

Analysis of Households with Interrupted Telephone Service Using 1995 NPTS

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Overview

When we think of households without phone service, we may think of isolated rural or very poor urban households. But in the modern day of pagers and cell phones, phone service is not fully described by that simple one-dimensional question. Previous research shows that many people who live in households without telephones use pagers or cell phones, or at least have telephones available at their place of work. So people in these households are not isolated from the world, but are isolated from us—household telephone survey practitioners.

There are two kinds of households which, by definition, cannot be reached by a household telephone survey—households with no telephone lines serving the residence, and households with telephones that have been disconnected. These two groups constitute the “No Telephone Households” category. In 1995 the Census estimates that 6.1 percent of occupied housing units had no telephone service¹. With telephone ownership so high and stable for the last two or three decades, not having a telephone can be considered a rare behavior². We are interested in determining more about these households to determine the impact of coverage bias in a telephone-based household travel survey, such as the NPTS and the ATS.

The question of how to reach households without telephones has come up again and again in household travel surveys. The reason is that, although telephone non-coverage may not seriously bias population estimates, serious biases can occur for specific population subgroups. The PUMS data shows that phone coverage is particularly low for such sub-groups as low-income groups, householders under 25 years of age, and African-Americans in the southern United States.³

When the survey area is local, it is possible, although difficult, to conduct in-person interviews with households without telephone service. Systematic methods of identifying such households include a canvass of areas identified on census block maps as low-telephone areas, or identified by the local telephone company as low-penetration areas. Some regional travel surveys have

¹ Statistical Abstract of the United States 1997, p. 566, Table No. 888
The Census question in 1990 read “Do you have a telephone in this house or apartment?”
In the 2000 Census that question will read “Is there telephone service available in this house or apartment from which you can both make and receive calls?”

² “Phone Home? An Analysis of Household Telephone Ownership”, Tom W. Smith, National Opinion Research Center, University of Chicago, 1987 (revised 1990).

³ “Analysis of Households Without Phones: Impact for the NPTS 1995”, Blair Cohen, A Peter Lobo, Elaine Felding, and Li-Shou Yang, FHWA, 1993

recruited no-telephone households on transit (Dallas, Denver). Some have identified no-telephone households through social service agencies (Morgantown, WV and Denver).

The FHWA-sponsored case study conducted in conjunction with the Denver Household Travel survey⁴ describes a process of identifying households with no telephones through social service agencies. This case study found that households recruited this way have different demographic characteristics, especially in terms of structure type, vehicle availability, and household income. It is impossible to say how fully these households represent the total population of households without telephones. However, at the local level it was possible to complete in-person recall travel interviews with household members.

Another approach described in the household survey literature is to recognize that telephone availability is a variable condition for many U.S. households who lose and gain telephone status over the year. These households have telephones when they can afford them, and the service is turned off when times get tough or when the bills get too large. One problem in keeping such households in the interview process is simply the many telephone calls over time it requires to complete the telephone interview: the recruit, the household and person interview, the reminder call, and the travel collection call, not to mention the calls to personally interview individual household members.

If a sufficient quantity of these households can be kept in the process and completed, they may be used to adjust the probability weights for the households reporting an interruption in telephone service to account for the households not covered by the survey⁵. The results of such an adjustment works best for estimates of variables related to economic status. Since trip generation rates are related to economic status, such a probability adjustment may mitigate some of the problem of coverage bias in the telephone survey.

The 1995 NPTS collected data on whether telephone service in the household was interrupted in the last year, and if so for how long. A total of 946 households surveyed in 1995 had telephone service was interrupted in the last year. Because the total number of interrupted phone service households was so small the sample weights were not adjusted.

Of course, the biggest question is whether households with intermittent phone service can be used like a proxy for people with no phone service. This analysis is the first step in answering that question.

A secondary reason for understanding more about the households with interrupted service are that such households more likely to be low-income, more likely to be minority or foreign-born, and more likely to be renters in non-single family housing, and these groups are considered under-

⁴ “Describing and Reaching Nonresponding Populations: Analysis and Project Report”, DRAFT, December, 1998

⁵ “Evaluating the Use of Data on Interruption in Telephone Service for Non-Telephone Households” Brick, Waksberg, and Keeter.

represented in the NPTS. Perhaps if we knew a little bit more about the households which have interrupted telephone service, we would be able to target and complete more such households in the 2000 survey.

Characteristics of Households with Interrupted Telephone Service

Two obvious factors limiting continuous telephone service are the cost and whether the household is transitory. The NPTS data shows that low income is associated with interrupted phone service, and more starkly in the urban areas than in the non-urban areas. Table 1 shows that a higher proportion of households with interrupted telephone service are urban poor.

Table 1 - Percent of Households by Urban Status by Whether Telephone Service Has been Interrupted in the Previous Year

	Interrupted ?	<\$15,000	\$15 - 29,999	\$30 - 44,999	\$45 and up	All
Urban	No	94.4%	97.6%	98.8%	99.0%	97.8%
	Yes	5.6%	2.4%	1.2%	1.0%	2.2%
Non-Urban	No	96.1%	96.8%	97.6%	98.8%	97.6%
	Yes	3.9%	3.2%	2.4%	1.2%	2.4%

Factors correlated with household income include the number of people in the home, the number of workers and autos, whether the home is owned or rented, and what type of housing it is. In general, the households with interrupted telephone service have more people in the household, and fewer automobiles. These households, which are slightly larger overall than other households, have fewer workers per household. The NORC study found that coverage was also lower among those in manual or low-prestige occupations, and the less educated.

The households with interrupted telephone service are more likely to be larger families than households with continuous service. Nearly half of the households with interrupted service had three people or more in the home, while almost a quarter had no workers, and 42 percent had only one worker.

Table 2 - Percent of Households by Number of People in the Household by Whether Telephone Service Has been Interrupted in the Previous Year

Household Size				
Interrupted?	One Person	Two Person	Three or More	All
No	97.5%	98.2%	97.4%	97.7%
Yes	2.5%	1.8%	2.6%	2.3%

Overall, almost one out of five households with interrupted service had no vehicles available to the household members, while only 11.2 percent had three or more vehicles. This contrasts with the less than eight percent of households with continuous phone service who had no car, and the

nearly 20 percent which had three or more cars for the household.

Table 3 - Percent of Households by Number of Autos in Households by Whether Telephone Service Has been Interrupted in the Previous Year

Number of Autos				
Zero	One	Two	Three or More	All
19.2%	40.9%	28.8%	11.2%	100.0%

Households with interrupted telephone service are likely to have fewer workers in the household than other households. Overall, a quarter of the households have no worker, and only 5 percent have three or more workers. However, the number of workers in the households is not as starkly differentiated as the income distributions, with an average of 1.17 in household with interrupted service and 1.3 in other households. Interrupted telephone service may be a condition of the working poor. Table 3 shows that households with interrupted service are more likely to have one worker than other households, and less likely to have two workers. Both types of households are about equally likely to have no-one in the family working.

Table 4 - Percent of Households by Number of Workers by Whether Telephone Service Has been Interrupted in the Previous Year

Interrupted?	Number of Workers in the Household				All
	None	One	Two	Three or More	
Yes	23.5%	42.0%	29.2%	5.3%	100.0%
No	22.8%	34.4%	34.8%	8.1%	100.0%
Total in NPTS	22.8%	34.6%	34.6%	8.0%	100.0%

In the NPTS, as in the NORC study, telephone service is more likely to be interrupted for renters rather than owners, and for people living in apartments and trailers rather than those families in single-family detached homes. Table 4 also shows that in general slightly higher interrupted telephone service is found in tracts with a higher percentage of immigrants. A slightly higher percent of households in census tracts with larger foreign-born populations had interrupted phone service in the last year.

Table 5 - Percent of Households by Housing Type and Percent Foreign Born in Census Tract by Whether Telephone Service Has been Interrupted in the Previous Year

% Foreign Born in Census Tract	Housing Type					
	Interrupted ?	Detached	Townhouse	Apartment	Mobile Hm	All
0 - 4%	No	98.5%	97.6%	95.5%	93.6%	97.7%
	Yes	1.5%	2.4%	4.5%	6.4%	2.3%
10 %	No	99.5%	94.4%	99.3%	100.0%	98.0%
	Yes	0.5%	5.6%	0.7%	0.0%	2.0%
15 - 24%	No	97.9%	97.8%	95.6%	100.0%	97.2%
	Yes	2.1%	2.2%	4.4%	0.0%	2.8%
25% and up	No	98.1%	97.4%	96.2%	95.6%	97.1%
	Yes	1.9%	2.6%	3.8%	4.4%	2.9%
Total	No	98.7%	96.4%	96.8%	94.7%	98.3%
	Yes	1.3%	3.6%	3.2%	5.3%	1.7%

The distribution of households by family income shows that almost a third of the families with interrupted service make less than \$15,000, compared to less than 15 percent of the households with continuous service. In the very low income group, these households are disproportionately African-American.

Table 6 - Percent of Households by Income Level and Race of the Householder by Whether Telephone Service Has been Interrupted in the Previous Year

Race of Head	Interrupted?	INCOME					All
		<\$5,000	\$5 - 9,999	\$10 - 14,999	\$15 -29,999	\$30,000 and up	
White	No	94.7%	95.6%	96.9%	97.9%	98.8%	98.1%
	Yes	5.3%	4.4%	3.1%	2.1%	1.2%	1.9%
Afri-American	No	93.8%	96.0%	93.2%	95.8%	98.4%	96.5%
	Yes	6.2%	4.0%	6.8%	4.2%	1.6%	3.5%
Asian	No	84.0%	96.1%	99.8%	96.6%	97.6%	97.2%
	Yes	16.0%	3.9%	0.2%	3.4%	2.4%	2.8%
N/A	No	83.9%	91.2%	86.2%	93.7%	99.0%	95.2%
	Yes	16.1%	8.8%	13.8%	6.3%	1.0%	4.8%

In the 1995 NPTS, we see that larger families and one-person households in low-income neighborhoods are more likely to have had interrupted telephone service.

Table 7 - Percent of Households by Household Size and Percent of Families in Poverty

Was Telephone Service Interrupted in the Previous Year? (Yes/No)

Percent of Families in Tract with Income Below Poverty	Number of People in the Household						Total in NPTS	
	One Person		Two People		Three or More			
	Yes	No	Yes	No	Yes	No	Yes	No
0 - 4 %	6.04	8.02	7.32	12.32	8.58	16.46	21.87	36.79
5 - 14 %	10.69	9.99	10.27	13.05	18.38	16.38	39.34	39.42
15 - 24 %	3.84	3.76	3.46	4.14	8.54	5.59	15.85	13.48
25 % ->	6.20	3.10	4.08	2.83	12.66	4.37	22.94	10.30
Total in NPTS	26.78	24.86	25.06	32.34	48.16	42.80	100.0	100.0

About half of the households with interrupted service are rented, compared to 28 percent of the other households. As density increases, the percent of households with interrupted phone service that are owned decreases and the percent that are rented increases. The households with interrupted service are 40% more common in very low density areas (19 percent compared to 14 percent) and 66 percent more common in areas with more than 10 thousand people per square mile (21 percent compared to 12 percent).

Table 8 - Percent of Households with Interrupted Telephone Service in Density Groups by Home Ownership Status

Was Telephone Service Interrupted in the Previous Year? (Yes/No)

Population Density of Block Group	Ownership Status of Householder				Total in NPTS	
	Owned		Rented			
	Yes	No	Yes	No	Yes	No
0 - 100	14.15	13.33	5.58	2.25	19.90	15.79
100 - 1K	12.81	18.99	7.24	4.24	20.21	23.37
1K - 4K	12.03	21.08	10.72	7.31	22.79	28.54
4K - 10K	5.90	13.88	13.24	7.44	19.33	21.42
10K- 25K	2.46	3.17	6.34	3.62	8.94	6.82
Total in NPTS	49.41	71.70	49.88	27.65	100.0	100.0*

* includes other housing types, like military and corporate

Home ownership can be seen as a measure of wealth. When we compare interrupted service households to others using density groupings and the percent of that population living in poverty, we see the direct relation of high-density low-income areas and interrupted phone service. More than twice as many households with interrupted service are found in neighborhood where a quarter or more of the families are below poverty, nearly 23 percent compared to just over 10 percent of other households.

Table 8 - Percent of Households with Interrupted Telephone Service in Density Groupings
By Percent of Families Below Poverty in the Block Group

Was Telephone Service Interrupted in the Previous Year? (Yes/No)

Population Density of Block Group	Percent of Families Below Poverty								Total in NPTS	
	0 - 4%		5 - 14 %		15 - 24%		25% ->			
	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No
0 - 100	2.69	2.05	11.20	8.47	4.07	3.75	1.94	1.52	19.90	15.79
100 - 1K	6.29	9.26	9.20	10.03	3.73	2.71	1.00	1.37	20.21	23.37
1K - 4K	7.53	14.31	6.43	9.59	2.12	2.53	6.72	2.10	22.79	28.54
4K - 10K	3.53	9.02	7.79	7.78	2.16	2.45	5.85	2.17	19.33	21.42
10K- 25K	0.88	1.54	2.44	2.60	2.21	1.43	3.41	1.26	8.94	6.82
Total in NPTS	21.87	36.79	39.34	39.42	15.85	13.48	22.94	10.30	100.0	100.0

Conclusion

The 1995 NPTS shows that larger families and one-person households in low-income neighborhoods are more likely to have had interrupted phone service. The average number of workers, however is not very different in households with interrupted phone service—1.17 vs. 1.3 in other households. Both types of households are about equally likely to have no-one in the home working. The households with interrupted phone service are much more likely to have lower family incomes, and to live in higher-density urban areas (66 percent more common than other households in areas with more than 10 thousand people per square mile).

In order to be meaningful, these analyses must be compared against the current PUMS data on households with no telephone service. If enough correlations exist, we could conclude that the interrupted telephone households could act as proxies for all households without telephone service. In such a case, a differential weighting scheme for these households might be attempted to mitigate the effects of non-coverage bias.