East to West Coast Household Travel Surveys: Practical Optimization Case Studies for Small and Medium MPOs

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Presentation Overview

• Why Conduct a Household Travel Survey (HTS)?
• Addressing Barriers For Small / Medium MPOs
• **Case Study 1:** Broome & Tioga Counties, NY (BMTS)
• **Case Study 2:** Whatcom County, WA (WCOG)
• Key Findings and HTS Tips
Why Conduct a Household Travel Survey (HTS)?
How can HTS help small and medium-sized MPOs?

HTS data provides current, realistic data to reflect local:
• Demographics
• Geography and land use
• Institutions (e.g., universities, airports, large employers)
• Travel options (e.g., transit usage, Uber/Lyft)

HTS also provides an opportunity to ask custom, regionally-specific questions:
• Recent trends (e.g., bike/scooter share)
• Local program benchmarks (e.g., highway “call boxes”)
• Other local features (e.g., toll roads, cross-border travel)
HTS data is extremely rich compared to other data sources.

**HTS DATA INCLUDES:**
- Demographic and vehicle information
- Typical and observed travel behavior
- Detailed trip attributes
- Trip paths (using smartphone data collection)

HTS Data can also complement other sources (like Big / Passive Data) that may lack contextual information on their own.
There are many possible applications for HTS data:

**General transportation planning**
- Regional long-range transportation plan
- County-wide comprehensive plan
- City-level comprehensive plans
- Transit planning
- Corridor and sub-area planning

**Active transportation planning**
- Bike share / scooter share planning
- TNC (Uber / Lyft) planning

**Trip-based travel demand modeling**
- Trip rates by purpose and mode
- Trip origins and destinations
- Trip distance and time-of-day distributions

**Understanding special travel markets**
- College and university student travel
- Long-distance commuters
Addressing Barriers for Small / Medium MPOs
High fixed costs and small sample sizes are two major hurdles for small and medium MPOs conducting HTS.

Fixed costs feel “large” for a small project.
- Questionnaire design & survey programming
- Survey branding & invitation / website design
- Pilot study

Sample sizes feel too small for desired analyses.
- Region of 50,000 households
  500 surveyed households*
  small sample of transit riders, bicyclists, Uber/Lyft users, etc.
- Such small sample sizes are problematic for analysis.

*Typical HTS range from 0.5% - 1.5% sample rate (surveyed households / total households), depending on budget.
Small / Medium MPOs can take steps to make HTS achievable.

- Leverage collaboratively-developed materials (e.g., survey questionnaires and invitations).
- Use a “soft launch” approach instead of a full pilot.
- Include smartphone data collection to get the most data out of your households and increase possible analysis use cases.
Case Study 1: Broome & Tioga Counties, NY (BMTS)
About BMTS and the Study Region

The Binghamton Metropolitan Transportation Study (BMTS) plans for long-range and near-term transportation needs for the 100K and households and 250K residents in the region.

Study Region:

• Comprised of two counties: Broome and Tioga.
• 180 miles (~3 hours) northwest of New York City.
• Population is older, but with 17K university students.
• High share of low-income households.
The 2018 BMTS HTS covered 919 households, with 51% using smartphones to collect travel data for up to 3 days.

2018 Study Design:
• Regionalized existing questionnaires & invitations.
• Fall 2017 data collection with soft launch.
• Online “recruitment” survey.
• 3-day smartphone or 1-day online travel diary.
• Gift-card incentives varied by survey method.

High-Level Results:
• 0.9% final sample rate*
• 1,896 persons in complete households
• 3,716 complete person-days of travel
• 13,972 trips on complete travel days

*Inclusion of household members not already in the database
Multi-day smartphone data collection **doubled the median number of trips captured** in each block group.

Chart includes data for all participants. Only smartphone participants (51%) traveled on days 2-3.
Smartphone data collection captured more accurate trip counts compared to the manual data collection.
Smartphone participants were younger and matched the population age distribution more closely.

*Population is represented by weighted data figures.
Case Study 2: Whatcom County, WA (WCOG)
About WCOG and the Study Region

The **Whatcom Council of Governments** (WCOG) provides a variety of services and programs for the 90K+ households (210K+ residents) of Whatcom Region in NW Washington.

**Study Region:**
- 45 miles south of Vancouver, B.C.
- 90 miles north of Seattle, WA

**Key Transportation Topics:**
- High passenger and freight volume at U.S. – Canadian border crossing
- Increase in ride-hailing / decrease in bus ridership
- Increase in urban bicycling
- Rapid population growth in past 10 years (many who commute to jobs outside the region)
The 2018 WCOG HTS covered 1,451 households, with 60% using smartphones to collect travel data for up to 7 days.

2018 Study Design:
• Regionalized existing questionnaires & invitations.
• Fall 2018 data collection with soft launch.
• Online “recruitment” survey.
• 7-day smartphone or 1-day online travel diary.
• Gift-card incentives varied by survey method.

High-Level Results:
• 1.8% final sample rate
• 3,000 persons in complete households
• 13,107 complete person-days of travel
• 47,874 trips on complete travel days

Invitation postcard mailed to all household invited to the study
Multi-day smartphone data collection provided more insight into rare travel behaviors and weekend-specific travel.

112 Persons Biked on Day 1
147 Persons Biked Only Days 2-7
131% Increase in Unique Bicyclists

24 Persons Made Trips to British Columbia on Day 1
71 Persons Made Trips to British Columbia Only Days 2-7
196% Increase in Cross-Border Travelers
Higher trip counts increased spatial coverage across study and neighboring regions.

<table>
<thead>
<tr>
<th>Destination Region</th>
<th>Work and Work-Related Trips</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bellingham</td>
<td>59.7%</td>
</tr>
<tr>
<td>Rest of Whatcom</td>
<td>26.8%</td>
</tr>
<tr>
<td><strong>Outside of Whatcom</strong></td>
<td><strong>13.4%</strong></td>
</tr>
</tbody>
</table>

Work trip ends (with added noise to preserve anonymity)
WCOG and RSG also included a regionalized question in the survey to gauge local Smart Trip program awareness.

Whatcom Smart Trips is a local program that encourages people of all ages to make more of their trips by walking, bicycling, sharing rides, and riding the bus.

For more information, visit whatcomsmarttrips.org/
Key Findings and HTS Tips
Key Findings and HTS Tips

**Tweaking existing materials and survey questionnaires** is a very efficient way to achieve customized results without a fully-customized approach.

**Replacing a full pilot study** with an extended data collection period (or soft launch) can reduce costs and make the data collection targets more achievable.

Including smartphone data collection dramatically **increases the quantity of data** in the final dataset while **improving the quality** of the data and **increasing data use** cases down the road.
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**WCOG:** The smartphone approach resulted in higher trip rates overall, including non-auto trips (walk, bike, transit).

<table>
<thead>
<tr>
<th>Mode</th>
<th>2008</th>
<th>2018</th>
<th>% Change</th>
</tr>
</thead>
<tbody>
<tr>
<td>Auto</td>
<td>3.08</td>
<td>3.73</td>
<td>+21</td>
</tr>
<tr>
<td>Walk</td>
<td>0.41</td>
<td>0.59</td>
<td>+45</td>
</tr>
<tr>
<td>Bike</td>
<td>0.11</td>
<td>0.14</td>
<td>+27</td>
</tr>
<tr>
<td>Transit</td>
<td>0.07</td>
<td>0.13</td>
<td>+80</td>
</tr>
<tr>
<td>Other</td>
<td>0.13</td>
<td>0.11</td>
<td>-17</td>
</tr>
<tr>
<td>Total</td>
<td>3.8</td>
<td>4.7</td>
<td>+24</td>
</tr>
</tbody>
</table>
WCOG: Smartphone data collection captured more accurate trip counts compared to the manual data collection.
WCOG: Smartphone participants were younger and matched the population age distribution more closely.

*Population is represented by weighted data figures.