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MEMORANDUM FOR ACS Research and Evaluation Advisory Group

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Subject: An examination of self-response for hard-to-interview groups
when offered an Internet reporting option for the American
Community Survey

Attached is the final American Community Survey Research and Evaluation report for “An examination of self-response for hard-to-interview groups when offered an Internet reporting option for the American Community Survey.” This report examines American Community Survey data from the first quarter of 2013, when the Internet response option was first offered. The purpose of this evaluation was to examine how adding the Internet reporting option affected the self-response levels for those demographic groups that have traditionally been more difficult to interview, such as younger adults, minority adults, households with young children and adults with little education.

If you have any questions about this report, please contact Elizabeth Nichols (301-763-1724), Rachel Horwitz (301-763-2834) or Jennifer Tancreto (301-763-4250).

Attachment

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An Examination of Self-Response for Hard-to-Interview Groups when Offered an Internet Reporting Option for the American Community Survey

FINAL REPORT

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Executive Summary

In 2013, the U.S. Census Bureau began offering American Community Survey (ACS) respondents the option of responding over the Internet, with the traditional paper form being mailed only to those who did not respond online. Prior to adding the Internet response option, the Census Bureau conducted two tests in 2011, which suggested that providing an online response option would slightly increase the overall self-response rate (that is, the rate of reporting by mail or Internet) and that many respondents would likely take the opportunity to respond through the Internet. This report examines ACS data from the first quarter of 2013 to assess how including the online response option affected the self-response for demographic groups that traditionally have been less likely to complete the ACS on their own and more likely to report in an interviewer-administered mode of ACS, compared with other demographic groups (Joshipura, 2008). These groups include younger adults, minority adults, households with young children, and adults with little education. The Pew Research Center (2013) found that younger adults had high Internet penetration, that is, more than 90 percent of people in that demographic group used the Internet. If higher Internet penetration is related to higher Internet self-reporting, then there may be an increase in overall levels of self-response for hard-to-interview groups with high Internet penetration, such as young adults.

Findings indicated that while groups of respondents with high Internet penetration were, as expected, more likely to respond via the Internet than other respondents, this did not necessarily result in an increase in their overall levels of self-response. In addition, self-response levels actually decreased for demographic groups with lower Internet penetration, even though households were still mailed the traditional paper survey form if they had not responded online.

Introduction

In 2013, the Census Bureau introduced an Internet reporting option as a means to collect self-reported data from households selected for the ACS. This change was largely motivated by a desire to reduce costs while maintaining data quality. Two years of ACS research preceded the inclusion of this new reporting option into the ACS data collection methodology. Research included testing different ways to notify the sample of the Internet reporting mode and analysis of self-response rates and missing data rates (Tancreto, *et al.*, 2012; Matthews, *et al.*, 2012; Nichols, *et al.*, 2013).

As part of this ACS research, Nichols *et al.* (2013) examined levels of self-response for ACS demographic groups with a history of low self-response. The research interest was to determine if adding the Internet as a reporting option was a motivator for these groups to self-report. Nichols *et al.* found some evidence suggesting that offering the Internet as a response option increased the self-response level among hard-to-interview groups with high Internet penetration

(that is, Internet usage rates). However, there was also evidence that self-response levels decreased when an Internet option was offered to groups with low Internet penetration, even though a paper form was mailed shortly after the initial invitation to complete the survey online. For these groups, perhaps the envelope containing the paper form was not opened (Nichols, 2012).

The findings from Nichols *et al.* (2013) were limited because the test data did not employ all of the standard nonresponse follow-up procedures that are in place to collect data for the production of ACS estimates. It is possible that those procedures would have boosted self-response among the groups.

The current study is a replication of that research using production data and all production procedures in place.

Background on the American Community Survey

The American Community Survey (ACS), conducted by the Census Bureau since 2005, is a mandatory monthly survey of American households. The ACS collects data to produce timely, detailed demographic, housing, social and economic statistics. Statistics are available each year for areas with populations greater than 65,000 and every five years for areas with lower population levels. The data have the same reliability as Census long-form data (U.S. Census Bureau, 2009) and are subject to similar measurement errors (U.S. Census Bureau, 2014). These data determine the distribution of various federal and state funds. Businesses and private individuals also use the data to plan investments and services, as well as study our changing population.

Prior to 2013, the Census Bureau collected data for each sampled ACS address within a three-month window (U.S. Census Bureau, 2009). In the first month, all sampled addresses received a paper form in the mail, followed by a second/replacement questionnaire mailing to nonrespondents about three weeks after the first mailing. Instructions in the mailings asked respondents to complete the form and mail it back to the Census Bureau. In the second month, the Census Bureau called the households for which there was a valid telephone number and no response on record, and an interviewer administered the ACS questions via Computer Assisted Telephone Interviewing (CATI). In the third month, the Census Bureau selected a subsample (about 1 in 3) of the remaining addresses with no ACS response. A field representative went to these addresses and conducted a Computer Assisted Personal Interview (CAPI). During the CATI/CAPI phases, mail forms were still accepted.

Beginning January 2013, sampled households first received an invitation to complete the survey via the Internet (with instructions in English and Spanish) and then received a paper questionnaire approximately two weeks later if they had not yet responded online. As in prior

years, CATI and CAPI nonresponse follow-up occurred in the second and third months, respectively, with acceptance of both mail forms and Internet responses during those months.

Prior to adding the Internet option to the ACS, the Census Bureau conducted two tests that investigated the most effective way to notify respondents of the Internet reporting option in order to maximize response and reduce cost. These tests included several experimental panels in which the paper form and the online reporting option were offered concurrently as well as other panels in which the reporting options were offered sequentially. In the sequential panels, the Internet option was offered to respondents first, followed by a paper form to those who did not respond online. The tests showed that a sequential notification shifted a large amount of self-response to online reporting, a faster and less expensive mode of data collection. The addition of the online reporting option with the sequential mailout strategy resulted in overall self-response rates either remaining unchanged or, in some areas, improving (Tancreto *et al.*, 2012; Matthews *et al.*, 2012; Nichols, 2012). None of the notification strategies tested showed signs of “mode paralysis;” that is, a reduction in response rates when offering more than one mode for self-reporting, as has been found in other studies (Millar and Dillman, 2011). For these reasons the sequential mailout strategy became the new ACS methodology in January 2013.

Background on the Current Research

The sequential mailout methodology has two main advantages. It accommodates those who do not use the Internet and it also allows people to respond via the Internet, which might be a preferred response mode for people who use the Internet frequently for other former paper-only tasks, such as paying bills (Groves *et al.*, 1979, Dillman and Tarnai, 1988, Couper, 2011). Researchers have long hypothesized that offering an opportunity to respond in a preferred mode may increase overall self-response (de Leeuw, 2005).

In this study, we investigate whether people with traditionally lower ACS self-response rates are more likely to respond by Internet or by paper and whether offering those two response modes sequentially affects their self-response levels. We focus our research on groups of people with traditionally lower self-response rates, which we refer to as “hard-to-interview” in this report. Motivating hard-to-interview groups to respond is one potential advantage of offering an Internet option as part of a mixed-mode design for the ACS, especially if some “hard-to-interview” groups prefer to report by Internet, and de Leeuw’s theory holds that preference affects self-response.

Research has shown that some groups of people are more likely to be interviewed in the CATI or CAPI phases or are more likely to be late responders in the self-administered mail phase of the ACS (Joshiyura, 2008; Diffendal, 2001). Many of these same groups are also less likely to self-report in a decennial census (Moul, 2002; Stern, 2003). These hard-to-interview groups include the following, among others: respondents without a high school diploma; African American or

Black respondents; Hispanic, Latino or Spanish respondents; young households (everyone younger than 30); households with a child under 5; households with at least one Spanish speaker; and renters.

Pew Research Center (2013) published Internet usage rates for demographic groups roughly corresponding to the first four hard-to-interview groups. Those usage rates were 59 percent for adults with less than high school education; 85 percent for adult Black/Non-Hispanic; 76 percent for adult Hispanic; and 98 percent for 18-29 years olds. Pew did not publish Internet usage rates for households with a child under 5, households with at least one Spanish speaker or renters, which are the other hard-to-interview groups we study in this report. However, we estimate that Internet usage ranged from 92 to 98 percent for households with a child under five years old (U.S. Census Bureau, 2013).

Older adults (65+) are not considered a hard-to-interview group. They generally have high self-response rates in the ACS (Joshipura, 2008). However, results from the prior ACS Internet testing research suggest that overall fewer older adults self-reported when the Internet option was included. We attribute this change to the lack of Internet penetration within that group, which was around 42 percent in 2012 (U.S. Census Bureau, 2012; Nichols *et al.*, 2012). Although the percent of older adults who used the Internet increased from the prior year, in 2013 it was still only 56 percent (Pew Center, 2013). For this reason, we include older adults in the current study.

Research Questions

Our research focused on whether adding Internet as the first mode in the ACS sequential multi-mode design affected self-response for these groups:

- respondents without a high school diploma;
- African American or Black respondents;
- Hispanic, Latino or Spanish respondents;
- young households (everyone younger than 30);
- households with a child under 5;
- households with at least one Spanish speaker;
- renters; and
- older adult (65+) respondents.

Based on the results suggested by the literature, we hypothesize that for the ACS:

- Groups with higher Internet penetration, such as younger adults and younger households, would be more likely to respond using the Internet than the paper form;
- Groups with lower Internet penetration, such as older adults and those without a high school degree would be more likely to respond using the paper form than the Internet;

- There would be no mode preference for groups with Internet penetration between 80 and 90 percent, which includes African American or Black respondents, Hispanic respondents, or for groups where we did not know the Internet usage rate, such as renters, and households with at least one Spanish speaker.
- The addition of the Internet option in the ACS methodology would increase the total level of self response for groups with higher Internet penetration rates, specifically young households and households with a child under 5;
- The addition of the Internet option in the ACS methodology would decrease the total level of self response for groups with lower Internet penetration, specifically older adults and those without a high school degree; and
- The addition of the Internet option in the ACS methodology would result in no change in the total level of self-response for groups with neither high nor low Internet penetration rates, specifically Black or Hispanic respondents, renters, or households with at least one Spanish speaker.

Research Design

The current study uses ACS data from the first three months of 2013. Because production data were used, they incorporate the standard CATI and CAPI follow-up procedures. Thus, the limitations of the Nichols *et al.* (2013) study are alleviated.

For some analyses, we compare these data to data from the first three months of 2011 and 2012.

Analysis Plan

We conducted two separate analyses using these data. The first analysis examined the mode choice of the hard-to-interview self-respondents. The second analysis examined whether offering an Internet mode before a paper mode affects the overall self-response levels of these hard-to-interview groups.

Mode Choice

For the first analysis, we used a logistic regression model to determine whether the hard-to-interview groups had a greater propensity to respond using the Internet compared to paper. We used all 353,255 mail and Internet self-respondents from the full three-month data collection period for the 2013 January, February, and March ACS monthly samples.

In the model, the outcome variable was mode choice (Internet/mail). The predictor variables represented the hard-to-interview groups, which we defined at the household level using characteristics of the entire household or of the respondent, assuming the respondent is “Person 1” on the Internet or paper survey (DeMaio and Bates, 1990; Hill *et al.*, 2008). Specifically, the predictor variables, which were all defined as bivariate variables, were renters; Hispanic

respondents; respondents without a high school degree; African American or Black respondents (either alone or in combination with another race); respondents 65 years old or older; households where everyone is under 30 years old; households with a child younger than five; and households with at least one Spanish-speaker. Additionally, we included household size as a predictor variable to control for any differences in self-response rates between modes by household size, as such differences were observed in the earlier ACS Internet tests (Matthews *et al.* 2012; Tancreto *et al.* 2012).

Approximately 10 percent of the households were missing some data to determine whether they were in a particular hard-to-interview group (for example, age of the respondent was not reported, but race was). We ran the model twice, first including those cases with missing data and then excluding them. The model results did not differ substantively whether we included or excluded those cases. We present results with those cases excluded.

The software used for the regression analysis was the SAS® software's proc surveylogistic with a varmethod of balanced repeated replication (BRR) and a Fay adjustment of 0.5 (SAS Institute Inc., 2012). The significance level reported is any difference at an alpha of 0.05 or lower.

Self-Response Proportions of Hard-to-Interview Populations

For the second analysis, we used data from the full three-month data collection period for the January, February, and March monthly samples in 2012 and 2013. We computed the percent of self-respondents among each hard-to-interview group for each year using the following formula:

$$\text{Hard-to-Interview self-response proportion} = (\text{Mail and Internet hard-to-interview respondents} / (\text{All respondents} = \text{Mail and Internet hard-to-interview respondents, CATI hard-to-interview respondents} + \text{CAPI hard-to-interview respondents})) * 100$$

For each hard-to-interview group, we compared the self-response proportions for 2012 to 2013 to determine if there was a change in proportion when the Internet mode was added.

Because there is year-to-year variation in self-response proportions when there are no operational changes to the ACS, we also compared the self-response proportions 2012 to 2011 to identify a baseline year-to-year difference. Only the paper form was available for self-responders in these years.

Although the hard-to-interview groups varied in size, all the groups had more than 30,000 but less than 150,000 self-responders in the first quarter of 2011, 2012 and 2013. Due to these large sample sizes, most differences were significant. We only discuss differences greater than one percentage point in this report.

Results

Mode Choice

The odds ratios in Table 1, ordered by likelihood of responding by Internet, show the odds of responding by Internet compared to paper for each defined hard-to-interview group.

Table 1: Odds Ratio of ACS self-reporting by Internet using first quarter 2013 data

Group	Odds Ratio of Internet response (standard error)
Households where everyone is under 30 years old	1.64 (0.02)*
Households with a child under five years old	1.02 (0.01)
Hispanic respondent	1.02 (0.02)
Households with a Spanish speaker	0.94 (0.03)*
Renter	0.84 (0.01)*
Black respondent	0.68 (0.01)*
Respondent over 65 years old	0.41 (0.01)*
Respondent without a high school diploma	0.24 (0.02)*

Source: First quarter 2013 American Community Survey Self-Responses

*Significant at the $\alpha = 0.05$ level

R-square=0.9541

Households with all members under age 30 were *more likely to respond by Internet* than by paper. This group also had the highest Internet penetration rate. Households with a respondent over 65 and respondents without a high school diploma were *more likely to respond by paper* than on the Internet. These were the two groups with the lowest Internet penetration rates. Rented housing units, Black respondents, and households with a Spanish speaker were also more likely to respond by paper compared to the Internet, and households with a Hispanic respondent and households with a child under age five were no more likely to respond by either mode.

These results show that choice of response mode and Internet penetration are related for some groups, particularly for households with everyone under age 30, respondents over 65 years old, and respondents without a high school diploma. We expected households with a child under age five to be more likely to respond by Internet due to estimated higher Internet penetration among that group. However, the variable for having children under five years old had a collinear relationship with household size, which was also included in the model. We reran the model excluding household size, and households with a child under age five were significantly more likely to respond by Internet than paper (odds ratio of 1.22 (0.01)).

Use of the Internet to complete the survey by Black respondents seemed relatively low when considering their penetration rate of 85 percent (Pew Research Center, 2013). In 2013, Hispanics' Internet penetration rate was 76 percent, but they did not show the same paper mode preference that Blacks did.

Self-Response Proportions

Responding via Internet is one measure of the effectiveness of the option. Another is whether the addition of this option increases the proportion of the universe that provides a self-response. Results in Table 2 show the difference in the proportions of self-respondents between the first quarter of 2012 and the first quarter of 2013 for each hard-to-interview group. Positive differences indicate that the addition of the Internet reporting option increased the self-response percent for that group while negative differences indicate that the addition of the Internet reporting option decreased the self-response percent for that group.

Table 2: Differences in ACS self-response proportion between the first quarter of 2012 and the first quarter of 2013 and the first quarter of 2011 and the first quarter of 2012 by hard-to-interview group

Group	Baseline Q1 2012 – Q1 2011 (standard error)	Effect of sequential Internet offer Q1 2013 – Q1 2012 (standard error)
Households with a child under five years old	1.06 (0.42)*	4.15 (0.35)*
Hispanic respondent	0.95 (0.35)*	1.71 (0.33)*
Households where everyone is under 30 years old	0.46 (0.49)	0.97 (0.43)
Renter	0.58 (0.24)	0.03 (0.22)
Households with a Spanish speaker	1.09 (0.36)*	0.12 (0.31)
Black respondent	1.58 (0.32)*	-0.78 (0.33)*
Respondent over 65	0.22 (0.26)	-3.10 (0.24)*
Respondent without a high school diploma	0.52 (0.39)	-7.54 (0.32)*

Source: First quarter 2013 American Community Survey (ACS) Self-Responses, First quarter 2012 ACS Self-Responses, and First quarter 2011 ACS Self-Responses

*Significant at the $\alpha = 0.05$ level

As we expected, due to their high Internet penetration rates, households with a child under five had a significantly higher self-response proportion (by 4.15 percentage points) when Internet was

offered as a response mode. However, we did not see a significant difference in self-response proportions for young households, which were more likely to complete the ACS using the Internet as shown in Table 1. These results partially support our hypothesis of higher self-response for groups with high Internet penetration.

Table 2 also shows that Hispanic respondents had a significantly higher self-response proportion with the addition of the Internet reporting option, which did not support our hypothesis. However, there was significant year-to-year variation in that group's self-response between the first quarter of 2012 and the first quarter of 2011 when there were no changes in methodology. Thus, more data are needed to draw a conclusion on this group.

We did not see a significant difference in the self-response proportions for renters or for households with a Spanish speaker, supporting our hypothesis regarding these groups.

Households with a respondent over 65 years old and households with a respondent without a high school diploma had significantly lower self-response proportions (by 3.10 and 7.54 percentage points, respectively) when Internet was offered as a first response mode compared to when only a paper form was offered. These results support our hypothesis of lower self-response for groups with low Internet penetration. We also found reduced self-response proportions for households with a Black respondent but by less than 1 percentage point. This group, too, had significant variability between 2011 and 2012; thus, more data are needed to draw a conclusion on this group.

Although we found lower self-response proportions for households with older and less-educated respondents, overall response rates for these groups (following CATI and CAPI follow-up) had less than a 1 percentage point difference between the first quarters of 2012 and 2013. Therefore, while fewer of the households with these demographics responded in the self-response phase, we did not have fewer overall respondents in these groups.

Discussion

Our hypotheses that Internet penetration rates affected mode choice and self-response rates for these groups were partially confirmed. For groups with very high Internet penetration rates -- younger adults and households with a child under five -- we found that both of these groups were significantly more likely to respond by Internet, but only households with a child under five also saw a significant increase in self-response. For young adults without young children, the Internet option only changed the response mode, as opposed to increasing their self-response proportion.

For groups with low Internet penetration rates -- older adults and respondents without a high school diploma -- we found both groups were significantly more likely to respond by paper, and both groups showed a decreased proportion of self-response. We speculate that the decreased

proportion of self-response was due in part to the lack of Internet penetration in these groups, and if they did not open the second mailing they would not know we offered a paper form option. As the younger generation ages, the self-response discrepancy for the older adult group may decrease. Additionally, Internet penetration will likely continue to increase, so we may see this self-response discrepancy decrease in the future.

Contrary to our expectations, we also found that households with a Black respondent were slightly less likely to self-report when the Internet option was offered, in spite of their Internet penetration rate of 85 percent. There are two possible causes for this difference. There was significant year-to-year variability in the self-response proportions for this group when there was no change in the methodology and the Internet penetration rates cited here include “access to the Internet,” not necessarily having Internet at home, which might explain why the relationship between self-responding and Internet access is not always consistent.

The Internet penetration rates for Hispanics (including Spanish and non-Spanish speakers) fall in the middle of these hard-to-interview groups at 76 percent. When the Internet was offered as the first response mode there was a higher self-response proportion for Hispanics, but we could not rule out year-to-year variability. There was no difference in self-response proportions for households with a Spanish speaker. Hispanics were no more likely to use the Internet than a paper form to respond.

We did not find data on the Internet penetration rates for renters. Even though they were more likely than non-renters to use the paper form, their preference did not affect their self-response rate.

Although we did find differences in the rate of self-response across many of the hard-to-interview groups when the Internet was offered compared to when only the paper form was available, Table 2 shows significant variability between the 2011 and 2012 estimates for four of the groups. This suggests that self-response is not consistent year to year, even when there are no operational changes to the survey. In addition to the year-to-year variability, there is also variability in self-response proportions due to calendar differences that may affect the timing of the mailings, and thus the response period. We would need more months of data to be certain of the variability of these estimates.

These results are fairly consistent with another study which used the first six months of 2013 ACS data (Baumgardner, *et al.*, 2014). That study looked at geographic variability in ACS self-response when the Internet was added compared to 2012. Nationally, they found an increase in the self-response rate of 1 percentage point between 2012 and 2013. They also found that self-response increased in some states and population groups, but decreased in others. However, they did not control for yearly variation in their assessment.

The results of our study have implications for other data collection efforts that survey older adults or less educated adults. For these groups, a paper-only design or a concurrent notification strategy offering the paper at the same time as the online reporting option might be better at maximizing self-response. Otherwise, nonresponse follow-up or increased communication about the availability of the paper form for self-response should be considered when implementing an Internet-first reporting option with these groups.

For the groups we studied, we saw very little support for the theory that offering a preferred mode increases self-response. Households with a child under five were the only group among those more likely to respond by Internet whose self-response proportion increased when given the opportunity to respond online. Households comprised of young adults were also more likely to respond using the Internet, but had no corresponding increase in self-response. This finding suggests that for these groups, the mode choice simply shifts how they respond.

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