

SOME RESULTS OF THE 2000 PRE-TEST OF THE COMBINED NATIONWIDE PERSONAL TRANSPORTATION SURVEY AND THE AMERICAN TRAVEL SURVEY

Promod Chandhok¹, The George Washington University

Promod Chandhok, Department of Statistics, The George Washington University, Funger Hall, 2201G Street NW, Washington, DC 20052

Key Words: Pretest, Nonresponse, Incentives

This paper summarizes the main lessons learnt from the pretest for the combined Nationwide Personal Transportation Survey (NPTS) and American Travel Survey (ATS). The objective of the pretest was to determine which frame/incentive level was the most cost-effective for the combined NPTS/ATS. The study was contracted to Battelle, Research Triangle Institute (RTI), KPMG and Westat by the Bureau of Transportation Statistics (BTS) and the Federal Highway Administration (FHWA).

It is common knowledge that the incentive-level affects response rates. For mail surveys, this has been extensively studied and reviews reported by Armstrong (1975); Kanuk and Berenson (1975); Fox, Crask and Kim (1988); and Singer, Hoewyk, Gebler, Raghunathan and McGonagle (1999). The use of monetary incentives in government surveys is discussed in Shettle and Mooney (1999). In telephone surveys and face-to-face interviews, the interaction between the respondent and the interviewer affects response rates and the level of incentives may not have a significant effect on response rate after taking into account the effect of interviewers. Generally, a higher incentive would increase the chance of responding to the survey. Also, a questionnaire that takes longer to administer may result in a lower response rate. We also identified some issues that affect data quality. Three of them are: incentives, respondent burden and long-trip reporting. Issues that affect cost are: incentives and respondent burden. In addition, an address-based sample is more expensive compared to a RDD sample.

The eight designs in Table 1 identify the levels of various variables considered.

The main criteria used for the evaluation of the designs are: response rates, effect on data quality and cost. For response rates we looked at both the household and person-level response rates. The formula for the household-level response rate (R_{HH}) is

$$R_{HH} = \frac{N_{HA} + N_{HR}}{N_{HE} + (N_{HU} \times P_{HE})}$$

where,

N_{HA} = number of eligible responding households who agreed to collect person-level travel data (diaries and/or calendars were accepted),

N_{HR} = number of eligible responding households who refused to collect person-level travel data (diaries and/or calendars were refused),

N_{HE} = total number of eligible cases,

N_{HU} = total number of cases where the eligibility could not be determined, and

P_{HE} = proportion of eligible cases for all cases with a known eligibility status.

The formula used to calculate the unconditional person-level response rate (R_p) is

$$R_p = R_{HH} \times \frac{N_{HA}}{N_{HA} + N_{HR}} \times R_{PC}$$

where R_{PC} , the within-household or conditional person-level response rate, is defined as

$$R_{PC} = \frac{N_{PS} + N_{PP}}{N_{P+}}$$

N_{PS} = number of completed person-level questionnaires where the information was relayed via a self-report interview,

N_{PP} = number of completed person-level questionnaires where the information was relayed via a proxy interview, and

N_{P+} = total number of persons

To assess the quality of data from the different designs we looked at trip rates and zero-trip cases. The trip rate is calculated by dividing i_d , the number of daily trips recorded for all completed person-level interviews within the usable households by p_d , the number of

completed person-level interviews within the usable households.

A zero-trip person is a person who claims that they did not travel to any destination outside of the home. A high percentage of these individuals would cause the data to be suspect and a certain unknown percentage should be classified as nonrespondents due to false information. The percent of NPTS zero-trip cases is z_d / p_d , where z_d is the number of completed person-level interviews reporting no travel day trips within the usable households, and p_d is the number of completed person-level interviews within the usable households.

Sampling Design

Two sites were chosen -- Boston, MA, and Tulsa, OK metropolitan statistical areas. This was done to keep travel costs low for face-to-face interviews. Independent list-assisted RDD samples were selected for Designs 1-7 from all 100-banks with at least one residential telephone number. For the selected cases mailing addresses were obtained from two vendors -- Axiom and Telematch. Addresses were acquired for only 65% of the cases. For Design 8, addresses were selected in Boston and Tulsa and the selected addresses were sent to Axiom for acquiring their phone numbers. Telephone numbers were obtained for approximately 70% of the cases. Questionnaires were mailed to households and approximately five days later telephone interviewers began contacting households. Westat field staff were utilized and their role was to elicit cooperation from the household, and to provide, for interviewing, their cellular telephone if the household did not have a phone. In addition, Westat field staff conducted non-response interviews for non-responding households. Questionnaires were administered to 1,362 households from Boston, and 1,378 from Tulsa. A household questionnaire was used for all designs and households were screened. For Design 8 it was also determined whether the contacted household was in the sample. NPTS extended person-level questionnaire was administered in Designs 1-3. In Designs 5-8, for NPTS, data on trips 50 miles or more, were not collected. ATS extended person-level questionnaire was given in Designs 4-8. A non-response follow-up questionnaire was used in Designs 5 and 8. The data were collected from February to May 2000. The main results of the study are given in the next section.

Results

Table 2 gives the unweighted household-level response rates by PSU and data collection firm within pretest design. Logistic regression was used to examine the

effect of various variables on response rates. There was no significant difference between D1 and D2 and thus the two are combined. The average response rate is 35.65. The p-value for testing whether there is any difference between the D1 and D2 combined and D3 is 0.0, with city and design*city as independent variables. This implies that the five-dollar incentive had a significant effect on the household-level response rate. In the previous test and all subsequent analyses, designs were combined if there was no significant difference between them. To see whether the number of calls has an effect on response rate, a maximum of 9 calls were placed in all designs except D5 and D8, where an additional 10 calls were placed. The response rate of Design 5 is 49.4% which is significantly different ($p=0.0$) than the 40.8% response rate for Designs 6 and 7 combined. Here, the independent variables were design, city and firm. Thus the additional ten calls had a significant effect on the household-level response rate. To see whether the field effort conducted by Westat staff affected the household-level response rate, we compare D5 and D8. Using the independent variables design, city and design*city, the p-value for the difference between D5 and D8 is 0.0, demonstrating that the field effort increased the household-level response rate.

The person-level response rate results were generally similar and are not presented here.

Table 3 presents the unweighted NPTS person-level daily trip rates for usable households by PSU and data collection firm within pretest design. The trip rate from the combined D1 and D3 was 4.15, which was significantly ($p=0.0$) different from the trip rate from D2, using city and design*city as independent variables, and thus the two-dollar incentive had a significant effect on the person-level daily trip rate. Using only RTI data, for consistency, we compare the trip rate of 4.45 for D6 and D7 combined with 5.1 for D2. The difference is significant ($p=0.02$) implying that participation in two data collection tasks (NPTS and ATS questionnaires) had a negative impact on the trip rate.

The unweighted percent of NPTS zero-trip cases within usable households by PSU and data collection firm within pretest design are given in Table 4. We see that for D1 and D3 combined this was 13.2% and for D2, this was 4.5%. The difference is significant ($p=0.0$) demonstrating that the two-dollar incentive reduced the number of zero-trip cases.

While Table 5a provides the unweighted percent of ATS trips with a calculated distance of at least 50 miles for all households by PSU and data collection firm

within pretest design, Table 5b gives the percent of ATS trips with a calculated distance of at least 40 miles. To aid the respondent in identifying the long trips that were 50 miles or more in length, 50-mile maps were used in Designs 4, 6, and 7. RTI and Westat prepared a map for each household depicting a circle of radius 50 miles around the household's address. Designs 5 and 8 collected data on long trips but respondents were not provided with a map. We see that in both the tables, significantly ($p=0.001$) more ATS trips are observed using maps.

Summary

To maximize response rates: use a five-dollar incentive with the initial contact letter, more call-backs, and have a longer data collection window. For collecting accurate trip data use: a \$2 incentive with each person-level data collection packet, retrospective method for collecting ATS trip data, and maps.

References

Armstrong, J.S. (1975). Monetary Incentives in Mail Surveys. *Public Opinion Quarterly* 39, 111-116.

Fox, R.J., Crask, M.R., and Kim, J. (1988). Mail Survey Response Rate: A Meta-Analysis of Selected Techniques for Inducing Response. *Public Opinion Quarterly* 52, 467-491.

Kanuk, L. and Berenson, C. (1975). Mail Surveys and Response Rates: A Literature Review. *Journal of Marketing Research* 12. 440-453.

Shettle, C. and Mooney, G. (1999). Monetary Incentives in U.S. Government Surveys. *Journal of Official Statistics* 15, 231-250.

Singer, E., Hoewyk, J.V., Gebler, N., Raghunathan, T., and McGonagle, K. (1999). The Effect of Incentives on Response Rates in Interviewer-Mediated Surveys. *Journal of Official Statistics* 15, 217-230.

1. The views expressed in the article are attributable only to the author.

Table 1 Description Of Study Design Components: 2000 NPTS/ATS Combined Pretest.

Pretest Study Design	Data Collection Mode	ATS Recall Period	ATS 50-Mile Map	Incentives	NR Follow-up ¹	Questionnaire Sequence	RTI Cases	Westat Cases	Total Cases
1. NPTS only	RDD			None			200		200
2. NPTS only	RDD			\$2/person ²			200		200
3. NPTS only	RDD			\$5/advance letter; \$10/household			200		200
4. ATS only	RDD	Prospective	Yes	\$2/person				400	400
5. Combined	RDD	Retrospective		\$2/person	Yes	NPTS - ATS	200	200	400
6. Combined	RDD	Prospective	Yes	\$2/person ³		NPTS - ATS	100	100	200
7. Combined	RDD	Prospective	Yes	\$2/person ³		ATS - NPTS	100	100	200
8. Combined	Address-based	Retrospective		\$5/advance letter; \$2/person	Yes	NPTS - ATS	200		200 ⁴
						Total	1,200	800	2,000

¹ \$10 was used as an incentive to encourage one member of a nonresponding household to complete a subset of the household questionnaire.

² \$2 was included with each diary after the household interview has been completed.

³ Incentive included in first packet of material sent to household.

⁴ Westat located the non-telephone households and RTI interviewed them

Table 2. Unweighted Household-Level Response Rates by PSU and Data Collection Firm Within Pretest Design: 2000 NPTS/ATS Combined Pretest.

Design	PSU		Firm		Overall
	Boston	Tulsa	RTI	Westat	
1	33.2	40.0	36.4	-	36.4
2	29.0	42.0	34.9	-	34.9
3	38.8	42.5	40.5	-	40.5
4	51.6	61.6	-	56.2	56.2
5	44.9	54.5	43.2	56.3	49.4
6	36.2	43.4	32.5	46.8	39.7
7	37.7	47.2	35.2	48.5	42.0
8	52.7	60.7	56.3	-	56.3
Total	40.7	49.2	39.7	53.6	44.6

Table 3. Unweighted NPTS Person-Level Daily Trip Rates for Usable Households by PSU and Data Collection Firm Within Pretest Design: 2000 NPTS/ATS Combined Pretest.

Design*	PSU		Firm		Overall
	Boston	Tulsa	RTI	Westat	
1	4.2	3.7	4.0	-	4.0
2	5.3	5.0	5.1	-	5.1
3	4.5	4.0	4.3	-	4.3
5	4.9	4.5	4.7	4.7	4.7
6	4.2	4.4	4.8	4.0	4.3
7	3.9	4.4	4.1	4.2	4.2
8	4.8	4.5	4.7	-	4.7
Total	4.6	4.4	4.5	4.4	4.5

*Design 4 excluded since the design did not include a travel day.

Table 4. Unweighted Percent of NPTS Zero-Trip Cases Within Usable Households by PSU and Data Collection Firm Within Pretest Design: 2000 NPTS/ATS Combined Pretest.

Design*	PSU		Firm		Overall
	Boston	Tulsa	RTI	Westat	
1	12.6	14.6	13.6	-	13.6
2	3.9	5.1	4.5	-	4.5
3	12.5	12.9	12.7	-	12.7
5	5.7	11.0	9.0	7.5	8.1
6	10.8	14.4	6.1	16.1	12.7
7	12.6	9.4	10.2	11.6	11.1
8	4.3	9.5	6.7	-	6.7
Total	8.3	11.0	9.0	10.8	9.6

*Design 4 excluded since the design did not include a travel day.

Table 5a. Unweighted Percent of ATS Trips With a Calculated Distance of at Least 50 Miles for all Households by PSU and Data Collection Firm Within Pretest Design: 2000 NPTS/ATS Combined Pretest.

Design	PSU		Firm		Overall
	Boston	Tulsa	RTI	Westat	
Map*	30.8	41.3	25.5	38.3	36.2
No Map**	22.8	27.4	20.5	33.1	24.8
Total	27.2	36.0	21.8	37.1	31.5

*Designs 4, 6, and 7.

**Designs 5 and 8.

Table 5b. Unweighted Percent of ATS Trips With a Calculated Distance of at Least 40 Miles for all Households by PSU and Data Collection Firm Within Pretest Design: 2000 NPTS/ATS Combined Pretest.

Design	PSU		Firm		Overall
	Boston	Tulsa	RTI	Westat	
Map*	32.1	42.8	28.5	39.3	37.5
No Map**	24.1	31.5	22.9	35.9	27.4
Total	28.5	38.5	24.4	38.6	33.3

*Designs 4, 6, and 7.

**Designs 5 and 8.