Use of Travel Diaries in Collection of Travel Data on the Elderly and the Handicapped

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Recently, there have been important policy developments regarding the planning and provision of transportation services for the elderly and the handicapped. Numerous experiments, notably the Service and Methods Demonstrations projects of the Urban Mass Transportation Administration (UMTA), have tested the worth of special transportation services for the elderly and the handicapped. Despite significant work in this area, much remains to be learned about the travel demand characteristics—i.e., the mobility—of such persons. This information is needed to design transportation systems that will enhance travel mobility. Improved mobility means not only more travel but also increased travel options, such as using preferred or more dependable modes, traveling to more attractive destinations, making more trips for certain purposes, and making trips at more convenient times of the day or week.

Measuring changes in travel mobility with statistical reliability depends heavily on the quality of the data. The quality of data is important because the changes being monitored are subtle in relation to background factors. Methods generally used for collecting travel data to assess changes in mobility have consisted of "retrospective" travel surveys and, of lesser relevance, on-board user surveys. Because these methods have not provided statistically reliable estimates of improvements in mobility, the evaluation of alternative service concepts has been limited.

The retrospective technique produces a high level of variability among individuals and their trip rates. In addition, when individuals are asked to recall travel behavior from a past period, memory lapse becomes a factor; if this problem is attacked by reducing the reporting period to shorter intervals, the problem of measurement is exacerbated by increased time-of-month variability (1).

This paper proposes a potential improvement in the data collection method to overcome these problems: recording travel data in a travel diary. A travel diary is a log in which the individual traveler records each trip made over a specified period of time. Because trips are recorded at or near the time they are made, the diary produces an accurate description of actual trip-making behavior. In addition, because the diary is typically compiled over an extended period of time, random variations in travel over time are greatly reduced.

The applicability of travel diaries to the analysis of the mobility of the elderly and the handicapped has been discussed by Kirby and McGillivray (2) and Crain and Associates (3). This paper reviews the planning and implementation of a before-and-after survey that incorporated diary techniques as part of the evaluation of a user-side-subsidy demonstration project in Lawrence, Massachusetts, under the UMTA Service and Methods Demonstrations Program (4).

The study plan called for the diary survey to be administered once before the start of the project and again a year after the project had been in operation so that changes in travel behavior as a result of the demonstration project could be evaluated.

PREVIOUS USE OF TRAVEL DIARIES

There are, of course, practical reasons why diaries have not enjoyed more widespread use, such as the difficulties in identifying an appropriate and willing sample, the risk of dissolution of the sample before the end of the survey period, and the potentially high costs of administration, quality control, and respondent incentives. Our research uncovered few previous attempts to use travel diaries in surveys, particularly for periods of a week or more. Three noteworthy attempts were reviewed: the disaggregate data set pilot test by the State University of New York at Buffalo, the London Transport Survey (LTS) (5), and the 1966 Skokie travel survey (6).

The Buffalo pilot survey experimented with 7-day and 24-h trip logs. A substantial number of data items were requested for each trip. No incentives for participation were offered, and no surveillance was maintained during the survey. The LTS requested only transit trip data; it experimented with two different instrument formats and two incentive schemes but maintained no surveillance over respondents. In Skokie, the effects of different instrument formats, incentive plans, and levels of surveillance were measured, and survey forms in open-ended and categorical response format were tested. Three levels of economic incentive—from $3.50 to $11.50 (total compensation)—as well as a no-incentive strategy were tested. The highest level of incentive was provided to only 8 percent of the sample; the average incentive received by participants was $5.18, and the median was $3.50.

Different levels of surveillance of respondents were also examined: Households were visited one, two, or three times a week for inspection and collection of forms.

Several lessons emerged from these surveys. The Buffalo survey had the lowest success rate of those studied, presumably because of the amount of data requested and the absence of surveillance or incentives. The LTS had the highest success rate, perhaps because of the public spirit of transit riders and the limited data requested in the survey. Of all individuals contacted in the London survey, 96 percent accepted the travel diaries and 81.5 percent completed the survey. The Skokie survey (in a relatively affluent suburb) had a scope and organization closest to those planned for use in Lawrence. About half of all the people initially contacted (56.7 percent) agreed to participate, and 50.8 percent of these eventually completed the survey.
SURVEY DESIGN

In designing the diary survey in Lawrence—an older, low-income city—we first assumed that some kind of compensation was essential, since the Buffalo survey produced virtually no response and a very poor response resulted in the zero-compensation group in the Skokie survey. It also appeared that higher incentives improved response and that payment schemes that offered a completion "bonus" were more effective in sustaining participation. Consequently, a total compensation of $20, divided into a $5 beginning payment and a $15 completion bonus, was offered. This amount was much higher than the average participant's compensation in Skokie, even after adjusting for inflation.

The Skokie survey concluded that surveillance was a very important factor in completion of the survey. However, since the city of Lawrence could more easily provide cash incentives than it could provide the personnel that were necessary for Skokie's higher levels of surveillance, a somewhat higher level of incentive was provided. Surveillance was limited to once-a-week visits to each household.

The final lesson learned from previous efforts was that survey forms should be kept as concise as possible. The Buffalo experience did not support the use of detailed travel logs, whereas the LTS achieved high reporting rates with simple forms. The Skokie experiment encountered problems with more ambitious data elements, such as route description and start-end times. In addition, the categorical response format (multiple choice) was not as effective as an "open-ended" approach.

SURVEY MATERIALS

As a result of the above considerations, the diary log for the Lawrence survey was designed to be as concise and simple as possible. The trip information requested included origin, destination, travel mode, trip purpose, and start time. Travel time could be calculated from external sources at some later time if desired. For trip purpose and travel mode, respondents were permitted to use responses freely rather than select from categories. Descriptions of origin and destination were to give just enough detail so that the location could be found on the map or in the city directory. A unique predated and prenumbered log sheet was supplied for each day of travel reporting. Sheets were printed on paper of different colors for each of the four weeks of the survey to facilitate identification when the forms were detached from the diary booklet and turned in at the end of each week's reporting.

Before the travel diary was filled out, each survey participant was administered a background questionnaire that collected data on age, sex, income, employment, handicaps, driver status, and the location, composition, automobile ownership, and income characteristics of the respondent's household. The questionnaire also recorded information on the participant's past travel behavior by means of a retrospective log that summarized all travel over the previous 3- or 7-day period. This was done to allow comparison between the reporting accuracy of diaries and that of retrospective logs.

SAMPLE REQUIREMENTS

Sample size was calculated to enable statistical testing of changes in travel behavior as a result of the user-side-subsidy project. Sample size was based on the number of individuals needed to measure a change in total monthly trip generation from the diary results for the entire sample on the order of a 5 percent increase by using a t-test and a 95 percent level of confidence. It was determined that, if a before-and-after paired sample could be "empaneled", complete records from 180 individuals would be needed; for independent samples, 240 individuals were necessary. Given the planned levels of incentive and reimbursement, a 20 percent drop-out rate and 10 percent unusable returns during the course of the survey were assumed. Thus, it was necessary to have a starting population of 320 for the independent sample. A 15 percent before-and-after attrition rate was assumed for the panel, which brought the required starting size to 260. The figure of 320 was selected as the design sample size given the uncertainties with the panel. The sample was to be stratified to include approximately two-thirds elderly and one-third nonelderly handicapped, roughly the ratio in the general population.

IMPLEMENTATION

The survey field plan had four stages: preliminary screening, field contact and training for the pilot test, conduct and review of the pilot test, and conduct of the main survey. Separate processes were used to identify the elderly and the nonelderly handicapped portions of the sample.

The sample of elderly individuals was selected from the names of persons 65 years of age or over in the Lawrence city directory by using a random start and skip interval technique. Of 714 names drawn from the directory, 485 resided in households with telephones and 229 did not. Each of the 485 persons with telephones were contacted for a 2-min screening interview. Of these, 321 of the telephone contacts agreed to accept a home visit from an interviewer and 194 subsequently entered into the pilot test. Of the 229 households without telephones, 106 were contacted in person and 28 entered into the pilot test.

Nonelderly handicapped participants were located through agency channels, civic organizations, nursing homes, and other contacts. A sample of 93 nonelderly handicapped persons was obtained. Individuals in wheelchairs and with hearing or sight impediments may have been underrepresented because of difficulties in locating such individuals. The pilot test was not administered to the handicapped sample because of delays in sample identification.

The pilot test was conducted during the two-week period before the main survey. Ten interviewers were needed to administer the pilot survey to the sample of 222 elderly individuals. This required an initial 1-h contact and a subsequent 1-h revisit, review, and action to prepare the individual for the main survey.

Of the 222 persons sampled, 196 successfully completed the one-week pilot test and entered the main survey along with the 93 nonelderly handicapped. No major flaws were observed in the survey materials or approach as a result of the pilot test; thus, the main survey proceeded without any change in plans.

The main survey took place over the entire month of May 1978. The staff of interviewers was reduced to six during this period. Interviewers were assigned to a geographic sector and maintained contact with the same individuals throughout the survey (continuing contact was later judged to be a very important factor). Participants were visited once a week, when forms were reviewed and collected. Major literacy or comprehension problems were not encountered in the main survey; persons who could not meet survey requirements or obtain help within the household were elimi-
nated at the pilot stage. The survey did retain a sample of approximately 10 percent of individuals who needed daily assistance. Ultimately, 195 of the 196 elderly and 90 of the 93 nonelderly handicapped completed the main survey. No diary was rejected because of unusable results or sloppy or suspicious reporting.

RESULTS

Only preliminary analysis of the diary data has been carried out to date. Tabulations of average daily trip rate by household income and automobile ownership have shown the expected relations. Weekly tabulations show the decline in the rate of travel from the beginning to the end of the month that is typical of travel among the elderly and the handicapped. The entire sample of elderly and handicapped travelers averaged 99 total monthly (one-way) trips with a mode of 60. An initial estimate of the standard deviation in total trips is 60, or about 60 percent of the mean. Although the mean trip rate for our sample, using the one-month diary, is as high as or higher than that in other reported surveys of the elderly and the handicapped, the variation is less than that reported elsewhere. Crain and Associates (3) describe a standard error in excess of the mean trip rate when the three-day-recall log method was used.

Two other initial findings are worth summarizing:

1. Only 38 percent of all trips were "return to home". This implies that 24 percent of trips were links in a travel chain, and at least 30 percent of all round trips had multiple destinations. The diary method of data collection is particularly effective in capturing this characteristic of travel behavior.

2. Although not all respondents to this "before" diary survey have joined the user-side-subsidy project, the same proportion have registered as in the population at large, or about 25 percent (the survey was conducted before demonstration project enrollment efforts began).

The total cost of the diary survey was $24,000, and this was broken down as follows:

<table>
<thead>
<tr>
<th>Item</th>
<th>Cost ($)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Telephone screening</td>
<td>2,100</td>
</tr>
<tr>
<td>Initial household visit</td>
<td>3,750</td>
</tr>
<tr>
<td>Return visit after pilot test</td>
<td>2,100</td>
</tr>
<tr>
<td>Main survey surveillance and quality control</td>
<td>6,800</td>
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<tr>
<td>Incentives</td>
<td>5,250</td>
</tr>
<tr>
<td>Other direct costs including data coding</td>
<td>4,000</td>
</tr>
<tr>
<td>Total</td>
<td>24,000</td>
</tr>
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</table>

For the 285 completed one-month diary surveys and the 315 sociodemographic and retrospective travel questionnaires, these costs represent approximately $77/usable diary and $6/usable survey questionnaire.

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REFERENCES


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