

CHARACTERISTICS OF NONTELEPHONE HOUSEHOLDS: A SUPPLEMENTAL SURVEY TO TWO TRAVEL-RELATED SURVEYS

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Abstract

The Bureau of Transportation Statistics (BTS) co-sponsored two national random digit dial (RDD) telephone surveys during the summer of 2002. Stakeholders expressed concern about the potential bias in travel-related behavior estimates because the sample designs of these surveys excluded the four percent of nontelephone (non land line) households. Nontelephone households may have different travel-related behaviors compared to telephone households. BTS responded to this concern by conducting a Supplemental Survey designed to investigate possible differences. This paper documents the process of identifying a sample of nontelephone households, conducting the survey, and the difficulties related to fielding the survey. Some initial findings from the survey are presented.

Keywords: Nontelephone Households, Coverage Bias, Mail Survey, Recontact

Background

The purpose of the BTS Supplemental Survey was to collect data in a very short time period from nontelephone households to augment ongoing data collection projects. BTS co-sponsored two surveys that used telephone number based samples. RDD telephone samples typically exclude households that have no land line telephone service and most cell phone exchanges. This exclusion is considered sample frame bias (coverage bias). Even though estimates from BTS surveys attempt to account for this bias through post-stratification of weights, stakeholders were concerned that nontelephone households differed from telephone households on travel-related behavior. BTS RDD surveys would not capture differences in travel behavior between telephone and nontelephone households.

About four percent of U.S. households¹ do not have telephone service. These nontelephone households are of three types:

- No telephone service at all,
- Temporary, interrupted telephone service, or
- Cell phone only households.

BTS was interested in collecting data from households who had no telephone. Collecting data from nontelephone households to supplement data collected via RDD sampling methods would help BTS assess the statistics from existing surveys and hopefully improve the reliability of those statistics.

Nontelephone Household Differences

Differences between households with and without conventional telephone service are well documented in the survey research

literature (Thornberry and Massey 1988; Keeter 1995; Giesbrecht, et al. 1996). In general, nontelephone households are more likely to:

- Be in the South,
- Lower income or unemployed,
- Non-white,
- Single parent or single male,
- Have recently moved, and
- Have young children (0-3 years old).

There is little research on whether there are any differences in travel-related behavior comparing nontelephone to telephone households.

Overview of Recent BTS RDD Surveys

The two RDD surveys sponsored by BTS during the summer of 2002 were the:

- 2002 National Survey of Pedestrian and Bicyclist Attitudes and Behaviors (Bike/Ped Survey), and
- 2002 National Transportation Availability and Use Survey (Disability Survey).

The Bike/Ped Survey was designed to collect general information on bicycling and walking. The main objectives of the survey were to collect information on:

- The scope and magnitude of bicycle and pedestrian activity,
- Origin and destination and trip purpose,
- Respondents' attitudes and opinions on bicycling and walking, and
- Respondents' pedestrian and bicycle safety practices.

Telephone interviews were conducted with 9,616 persons 16 years or older between June 11 and August 20, 2002. The overall unweighted CASRO response rate for the survey was 27 percent. The results of the survey are only applicable to the 2002 summer season (summer defined as May through August).

The Disability Survey was initiated because of the President's 2000 "New Freedom Initiative" that included an objective to expand transportation options for persons with disabilities. In response, BTS planned a national survey to collect data about how persons with disabilities (PWDs) use transportation, what barriers they face, and their overall satisfaction with the transportation system. The objectives of the survey were to:

- Benchmark PWD transportation experiences,
- Provide comparison data between PWD and persons without disabilities relative to their transportation experiences, and

¹ December 2002 Current Population Survey.

- Provide data on use of adaptive equipment.

The survey was fielded from July 12 to September 29, 2002 using telephone interviewing. The goal was to complete equal numbers of interviews with disabled and non-disabled persons. The actual number of completed interviews was 2,321 persons with disabilities and 2,698 non-disabled persons for a total of 5,019. Proxy respondents were used for those persons who could not respond for themselves or who were less than 18 years of age. The overall unweighted CASRO response rate for the survey was 56 percent.

BTS Supplemental Survey Design

BTS identified the need for the Supplemental Survey in February 2002. The survey had to be planned, designed, sample procured, and contract awarded in a very short time period. BTS wanted the Supplemental Survey to be fielded during the same time period as the other RDD surveys so that comparison of statistics between surveys would not be complicated by different data collection periods.

Identifying Nontelephone Household Sample Frame - BTS undertook market research to identify potential sources of a probability sample of nontelephone households for the Supplemental Survey.

The first phase of the market research eliminated all federally funded surveys that included nontelephone households because of confidentiality issues related to restricted access. BTS had only four months to procure a sample of nontelephone households, and this expedited schedule hindered our ability to effectively plan and work out the confidentiality issues to use a Federal agency's sample.

The second phase identified privately funded surveys (which would not have restricted access) that included nontelephone households. Four privately funded surveys were identified. However, before using any sample of nontelephone households, BTS set three conditions that had to be met. The sample had to:

- Use probability methods of selection, down to the final unit of analysis (household or person),
- Use random methods of selection, and
- Be no more than 2 years old.

These conditions would ensure that reliable data were collected, inferences could be made from the data, and the sample frame would be relatively complete, thus reducing the level of noncontact.

Four private surveys having samples of nontelephone households were assessed on how they met the three conditions. The Gallup Organization and RoperASW "Omnibus Survey" samples did not meet these conditions. They were either too old or did not use random selection methods down to the level of the unit of analysis.

The Urban Institute's National Survey of American Families (NSAF) and Mediamark Research's (MRI) Survey of American Consumers (SAC) met these conditions. The sponsors of these two surveys were contacted about access to their samples of

nontelephone households. The Urban Institute declined access to their sample. However, MRI indicated a willingness to allow BTS access to their sample under the condition they conduct the survey for BTS. BTS entered into a sole source contract with MRI for access to their nontelephone household sample and to conduct the survey.

Sample Design of Supplemental Survey - The Supplemental Survey relies on the sample design of the SAC. SAC collects information from 25,000 adults twice per year on various commercial product preferences and buying habits. SAC uses a commercial file of listed residential telephone numbers augmented by other sources of household information, but excludes telephone numbers from Hawaii and Alaska. The sample frame has more than 90 million listings. SAC's sample design consists of three strata:

- Ten major media markets, each of which is a self-representing primary sampling unit (PSU),
- Other metropolitan statistical areas (MSAs) outside these ten markets, and
- Non-metropolitan statistical areas (non-MSAs).

Within the MSA and non-MSA strata, a set number of PSUs are selected based on probability proportionate to a weighted household count within each of these strata. Within each PSU, a set number of clusters are selected using a random start and a sampling interval. Each of these clusters contains a starting address and the next 14 listings.

All households listed within each cluster are confirmed in-person by a MRI interviewer. Listing sheets with selected addresses are assigned to interviewers, who then canvass the area (cluster) and record any additional dwellings (new construction, non-telephone households and those with unlisted numbers; group quarters are excluded). This method accounts for all dwelling units within each cluster. Hence, nontelephone and unlisted households are captured in the sample.

Within each cluster, the final sample of housing units is selected through a systematic, random selection process. The selected households are randomly predesignated to select either a male or female adult respondent (18 years or older). When the interviewer contacts the sample household, they record the names and ages of all adults of the predesignated sex on a grid. A random number is assigned for selecting the household adult of the specified sex. If the household has no adult member of the predesignated sex, then all adult names are listed and a sample respondent is randomly selected.

Nontelephone Sample Selection - Using four waves of SAC sample, MRI identified 1,087 adults from nontelephone households for the Supplemental Survey². The sample for this study consisted of all interviewed households that reported having no landline telephone when the SAC interview was

² The nontelephone households identified for the Supplemental Survey were in SAC during one of four waves (43 to 46) of data collection that occurred between March 2000 and April 2002. MRI reported the response rates for SAC waves 43 and 44 as 67 percent and waves 45 and 46 as 67.5 percent.

conducted. These households constituted the sample for the Supplemental Survey.

Data Collection - Once MRI identified all nontelephone households for the Supplemental Survey, the contact information for these households were updated using the National Change of Address (NCOA) to reduce noncontact. As a result, 136 addresses were updated and 79 were determined to have address or name problems or the respondent moved. Advance letters were sent out to all valid addresses, followed by a mailout of the questionnaire a week later. Based on the initial mailing, 149 respondents sent back questionnaires. Reminder postcards were sent to the nonrespondents, followed by a second questionnaire mailing about two weeks later. The field period was from October 8 to December 31, 2002. In the end, a total of 230 completed questionnaires out of 1086 (1 deceased) were received.

MRI processed and keyed the data from returned questionnaires, and merged the data from SAC to BTS data on sample respondents to facilitate analysis of nonresponse.

Analysis Plan

The survey design and analysis plan were based on making travel-related behavior estimates for nontelephone households. To do this, survey design differences between the two BTS RDD surveys and the Supplemental Survey were minimized. Every effort was made to keep question wording, reference periods, skip patterns, and fielding periods the same across the surveys. This would enable definitive comparisons of estimates between the Supplemental Survey (nontelephone households) and the BTS RDD surveys (telephone households).

However, as the analysis work progressed, complicating issues arose which impacted the analysis and the results. The following section describes some of the difficulties associated with conducting such a study and data analysis.

Practical Considerations and Constraints

Low Response Rate - The Supplemental Survey resulted in a unweighted CASRO response rate of 21 percent. With such a high nonresponse rate, confidence in any estimate is difficult. A nonresponse bias analysis is underway, and will be reported in a future paper.

There are ways to improve response rates in recontact studies. The Supplemental Survey did have some follow-up measures that helped improved response rates, but it was not possible to get an adequate response because of the time lapse between the original SAC interview and the Supplemental Survey fielding. Despite using the NCOA service, 27 percent of the 1,087 addresses were unusable. Hence, 292 persons never received a questionnaire. In addition, due to cost restrictions, the only mode of data collection was mail. We were not able to do in-person interviews because of the extreme cost of in-person contact. If cost was not a consideration, the survey and sample would have been designed differently, with a focus on in-person contact.

Small Sample Size - Even with a 100 percent response rate, the overall sample would still be fairly small. But with a 21 percent response rate and only 230 respondents, any estimates are likely unreliable.

Differences in Populations of Inference - Originally the goal was to compare telephone households to nontelephone households. If there were differences in estimates between the two groups, the plan was to estimate how much the lack of nontelephone households contributed to the overall coverage bias. However, weights on the Supplemental Survey and the other BTS RDD surveys were not designed for inferences to specifically non-telephone or telephone households. Each of the 1,087 sample cases had a nonresponse adjusted weight provided by MRI, but they were not weighted specifically to provide estimates for nontelephone households.

For the RDD surveys, even though the base weights represented only telephone households, the nonresponse weight adjustments were created so they would represent all households. The analysis could not use just the base weights for the RDD surveys since they would not have the appropriate nonresponse adjustments.

Also, by the time the Supplemental Survey was conducted, 64 percent of the households indicated they had telephone service. This is an artifact of the time lapse between SAC and fielding the Supplemental Survey.

Variance Estimation - Neither explicit sample design information nor replicate weights were available for variance estimation of the estimates from the Supplemental Survey. However, certain geographic information (ZIP code and MSA status) on clustering in the sample might be used for variance estimation, and will be explored in the future.

Differences in Fielding Periods - The Supplemental Survey was to be fielded at the same time as the other RDD surveys. However, contractual difficulties delayed fielding the Supplemental Survey by three months. Given that some travel behavior is seasonal in nature, the difference in fielding periods complicates comparing estimates across surveys.

Variation in Questionnaire Format Between Surveys - The Supplemental Survey was limited to four pages and only included select items from the BTS RDD surveys. Also, the Supplemental Survey was a self-administrated mail survey and the RDD questions had to be modified for this format. The complexity introduced by these requirements, the difference in question ordering and wording (due to rewording for a mail survey) may led to estimates not being comparable across surveys.

Results From Comparing Estimates

With the above limitations in mind, estimates were computed from the Supplemental Survey and the two BTS RDD surveys using the nonresponse adjusted weights. The tables (A through K) in the appendix illustrate some of the results.

In the majority of comparisons, there seemed to be differences between the supplemental and RDD survey estimates, but there

are a few travel-related behaviors that show virtually no difference. Both the Supplemental Survey and Bike/Ped Survey estimated that about 40 percent (41 percent and 42 percent respectively) of adults over 18, rode a bicycle at least once over the summer (table A). The estimated percent of adult pedestrians were not as comparable (96 and 86 percent respectively). However, in both surveys, about a third of the walkers (67 percent vs. 68 percent) and half of the bikers (51 percent vs. 50 percent) felt that they had adequate sidewalks and bike paths. Similarly, the mean numbers of days walked and biked were also very similar (table B).

However, possible differences were found in other characteristics. Adults in nontelephone households appear less likely to:

- Be drivers (79 percent compared to 85 percent) (table C),
- Live in a household with a personal vehicle (88 percent compared to 94-95 percent) (table D),
- Have taken a long distance trip (56 percent vs. 75 percent) (table F), and
- Leave home at least one day a week (94 percent versus 99 percent) (table G).

For demographic characteristics, adults in nontelephone households appear more likely to:

- Be between 18 and 34 years of age (table H),
- Have less than a high school degree (table I),
- Be non-white (table J), and
- Live in households where the total income was less than \$15,000 (table K).

Conclusion and Future Plans

A number of analytical issues have been identified in this paper that need to be settled before we can determine if there are any

differences between nontelephone and telephone household travel-related behavior. To account for certain limitations of this study and make a fuller determination, future plans are to:

- Readjust RDD survey weights to control totals for telephone households only and rerun estimates for comparisons,
- Readjust Supplemental Survey weights to control totals for nontelephone households and rerun estimates,
- Develop a method to calculate standard errors for the Supplemental Survey,
- Complete a nonresponse bias analysis of the Supplemental Survey using the information for all nonrespondents from the original MRI survey data,
- Conduct a multivariate analysis to ascertain predictors of nonresponse to the Supplemental Survey, and
- Assess quality of the SAC nontelephone sample by comparing original sample to known characteristics of nontelephone households.

References

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Appendix

Walking and Biking-related Characteristics: Comparing Nontelephone and Telephone Households

Table A: Walking and bicycling characteristics

Characteristic	Supplementary Survey (percent)	Bike/Ped Survey (percent)
Walking		
Walked, ran or jogged outside, at least five minutes over the summer months	95.8	85.5
Walked at least once a month	93.0	81.1
Did not walk in the last 30 days	12.4	20.3
Availability of sidewalks or paths where respondent lives*	66.7	68.0
Biking		
Biked outside, at least five minutes over the summer months	40.7	41.5
Biked at least once a month	29.7	28.8
Did not bike in the last 30 days	75.9	73.9
Availability of bike paths where respondent lives*	50.8	50.3

*Limited to walkers/bikers in Supplemental Survey to match Bike/Ped Survey.

Table B: Mean days walked and biked

Characteristic	Supplementary Survey (days)	Bike/Ped Survey (days)
Walking		
Days walked in last 30 days by pedestrians	15.0	14.8
Biking		
Days biked in last 30 days by bicyclist	9.8	7.7

Driver Status and Vehicle Ownership: Comparing Nontelephone and Telephone Households

Table C: Currently drive a car or other motor vehicle

Driver Status	Supplementary Survey (percent)	Disability Survey (percent)
Driver	79.0	84.9
Not a driver	21.0	15.1
Total	100.0	100.0

Table D: Number of licensed vehicles available for regular use

Number of vehicles	Supplementary Survey (percent)	Disability Survey (percent)	Bike/Ped Survey (percent)
None	17.6	5.8	4.6
1	32.2	23.3	24.2
2	31.0	37.4	40.8
3 or more vehicles	19.2	29.6	30.5
Total	100.0	100.0	100.0

Travel Behavior: Comparing Nontelephone and Telephone Households

Table E: Availability of public bus within ¾ of a mile from home

Availability of public bus	Supplementary Survey (percent)	Disability Survey (percent)
Yes	51.7	57.1
No	48.3	42.9
Total	100.0	100.0

Table F: Long distance trip (100 miles or more one-way) in the past year

Long distance trip	Supplementary Survey (percent)	Disability Survey (percent)
Yes	55.5	75.3
No	44.5	24.8
Total	100.0	100.0

Table G: Number of days leave home

Number of days	Supplementary Survey (percent)	Disability Survey (percent)
Never leave home	6.0	1.1
1-2 days	5.4	5.9
3-4 days	16.3	8.8
5-7 days	72.3	84.2
Total	100.0	100.0

Demographic Characteristics: Comparing Nontelephone and Telephone Households**Table H:** Age distribution

Age	Supplementary Survey (percent)	Disability Survey (percent)	Bike/Ped Survey (percent)
18-34	46.3	32.4	30.6
35-54	38.4	39.6	40.5
55+	15.3	27.9	28.9
Total	100.0	100.0	100.0

Table I: Education level

Education Level	Supplementary Survey (percent)	Disability Survey (percent)	Bike/Ped Survey (percent)
Less than HS	33.3	14.1	13.5
HS graduate/GED	38.4	29.4	32.4
Some college	21.9	29.7	28.1
4-year college	4.0	16.6	16.8
Graduate degree	2.3	10.3	9.2
Total	100.0	100.0	100.0

Table J: Race/Ethnicity

Race	Supplementary Survey (percent)	Disability Survey (percent)	Bike/Ped Survey (percent)
White	59.0	72.7	75.4
Black	21.0	10.5	9.5
Hispanic	14.0	11.2	10.9
Other	6.0	6.2	4.2
Total	100.0	100.0	100.0

Table K: Household income

Household Income	Supplementary Survey (percent)	Disability Survey (percent)	Bike/Ped Survey (percent)
Less than 15K	53.5	15.6	13.2
15K-less than 50K	38.5	39.7	44.3
50K and above	8.0	44.7	42.5
Total	100.0	100.0	100.0