Who Doesn't Respond When a Survey is Voluntary?

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Abstract

Most surveys conducted by the federal government and the private sector cannot rely on mandatory messaging to encourage participation. Gaining respondent cooperation requires other incentives or appeals. While mandatory surveys achieve higher survey response rates than voluntary surveys, little research is available to see who may be included in a mandatory survey, but missed in a voluntary survey. The American Community Survey (ACS) is a mandatory national household survey. In 2003, the Census Bureau conducted a test to assess the implications of using voluntary methods in the ACS. Recently staff reanalyzed the dataset from that test to compare the characteristics of the population that was included in the voluntary implementation with the characteristics of the population included in the mandatory implementation. The hardest-to-interview populations were equally likely to be included in voluntary and mandatory implementations. Mandatory methods were more successful in gaining cooperation from the higher educated, more mobile, and higher income populations, suggesting that these individuals may be missing from voluntary surveys.

Keywords: Nonresponse, voluntary data collection, American Community Survey

1. Background

1.1 The American Community Survey

The U.S. Census Bureau conducts the American Community Survey (ACS) to measure the characteristics of the nation's population and housing. The ACS collects demographic, social, and economic data from the population living in both housing units and in group quarters facilities such as college dormitories, military bases, and prisons. The ACS also collects data on the physical and financial characteristics of the nation's housing. National implementation of the ACS as a demonstration program began in 2000. The Census Bureau began full implementation of the ACS in 2005 with annual samples of about 3 million housing unit addresses. Each year the Census Bureau selects the ACS sample and distributes it across all 12 months of a calendar year into monthly samples. In 2003, the ACS used a Primary Sampling Unit - based design for each month's sample. The sample design changed in 2005. Under both designs, every month's sample is nationally representative.

The survey uses three sequential modes of data collection (mail, telephone, and personal visit) over a 3-month time period to collect data for each ACS monthly sample. Figure 1 summarizes this design. Sample cases without a response after mail and phone attempts

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[1] Any views expressed are those of the authors and not necessarily those of the U.S. Census Bureau.

are sub-sampled prior to the final personal visit stage. You can find a more complete description of the design and methodology of the ACS at U.S. Census Bureau (2009).

	Calendar Month					
Sample Panel	February 2003	March 2003	April 2003	May 2003	June 2003	July 2003
Feb 2003	Mail	Mail Phone	Mail Personal Visit			
March 2003		Mail	Mail Phone	Mail Personal Visit		
April 2003			Mail	Mail Phone	Mail Personal Visit	
May 2003				Mail	Mail Phone	Mail Personal Visit
June 2003					Mail	Mail Phone

Figure 1: ACS Data Collection Design (Shaded – Voluntary, all others Mandatory)

Participation in the ACS, as part of the decennial census program, is mandatory. Mail materials, including the envelope of the mailing package, state that, "Your Response is Required by Law." The Census Bureau trains survey interviewers to encourage respondents to participate based on the survey's benefits but they may also choose to remind respondents of this legal requirement. A mandatory ACS has achieved consistently high levels of survey response with weighted response rates of about 98 percent since 2000 (U.S. Census Bureau, 2012).

1.2 Test of Voluntary Methods

At the request of Congress, the U.S. Census Bureau conducted research in 2003 to determine the implications of implementing the ACS as a voluntary, rather than a mandatory, survey. Staff designed a test to answer key questions on mail response, survey quality, and costs. The Census Bureau collected data for all modes of the March and April samples in the 2003 ACS using voluntary methods. In all other 2003 ACS monthly samples, data collection relied on the standard, mandatory methods. Figure 1 shades the voluntary data collections.

We revised the ACS mandatory mail materials and interviewer's procedures to reflect voluntary data collection methods basing the changes on the materials used in Census Bureau voluntary household surveys such as the Current Population Survey. For this reason, it is reasonable to say that the methods used in the voluntary ACS were similar to those regularly used in other voluntary household surveys. We conducted training sessions with ACS interviewers on the shift to voluntary methods. We did not tell them that this was a test; rather, we told them that the survey was now voluntary.

The initial sample for the combined March and April samples included 103,000 addresses. After three data collection modes and subsampling the test obtained about 60,000 completed interviews. These interviews were the basis for assessing cost and quality implications if the survey were no longer mandatory. For details on the design of this test, refer to U.S. Census Bureau (2003).

2. Methodology

2.1 Data

We re-analyzed data from the 2003 test of voluntary methods for this research. As noted above, in that test data collection for the March and April samples used voluntary methods. All other 2003 monthly samples used mandatory methods. Based on combinations of months we created two sets of 2003 ACS estimates for this research. We tabulated estimates by collection method for over 400 demographic, social, economic, and housing characteristics including estimates of person, household and housing unit totals, ratios and percentages. For each of these sets of estimates, we weighted the data only for selection probabilities (including subsampling selection probabilities) to obtain the best estimate of the characteristics of survey respondents. Please see Navarro et al (2011) for details on the methodology we used to produce these annualized estimates.

Due to the design of our test, we must compare estimates based on different months of the year. Because it is possible that some observed differences could be due to seasonal differences, we developed a methodology to try to control for that. Specifically, we partitioned 2002 and 2004 ACS data by the same months as the test and assessed if in these years, without a change in methods, estimates differed. Only those items without evidence of seasonal differences remained in scope for this research. In particular we found that the questions on school enrollment, the year that a household moved into a unit, home value, and selected monthly owner costs had some seasonal effects and we excluded them from this analysis.

Table 1 summarizes the set of topics that were included – social, housing, economic, and demographic characteristics. We used the two sets of annualized ACS estimates, focusing on estimates of total persons, total households, and total housing units. As noted earlier, these estimates reflected only the selection probability weights in order to serve as our best estimate of the responding populations under voluntary and mandatory methods. To facilitate comparisons, we collapsed some detailed response categories within these topics, calculating new totals and revised standard errors for the aggregate estimate. For example, rather than analyzing 5-year age intervals, we analyzed larger age intervals associated with children, younger adults, and older adults.

Table 1: Topics included in Analysis

Social Characteristics	Housing Characteristics	Economic Characteristics	Demographic Characteristics
Households by Type	Units in Structure	Employment Status	Sex
Relationship	Year Structure Built	Income and Benefits	Age
Marital Status	Bedrooms	Occupation	Race
Mobility	Housing Tenure		Hispanic Origin
(Residence 1 Year Ago)	(Owner/Renter)		
Educational Attainment	Mortgage Status		
Place of Birth	Gross Rent		
Language Spoken at Home			

For each characteristic, we calculated a response ratio and the margin of error for the response ratio.

$$\text{Response ratio} = \frac{\text{Estimate of the responding population with this characteristic using VOLUNTARY methods}}{\text{Estimate of the responding population with this characteristic using MANDATORY methods}}$$

For example, we calculated the response ratio for the population with a bachelor's degree as the ratio of the estimated number of persons 25 years and over with a bachelor's degree based on the voluntary ACS responses to the estimated number of persons age 25 years and over with a bachelor's degree based on the mandatory ACS responses.

We interpret these response ratios as the proportion of the responding population when a survey is mandatory that responds when the survey is voluntary. A drop of about 4 percentage points in the survey response rate for the voluntary implementation meant that the estimates of the responses from the total population, total households, and total housing units based on voluntary methods would be about 96 percent of those based on mandatory methods. We calculated the following response ratios for total housing units (0.955), total population (0.944) and total households (0.937). We wanted to understand if this ratio was consistent across groups or if the change in methodology affected some groups differentially. To determine this we compared response ratios across selected groups, testing to see if the differences were statistically significant. We used a 90 percent confidence level for these tests. We did not make any adjustments for multiple comparisons.

3. Limitations

This research used data from a test of voluntary and mandatory methods that took place in 2003. It may be unrealistic to assume that we would achieve the same results 10 years later. Because the final survey response rate in the voluntary implementation is similar to response rates achieved in other government-sponsored household surveys, we believe it is reasonable to consider the voluntary ACS implementation as an approximation of the respondents included in these surveys. Specifically, the final voluntary ACS response rate was 93.4 percent[2] and the response rate for the March 2011 Current Population Survey was about 91 percent[3]. It is possible that the comparison will illuminate some of the characteristics of the population that may not be included in these voluntary surveys. We acknowledge that these results offer limited insight into the populations missed in voluntary surveys that achieve far lower response rates.

4. Results

4.1 Basic Demographic Characteristics
Table 2 summarizes the response ratios and the associated margins of error for basic demographics – sex, age, race, and Hispanic origin. The response ratio for the total population is 0.944.   Males and females had similar response ratios as did many age groups. Persons 65 and over had significantly higher response ratios than persons 20 to 34, persons 35 to 54 and persons 55 to 64. Persons between 55 and 64 had lower response ratios than persons under 20. This indicates that the older population is less vulnerable to nonresponse in a voluntary setting. The population under 20 also seems less at risk.

We did not find a difference in the response ratios by Hispanic Origin suggesting that mandatory and voluntary participation varies little in the Hispanic population. The race findings are interesting. Response ratios are high for persons reporting a race of Black or African American (statistically higher than the ratios for Whites, Asians, and Native

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[2] Griffin and Raglin (2011).

[3] http://www.census.gov/cps/methodology/nonresponse.html

Hawaiian and Other Pacific Islanders). This suggests that the level of participation for Blacks, like Hispanics, is not affected by the use of voluntary versus mandatory methods. The low response ratio for Asians is statistically different from the ratio for both Whites and Black/African Americans. This indicates that the use of voluntary methods appears to have a differentially negative impact on Asians.

Table 2: Response Ratios – Demographic Characteristics

Topic	Response Ratio (Voluntary to Mandatory)	Margin of Error of Response Ratio
Total population	**0.944**	**0.010**
Sex		
Male	0.942	0.011
Female	0.946	0.011
Age		
Under 20	0.952	0.014
20 to 34	0.939	0.016
35 to 54	0.938	0.012
55 to 64	0.925	0.019
65 and over	0.964	0.017
Race (single race)		
White	0.950	0.012
Black or African American	0.989	0.033
Asian	0.893	0.051
American Indian and Alaska Native	0.945	0.186
Native Hawaiian and Other Pacific Islander	0.772	0.212
Some other race	0.803	0.049
Hispanic Origin		
Hispanic or Latino	0.968	0.035
Not Hispanic or Latino	0.940	0.011

4.2 Housing Characteristics

Table 3 displays the response ratios for selected physical and financial characteristics of housing. Note that the response ratio for total housing units is 0.955. Keep in mind that we conducted the test in 2003 so the estimates based on housing units built in 1990 or later would be considered relatively new housing units. We did not find differences in the response ratios based on housing unit tenure (owner/renter), or mortgage status. We detected a small significant difference when comparing the response ratios for 1-unit detached and 1-unit attached housing units (attached slightly lower). The response ratios based on the year that a structure was built were higher for people living in older units (those built before 1950) than persons living in newer homes (those built in 1970 to 1990 or later than 1990). This suggests that persons living in older units are more likely to be included in both voluntary and mandatory survey implementations.

Two of the topics in Table 3 describe the financial characteristics of the housing unit – bedrooms and gross rent. The response ratios for housing units with 2 or 3 bedrooms were significantly higher than those for housing units with no bedroom or 1 bedroom and for housing units with 4 or more bedrooms. The highest rent category ($750 or more) has a response ratio that is lower than the other two rent categories. These topics suggest that persons living in larger homes or rentals that are more expensive may be more at risk of being missed in a voluntary survey.

Table 3: Response Ratios – Housing Characteristics

Topic	Response Ratio (Voluntary to Mandatory)	Margin of Error of Response Ratio
Units in Structure		
Total housing units	**0.955**	**0.008**
1-unit, detached	0.958	0.012
1-unit, attached	0.924	0.030
2 to 9 units	0.953	0.027
10 or more units	0.961	0.025
Mobile home	0.956	0.051
Year structure built		
Total housing units	**0.955**	**0.008**
Later than 1990	0.939	0.023
1970 to 1990	0.942	0.015
1950 to 1970	0.961	0.016
Before 1950	0.984	0.020
Bedrooms		
Total housing units	**0.955**	**0.008**
No bedroom or 1 bedroom	0.925	0.024
2 to 3 bedrooms	0.968	0.010
4 or more bedrooms	0.935	0.020
Housing tenure		
Occupied housing units	**0.937**	**0.009**
Owner-occupied	0.943	0.011
Renter-occupied	0.926	0.018
Mortgage status		
Owner-occupied housing units	**0.943**	**0.011**
Housing units with a mortgage	0.934	0.013
Housing units without a mortgage	0.959	0.017
Gross rent		
Occupied units paying rent	**0.926**	**0.018**
No rent paid or rent less than $500	0.935	0.031
Rent $500 to $749	0.956	0.034
Rent $750 or more	0.897	0.024

4.3 Economic Characteristics

Table 4 summarizes the response ratios for a set of economic characteristics – employment status, occupation, income, and benefits. We did not find differences based on labor force status but unemployed persons had slightly lower response ratios than employed persons. Looking at occupation data showed consistently high response ratios across occupations. Persons in construction, extraction, maintenance, and repair occupations had significantly higher response ratios than those in both management, professional, and related occupations and sales and office occupations. The ratio of 0.991 for this occupation indicates that there were essentially no differences in the number of responses received reporting a construction, extraction, maintenance, or repair occupation in a voluntary and mandatory survey implementation.

The response ratios for income highlight that the households with the highest incomes ($200,000 or more) have significantly lower response ratios than households with all other levels of income. We found no important differences for households receiving specific benefits. Households receiving social security benefits had higher ratios than households receiving either retirement benefits or food stamps. This is another indication

that older respondents may be equally likely to cooperate with mandatory and voluntary surveys.

Table 4: Response Ratios – Economic Characteristics

Topic	Response Ratio (Voluntary to Mandatory)	Margin of Error of Response Ratio
Employment status		
Population 16 years and over	**0.942**	**0.010**
In labor force	0.944	0.012
In civilian labor force	0.945	0.012
Not in labor force	0.939	0.014
Employed	0.948	0.012
Unemployed	0.904	0.031
Occupation		
Civilian employed population 16 years and over	**0.948**	**0.012**
Management, professional, and related occupations	0.943	0.016
Service occupations	0.955	0.024
Sales and office occupations	0.927	0.020
Construction, extraction, maintenance, and repair occupations	0.991	0.034
Production, transportation, and material moving occupations	0.958	0.030
Income and benefits		
Total households	**0.937**	**0.009**
Less than $35,000	0.938	0.015
$35,000 to $99,999	0.939	0.014
$100,000 to $149,999	0.962	0.028
$150,000 to $199,999	0.969	0.050
$200,000 or more	0.779	0.047
With Social Security	0.962	0.015
With retirement income	0.912	0.018
With Food Stamp/SNAP benefits in past 12 months	0.892	0.035

4.4 Social Characteristics

Table 5 displays the response ratios for selected social characteristics of both households and persons. The household characteristics include household type, relationship, and marital status. Nonfamily households have significantly lower response ratios than both family households and family households with children. These ratios indicate that family households may be more receptive to completing both voluntary and mandatory surveys while nonfamily households may be more inclined to opt out of a voluntary survey. The only statistically significant differences across relationship categories were higher response ratios for other relatives (0.982) when compared with both householders (0.937) and spouses (0.941). The only marital status category found to be significantly different was widowed (higher ratio relative to both now married and never married). This is likely a consequence of high levels of participation by the oldest population groups in both voluntary and mandatory surveys.

The population with an associates, bachelors, or graduate degree had response ratios significantly lower than those of high school graduates. It appears that voluntary surveys may slightly under represent the more highly educated population. This population may take the additional time to read the survey letters and discern that the survey is optional.

Persons with some college, but no degree had ratios lower than all other groups (0.908). High school graduates had higher response ratios than persons with less than a 12th grade education.

Table 5: Response Ratios – Social Characteristics

Topic	Response Ratio (Voluntary to Mandatory)	Margin of Error of Response Ratio
Households by type		
Total households	**0.937**	**0.009**
Family households	0.944	0.011
Family households with own children under 18	0.948	0.017
Nonfamily households	0.923	0.017
Householder living alone	0.924	0.018
Relationship		
Population in households	**0.944**	**0.010**
Householder	0.937	0.009
Spouse	0.941	0.013
Child	0.949	0.016
Other relatives	0.982	0.037
Nonrelatives	0.941	0.037
Marital status		
Population 15 years and over	**0.942**	**0.008**
Never married	0.934	0.015
Now married, except separated	0.944	0.009
Separated	0.900	0.045
Widowed	0.986	0.022
Divorced	0.933	0.020
Educational attainment		
Population 25 years and over	**0.943**	**0.010**
Less than 12th grade, no diploma	0.936	0.020
High school graduate (includes equivalency)	0.987	0.014
Some college, no degree	0.908	0.016
Associates, bachelors, or graduate degree	0.929	0.013
Residence 1 year ago		
Population 1 year and over	**0.944**	**0.010**
Same house	0.963	0.010
Different house in the US	0.840	0.032
Different house - abroad	0.813	0.118
Place of birth		
Total population	**0.944**	**0.010**
Native born	0.945	0.011
Foreign born	0.938	0.028
Language spoken at home		
Population 5 years and over	**0.944**	**0.010**
English only	0.949	0.012
Language other than English	0.921	0.026
Language other than English and speak English less than "very well"	0.916	0.032
Spanish	0.951	0.037
Other Indo-European languages	0.898	0.048
Asian and Pacific Islander languages	0.864	0.057

While we found no differences by place of birth, we note important differences for mobility. The population living in the same house that they lived in 1 year ago had a significantly higher response ratio than the population who were living in a different house in the United States and the population who were living abroad a year ago. This suggests that a voluntary survey may be more likely than a mandatory survey to miss the more mobile populations.

Data on language spoken at home indicates no differences between the response ratios for the population speaking only English when compared with the population speaking a language other than English at home, the population speaking a language other than English with limited English proficiency, or the Spanish-speaking population. Despite the relatively large margins of error, the populations speaking an Asian or Pacific Islander language or an Indo-European language had significantly lower response ratios than population that only speaks English. Table 2 indicated lower response ratios for the Asian population; the lower response ratio for persons speaking an Asian or Pacific Islander language is consistent.

5. Conclusions

This research suggests that the additional nonresponse that occurs when a survey is voluntary may not be evenly distributed across demographic, economic, and social subgroups of the population. A voluntary survey may under represent the more highly educated, mobile, and wealthy population. This analysis does not find any evidence that the traditionally undercounted populations are especially at risk in a voluntary survey; rather, the results suggest that they are about equally likely to be included in voluntary and mandatory surveys.

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