ABSTRACT

The 1995 Nationwide Personal Transportation Survey (NPTS) is a household travel survey on personal travel in the United States. It has been conducted every 5 to 7 years, beginning in 1969. Although, as survey researchers, we want to improve survey methods over time, we also need to build in methods to measure the impact of these methodological changes so that we can compare travel over time. Three topics are addressed in this paper: 1) an update on the 1995 NPTS; 2) the changes in survey methodology between 1990 and 1995, and, 3) recommendations to others based on our recent experience.

1995 NATIONWIDE PERSONAL TRANSPORTATION SURVEY

General Description

The survey for the 1995 dataset was conducted from May 1995 to July 1996, and the public-use dataset was to be available in the fall of 1997. The dataset consists of 42,000 households, of which approximately half are in the “national sample,” that is, 21,000 households represent travel throughout the United States. Please see Attachments 1, 2, and 3 for additional information.

Local “Add-on” Samples

The four local “add-on” areas account for the other 21,000 households. As a part of the NPTS, local governments such as states and metropolitan planning organizations (MPOs) could purchase additional samples to create a household travel survey for their area. The four local add-on areas and the samples they purchased are:

- State of New York.................................9,500
- Commonwealth of Massachusetts..........7,500
- Oklahoma City, Oklahoma...................3,000
- Tulsa, Oklahoma................................1,000.

The benefits of the add-on program to the state or MPO are:

- the U.S. Department of Transportation has already paid for designing, developing and pretesting the survey instrument and procedures
- there is an assurance of a standard of quality in sample selection, interviewing, editing the data, weighting the data, and a host of other survey elements
- the add-on area gets a larger sample, because they get those records that are part of the national sample, in addition to those they pay for directly.
The benefits to the U.S. Department of Transportation are that we receive an enriched sample from all areas that conduct add-ons. At the Transportation Research Board conference, “Data Needs for the 21st Century,” held in Irvine, California, in March 1997, one of the recommendations was to increase the local add-on program in the future.

Changes in Survey Content

Other changes to the survey included odometer readings, street addresses of residences and workplaces, customer service questions, additional trip purposes, and questions about seatbelt use.

Odometer Readings

Two odometer readings, which were approximately 2 months apart, and the associated date of the readings were to be collected on each household vehicle. Oak Ridge National Lab has developed a model to convert these two readings to annual estimates. We believe that the odometer readings will produce a more accurate estimate of vehicle miles than the owner’s annual estimate or the summation of travel day trips made in that vehicle.

Address of Residence and Workplace

The first three NPTS surveys, conducted in 1969, 1977 and 1983, used an address sample from the Census Bureau. However, because the Census Bureau had conducted the survey, there were stricter confidentiality requirements, and neither the address nor the Census tract could be provided to us. In the 1990 NPTS, we did not need to collect the address, since the survey was conducted totally by phone, with no diary mailings. The purpose of collecting the addresses in 1995 was to append the file with a series of characteristics of the residences and workplaces (see Attachment 2 - 1995 NPTS Geographic Descriptors). Addition of these characteristics to the travel data will allow us to conduct analyses of the land use-transportation connection, and may also allow us to create synthetic travel surveys for states or metropolitan areas.

Customer Service Questions

For the first time in our NPTS series, the 1995 survey addressed questions of the public’s opinion of transportation services and systems. Not only was the feedback from the public positive, but also we can now look at these attitudes in the context of how much travel the respondent does, which modes he uses, vehicle ownership and income at the household level, and a host of other characteristics. We anticipate that customer satisfaction questions will continue to be incorporated in future NPTS work.

Updated Trip Purposes

To better understand travel, we dropped some trip purposes that had poor response in the past and added others. For example, serve-passenger trips were previously reported under the more general category of “other family and personal business.” In the 1995 survey, we created two purposes, “drop off someone” and “pick up someone.”
Seat Belt Use

We added questions on how often people use seat belts, and for those that use them some or most of the time, their reasons for not using them all of the time. This is a great benefit to any safety analysis done with the data, and it also resulted in perhaps the best catalog in existence of reasons people use seat belts occasionally. We believe that all of these elements will make our 1995 NPTS more comprehensive and accurate than its predecessors.

Survey Method Changes

It is particularly timely to address the conflict between improving the survey and maintaining comparability over time. Once we received the NPTS pretest data and our preliminary full-survey data, we had reason to contact some of the larger U.S. metropolitan areas to compare their data with ours. We found we were not alone in having made a number of changes that were important improvements, but resulted in problems in looking at our data over time. With the cost of conducting household travel surveys and changes in travel behavior occurring at a rapid pace, we are all under pressure to make changes in our survey methods, procedures and instruments. But what is the cost of these changes in trend analysis, and what can be done to address that concern?

Note that the comparisons made in this section are based on the pretest for the 1995 NPTS, because, as of this writing, the full 1995 dataset is not available. The pretest consisted of

- 2,360 households
- 4,938 persons
- 20,769 travel/day person trips.

We conducted a large pretest to determine the best methods for the full survey and to provide a measure of change from the recall method used in 1990, if that method was not going to be repeated in 1995.

The changes in survey methods for 1995, which are listed in Table 1, resulted in our collecting a seemingly large increase in trips and travel. Table 1 demonstrates that there was much more that could have been measured than we did. We were naive. We were very much aware of the elements that remained constant between the 1990 and the 1995 surveys. These included

- same survey contractor, Research Triangle Institute
- same sampling approach
- same trip definition
- same approach to expanding the sample.

We thought that the real increases in trip-making would show up in the comparison of the recall (or retrospective) approach with the diary. Now that we have some preliminary results, we realize that many of the other survey elements had impact. These impacts are covered in Table 2.
<table>
<thead>
<tr>
<th>Topic</th>
<th>No advance letter</th>
<th>To 1995</th>
<th>Could Measure</th>
<th>Did Measure</th>
<th>Measure after the fact</th>
<th>Estimate after the fact</th>
</tr>
</thead>
<tbody>
<tr>
<td>Respondent contact</td>
<td>No incentive</td>
<td>Advance letter (2/3 of sample)</td>
<td>XXXX</td>
<td>XXXX</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Recall</td>
<td>Incentive ($2/person)</td>
<td>XXXX</td>
<td></td>
<td>XXXX</td>
<td></td>
</tr>
<tr>
<td>Trip reporting</td>
<td>All individual interviews</td>
<td>Travel diary</td>
<td>XXXX</td>
<td>XXXX</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Not confirm zero trips</td>
<td>Household rostering of trips</td>
<td>XXXX</td>
<td></td>
<td>XXXX</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Proxy from memory</td>
<td>Confirm zero trips</td>
<td>XXXX</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Trip Definition</td>
<td>Proxy from diary</td>
<td>XXXX</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>On-line edits</td>
<td>Clearer Trip Definition</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Completed household—adults</td>
<td>More on-line edits</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Overall survey</td>
<td></td>
<td>Completed household-50%+ adults</td>
<td>XXXX</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### TABLE 2 Probable Impacts of NPTS Survey Changes

<table>
<thead>
<tr>
<th>Topic</th>
<th>From</th>
<th>To</th>
<th>Probable impacts</th>
</tr>
</thead>
<tbody>
<tr>
<td>Respondent contact</td>
<td>No advance letter</td>
<td>Advance letter</td>
<td>More trips</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>More male respondents</td>
</tr>
<tr>
<td></td>
<td>No incentive</td>
<td>Incentive ($2/person)</td>
<td>Obtain respondents that may not have participated otherwise</td>
</tr>
<tr>
<td>Trip reporting</td>
<td>Recall</td>
<td>Travel diary</td>
<td>More trips reported</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>More short, incidental trips</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>More trips for family &amp; personal business and social &amp; recreational purposes</td>
</tr>
<tr>
<td></td>
<td>All individual Interviews</td>
<td>Household rostering of trips</td>
<td>Include forgotten trips</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Lower respondent burden</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>More coherent picture of household trip-making</td>
</tr>
<tr>
<td></td>
<td>Not confirm zero trips</td>
<td>Confirm zero Trips</td>
<td>Reduce zero trip persons from 25% in 1990 to 6% in the 1995 pretest</td>
</tr>
<tr>
<td></td>
<td>Proxy from Memory</td>
<td>Proxy from diary</td>
<td>More trips reported</td>
</tr>
<tr>
<td></td>
<td>Trip definition</td>
<td>Clearer trip Definition</td>
<td>Better reporting of trip characteristics</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Easier for respondent to report trips</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Interviewers more attuned to pick up incidental trips</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>More coherent trip reporting increase interviewer awareness</td>
</tr>
<tr>
<td>Overall survey</td>
<td>Completed household = 1+ adults</td>
<td>Completed household = 50%+ adults</td>
<td>Works with household rostering to increase trip reporting</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Respondent Contact

Advance Letter

Advance letters were sent to all households with listed phone numbers, i.e., the number is published in the phone book or available from “information.” Approximately two-thirds of the households in the United States have listed numbers. About 10% of the letters were returned, so we probably reached 60% of the households with the letter. The primary purpose of the letter was to inform the prospective respondents that this was a legitimate survey, not a marketing or fundraising call. It is difficult to determine the impact of the advance letter between the 1990 and the 1995 data because response rates dropped in that time period. The number of times a household received a call from someone they did not know increased, and the level of suspicion about these calls increased. Although these factors make it difficult to measure the impact of the advance letter, we believe it may have resulted in more participation by male respondents, because they were assured it was a legitimate survey effort.

Incentives

The pretest data provide some insight into the use of incentives, because the pretest was split into three subsamples: retrospective or pure recall, travel diary and memory jogger. The diary and jogger cases got the incentive, while the retrospective cases did not, and the results are as follows (see Table 3):

<table>
<thead>
<tr>
<th></th>
<th>Retrospective</th>
<th>Diary</th>
<th>Jogger</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Overall household response rate</td>
<td>57.4%</td>
<td>47.6%</td>
<td>49.0%</td>
<td>52.6%</td>
</tr>
<tr>
<td>Person interview rate</td>
<td>79.2%</td>
<td>88.2%</td>
<td>88.5%</td>
<td>84.9%</td>
</tr>
<tr>
<td>Overall response rate</td>
<td>45.4%</td>
<td>42.0%</td>
<td>43.3%</td>
<td>44.7%</td>
</tr>
</tbody>
</table>

Trip Reporting

Travel Diary

Trip reporting changed considerably from the 1990 survey, and the most apparent change was the use of the travel diary. Not only were more trips collected, but also they were the types of trips that would be most likely to be overlooked unless a diary was used. As expected, the additional trips were concentrated in the areas of family and personal business, and social and recreational activities. Use of the diary increases the number of shorter, incidental trips reported.

Household Rostering

The next change, “household rostering” of trips, captured some trips that may well have been overlooked. In “household rostering,” the interviewer has the benefit of trip data from all household members he/she has already interviewed. If person #1 took a trip and reported persons #2 and #3 were with him/her, when persons #2 and #3 are interviewed,
they can simply confirm they were on the trip with #1. If person #2 or #3 said he/she was not on the trip with #1, then that was considered as the last word. This system resulted in a number of benefits for us, including making the tedious travel day reporting easier and, of course, in aiding the memory of the respondent.

**Confirmation of Zero Trips**

When the respondent reports not going anywhere on travel day, this is often the ultimate “soft refusal.” He/she doesn’t want to report his/her trips, but he/she also doesn’t want to appear totally uncooperative. In previous NPTS surveys, we were very hesitant to question this, but changed our minds after the 1990 NPTS showed 25% of respondents not taking a travel day trip. We still do not go as far as many of the U.S. urban travel surveys in questioning this, but in 1995, we added the question “Does that mean you did not go anywhere on that day?” For the 1995 pretest, our rate of zero trip persons dropped to 6%. This should not be solely attributed to the inclusion of this one question. We have no way of knowing how much the use of the preinterview letter, the travel diary and the incentives influenced this result.

**Proxy from Diary**

Use of the travel diary affects proxy as well as self-interviews. The net result in 1995 was that we had fewer proxies, and the proxies we had reported more trips (see Table 4).

**TABLE 4 Daily Person Trips per Person by Self- and Proxy Reporting**

<table>
<thead>
<tr>
<th></th>
<th>Self-report</th>
<th>Proxy</th>
<th>Proxy as % of Self-report</th>
</tr>
</thead>
<tbody>
<tr>
<td>1990 NPTS recall</td>
<td>3.22</td>
<td>2.17</td>
<td>0.62</td>
</tr>
<tr>
<td>1995 NPTS pretest</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Diary</td>
<td>4.80</td>
<td>3.51</td>
<td>0.73</td>
</tr>
<tr>
<td>Jogger</td>
<td>2.56</td>
<td>3.50</td>
<td>0.77</td>
</tr>
</tbody>
</table>

**Clearer Trip Definition**

An outsider to this field would have trouble understanding why the definition of a “trip” is so difficult. But anyone who has conducted a household travel survey recognizes the numerous issues involved—when is something a trip and when isn’t it, when is a new trip started, how do you handle a change of mode or vehicle without any other changes, do you collect linked trips or unlinked or some combination of them? For the 1995 NPTS, we used the same definition of “trip” that we had used in 1990, but greater care was taken to clarify what a trip was and when each new trip began. While the impact of this cannot be measured, it is important to recognize that it most likely had an impact on the increase of trips collected.

**More On-line CATI Edits**

Like a clearer trip definition, the inclusion of more on-line CATI (computer-assisted telephone interviewing) edits most probably had an impact in favor of collecting more trips. For example, 2 people are going to a movie, and it is an auto trip of 2 miles that
takes 30 minutes in non-rush hour traffic. The CATI system produces a message to the interviewer to verify the time. In this example, it turns out they stopped at a friend’s house, and the friend also went to the movie. What was originally reported as one trip has become two. More on-line editing of trips has the effect of increasing the interviewers’ awareness of typical problems, and all of this likely works in favor of collecting more trips. It is not possible to measure the impact, but it should be noted by the data users.

**Overall Survey**

**Definition of Completed Household**

The definition of a completed household changed from 1990, when it was one or more household adults interviewed, to 1995, when it required that 50% or more of the household adults be interviewed. This resulted in changes in who was in the sample and the impact of the person weights in adjusting for missing persons within the household. The pretest was conducted using the one-or-more-adults definition, so analysis of the impacts of this change must await the full survey data.

**NORMALIZING THE RESULTS AND RECOMMENDATIONS**

**Urban Trip Rate Comparison Project**

Now that we have reached this point, we obviously need to determine how much of the increase in trips and travel in the preliminary 1995 data is due to improved survey methods and how much of the increase is real travel. First, we are measuring the impact of change in all the elements that can be measured (see Table 1). Second, we are comparing trip rates in a group of U.S. urban travel surveys conducted around 1990 with rates from other surveys conducted around 1995. We are computing the NPTS data from 1990 and 1995 using the parameters normally used in an urban travel survey, i.e., urban area only, weekday trips only, trips of 75 miles or less, all POV and transit trips included, walk and bike trips included only if to work or school, interview must be within 3 days of travel day, and households where all adults were interviewed. Then we will compare the urban survey rates from 1990 with NPTS rates from 1990, and the urban travel survey rates from 1995 with the NPTS rates from 1995. We are seeking to establish an adjusted 1990 NPTS trip rate, so that when it is compared with the 1995 NPTS trip rate, the differences will be the real increase in travel. Although this will not be an exact measure, we believe we must give our data users some guidance on this issue.

**Recommendations**

For others going through this process, I offer the following recommendations:

1. Define as many elements of change that you can, and
2. Build a bridge between the old and new data. This can be done in one of two ways: either through a large parallel pretest or through a “comparability component” of the full survey. In either case, seek to replicate the previous survey as closely as possible with one group of the pretest or full survey, and use the new survey instrument and procedures on the rest. If you cannot run a parallel test in the pretest, do it as part of the full survey. But don’t ignore it.
The NPTS is unique in some respects, however, when we consider the surveys presented by four countries (Australia, Switzerland, Austria and the United Kingdom) in this session. We certainly have more in common than not. There were striking similarities in the types of issues we face in conducting national household travel surveys, and the considerations we brought to bear in resolving them. Issues in common include how we design and deliver our transport surveys; what issues and considerations are surfaced, and how they are resolved; and how the data are used in planning and policymaking. The last recommendation is that we pool resources to examine some of our current issues in raising the standard of transport surveys.
Attachment 1 - 1995 NPTS (NATIONWIDE PERSONAL TRANSPORTATION SURVEY) FACT SHEET

WHAT
The NPTS is a household travel survey that provides data on the amount and nature of personal travel in the United States. Data are collected from a sample of households, and expansion factors are applied to obtain annual, national estimates of trips, miles of travel, household vehicles, etc. The survey collects data on all trips, by all modes, for all purposes.

WHY
The NPTS data provide the only authoritative source for the characteristics of travel, particularly as linked to the demographics of the traveler, for the nation. These data allow analysis of trends in travel and the relative use of different modes of transportation.

WHO
Interviews are conducted for all persons age 5 and older in the household. Persons 14 and older are interviewed directly, and a household adult is asked to report for children age 5 -13. A list-assisted Random-Digit-Dialing sample framework is used. The sample is stratified by region of the country, size of the metropolitan area and presence or absence of a subway system.

HOW
The interviews are conducted by telephone, using a computer-assisted telephone interviewing (CATI) system.

DATA COLLECTED
Examples of the data collected are

**Household level** - household size, number of household vehicles, income, location.

**Person level** - age, sex, education, relationship within household, driver status, annual miles driven if a worker, worker status, if drive as an essential part of work if employed, seat belt use.

Customer service questions - rating of issues in traveling, such as mobility, congestion, traffic conditions and pavement conditions.

**Vehicle level** - annual miles (based on odometer readings at two-month intervals), make, model, and model year.

**Trip level** - trip purpose, mode, length (in miles and minutes), time of day, vehicle characteristics (if a household vehicle was used), number of occupants, driver characteristics (for private vehicle trips only, and only if a household member was driving).
**SPONSORS**

The 1995 NPTS is sponsored by the following U.S. DOT agencies:

- Federal Highway Administration
- Bureau of Transportation Statistics
- Federal Transit Administration
- National Highway Traffic Safety Administration

**COVERAGE**

The NPTS is multi-modal in coverage of travel, as well as sponsorship. Trips made on any mode are collected.

**CONDUCTED BY**

Research Triangle Institute, Research Triangle Park, North Carolina.

**1995 NPTS PRETEST**

Conducted November 1994 through January 1995. Two thousand three hundred thirty households were in the final data. Emphasis on inclusion of customer service questions.

**1995 NPTS FULL SURVEY**

Conducted May 1995 through July 1996. Approximately 21,000 households throughout the nation will be in the final dataset.

**NPTS PRODUCTS**

Reports, public-use dataset on CD-ROM, Internet web site.

**CONTACT PEOPLE**

Both people listed below are at the same address and fax number:

FHWA - HPM 40, Rm. 3306, Washington, D.C. 20590
Fax: (202) 366-7742

Susan Liss, NPTS Project Manager
Voice - (202) 366-5060
Internet email - susan.liss@fhwa.dot.gov

Bryant Gross, Data User Support
Voice - (202) 366-5026
Internet email - bryant.gross@fhwa.dot.gov
Attachment 2 - 1995 NPTS GEOGRAPHIC DESCRIPTORS

RESIDENCE - Population variables (at Census tract and block group level)

- Population density - persons per square mile
- % below poverty
- % over 25 who are high school graduates
- % over 25 who are college graduates
- % 65 or older
- % foreign born
- % Hispanic
- % White, % African-American, % Asian-American, % other

RESIDENCE - Households & housing variables (at Census tract and block group level)

- Urban/rural code - metro urban, metro suburban, second city, small town, rural
- Residential density - dwelling units per square mile
- Housing - % single family, % multi-household dwellings
- Housing - % owner, % renter
- Housing - % dwelling units built since 1985
- Housing value - median housing value
- Income - median household income and % households: below $15,000,
  $15,000-$40,000, $40,000- $60,000, $60,000 and over

WORKPLACE - Employment variables (Census tract)

- Employment density - jobs per square mile
- Retail employment (as a measure of accessibility to goods and services)
- Employment - % by broad SIC categories (e.g., manufacturing, retail)
## Attachment 3 - NPTS OVER TIME

<table>
<thead>
<tr>
<th>Year</th>
<th>Sample Size</th>
<th>Method</th>
<th>Conducted By</th>
<th>Content Notes</th>
<th>Survey Notes</th>
</tr>
</thead>
</table>
| 1969 | 15,000      | In-home Interview | Bureau of Census | -auto only, not all POV, trips collected | -shortest NPTS questionnaire  
-problems with weighting  
-cannot add daily trips and long trips  
-used retired CPS sample |
| 1977 | 18,000      | In-home interview | Bureau of Census | -much detail on long trips  
-mapping certain daily trips to determine urban/rural split of travel | -part of sample also interviewed for a separate long trip survey, NTS  
-cannot add daily trips and long trips  
-used retired CPS sample |
| 1983 | 6,500       | In-home interview | Bureau of Census | | -sample so small that interviewers never got proficient  
-used retired CPS sample |
| 1990 | 22,300 18,400-national 3,900-add-ons | Telephone CATI | Research Triangle Institute | -collected segmented trips  
-collected minor accident data | -recall method (no advance warning of travel day)  
-first add-on component  
-list-assisted, stratified RDD (random digit dialing) sample |
| 1995 | 42,000 21,000-national 21,000-add-ons | Travel diary with telephone Retrieval | Research Triangle Institute | -odometer readings on household vehicles  
-address of residence and workplace  
-information on incidence of telecommuting and transit use | -large add-on component  
-first use of incentives  
-first use of travel diary  
-household rostering of trips  
-list-assisted, stratified RDD sample |