

DESCRIPTION

Regional and state transportation planners rely on detailed travel behavior data to inform planning activities. These data reveal who is traveling, when they travel, where they are going, why they go there, and how they get there. A household travel survey (HTS) helps collect these data, which planners use to better understand travel behavior in the survey region. HTS data are commonly used to develop and calibrate travel demand models, but planners can also use the data outside of these models to create descriptive statistics on regional travel and to analyze trends over time.

Until recently, most HTS projects in North America used a self-reported diary approach. In this approach, all household members record details of their trips on an assigned day using a telephone (call center) or an online or paper form. These details included origin and destination locations, departure and arrival times, trip purpose, mode of travel, and travel party size.

Smartphone-based HTS has begun to supplant traditional survey methods. This survey method integrates the traditional self-reported survey questions into a travel survey app on participants' smartphones that also passively collects GPS trip location data. Because of the reduced respondent burden, approximately 80% of participants in smartphone-based HTS projects have provided up to seven days of GPS travel data. Overall, the smartphone method generates more data than traditional diary methods, which typically collect just one day of travel data.

An HTS can help answer key planning and policy questions by collecting data on household and person demographics, household vehicle information, and information about daily travel patterns. Some examples of questions an HTS can help answer include:

- How many car trips does the average resident make on a typical weekday?
- How does transit use vary by income?
- What are the peak travel hours, by trip purpose, throughout the day?
- How often do employed persons typically telecommute (vs. commuting to work)?



HOW WILL THIS SURVEY HELP ME?

- > **Estimation and validation of travel demand models:** Collect the latest data on how residents are traveling throughout a region to estimate travel demand models (e.g. four-step or activity-based models).
- > **Monitor travel trends:** Inform transportation planning around emergent modes such as app-based ride-hailing services and bike- and scooter-share services.
- > **Identify planning considerations:** Generate demographic profiles to help serve specific transportation needs (e.g., are younger or older residents more likely to travel by bicycle, and for which purposes?).



Important Considerations!

HTS data, by design, capture nearly all regional household travel. But some travel—such as transit, air travel and airport ground access, emerging travel modes (e.g., e-scooters, ride-hailing services), and seasonal travel—often require additional data and research to understand. Other travel, like visitors, external/pass-through trips, or commercial travel, are not captured in an HTS.

COST

Medium-High

TIME

Medium-Long

METHODS

Smartphone Online

CHALLENGES

Recruitment & Response Cost

EXPERTISE

Sampling Design Data Wrangling



SUCCESS STORIES

North Florida Travel Survey

Administration Method: Online questionnaire.

Recruitment: Mailings to residents of the six-county North Florida region with in-person and digital outreach.

Sampling: Address-based sample of the six-county North Florida region with supplemental convenience-based sample. Report available at:

<https://tinyurl.com/ybfb6uym>

The fall 2017 North Florida Travel Survey studied household demographics, daily travel activities, and typical travel patterns throughout the six-county North Florida region of Baker, Clay, Duval, Nassau, Putnam, and St. Johns counties. The North Florida Transportation Planning Organization is using the data collected to update the regional transportation models and the region's long-range transportation plan, including an analysis of automated-vehicle adoption and use attitudinal questions.

STUDY ROADMAP

1 QUESTIONNAIRE DESIGN/ADMINISTRATION - Important questions to ask in an HTS include demographic information, vehicle ownership information, and daily travel patterns. Daily travel patterns are obtained by structuring the questionnaire in a travel diary format, with origin and destination locations, departure and arrival times, trip purpose, mode of travel, and travel party size questions for each trip. A smartphone travel log is designed to capture this information in a way that minimizes respondent burden.

Administration Methods:

Online instruments: Internet penetration is high enough that many researchers feel most surveys can occur entirely online, with adaptations for use over the telephone using computer-assisted telephone interviews (CATI). However, traditional online diary methods rely on the memory of participants which can result in rounding errors on travel times, and typically some forgotten and omitted trips. Further, it is generally only feasible to collect one day of data with an online self-reported diary to minimize respondent burden.

Smartphone app instruments: Using a GPS-based smartphone app survey instrument can greatly enhance data quality and quantity. Smartphone data collection yields more accurate daily trip counts than its online counterpart because short trips that may be forgotten in a self-reported travel log are captured by the smartphone app. Participants in smartphone-based travel studies are often more willing to provide up to seven days of GPS travel log data, including trip route location data. Smartphone ownership rates are also quite high (81% and rising¹); however, to ensure individuals without smartphones are included in the survey sample, most smartphone studies still include a phone- or web-based option.

Paper: Most agencies are moving away from paper instruments because accurate location information is more difficult to obtain and geocode using paper instruments than with online- or smartphone-based survey instruments.

2 SAMPLING/RECRUITMENT - The best sample and recruitment strategy will depend on the target population and budget of the survey.

- **Random address-based sample:** Address-based sampling (ABS) typically relies on United States Postal Service residential address data to sample and invite survey participants. This approach provides the most complete and reliable data frame for household-level surveys (compared to other methods, such as random digit dialing). Using ABS, survey invitations are mailed to participants, which can increase costs. Despite this, ABS is considered the best method for generating a regionally representative sample (which can make analysis and weighting less burdensome later).
- **Panels:** Re-inviting a panel from previous survey efforts is a fast, efficient, and potentially cost-effective way to collect data. Response rates are often higher for studies where respondents have been re-invited to a panel.
- **Convenience:** Email lists, public meetings, or social media are effective at inviting participants to recruit into a survey, but these methods do not yield representative data. This option is recommended as a supplement to (but not replacement for) more rigorous sampling approaches.

3 ANALYSIS AND PROCESSING - Following data collection, survey responses should be weighted and expanded to match the regional population across key sociodemographic dimensions. Weights help correct for bias that may be present in the sample of people who completed the survey (e.g., from surveying too many persons of a demographic profile or from a particular area). Weighting aligns the survey data with census totals for target demographics.

The range of possible HTS data analyses is broad. Some examples of analyses include generating trip rates, mapping home, work, and school locations, and creating crosstabs to compare the distribution of two variables in relation to each other. HTS data are also commonly used for model estimation and calibration.

> In generating analyses using HTS data, data users should:

1. Keep the universe of data collection in mind.

If the study was designed to survey residents on a typical weekday, the dataset will not be ideal for generating analyses of weekends in the region.

2. Use the weighted survey data. Applying weights ensures that the final analysis is regionally representative, as opposed to just reflecting the behavior of survey-takers.

3. Ensure a sufficient sample size (and acknowledge margins of error). The smaller the sample size, the larger the margin of error. This is particularly important to keep in mind when conducting analyses on subgroups of interest within the final dataset.



TYPICAL CHALLENGES

Sampling: The most challenging and costly aspect of an HTS is contacting the households and encouraging them to complete the survey. The predominant sampling method is ABS, which offers a great deal of control over the geographic distribution of the survey sample. ABS struggles with declining response rates and a growing bias toward older age groups.

Recruitment and response: Typically, only 2–6% of households that receive the survey materials provide complete data. Response rates tend to vary by region of the country and the incentive offered for completion.



ADDITIONAL RESOURCES

TRB Travel Survey Methods Committee
Information Resource Center,
<http://www.trb.org/ABJ40/ABJ40.aspx>.

This Transportation Research Board committee maintains research and other resources on travel surveys.

National Household Travel Survey, <https://nhts.ornl.gov/>. The NHTS surveys personal and household travel on a national scale and is useful as a general resource on HTS projects in the United States.

For more information visit the Statewide Survey Colloquium:
<https://bit.ly/SurveyColloq>

¹ Pew Research Center. 2019. "Mobile Fact Sheet," <https://www.pewresearch.org/internet/fact-sheet/mobile/>.