MEASURING EDUCATION: A COMPARISON OF THE DECENNIAL CENSUS AND THE AMERICAN COMMUNITY SURVEY[1]

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Introduction

The American Community Survey (ACS) is a monthly household survey being developed by the U.S. Census Bureau to provide data users with annual estimates of household, social, and economic characteristics for geographies and populations of at least 65,000 people. In addition, the ACS will provide annually updated multi-year estimates for geographies down to the block group. Pending congressional approval and funding, the ACS will replace the Census 2010 long form sample.

Since data from the ACS are eventually expected to replace data traditionally collected during the decennial census it is important to evaluate the validity and reliability of the American Community Survey data prior to full implementation in 2005. The purpose of this study is to perform a detailed comparison of the school enrollment data collected from the Census 2000 sample with data collected from the 2000 American Community Survey. The first phase of analysis compares total enrollment estimates and estimates of enrollment by type of school, grade, and age at the national level and for 21 ACS test sites. The second phase of analysis examines differences in data collection and methodology across the two surveys and discusses how these differences may impact the survey estimates. The final phase of analysis uses logistic regression to further study the effects of survey mode and timing on the likelihood of school enrollment, controlling for individual and household background characteristics.

Data

Census 2000

Since 1790, a census of the United States population has been conducted every ten years. The most recent census occurred in 2000. The Census Bureau used two different types of forms to collect Census 2000 data. A short form with seven basic questions went to most households, and a long form including over 50 population and 30 housing questions went to a sample of households and individuals living in group quarters. The long form, totaling 34 subjects, gathered information on important social, economic and housing characteristics such as income, occupation, school enrollment, and educational attainment.

A variable-rate sampling plan was implemented to select the Census 2000 sample. Four sampling rates were used: 1/2, 1/4, 1/6, and 1/8. The sampling rate was inversely related to population size. The overall sampling rate was 1-in-6 housing units, with 18.3 million households receiving the long form. The use of variable sampling rates was designed to provide relatively more reliable estimates for small areas and to decrease respondent burden in more densely populated areas while maintaining data reliability.

The primary mode of Census 2000 data collection was mail-out/mail-back questionnaires (79.8 percent of housing units were in mail-out/mail-back areas, 19 percent were in update/leave areas). The data collected reflect the U.S. population on April 1, 2000. Enumerators followed up with occupied housing units that did not return their questionnaires, making multiple contacts (telephone calls and personal visits) with occupied housing units. The long form mail return rate was 67.8 percent.

The American Community Survey

The American Community Survey is part of the Census Bureau's plan to redesign census-taking and the 2010 Census to provide data users, including federal, state, and local governments, with timely demographic, housing, social, and economic data that can be compared across states, communities, and population groups. The ACS will collect long-form data from a national sample of 3 million households a year. Data is collected throughout the year, at a rate of approximately 250,000 households a month, and aggregated to provide a single estimate for the entire year. Like the census, the primary mode of ACS data

[1] This paper reports the results of research and analysis undertaken by Census Bureau staff. It has undergone a Census Bureau review more limited in scope than that given to official Census Bureau publications. This report is released to inform interested parties of ongoing research and to encourage discussion of work in progress.

collection is mail-out/mail-back questionnaires. Census Bureau interviewers attempt computer-assisted telephone interviews (CATI) with all non-responding households for which they can obtain phone numbers. Following the CATI operation, a 1-in-3 sample of the remaining uninterviewed housing units is selected for computer-assisted personal interviews (CAPI).

When fully implemented, the American Community Survey will provide annual estimates for the nation, states, and all places of 65,000 or more. After three years of full implementation, annual moving averages will be provided for all places of 20,000 or more and, after five years of full implementation, annual moving averages will be provided for all census block groups.

The American Community Survey began in 1996 with data collection in four demonstration sites: Brevard County, FL (dropped after 1997); Fulton County, PA; Multnomah County, OR; and Rockland County, NY. By 1999 the ACS had expanded to 30 sites, containing a total of 36 counties. The sites were selected to have at least one site in each of 24 strata representing combinations of county population size, difficulty of enumeration, and 1990-1995 population growth. The selection also attempts to balance areas by region of the country, and seeks to include several sites representing different characteristics of interest, such as specific racial or ethnic groups, highly seasonal populations, migrant workers, American Indian reservations, improving or worsening economic conditions, and specific occupation or industry types. The overall housing unit sampling rate was 1 percent in Fort Bend and Harris Counties, TX, 3 percent in Broward, FL; Bronx, NY; Lake, IL; San Francisco, CA; and Franklin, OH, and 5 percent in the other 29 counties.

In 2000 and 2001 the American Community Survey also included a national survey, called the Census 2000 Supplementary Survey and the 2001 Supplementary Survey respectively. These surveys used the questionnaire and methods developed for the ACS to collect data from a national sample of 700,000 households in 1,203 counties. Group quarters were not included in the Supplementary Survey samples. The Supplementary Survey data were designed to be used in combination with data from the American Community Survey sites to produce annual estimates for the United States as a whole, the 50 states, and the District of Columbia, as well as large counties and cities.

This paper will compare Census 2000 sample national estimates with those from the Census 2000 Supplementary Survey (C2SS) and Census 2000 county estimates with those from the 21 largest American Community Survey (ACS) sites. In both cases we will look only at estimates for the household population and exclude those living in group quarters.

School Enrollment

National Estimates

Table 1, row 1 presents national estimates of school enrollment by type of school from the Census 2000 sample and the Census 2000 Supplementary Survey/American Community Survey. According to Table 1, C2SS/ACS estimated slightly lower levels and rates of enrollment among those 3 years and over than did Census 2000. The C2SS estimated total enrollment at 72.6 million individuals (27.7 percent) compared to 73.9 million individuals (28.2 percent) for Census 2000. Nearly all of the difference in estimated enrollment was due to differences in public school enrollment. While Census 2000 estimated that there were 1.4 million more public school students (62.4 million compared with 61.0 million), the C2SS estimated that there were 0.1 million more private school students.

Site-Level Estimates

The remainder of Table 1 presents estimates of enrollment for the 21 publishable ACS sites. The final two columns of/ the table present the ratio of total enrollment and percent enrolled in public school for the two surveys. In general, the estimates of number enrolled and percent enrolled in public school are quite similar across the two surveys. The ratio of ACS enrollment to Census 2000 enrollment varies from a low of 0.93 in San Francisco, CA to a high of 1.06 in Jefferson County, AR, with one-third of the sites having ratios between 0.99 and 1.01. While the ratios of percent enrolled in public school vary from a low of 0.96 in Calvert County, MD and Sevier County, TN to a high of 1.04 in Rockland County, NY, over half of all the ratios fall between 0.99 and 1.01.

Enrollment by Level

Table 2 presents the distribution of students by level of enrollment from the Census 2000 sample and the C2SS/ACS. As mentioned above, estimates of total enrollment and type of enrollment (public or private) are relatively similar across the two surveys. However, this simple comparison of total enrollment may mask important differences by level of enrollment. As Table 2 illustrates, the Census and the C2SS/ACS estimate roughly comparable percentages enrolled in grades 1 to 12, both at the national level and for most of the ACS sites. Nationally, both Census 2000 and the C2SS

Table 1. School Enrollment by Type of School for the Household Population 3 Years and Over: 2000

	C2SS, ACS			Census 2000			ACS/Census	
Geography	Total enrolled	Percent enrolled	Percent public	Total enrolled	Percent enrolled	Percent public	Total enrolled	Percent public
Nation	72,560,000	27.7	84.1	73,947,000	28.2	84.4	0.98*	1.00
ACS Sites								
Pima, AZ	229,569	29.1	88.6	227,238	28.8	89.0	1.01	1.00
Jefferson, AR	23,073	30.5	92.8	21,817	28.9	92.8	1.06*	1.00
San Francisco, CA	164,616	22.3	73.2	177,242	24.0	74.0	0.93*	0.99
Tulare, CA	115,389	33.7	95.1	116,930	34.1	93.4	0.99	1.02*
Broward, FL	400,255	25.9	77.0	408,335	26.5	79.4	0.98*	0.97*
Lake, IL	179,674	30.3	81.1	181,284	30.6	81.9	0.99	0.99
Black Hawk, IA	35,377	30.3	84.9	36,325	31.1	85.8	0.97	0.99
Calvert, MD	22,491	31.6	84.2	21,729	30.5	87.6	1.04	0.96*
Hampden, MA	120,817	28.4	84.7	120,820	28.5	83.8	1.00	1.01
Madison, MS	20,572	29.5	73.1	21,155	30.5	74.4	0.97	0.98
Flathead and Lake, MT	23,742	25.0	86.9	24,663	25.8	89.5	0.96	0.97*
Douglas, NE	127,595	29.6	79.2	127,785	29.6	77.3	1.00	1.02*
Bronx, NY	394,207	32.3	79.2	407,761	33.4	79.5	0.97*	1.00
Rockland, NY	82,323	30.9	65.6	82,576	31.0	63.1	1.00	1.04*
Franklin, OH	281,035	28.2	83.2	295,177	29.5	83.2	0.95*	1.00
Multnomah, OR	153,107	24.7	81.7	156,962	25.4	82.7	0.98*	0.99
Schuylkill, PA	30,346	21.9	82.6	30,080	21.7	84.5	1.01	0.98
Sevier, TN	15,249	22.4	87.0	15,009	22.1	90.8	1.02	0.96*
Fort Bend and Harris, TX	1,055,040	29.9	90.0	1,076,871	30.6	87.8	0.98*	1.03*
Starr and Zapata, TX	20,668	33.6	97.3	21,836	35.4	97.7	0.95*	1.00
Yakima, WA	62,133	29.9	92.4	63,150	30.5	91.3	0.98	1.01

*American Community Survey and Census estimates are significantly different at α=0.10.

Source: Census 2000, Census 2000 Supplementary Survey, 2000 American Community Survey

estimated that 67.1 percent of those enrolled were enrolled in grades 1 to 12.

There are, however, notable differences between the two surveys at the preprimary and postsecondary levels. The estimates of nursery school and kindergarten enrollment from the Census 2000 sample tend to exceed similar estimates from the C2SS/ACS. According to Census 2000, 6.7 percent of those enrolled were enrolled in nursery school, compared with 6.0 percent in the C2SS. In addition, in 17 of the 21 ACS sites the Census estimate exceeds that of the ACS, although most of these differences are not statistically significant. Conversely, the estimates of the percent of students enrolled in postsecondary school are slightly lower in Census 2000 than in the C2SS/ACS. This is particularly true for college undergraduate enrollment where the ACS estimate exceeds the Census 2000 estimate in two-thirds of the sites, and is statistically significantly different in 4 sites.

Enrollment by Age

Table 3 presents the ratios of national and site-level estimates of school enrollment by age for the C2SS/ACS to those for the Census 2000 sample. As Table 3 illustrates, the Census reports significantly higher rates of enrollment among 3-4 year olds than the C2SS (49.3 percent compared to 42.7 percent). At the site level, the ratio of C2SS enrollment to Census 2000 enrollment for 3 and 4 year olds varies from a low of 0.75 in Flathead and Lake, MT, to a high of 1.44 in Sevier, TN[2]. However, three-quarters of the sites have ratios below 0.98.

The Census 2000 sample also estimates slightly higher enrollment rates for those ages 25 to 34 and those ages 35 and over than does the C2SS/ACS. Ratios for these age groups show greater variability across sites, perhaps due to lower enrollment rates at older ages. Only among 20 to 24 year olds does the C2SS/ACS seem to estimate higher rates of enrollment than Census 2000, although the evidence is not particularly strong. Among those ages 5 to 19, the enrollment estimates, although occasionally statistically significantly

[2] The difference in enrollment rates for 3 and 4 year olds in Flathead-Lake, MT is not statistically significant.

Table 2. School Enrollment by Level Enrolled for the Household Population 3 Years and Over, Percent Distribution: 2000

	Nursery school		Kindergarten		Grade 1 to 4		Grade 5 to 8		Grade 9 to 12		College Undergraduate		Graduate or Professional	
Geography	ACS	Census	ACS	Census	ACS	Census	ACS	Census	ACS	Census	ACS	Census	ACS	Census
Nation	6.0*	6.7	5.4*	5.6	22.7*	22.9	22.7*	22.5	21.7	21.7	17.3*	16.5	4.3*	4.1
ACS Sites														
Pima, AZ	5.3	5.7	5.2	5.2	19.8*	21.7	20.9	20.5	18.9	19.6	23.7*	21.9	6.1*	5.3
Jefferson, AR	5.9	6.5	5.1	4.8	23.2	23.5	21.7	23.8	22.5	23.3	18.6	16.4	3.0*	1.8
San Francisco, CA	5.0	5.3	3.5	3.7	14.8	13.9	16.0	15.4	16.1	16.2	32.3	32.5	12.3	13.0
Tulare, CA	3.5*	4.9	5.7	6.0	24.8	25.0	23.7	24.9	26.8*	24.2	14.2	13.3	1.3*	1.8
Broward, FL	7.4	7.8	6.3*	5.7	22.1	22.1	22.2	21.7	21.1	21.2	16.8	17.0	4.1	4.5
Lake, IL	8.2*	9.3	7.1	6.4	24.6	24.7	22.6	22.9	20.6	20.4	12.9	12.0	4.0	4.4
Black Hawk, IA	5.7	6.2	3.3*	4.5	17.3	19.0	20.5*	17.5	20.7	20.0	28.4	29.1	4.2	3.7
Calvert, MD	7.7*	5.9	5.5	5.9	22.5	25.4	24.2	24.9	22.3	23.5	14.4*	11.8	3.4	2.6
Hampden, MA	7.1	7.2	5.4	6.0	22.0	23.0	22.6	23.0	23.0	22.0	15.3	15.0	4.5*	3.7
Madison, MS	10.7	9.8	7.0	6.8	23.1	24.8	24.0	23.2	20.2	20.5	11.3	11.8	3.8	3.3
Flathead and Lake, MT	4.2	5.5	4.0	5.4	22.9	24.4	29.0	26.7	27.0	25.5	10.7	10.9	2.3	1.7
Douglas, NE	5.6*	7.1	4.7*	5.5	20.5*	22.0	23.4*	21.2	20.3	20.2	19.7*	18.5	5.8	5.6
Bronx, NY	5.0*	5.5	5.3*	6.0	25.4*	24.4	22.6	22.2	23.1*	22.4	15.8	16.0	2.9*	3.5
Rockland, NY	7.3	8.2	5.8	5.4	21.6	22.8	23.3	22.5	22.2	21.2	15.1	14.6	4.8	5.3
Franklin, OH	5.8*	6.9	5.9*	5.2	22.0	21.3	20.2	20.2	18.3	18.1	21.5	21.7	6.3	6.6
Multnomah, OR	5.9	6.2	5.2	4.9	21.8	21.7	19.6	19.9	19.9	19.9	21.6	21.1	6.0	6.3
Schuylkill, PA	6.2	6.2	6.3	5.6	21.6*	24.8	25.5	25.6	25.0	24.6	13.0	11.4	2.4	1.8
Sevier, TN	7.5	5.5	3.8*	6.0	27.7	26.7	23.3	24.9	23.3	23.2	12.2	11.9	2.3	1.8
Fort Bend and Harris, TX	6.2*	6.9	5.7*	6.3	24.8*	23.9	23.0	23.1	21.6	21.6	14.6	14.5	4.0	3.7
Starr and Zapata, TX	6.4	7.2	6.0	7.6	28.1	26.0	25.4	24.6	23.4	23.8	9.5	9.3	1.2	1.5
Yakima, WA	4.7	5.6	6.4	6.7	28.1	26.2	24.0	25.7	23.4	24.8	12.3*	9.5	1.2	1.6

*American Community Survey estimate is significantly different from the Census estimate at α=0.10.

Source: Census 2000, Census 2000 Supplementary Survey, 2000 American Community Survey

different, are substantively similar across the two surveys.

Survey Differences

The two surveys differ in two important aspects: mode of data collection and timing. Differences in either of these factors may lead to differences in estimated levels and rates of school enrollment across the surveys. We consider each of these differences separately.

Mode of Data Collection

Enrollment numbers and rates may differ due to differences in mode of administration across the two surveys. In Census 2000 most sample data were collected by either self-response using a mail-out/mail-back questionnaire or in-person by a census enumerator (80 percent). Most of the remaining sample data was collected using a left/mail-back questionnaire (19 percent). The Census 2000 long-form mail response rate was 67.8 percent.

As mentioned above, the ACS employs three different modes of data collection: self-response using a mail-out/mail-back questionnaire, computer-assisted telephone interviewing (CATI), and computer-assisted personal interviewing (CAPI). Table 4 presents the weighted percent of individual interviews collected by the various modes. In the C2SS, 58.3 percent of respondents resided in households interviewed via mail, 9.4 percent in household interviewed by CATI, and 32.3 percent in households interviewed by CAPI. The distribution of interviews by mode differs across the ACS sites. In Black Hawk, IA over 70 percent of responding individuals were in households interviewed by mail, compared to only 21.9 percent in Starr and Zapata, TX.

Table 5 presents weighted age-specific enrollment rates for the C2SS by mode of data collection. For all age groups the enrollment rate among those enumerated by mail is significantly higher than the enrollment rate for those enumerated by CAPI, with the largest differences occurring among 3 and 4 year olds. If mail respondents are more likely to misclassify themselves as enrolled than CATI or CAPI respondents, because they misread/misinterpret the question, then C2SS's greater reliance on computer-assisted interviewing may partially explain why its estimates of age-specific enrollment tend to be somewhat lower than comparable Census 2000 estimates.

Table 3. Ratio of ACS to Census Age-Specific Enrollment Rates for the Household Population 3 Years and Over: 2000

	Age							
Geography	3 and 4 years	5 to 9 years	10 to 14 years	15 to 17 years	18 and 19 years	20 to 24 years	25 to 34 years	35 years and over
Nation	0.87*	0.98*	0.99*	0.99*	1.00	1.03*	0.98*	0.94*
ACS Sites								
Pima, AZ	0.98	0.99*	1.00	1.00	0.95	1.06*	1.09*	1.00
Jefferson, AR	0.94	1.01	1.01	1.01	1.04	1.31*	0.87	1.63*
San Francisco, CA	0.80*	1.01	1.00	0.97*	1.01	0.98	0.85*	0.76*
Tulare, CA	0.79*	0.97*	0.97*	1.01	1.07	0.99	0.96	1.21*
Broward, FL	0.94*	1.00	0.99	0.99	0.96	0.97	1.02	0.79*
Lake, IL	0.87*	1.01	0.99*	1.01	1.15*	1.02	1.01	0.85*
Black Hawk, IA	1.02	0.96*	1.00	1.00	1.10*	0.86*	0.88	1.10
Calvert, MD	1.28*	0.97*	1.00	0.99	1.23*	1.19	1.03	1.33*
Hampden, MA	0.96	0.97*	1.00	1.00	0.95	1.04	1.06	1.06
Madison, MS	0.86	1.03*	0.99	0.95	0.89	0.95	0.84	0.78
Flathead and Lake, MT	0.75	0.94*	0.99	1.01	1.14	1.22	0.66	0.81
Douglas, NE	0.82*	0.98*	1.00	1.02*	1.02	1.08*	1.04	0.94
Bronx, NY	0.89*	1.00	1.00	0.99	1.04*	1.03	0.76*	0.84*
Rockland, NY	0.95	0.99	1.01*	1.02*	1.09*	1.14*	0.81*	0.89
Franklin, OH	0.86*	0.97*	0.99*	0.99	1.01	0.94*	0.86*	0.86*
Multnomah, OR	0.97	0.99	0.99*	1.00	1.01	0.98	0.92	0.87*
Schuylkill, PA	0.97	0.96*	0.99	0.98	0.97	1.26*	1.05	1.29
Sevier, TN	1.44*	0.97	1.01*	1.02	0.83	1.00	0.81	1.54
Fort Bend and Harris, TX	0.90*	0.99	0.99*	0.99	0.98	0.99	1.00	0.83*
Starr and Zapata, TX	1.01	1.00	1.01	0.93	1.11	0.58*	1.21	0.50*
Yakima, WA	0.79*	1.00	1.00	0.99	0.97	1.04	0.92	0.75*

*American Community Survey and Census estimates are significantly different at α=0.10.

Source: Census 2000, Census 2000 Supplementary Survey, 2000 American Community Survey

Timing and Reference Periods

Enrollment numbers and rates may also differ due to differences in the "timing" of the two surveys. In particular, differences in the length of the reference period for the school enrollment question and differences in the time of year in which the question was asked may explain some of the differences in enrollment by level and age between the two surveys.

The school enrollment questions for Census 2000 and the C2SS/ACS appear in Box 1. While the two questions are highly correspondent in wording, including the parenthetical explaining appropriate levels of schooling to include, there is one major difference in terms of the reference period used by the two surveys. The reference period for the Census 2000 enrollment question varied by household; it began February 1 and ended when the household completed their questionnaire. The Census 2000 questionnaires were mailed in late March with the official census date designated as April 1.

Box 1: School Enrollment Questions

Census 2000

"At any time since February 1, 2000, has this person attended regular school or college?"
[Include only nursery school or preschool, kindergarten, elementary school, and schooling which leads to a high school diploma or a college degree.]

American Community Survey/Census 2000 Supplementary Survey

"At any time IN THE LAST 3 MONTHS, has this person attended regular school or college?"
[Include only nursery or preschool, kindergarten, elementary school, and schooling which leads to a high school diploma, or a college degree..]

Approximately 50 percent of the mail-out questionnaires were mailed back the first week of April. Data collection continued, using the various

collection instruments, until July 7. The median response date for Census 2000 was approximately April 6. Thus, Census 2000 measured spring enrollment with a median recall length of just over two months.

Table 4. Weighted Percent Distribution of Individual Interviews by Mode of Interview for the Population 3 Years and Over

	Interview Mode (percent)		
Geography	Mail	CATI	CAPI
Nation	58.3	9.4	32.3
ACS Sites			
Pima, AZ	60.7	7.9	31.5
Jefferson, AR	50.2	16.2	33.7
San Francisco, CA	55.0	5.6	39.4
Tulare, CA	45.6	8.6	45.7
Broward, FL	53.3	10.5	36.3
Lake, IL	64.2	10.4	25.4
Black Hawk, IA	70.2	11.4	18.4
Calvert, MD	62.9	12.9	24.2
Hampden, MA	61.8	9.3	29.0
Madison, MS	51.6	13.5	34.9
Flathead and Lake, MT	61.5	9.1	29.4
Douglas, NE	65.7	11.4	22.9
Bronx, NY	37.1	5.7	57.2
Rockland, NY	54.8	10.2	35.0
Franklin, OH	61.4	8.6	30.0
Multnomah, OR	62.5	7.2	30.3
Schuylkill, PA	69.7	7.7	22.7
Sevier, TN	58.4	12.5	29.0
Fort Bend and Harris, TX	48.1	11.1	40.8
Starr and Zapata, TX	21.9	8.6	69.5
Yakima, WA	52.3	10.5	37.2

Source: Census 2000 Supplementary Survey, 2000 American Community Survey

Unlike Census, the C2SS/ACS reference period was fixed at 3 months and the C2SS/ACS was in the field all year. Approximately one-twelfth of the surveys were mailed out the last week of each month. Roughly six weeks later the Census Bureau began conducting CATI interviews for those who did not return completed questionnaires. Two months after the questionnaires were mailed, the Bureau attempted to conduct CAPI interviews with a one-third sample of the households that had neither completed a questionnaire nor a CATI interview. An individual's information was recorded in the month in which it was received.

The slightly longer recall period should result in higher age-specific enrollment rates in the C2SS/ACS than in Census 2000. The seasonal effect is unclear a priori. Since the typical academic year starts in the Fall and ends in the Spring and since individuals are more likely to drop out than drop in as the year progresses, we might expect that Fall and Winter enrollment would exceed Spring enrollment. On the other hand, since most students are not enrolled for at least a portion of the Summer, we would also expect to see slightly lower levels of enrollment among those interviewed during the Summer, even with the three-month recall period. What the net effect would be is unclear.

Table 5. Weighted Enrollment Rate of the Population Age 3 and Older by Age and Mode of Interview: Census 2000 Supplementary Survey

	Percent Enrolled			
Age	All Modes	Mail	CATI	CAPI
3 and 4 years	42.7	50.4	38.7*	34.5*
5 to 9 years	94.1	95.4	94.8*	92.3*
10 to 14 years	97.9	98.3	98.3	97.3*
15 to 17 years	94.2	96.4	95.0*	90.6*
18 and 19 years	62.6	71.0	64.9*	51.8*
20 to 24 years	33.8	39.9	31.5*	28.0*
25 to 34 years	11.2	12.6	10.4*	9.5*
35 years and over	3.1	3.1	3.1	2.9*

*Rate is significantly different from the mail rate at α=0.10.
Source: Census 2000 Supplementary Survey

Enrollment rates by season for the C2SS/ACS are presented in Table 6. Nationally, enrollment is highest in the Spring (March, April, May) and Fall (September, October, November) and lowest in Winter (December, January, February) and Summer (June, July, August). At the ACS site level, enrollment tends to be lowest in the Summer: 14 of the 21 sites reported their lowest enrollment in the summer, although the Summer enrollment rate is only significantly different from the Spring enrollment rate in 4 of these sites. There is no clear pattern among the other three seasons.

Multivariate Analysis

Table 5 depicted a clear correlation between the age-specific school enrollment rate and the mode of administration in the C2SS/ACS. Whether this correlation represents a true mode effect or whether students are simply more likely than non-students to be interviewed by mail is not clear. To help discern whether the differences in enrollment by mode are really the result of survey mode and not characteristics correlated with survey mode, we estimated a multivariate logistic regression model to further analyze the relationship between enrollment, mode, and season. The dependent variable was a binary variable equal to 1 if the individual indicated that he or she was enrolled in school and 0 otherwise. Mode of administration was measured by two binary variables for CATI and CAPI respectively with mail

as the reference mode. Season was measured by three binary variables for Winter, Summer, and Fall with Spring as the reference season. The model also controlled for several individual and household characteristics that might be related to mode of administration and/or likelihood of enrollment including age, sex, race, ethnic origin, nativity, language ability, household poverty, type of housing unit, household marital status, household mobility, and individual work status. The model was run for the nation as well as for each of the ACS sites.

Table 6. Percent Enrolled by Season for the Population 3 Years and Over: Census 2000 Supplementary Survey

	Season			
Geography	Winter	Spring	Summer	Fall
Nation	27.0*	28.1	27.0*	28.3
ACS Sites				
Pima, AZ	29.7	29.5	27.4*	30.0
Jefferson, AR	28.3	31.4	33.4	28.8
San Francisco, CA	21.3*	22.4	22.9	22.6
Tulare, CA	32.0*	35.7	32.7	34.2
Broward, FL	24.7*	27.6	25.9	25.4*
Lake, IL	31.6	30.6	29.0	30.2
Black Hawk, IA	30.2	29.8	31.8	29.4
Calvert, MD	35.0	30.1	32.8	28.0
Hampden, MA	28.4	30.1	27.5*	27.8
Madison, MS	33.2*	28.3	26.0	30.6
Flathead and Lake, MT	25.8	26.3	22.8	24.7
Douglas, NE	30.6	29.6	28.6	29.4
Bronx, NY	33.2	31.4	30.8	34.0*
Rockland, NY	30.1	31.8	30.1	31.7
Franklin, OH	28.8	29.0	26.7*	28.2
Multnomah, OR	25.3	24.7	24.2	24.8
Schuylkill, PA	23.6*	18.8	21.8	23.2*
Sevier, TN	26.1	22.5	12.6*	26.7
Fort Bend and Harris, TX	30.3	29.5	29.0	31.0
Starr and Zapata, TX	34.4	33.5	31.7	34.6
Yakima, WA	31.6	30.1	27.0	30.9

*Rate is significantly different from the Spring rate at α=0.10.

Source: Census 2000 Supplementary Survey, 2000 American Community Survey

Table 7 presents the estimated odd-ratios for the regression coefficients on mode and season for the 22 individual logistic regression models. The odds-ratios from the national model suggest that, compared to mail questionnaires, CATI has a moderate negative effect on enrollment rates while CAPI has a large negative effect on enrollment rates, controlling for a variety of individual and household characteristics. The odds of an individual enumerated by CATI or CAPI being enrolled in the last three months are only 83 percent and 70 percent respectively of the odds of an individual enumerated by mail being enrolled. The CATI effect is negative for all but two of the ACS sites but statistically significantly different from 1.0 in only 5 sites. The CAPI effect is negative for all but one of the ACS sites and statistically significantly different for all but 5 sites.

The results for the seasonal variables are more mixed. The national model suggests a small but significant negative effect of Summer enumeration on the likelihood of enrollment and a small but positive effect of Fall enumeration, compared with Spring enumeration. The evidence at the site level is less compelling. While nearly all of the sites have Summer odds ratios less than 1.0 only 3 of these are statistically significantly different from 1.0. In addition, only 1 site has a significant odds-ratio for Fall and its less than 1.0.

Table 7. Estimated Odds-Ratios for a Logistic Regression of School Enrollment on Interview Mode and Season: Census 2000 Supplementary Survey[1]

	Interview Mode		Interview Season		
Geography	CATI	CAPI	Winter	Summer	Fall
Nation	0.83*	0.70*	1.01	0.89*	1.05*
ACS Sites					
Pima, AZ	0.87	0.76*	0.96	0.85*	1.07
Jefferson, AR	0.93	1.04	1.15	1.37	0.90
San Francisco, CA	0.95	0.73*	1.03	1.02	1.01
Tulare, CA	0.90	0.65*	0.96	0.85	0.87
Broward, FL	0.88	0.69*	0.84	0.87	0.91
Lake, IL	0.87	0.63*	0.91	0.79	0.87
Black Hawk, IA	0.56*	0.72*	0.95	1.01	1.11
Calvert, MD	0.56*	0.80	1.24	0.87	0.97
Hampden, MA	1.00	0.56*	0.89	0.85	0.88
Madison, MS	0.61	0.47*	1.35	0.77	1.38
Flathead-Lake, MT	0.88	0.57*	0.84	0.92	0.55*
Douglas, NE	0.73*	0.53*	1.24*	1.14	1.16
Bronx, NY	0.61*	0.59*	1.05	0.85*	1.08
Rockland, NY	1.05	0.89	0.74	0.95	1.08
Franklin, OH	0.89	0.53*	1.00	0.92	0.95
Multnomah, OR	0.83	0.67*	1.06	0.97	1.03
Schuylkill, PA	0.99	0.49*	1.39	0.98	1.18
Sevier, TN	1.38	0.50*	0.71	0.37*	1.14
Fort Bend-Harris, TX	0.79*	0.62*	0.97	0.83	1.18
Starr-Zapata, TX	0.61	0.38	0.47	0.43	1.30
Yakima, WA	0.86	0.81	1.02	0.85	1.01

*$p < 0.10$

Source: Census 2000 Supplementary Survey, 2000 American Community Survey

1. Models also include controls for age, sex, race, ethnic origin, nativity, linguistic isolation, household poverty, type of housing unit, whether household has a phone, household marital status, household mobility, and individual work status.

In addition to the ACS models, we also estimated a multivariate model on the Census 2000 sample data to analyze the difference in the likelihood of school enrollment between individuals

in households that responded by mail and individuals in households that responded by other interview modes. There were four differences between the ACS model and the Census 2000 model. The Census 2000 model measured mode of administration with a single dummy variable equal to one if the household responded by some mode other than mail and zero otherwise. The Census 2000 model did not, for obvious reasons, include seasonal variables. Instead of household poverty, the Census 2000 model controlled for household income and household size. The Census 2000 model did not control for mobility.

Table 8 presents the estimated odd-ratios for the Census 2000 sample regression coefficients on interview mode for the nation and for the 21 ACS sites. All but 3 of the regression coefficients are statistically significantly smaller than one, indicating that individuals in households that did not respond by mail were significantly more likely to indicate that they were enrolled in school than individuals in households that did respond by mail, controlling for individual and household characteristics that are correlated with mode of interview.

Table 8. Estimated Odds-Ratios for a Logistic Regression of School Enrollment on Interview Mode: Census 20000

	Interview Mode
Geography	Non-Mail
Nation	0.80*
ACS Sites	
Pima, AZ	0.85*
Jefferson, AR	0.73*
San Francisco, CA	0.93*
Tulare, CA	0.77*
Broward, FL	0.76*
Lake, IL	0.68*
Black Hawk, IA	1.05
Calvert, MD	0.82
Hampden, MA	0.84*
Madison, MS	0.87
Flathead and Lake, MT	0.83*
Douglas, NE	0.72*
Bronx, NY	0.77*
Rockland, NY	0.85*
Franklin, OH	0.81*
Multnomah, OR	0.81*
Schuylkill, PA	0.77*
Sevier, TN	0.59*
Fort Bend and Harris, TX	0.71*
Starr and Zapata, TX	0.59*
Yakima, WA	0.75*

*p < 0.10

Source: Census 2000

1. Models also include controls for age, sex, race, ethnic origin, nativity, linguistic isolation, household income, number of people in the household, type of housing unit, whether household has a phone, household marital status, and individual work status.

Conclusion

The Census 2000 sample and the 2000 Census Supplementary Survey/American Community Survey both measure the level and rate of school enrollment for the population 3 years and over. Estimates of overall enrollment and enrollment by type of school are quite similar across the two surveys, both at the national and site, or county, level. Estimates of primary and secondary school enrollment are also very similar across the two surveys as are age-specific enrollment estimates of those ages 5 to 19. There are, however, notable differences in preprimary and postsecondary enrollment. In general, the Census 2000 sample estimates higher rates of preprimary enrollment and lower rates of postsecondary enrollment than the C2SS/ACS. This is due, at least in part, to significant differences in the age-specific enrollment rates for individuals ages 3 and 4 years and 20 to 24 years.

Differences in mode of administration, reference period, and survey timing would lead us to expect some difference in enrollment across the two surveys but do little to explain the observed pattern of differences. Evidence suggests that individuals interviewed by CATI/CAPI may be less likely to report being enrolled in school than those enumerated by mail, regardless of individuals true enrollment status, and that individuals interviewed in the Summer are slightly less likely to report being enrolled than those interviewed in the Spring. Since the C2SS/ACS relies more heavily on non-mail interviewing and collects roughly one-quarter of its data in the Spring we would expect this to lead to lower enrollment estimates in the C2SS/ACS than in the Census 2000 sample. On the other hand, the longer reference period in the C2SS/ACS would lead us to expect slightly higher levels of enrollment in the C2SS/ACS than in Census 2000. The net effect is likely to be negative but this does not explain the higher age-specific enrollment rates in the C2SS/ACS among those ages 20 to 24. Its possible that the logistic regression model fails to pick up important individual and household differences that affect both school enrollment and selection into interview mode and that, as a result, the mode effects are not as pronounced as initially believed. However, this still would not help us explain why the C2SS/ACS estimates higher rates of enrollment at some ages and lower rates of enrollment at other ages. Clearly additional research is needed.