the coverage ratio for females in AIAN areas was not significantly different than that of females in the nation (0.954), but the coverage ratio for males in AIAN areas was less than that of males in the nation (0.942).

Table 13: Coverage in AIAN Areas by Sex

Sex	Coverage Ratio	MOE
Female	0.948	0.010
Male	0.928	0.010

Source: 2010 American Community Survey 1-year Data and 2010 Census Data

In Table 14, we see statistically significant undercoverage in AIAN areas across all age groups except 55-64 and 75+. Generally, the differences in the coverage ratios between the AIAN areas and the national totals by age group were not statistically significant (see Table 2). The only exception was the 65-74 (0.948) age group, which saw higher coverage at the national level (0.983).

Table 14: Coverage in AIAN Areas broken down by Sex and Age Group

Age Group	Total		Female		Male	
	Coverage Ratio	MOE	Coverage Ratio	MOE	Coverage Ratio	MOE
0-4	0.950	0.030	0.963	0.041	0.938	0.037
5-14	0.935	0.022	0.946	0.029	0.924	0.029
15-17	0.915	0.029	0.916	0.040	0.914	0.043
18-19	0.916	0.049	0.914	0.059	0.919	0.064
20-24	0.890	0.028	0.904	0.039	0.877	0.040
25-29	0.909	0.031	0.914	0.035	0.904	0.039
30-34	0.947	0.032	0.937	0.038	0.956	0.044
35-44	0.928	0.020	0.940	0.022	0.915	0.025
45-49	0.921	0.027	0.928	0.030	0.914	0.036
50-54	0.944	0.027	0.985	0.033	0.901	0.030
55-64	0.983	0.024	0.995	0.026	0.970	0.028
65-74	0.948	0.023	0.960	0.027	0.935	0.027
75+	0.974	0.027	0.954	0.032	1.004	0.037

Source: 2010 American Community Survey 1-year Data and 2010 Census Data

In Table 14 we also see the coverage ratios of females and males crossed by age group. For comparison to national results, see Table 4. In AIAN areas, the differences in the coverage ratios for females were not statistically significant from the national level. The differences in the coverage ratios for specific age groups for males were not statistically significant from those at the national level except for age groups 50-54 (0.901) and 65-74

(0.935), whose national coverage ratios were 0.944 and 0.980 respectively (the difference between the coverage rates of male 50-54 and male 65-74 is not statistically significant).

6. Conclusions

The Census Bureau continually evaluates the quality of the ACS, including publishing annual measures of ACS coverage. These annually produced measures are calculated by comparison to the PEP estimates, which are both dated and limited in detail. Comparing the pre-controlled ACS estimates to the 2010 Census afforded an opportunity to examine the ACS coverage with a fully up-to-date comparison and in greater detail than we could have using the PEP estimates as done in previous years. This proved particularly valuable for examining the coverage of smaller geographic areas such as AIAN areas and for demographic breakdown of AIAN persons.

We concluded that the race group AIAN alone or in combination was a more robust measure for AIAN persons than was AIAN alone. The coverage of AIAN alone or in combination persons was lower than that of white alone or in combination, but not lower than that of other nonwhite race groups. We also note that the coverage of AIAN alone or in combination varied widely by state. Further, the coverage between individual tribal groupings varied. In summary, the coverage of AIAN persons cannot easily be generalized, but must be considered for specific geographies and for specific tribal groupings.

We found that the ACS coverage of people in AIAN areas was only modestly lower than that of the overall nation, with the difference due to the lower coverage of AIAN alone or in combination persons who lived in them. Further, the individual AIAN areas consistently showed undercoverage or had coverage that was not statistically different than 1.0. That said, there was a range of coverage ratios across the 20 largest AIAN areas.

Lastly, there is more to understand about differences in race reporting between the ACS and the 2010 Census. Some of the observed differences in coverage ratios between the ACS estimates and the 2010 Census measured for race and ethnicity were attributable to differences between the two surveys in data collection. These issues limit the usefulness of the coverage ratio as a measure of coverage error for race and ethnic groups. A potential approach to better understand race reporting differences would be to link ACS 1-year 2010 persons to the 2010 Census person records and compare the race.

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