WHAT'S NEXT? LESSONS FROM 2009 NHTS ADD-ON WITH 2010-2011 NYMTC/NJTPA REGIONAL HOUSEHOLD TRAVEL SURVEY

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RESEARCH GOAL

This research attempts to see if NHTS adds-on samples can be utilized as additional source for development of regional Activity-Based Model (ABM). Various travel patterns (i.e. trip frequency, travel time and distance, trip purpose, time of day, and travel mode) in 2009 NHTS NYS adds-on samples in the areas of New York Metropolitan Transportation Council (NYMTC)'s Best Practice Model (NYBPM) and its counterpart samples in the NYMTC/NJTPA's 2010-11 Regional Household Travel Survey (RHTS) are investigated to see the compatibility. I hypothesized that while different survey design, sampling plan, and data collection methods exist the variances may not be statistically significant as survey recruitment and retrieval tools advances in the help of online tools i.e., map-assisted location finder. Attentive data QA/QC procedures by survey firms also help improve the data quality; thus, the add-on sample can help supplement the survey sample input for ABM development

THE ORIGIN OF RESEARCH

HTS is a basic but main resource for the development of travel demand model, which consequently supports policy decision-makings i.e. amounts and/or places for major transportation funding allocation. The demand for quality survey data, therefore, is increasing especially in the midst of ongoing government budget constraint. Yet HTS is under debate because sample representation can be questionable when it comes to smaller geographic boundary or specific travel pattern analysis where only limited samples are available. Today, other big data i.e. cell-phone tower signal and social network check-in data (i.e., from Facebook, Twitter, and Foursquare) are suggested as alternatives to meet the data needs for the development of travel demand models. Yet, the importance of travel survey still remains because it is the only comprehensive data source for acquisition of trip purpose, travel mode and social demographic characteristics, which affects travel patterns. There has been limited integration effort to use NHTS for development of regional travel demand model. Previous study did not suggest using NHTS due to the data transferability, where NHTS and RHTS show dissimilar travel and activity behaviors although both national and regional surveys shared similar socio-demographic characteristics (Henson and Goulias 2011). This research seeks to see whether it is the same for the NYMTC region where the most complex transportation network and travel pattern exist in the North America

DATA SOURCE

The NHTS implemented landline-based random digit dial sampling and trip-based diary survey. 150,147 samples were collected nationwide in 2009 survey, which includes add-on samples. 6,898 households were located in the New York-Northern New Jersey-Long Island, NY-NJ-C-PA Metropolitan Statistical Area (MSA) – 5602. Due to smaller sample size, 583 national samples for New Jersey and Connecticut were excluded in this study. 6,335 households within 12 NYS counties (10 NYMTC counties plus 2 Mid-Hudson counties: Orange and Dutchess), parts of New York Best Practice Model (NYBPM) boundaries, were remained. In the end, 4,537 households were left as valid samples after excluding 1,798 weekend samples. 416 households (9.2% out of the valid samples) were identified as zero-trip households. The NYMTC/NJTPA 2011-11 RHTS implemented address- based sampling, multiple modes of recruitment and retrieval (CATI, mail, and web), and place-based 24-hours travel diary survey. It collected weekday-only samples (when school is open) between September 2010 and November

2011, for the travel demand model (as of today) is work trips-based. In total, 18,965 households (including 1,930 GPS samples) and 43,558 persons participated in the RHTS and collected 188,199 trips. In our analysis, we exclude GPS samples because no counterpart exists in NHTS. In our survey, 1.25 times more household trips are observed in GPS samples where 9.3 trips (margin of error: 0.32 trips in 95 percent confidence interval) while 7.4 trips (margin of error: 0.09 trips) for non-GPS samples. Samples in New Jersey and Connecticut were disregarded for comparison purpose. In the end, only 9,070 households remain as valid samples in 12 NYS counties where 589 households (6.5 percent) are zero-trip households. Table 1 shows the distribution of valid weekday samples in NHTS and RHTS.

Table 1 - Valid Samples of Weekday-Travel Household

Geography (Group)		NHTS	Percent	RHTS	Percent	Pop ACS
NYC	Bronx	250	5.50%	992	10.90%	1,365,725
NYC	Brooklyn	235	5.20%	1,188	13.10%	2,466,782
NYC	Manhattan	296	6.50%	1,350	14.90%	1,583,345
NYC	Queens	257	5.70%	1,187	13.10%	2,199,169
NYC	Staten Island	425	9.40%	420	4.60%	463,450
Long Island	Nassau	314	6.90%	958	10.60%	1,329,083
Long Island	Suffolk	317	7.00%	1,035	11.40%	1,482,548
Mid-Hudson	Westchester	319	7.00%	686	7.60%	939,406
Mid-Hudson	Rockland	528	11.60%	284	3.10%	305,461
Mid-Hudson	Putnam	483	10.60%	307	3.40%	99,545
Mid-Hudson	Dutchess	572	12.60%	247	2.70%	296,152
Mid-Hudson	Orange	541	11.90%	416	4.60%	370,201
Total		4,537	100.00%	9,070	100.00%	12,900,867

Table 2 - Trip OD distribution by Area Types

	2010 RHTS_NYS Only							2009 NHTS						
Work Trip	DATYPE_s							DATYPE_s						
HATYPE_s	1	2	3	4	5	6	Total	1	2	3	4	5	6	Total
1	0.2%	0.2%	0.2%	0.1%	0.8%	0.2%	1.7%	0.9%	0.2%	0.1%	0.0%	0.0%	0.0%	1.2%
2	0.9%	2.7%	3.1%	1.1%	4.7%	1.3%	13.7%	1.5%	3.4%	0.5%	0.1%	0.1%	0.0%	5.7%
3	1.5%	4.3%	6.5%	2.2%	7.7%	1.3%	23.4%	1.9%	2.8%	7.0%	0.9%	1.3%	0.1%	13.9%
4	0.7%	1.5%	2.6%	3.0%	7.7%	1.0%	16.5%	1.2%	1.3%	1.5%	4.0%	1.0%	0.0%	9.0%
5	1.1%	3.0%	5.7%	3.4%	20.2%	3.7%	37.1%	2.6%	2.0%	4.7%	1.5%	27.6%	3.4%	41.8%
6	0.3%	0.6%	1.0%	0.7%	3.7%	1.2%	7.5%	1.3%	1.1%	1.6%	0.5%	8.1%	15.8%	28.4%
Total	4.7%	12.4%	19.0%	10.5%	44.8%	8.6%	100.0%	9.3%	10.9%	15.4%	7.1%	38.1%	19.3%	100.0%

Note: Area Type is grouped (originally 11 area types)
1: the most densely land-use areas.
6: the least densely land-use areas

Table 3 - Comparison of Trip Distance by travel modes used for morning peak work trip

Trip Distance (mile); Morning Peak 6AM - 10AM; Work Trip

		2010 RHTS_NYSonly				2009 NHTS			
Mode	HATYPE_s	Freq	**Mean**	Lower (95% CI)	Upper (95% CI)	Freq	**Mean**	Lower (95% CI)	Upper (95% CI)
Veh	1	11	**12.3**	2.5	22.1	2	**36.5**	(389.2)	462.2
Transit	1	38	**4.5**	2.5	6.4	14	**3.0**	0.2	5.8
Non-Motorize	1	34	**0.4**	0.3	0.5	15	**0.8**	0.4	1.2
Veh	2	150	**7.7**	6.0	9.4	**27**	**10.2**	**6.9**	**13.5**
Transit	2	496	**5.4**	4.9	5.8	67	**4.2**	2.5	5.9
Non-Motorize	2	166	**0.7**	0.6	0.8	32	**1.3**	0.6	2.0
Veh	3	524	**7.5**	6.7	8.2	**191**	**12.0**	**8.9**	**15.2**
Transit	3	779	**8.0**	7.6	8.5	144	**7.9**	5.4	10.3
Non-Motorize	3	160	**0.7**	0.5	0.9	52	**0.5**	0.2	0.9
Veh	4	630	**7.7**	7.0	8.3	**146**	**9.7**	**8.0**	**11.4**
Transit	4	375	**12.1**	11.5	12.6	87	**9.5**	6.9	12.1
Non-Motorize	4	54	**0.7**	0.4	1.0	7	**0.5**	0.2	0.8
Veh	5	1961	**9.4**	9.0	9.9	**1,012**	**10.1**	**9.2**	**11.0**
Transit	5	350	**27.0**	25.6	28.5	64	**21.0**	15.7	26.2
Non-Motorize	5	49	**0.3**	0.2	0.4	55	**1.0**	0.2	1.8
Veh	6	423	**14.2**	12.9	15.6	**701**	**18.7**	**17.3**	**20.1**
Transit	6	34	**42.6**	36.2	49.0	23	**32.7**	17.0	48.4
Non-Motorize	6	7	**0.3**	0.1	0.5	23	**2.9**	(1.2)	7.0

Table 4 – Life cycle category and pertinent person trips

		2010 HTRIPS			2009 NHTS			
Employment Status	Freq	**Mean**	Lower (95% CI)	Upper (95% CI)	Freq	**Mean**	Lower (95% CI)	Upper (95% CI)
Full-Time	7647	**3.32**	3.27	3.37	3211	3.30	3.21	3.40
Part-Time	2759	**3.80**	3.70	3.91	677	3.66	3.43	3.88
Unemployed	1439	**2.66**	2.53	2.79	504	2.90	2.63	3.17
Homemaker	894	**3.14**	2.94	3.35	732	3.05	2.80	3.30
Adult Student	515	**2.70**	2.51	2.90	199	3.06	2.70	3.41
Retired	3053	**2.68**	2.58	2.77	2320	2.77	2.65	2.89
School-Aged (5-17 years)	2897	**2.73**	2.67	2.79	188	2.74	2.42	3.07
Under 5 years	912	**2.24**	2.10	2.38				
Other	291	**2.41**	2.15	2.66	1805	2.42	2.32	2.53
Total	20407	**3.07**	3.04	3.11	9636	2.98	2.92	3.03

KEY FINDINGS

Household trips (not shown here), person trips, and trip distance and duration (not shown here) are statistically indifferent. A little difference for vehicle trips is associated with large samples from the Mid-Hudson counties where high inter OD pattern (by vehicles) reveals.

DISCUSSION

Given little difference between NHTS and RHTS, observed when it comes to travel characteristics this research opens the possibility of using NHTS to supplement data input for development of travel demand model for MPOs.