Socio-Demographic Study of Telephone Survey Nonrespondents

Timothy Triplett, Natalie Abi-Habib

Urban Institute
2100 M Street, NW, Washington DC
ttriplet@ui.urban.org, nabihabi@ui.urban.org

Introduction

Response rates for telephone surveys in the United States are declining (Curtin et al., 2005; Steeh et al., 2001). The impact of nonresponse on estimates derived from a telephone survey depends on the extent to which nonrespondents differ from respondents on survey items of interest. Whether survey estimates are unbiased depends on the assumption that nonrespondents are missing at random (MAR). When nonrespondents differ from respondents the MAR assumption does not hold and nonresponse error may be present in some of the survey estimates.

Little empirical evidence exists to evaluate the MAR assumption because any information about nonrespondents must come from administrative records or other auxiliary sources. The current research compares respondents and nonrespondents from the Urban Institute's 2002 National Survey of America's Families (NSAF). Auxiliary information about nonrespondents comes from 2000 census block group level data. A *census block* is the smallest geographical area for which census data are collected. A clustering of blocks forms the geographically larger *census block group* and at the next level several block groups combine to form a *census tract*. The Census Bureau's goal is for each block group to contain 400 housing units, however block groups generally vary in size between 250 and 550 housing units. For confidentiality reasons census data is available publicly at the block group level [1].

Linking census block group data to the NSAF allows comparisons of block group characteristics of respondents to those of nonrespondents. For this research, neighborhood classifications are defined as being above or below the national averages of a set of characteristics. For example a neighborhood that has a Hispanic population above the national average of 12.5% is characterized as a Hispanic neighborhood. Learning the extent to which nonrespondents' neighborhood characteristics differ from those of respondents sheds light on the appropriateness of the assumption that nonrespondents are missing at random and the presence of nonresponse bias in the sample.

Data Sources

The 2002 NSAF survey has a dual-frame design (a large random-digit-dial of telephone households and small area sample of non-telephone households), features an over sample of low-income households with children, and is representative of the nation and of 13 states. The questionnaire consists of a short screening interview used to determine household eligibility and a longer extended interview, which gathers detailed information on the characteristics of sampled household members. The extended interview collects data about one or two sampled children, their parents or guardians as well as a randomly sampled childless adult if present in a subset of households (Abi-Habib et al., 2004). NSAF uses standard survey methods to reduce nonresponse, such as multiple contact attempts, refusal conversion, monetary incentives and an extended field period. Westat conducted the interviews from a random-digit-dial (RDD) sample of 556,651 telephone numbers. This research uses data from only the RDD sample.

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1 United States Census Bureau. 2003. *2000 Geographic Terms and Concepts*.

The census block group data comes from both the census 2000 long and short form questionnaires. The data collected on the long form is available at the block group level, the smallest geographical level released publicly for confidentiality reasons. The long form is administered to 1-in-6 census households and collects data at both the household and person levels. The short form questionnaire collects information about gender, race, and age while the long form collects data about living arrangements, disability, personal and household income, educational enrollment, and other topics[2].

Research Plan

The current research seeks to explore differences between respondents and nonrespondents to the 2002 NSAF by linking to data from the 2000 Census at the block group level. Census block group is identified for each NSAF household (respondent and nonrespondent households) using reverse directory call back services. These services identify a household's address through its telephone number. Of the initial NSAF telephone sample of over half a million telephone numbers, 214,181 were identified as residential. Of these residential telephone numbers 75.7% (or 162,157) were matched to an address using reverse directory call back services and subsequently matched to the census block group in which the address is found. Future research may explore the remaining households by matching them to census data at the zip code level[3]. However the current research only examines nonresponse in the block group matched NSAF households.

Once matched to Census data, NSAF respondent and nonrespondent households were characterized as being located in block groups above or below the national average on the indicators below:

- Racial composition
- Linguistic isolation, foreign born and US citizenship
- Poverty rate
- Receipt of public assistance
- Education
- Urbanization indicator
- Employment
- Time spent living in neighborhood
- Home ownership

Neighborhood characteristics are explored for respondents and nonrespondents at the screener interview and extended interview levels. Nonrespondents at both levels are broken down into *refusals* and *other nonresponse* categories. The latter category includes passive refusals and also households that did not respondent because they were difficult to contact. Households selected for the extended interview are a subset of those who completed the screener interview. Criteria for selection into the extended interview sample include the presence of at least one householder under the age of 65, the presence of at least one child under the age of 17 and family income below 200% of the federal poverty line. Due to these sampling criteria analysis of nonresponse at the extended interview is less comparable to other national telephone surveys of the general population than analysis of nonresponse at the screener level.

Comparison of Screener Respondents versus Nonrespondents

Most telephone nonresponse occurs before the first question of a survey is even asked. Similar to other national telephone surveys the NSAF also experiences its highest rates of nonresponse when attempting to

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2 U.S. Census Bureau, 2000 Census of Population and Housing, Summary File 3: Technical Documentation

3 Using telephone exchange information the most populace zip code within an exchange could be assigned to each household then either use zip code level census data or assign the most populace block group within that zip code.

complete the screener survey. Table 1 shows the variation in household screener completion, refusal, and other nonresponse rates by neighborhood type. The above average and below average sub-columns indicate the rate of survey response, refusal or other nonresponse for each neighborhood characteristic. Given the large sample size small differences found in this table are significant.

Table 1. Household Screener Response, Refusal and Other Nonresponse Rates by Neighborhood Characteristics

Neighborhood Characteristics	Screener Completes Overall Rate= 65.9% (n = 106,804)		Screener Refusals Overall Rate=26.6% (n = 43,134)		Screener Other Nonresponse Overall Rate = 7.5% (n = 12,219)	
	Above Average	Below Average	Above Average	Below Average	Above Average	Below Average
Urban	64.4%	70.3%	27.3%	24.6%	8.4%	5.1%
Rural	70.3	64.6	24.9	27.1	4.9	8.3
White	65.9	65.8	27.3	24.9	6.9	9.3
Black	66.0	65.8	25.5	26.9	8.5	7.3
Asian	62.3	67.0	27.6	26.3	10.1	6.7
Other Race	66.2	65.8	24.5	26.9	9.3	7.3
Hispanic	64.5	66.2	25.8	26.8	9.7	7.0
Spanish language isolation	64.4	66.2	25.9	26.7	9.7	7.1
Asian language isolation	62.6	66.7	27.3	26.4	10.2	6.9
Linguistically Isolated: Any Language	62.6	66.8	26.7	26.6	10.7	6.6
Foreign Born	61.3	67.6	27.9	26.1	10.8	6.3
Non-Citizen	61.8	67.2	27.2	26.4	11.0	6.4
Same house in 1995	66.2	65.4	26.9	26.2	6.9	8.4
Different house in 1995	65.1	66.4	26.5	26.7	8.4	6.9
High school degree only	67.7	64.5	25.9	27.2	6.5	8.3
College degree or higher	62.9	68.0	28.7	25.1	8.4	6.9
Employed – all	65.1	66.5	27.3	26.0	7.6	7.5
Employed – females	65.4	66.2	27.0	26.3	7.6	7.5
HH receives public assistance	66.7	65.8	24.4	26.8	8.9	7.4
Less than 50% of FPL	66.5	65.6	25.1	27.2	8.4	7.2
Less than 100% of FPL	67.2	65.3	24.8	27.4	8.1	7.3
Less than 200% of FPL	68.0	64.8	24.4	27.8	7.6	7.48
Owner occupied	66.6	64.7	27.0	25.9	6.5	9.4
Renter occupied	64.3	66.7	26.2	26.8	9.5	6.5

Rural neighborhoods tend to have higher household screener completion rates than urban neighborhoods, although the reason appears to be the result of having a lower other nonresponse rate. Over half of the 5.7 percentage point increase in the rural completion rate can be accounted for by the 3.4 percentage point decrease in the other nonresponse rate. Maybe more telling is that the other nonresponse rate for urban neighborhoods is almost twice as high as it is in rural neighborhoods. This implies that nonresponse in urban neighborhoods is not only a problem of high refusal rates but of making contact with respondents.

Surprisingly there is no difference in screener completion rates between White and Black neighborhoods. This is surprising given that NSAF weighting adjustments give greater weights to black non-Hispanics. This anomaly could mean that by increasing the share of black non-Hispanics through post stratification there becomes a slight over representation of black respondents living in black neighborhoods. This potential problem is similar to the 1997 NSAF nonresponse analysis (Groves and Wissoker, 1999) where there was some evidence that by treating black respondents and nonrespondents the same the weight may have overstated the number of black low-income households. Though this potential problem was investigated the report did not find evidence that this in fact occurred. While completion rates are roughly the same in Black and White neighborhoods the source of nonresponse varied as White neighborhoods had a higher refusal rate while Black neighborhoods suffered from a higher other nonresponse rate. This indicates that potential respondents in Black neighborhoods are more difficult to reach but once reached they can be more cooperative.

Both Asian and Hispanic neighborhoods had lower completion rates than White and Black neighborhoods. These differences may be explained by the low completion rates found in neighborhoods with high levels of linguistically isolated households and by the low completion rates of neighborhoods with above average numbers of foreign-born and non-citizen residents. In fact the screener completion, refusal and other nonresponse rates of Hispanic and Asian neighborhoods are mirrored by the language isolation measures for those groups. The screener completion rate in Spanish language linguistically isolated neighborhoods is higher than in Asian language linguistically isolated neighborhoods but may be attributable to the availability of a Spanish language translation of the NSAF survey. The NSAF is available in English and Spanish only. Presumably households that are linguistically isolated in a language other than Spanish would be unable to respond or even to refuse the survey request, explaining the higher other nonresponse rate and lower refusal rate of Asian language linguistically isolated neighborhoods.

Transient households, those that had moved to the current neighborhood in the last 5 years, did not differ much in their willingness to complete the NSAF screener than more established households. However, neighborhoods with above average numbers of transient household had a higher other nonresponse rate than neighborhoods where people had lived for more than 5 years. Here the small finding is fairly intuitive, since often more transient respondents are thought to be more difficult to contact and interview. While this research supports the notion that nonresponse increases in transient neighborhoods, the difference of 1.1 percentage points is modest.

Education tended to have a negative impact on response rates. The data show that screener completion rates in less educated neighborhoods, where respondents tended to have only a high school degree or equivalent, are nearly 5 percentage points higher than in neighborhoods with above average numbers of college graduates. Highly educated respondents tend to not only refuse the survey request at a higher rate than less educated respondents but are also more difficult to contact as evidenced by their higher refusal and other nonresponse rates.

Neighborhoods with higher overall employment and higher female employment had only slightly lower screener completion rates than the overall average for the survey. This is a positive finding given that previous NSAF nonresponse analysis (Black and Safir, 2000; Triplett et al., 2002) found that employment negatively impacted response rates. Both the long field period (9 months) and the selection of any adult to complete the screener probably offset the difficulty that most national telephone surveys experience in attempting to reach employed respondents.

Neighborhoods with more than the national average number of households receiving public assistance as well as poor neighborhoods had slightly higher completion rates than the overall average screener completion rate for the survey. This finding seems somewhat counterintuitive however; there may be topic interest effect among poorer households that increases their propensity to respond to the NSAF. Research has demonstrated that respondent interest the topic of a survey can affect survey participation decisions (Groves et al., 2004).

Finally, neighborhoods that have a high concentration of homeowners tend to have higher screener completion rates than high rental occupancy neighborhoods. This difference may be explained by the higher other nonresponse rate in homeowner neighborhoods and indicate that renters are more difficult to contact. This finding is similar to the trend seen among respondents in transient neighborhoods where home rental rather than home ownership is likely to be more common.

Comparison of Extended Interview Respondents versus Nonrespondents

The households that completed an extended interview are a subset of the households that completed the screener interview. The research on extended interview nonresponse on the NSAF is less comparable to other household surveys since not all-high income and childless households are asked to complete an extended interview. In addition, the respondent was often the most knowledgeable adult for a child in the household. However, the findings in this section should be useful for those studies collecting data on children or low-income populations.

Table 2 shows variation in response rates by neighborhood characteristics at the extended interview level. As before the above and below average columns indicate the rates of response, refusal or other nonresponse to the extended interview by neighborhood type. The sample sizes are still large so that again even the small differences found in this table are significant.

Table 2. Household Extended Response, Refusal and Other Nonresponse Rates by Neighborhood Characteristics

Neighborhood Characteristics	Extended Completes Overall Rate= 84.3% (n=33,919)		Extended Refusals Overall Rate=10.4% (n = 4,179)		Extended Other Nonresponse Overall Rate = 5.3% (n = 2,137)	
	Above Average	Below Average	Above Average	Below Average	Above Average	Below Average
Urban	83.4%	86.6%	10.6%	9.7%	6.0%	3.7%
Rural	86.9	83.4	9.7	10.6	3.5	6.0
White	85.4	81.9	10.4	10.4	4.2	7.7
Black	82.2	84.9	10.9	10.2	6.9	4.9
Asian	82.1	85.0	10.9	10.2	7.0	4.8
Other Race	82.3	84.7	9.0	10.6	8.8	4.7
Hispanic	82.4	84.8	9.3	10.7	8.3	4.5
Spanish language isolation	82.3	84.8	9.3	10.7	8.5	4.6
Asian language isolation	82.3	84.8	10.2	10.4	7.5	4.8
Linguistically Isolated: Any Language	81.7	85.1	9.8	10.6	8.5	4.4
Foreign Born	80.8	85.6	10.7	10.3	8.6	4.2
Non-Citizen	81.1	85.3	10.3	10.4	8.6	4.3
Same house in 1995	84.1	84.5	11.0	9.6	4.9	5.9
Different house in 1995	84.6	84.1	9.6	11.0	5.9	4.9
High school degree only	85.1	83.7	10.2	10.5	4.7	5.8
College degree or higher	83.6	84.7	11.5	9.8	4.9	5.5
Employed – all	84.8	83.9	10.6	10.2	4.5	5.9
Employed – females	85.0	83.7	10.4	10.4	4.6	5.9

HH receives public assistance	84.0	84.3	9.0	10.5	7.0	5.2
Less than 50% of FPL	83.8	84.5	9.5	10.8	6.7	4.7
Less than 100% of FPL	84.1	84.4	9.5	10.8	6.4	4.8
Less than 200% of FPL	84.5	84.1	9.3	11.1	6.2	4.7
Owner occupied	84.9	83.3	10.7	10.0	4.4	6.8
Renter occupied	83.2	84.9	10.0	10.6	6.9	4.5

A comparison of the screener and extended response and nonresponse rates shows that completion rates are much higher for the extended interview even though the extended interview often takes more than 45 minutes to complete. This is evidence that length of the questionnaire has little impact on response rate. Additionally, other nonresponse makes up over half of the overall extended nonresponse but only 28% of the overall screener nonresponse. This is likely a result of the added difficulty of scheduling a long interview with a chosen respondent whereas the screener interview was completed by any householder 18 years of age or older.

While differences in the extended completion rate by neighborhood characteristics were generally smaller than the differences found at the screener level, they tend to follow the same patterns as the screener interview completion rates. There were a few exceptions such a decline in the completion rates of Black neighborhoods and very poor neighborhoods (below 50% of Federal Poverty Level). However, neighborhoods with high employment rates maintained response rates above the overall rate for the survey while at the screener level the opposite is true. This finding may be attributable to the NSAF data collection design of administering the survey to the adult in the family who is most knowledgeable about the sampled child(ren). This adult also provides information about him or herself and any spouse or partner in the household, thereby relieving the need for scheduling time to administer the survey to the spouse or partner.

Regression Analysis

In our descriptive analysis of neighborhood characteristics most of the findings have shown that some relationship between the neighbor type and the propensity to responds exists. To further the research a regression model is used to answer the question “Does not knowing the percentage of neighbor that has a certain characteristic help us predict a household’s likelihood of participating. The result of this model is shown in Table 3 at the top next page.

The results indicate that knowing any of the block group characteristics used in this model would provide some insight in predicting nonresponse. These results still show that rural areas predict higher response but the factor seems smaller when compared with some of the other predictors of higher response (below poverty, owner occupancy, and receipt of public assistance). The reason households located in rural areas are more likely to respond may have more to do with characteristics about rural areas rather than the household simply being located in a rural area. The only real surprise is that the sign of the high school only coefficient is the opposite of what one would have guessed based on the descriptive analysis. In this model having a greater percentage of either more college graduates or more high school only respondents predicts lower response rates. Finally, the descriptive analysis did not find much association between being Black or employed. The regression confirms this in that these two characteristics have only slight predictive powers.

Table 3. Linear Regression

	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	95% Confidence Interval for B	
	B	Std. Error	Beta			Lower Bound	Upper Bound
(Constant)	.567	.016		34.758	.000	.535	.598
Black	-.034	.007	-.012	-4.670	.000	-.049	-.020
Rural	.044	.004	.028	11.493	.000	.036	.051
Hispanic	-.115	.015	-.034	-7.587	.000	-.144	-.085
Different house in 1995	.058	.010	.015	5.615	.000	.038	.079
Less than 100% of FPL	.124	.020	.023	6.247	.000	.085	.163
Other Race	.151	.030	.022	5.022	.000	.092	.211
Owner occupied	.098	.007	.043	13.193	.000	.083	.112
High school degree only	-.123	.022	-.022	-5.594	.000	-.166	-.080
HH receives public assistance	.299	.110	.008	2.725	.006	.084	.513
College degree or higher	-.212	.014	-.066	-15.171	.000	-.239	-.185
Employed - all	.053	.012	.011	4.280	.000	.029	.077

Dependent Variable: Screener Disposition (0=nonrespondent, 1=respondent)
Independent Variables: Percentage of block with that that characteristic (values 0 to 100)

Summary & Conclusions

Most of the findings only show modest differences in completion rates by neighborhood type. However, even differences of a couple percentage points could introduce enough bias into some survey estimates so as to affect the overall findings. In addition, the differences in completion rates by neighborhood characteristics are probably somewhat conservative in that the households that were not matched to block group data are probably more transient and therefore would tend to not respond to the survey.

Some of the potential bias associated with different response by neighborhood type is dealt with by the under coverage and post stratification weights (Bethlehem, 2002) developed for the NSAF. The NSAF methods and response rate evaluation (Brick et al., 2003) report did some evaluation of the potential bias owing to nonresponse. However, this report was fairly vague as to the degree of how much increasing nonresponse rates are biasing survey estimates. This paper goes one step further in that it identifies types of neighborhoods that have differing response propensity (rural, Asian, Hispanic educated, owner occupancy rates). A natural next step would be to look at the completed cases block group characteristics using the survey weights. Unfortunately, for the screener where most nonresponse occurs post-stratification information is unavailable However, post-stratification is not as effective if the nonrespondents differ from respondents which does appear at least partially true.

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