

# **Household Travel Survey Methods: Ensuring a Match between Survey Needs, Design and Sample Size**

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# Introduction

- Modern household travel surveys are facing many challenges, such as declining telephone response rates, cell phone only households, answering systems, caller identification, etc.
- Price tag: seems to average \$175-\$200 per complete and useable survey

## Challenges & how to conduct surveys

- It appears more and more common to randomly select households by postal carrier routes, instead of random digit dialing, as has been the case in the past, due to no call listings.
- It is also advised that any travel diary have a GPS add-on component, as well as an internet option to fill out the survey.

## Other options: NHTS????

- NHTS is mostly suited for small to mid-size MPO's, as well as State DOT's.
- Large MPO's, such as NYMTC, are usually better served by a thorough household travel survey, administered and conducted separately from NHTS.
- NHTS type of survey may not necessarily be the most appropriate instrument to build robust activity based models

# Key Issues in Metropolitan Travel Survey Design: Who is Doing What?

- Montreal:
  - CATI telephone-interviewed household travel survey
  - conducted at a 5 % (wow!) sampling every 5 years
  - 65,000 households, 400,000 trip records with 80 attributes
- Toronto:
  - 2001 survey of 30,000 households
  - Total Number of Households: 2,417,500
  - Total Population: 6,529,600
  - Derived sample size: 1.24%

## Other Survey Examples, Continued...

- Vancouver:
  - 2008: 24-hr weekday, 5% of households, \$1.7M
  - 1999: 24-hr weekday, 0.4% of households
- Atlanta:
  - 2001: 48-hr, 8000 households, 0.5 % sample size
- New York:
  - 1998: 24-hr weekday, 11,000 households

# Comparison of Household Response Rates Among Other Metropolitan Areas

<b>Survey</b>	<b>Type</b>	<b>Rate</b>
<b>Atlanta SMARTRAQ</b>	<b>2-day</b>	<b>30%</b>
<b>2000 Phoenix</b>	<b>2-day</b>	<b>31%</b>
<b>2000 Philadelphia/ Jersey</b>	<b>1-day</b>	<b>33%</b>
<b>1997/98 Metropolitan NY/NJ/CT</b>	<b>1-day</b>	<b>34%</b>
<b>1999 Seattle</b>	<b>2-day</b>	<b>32%</b>

# Recent Survey Experience

<b>Region/Year</b>	<b>Survey</b>	<b>Model</b>
New York, NY, 1996-1997	10,971 HHs 1 day	NYMTC model, developed & used
Columbus, OH, 1999	5,555 HHs 1 day	MORPC model, developed & used
Atlanta, GA, 2001	8,069 HHs 2 days	ARC model being developed

## Pitfalls to Avoid

- Missing / miscoded locations
- Conflicting joint activities & travel
- Second day under-reporting
- Underreporting of short non-mandatory activities
- Missing preschool children (ARC)

# Designing Surveys to Support Activity-Based and Tour-Based Models

- Need full & consistent diary-days for all household members
- Matching of household, person, activity, and location files is critical
- Perform checks of frequency distributions, ARC found out that age distribution indicates missing children under age 5

## Continued...

- Activity start and end times: Day should start at home at 3 AM and end at 2:59 (1,439 minutes). Duration of all activities and travel should add to 24 hours (valid range of 1:00 to 24:59)
- Ensure that all activities are accounted for in survey diary

# Continued...

- What to collect for ABTB models:
  - household data:
    - demographic information about the households, such as household size, household vehicles, dwelling type, home ownership status, tenure, and computer ownership, the number of workers, students, and trips made during the travel period.

# What data items are needed

- Household Vehicle Availability
- Household Size Distribution
- Household Size by Number of Workers
- Household Size by Number of Students
- Household Size by Income
- Gender of Household Members
- Mobility Disability Status
- Relationship to Head of Household
- Level of Education Attained
- Licensed Driver Status Employment Status by Transit Use
- Employment Status
- Number of Additional Paying Jobs

## What else is needed for ABTB models:

- Occupational Area
- Mode to Work
- Employer Offered Benefits
- Benefit Usage
- Distribution of Vehicle Age
- Distribution of Vehicle Type
- Average Household Trip Rates by Household Income
- Daily Trips by Vehicles per Household
- Daily Trips by Workers
- Average Person Trip Rates by Gender
- Average Person Trip Rates by Respondent Age
- Main Activity Distribution
- Travel Mode, Access Mode, Egress Mode

# Sample size & degree of precision

- How big of a sample is needed for activity-based models?
  - At a minimum, 1 household out of every 200 households should be surveyed
  - the more the better the merrier...
  - Could be as high as 1 and 5%
  - 0.5% is desired at the very least, anything less may invalidate a model statistically and underperform

# Other things to watch out for...

- Weighting & Expansion Factors
  - Documentation
  - Total Numbers
  - Universe of Trips accountability
- Incomplete records
- Geo-coding

## Other Key Questions for Model Development

- Oversampling of environmental justice areas, and “difficult to reach” populations
- Design the survey so that it can meet the needs of both the 4-step trip based model and the activity-based model

# The future of survey design

- It is anticipated that the state of the practice in surveying will advance rapidly over the coming years, offering more robust behavioral modeling approaches, and more abundant data passively captured through advanced telematics and pricing systems.
- These capabilities will both define what can be done with data and models, as well as how they are collected and built.

## Continued...

- It is premature to speculate about the types of models and NYMTC will need and use in the future
- It is clear that the data streams defined for the NYMTC models will continue to be required
- NYMTC could implement continuous data collection programs rather than large scale episodic survey programs as are commonly done for household travel surveys every 10 years
- A mixture of revealed and stated preference survey techniques could also be used to elicit information on all aspects of the transportation system.